A Multilevel Examination of Occupational Safety: Regulatory Focus as an Explanatory Link Between Climate, Conscientiousness, and Performance

A Dissertation
Presented to
The Academic Faculty

by

J. Craig Wallace

In Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy in the
School of Psychology

Georgia Institute of Technology
April, 2004

A Multilevel Examination of Occupational Safety: Regulatory Focus as an Explanatory Link Between Climate, Conscientiousness, and Performance

Approved by:

Dr. Gilad Chen, Advisor

Dr. Jack Feldman

Dr. Ruth Kanfer

Dr. Charles Parsons

Dr. Henry Moon

Date Approved: 4/13/2004

ACKNOWLEDGEMENTS

"Opportunity is missed by most people because it is dressed in overalls and looks like work." (Thomas Edison). I certainly tried my hardest to avoid work over the years and I had nothing to show but faint memories and crazy stories. That is until I grabbed opportunity by the throat, wrestled it down, and made it mine. I am indebted to several people for letting me find these opportunities and kicking me in the rear when I did not. Thanks Mom & Dad for giving me the freedom of choice and being supportive of my endeavors. I know you never thought your youngest son would be called 'Doctor', but guess what? To my wife Jerae, we have known nothing but the life of poor students, but now you get to experience life married to a poor assistant professor. We started this journey together a mere two weeks after we were married and you have certainly been a trooper. Thank you for putting up with me and the long hours I needed to devote to reaching this milestone. While you give me all the credit for this degree you deserve at least half. I love you. I also wish to thank my friends and colleagues Tracy Kantrowitz, David Finch, and Steve Vodanovich for all of their support and insight into this project and graduate school as a whole. You three have certainly made this journey a bit more fun. I also wish to formally thank my committee, for helping to make this study that much better. Thanks!

Oh yea, a wise man once said: "If life gives you lemons, make lemonade. If life gives you limes, make margaritas" (Jimmy Buffett).

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

SUMMARY

Occupational safety has once again become an inviting area of research and application for organizational researchers. Researchers have abandoned the search for the accident-prone employee and begun to identify the underlying symptoms that might lead to unsafe behaviors and accidents. The current research built upon theory and recent findings by integrating regulatory focus theory into an interactional model of occupational safety and productivity in an attempt to explain and predict safety performance and speed performance. Using a sample of facility workers (i.e., building & landscape development and maintenance, n = 251) a cross-level model of relationships was investigated that links facets of conscientiousness (dependability & achievement) and climate (safety & productivity) to facets of performance (safety & speed) via regulatory focus (prevention & promotion). Results indicated that both climates and personality facets were important predictors of prevention while achievement and production climate predicted promotion. In turn prevention positively predicted safety and negatively predicted speed while promotion positively predicted speed and negatively predicted safety. Most interesting were the findings that prevention carried the effects of both climates and conscientiousness facets to safety and speed performance and promotion carried the effects of production and achievement to speed and safety performance. Results failed to support any cross-level interactions between climate and personality in predicting regulatory focus. It appears that regulatory focus is indeed an important construct in occupational safety and that both individual and contextual characteristics uniquely play an important role in predicting one's regulatory focus.

CHAPTER 1

INTRODUCTION

Speed and accuracy have been studied by various organizational researchers (e.g., Brewer & Ridgeway, 1998; Joseph & Hahn, 1995). However, these studies have traditionally relied on either individual differences (e.g., Forster, Higgins, & Bianco, 2003) or situational variables (e.g., Johnson, 1975) in an effort to predict and explain why some people are fast and some are accurate. The same can be said of an analogous tradeoff in organizations: the tradeoff between safety and speed. With regard to occupational safety, it appears that outcomes are the result of a combination of environmental influences (safe or unsafe) and the individual's choice between a safe response and a risky response. The current study is designed to examine the safety/speed tradeoff by incorporating both differential psychology (e.g., personality) and situational psychology (e.g., climate). Endler (1977), among others (e.g., Cronbach, 1957), has explicitly called for such an interactionist perspective and it seems quite fruitful to follow his suggestion:

> We need to develop studies based on theory that simultaneously incorporate personality and situational variables in their experimental designs. We need to make predictions in studies in which we simultaneously examine various levels of personality variables in conjunction with various situational variables (p. 352).

The current study followed such an approach as it examined the impact of climate and personality on individual safety and speed in an organizational setting. More specifically, it examined if such relationships are mediated by one's regulatory focus. While recent research has begun to identify several distal predictors of occupational

safety (e.g., personality, affect, climate), no study that I am aware of has yet to examine the mediating properties of regulatory focus among such distal predictors and outcomes. In other words, this study examined if a person's regulatory focus (i.e., prevention or promotion) mediates the relationship between the distal safety antecedents of conscientiousness (i.e., duty & achievement facets) and climate (i.e., safety climate & productivity climate) and their relationship with occupational safety and productivity. More so, it added external validity to the construct of regulatory focus by predicting performance (i.e., safety & speed).

This study appreciably expanded several bodies of literature (e.g., occupational safety, self-regulation, climate, personality) by (1) examining an interactional model of the safety/speed tradeoff in organizations, (2) examining the mediating and indirect effects of regulatory focus with regard to occupational safety and performance, and (3) providing additional validity evidence for the construct of regulatory focus by validating it against performance ratings.

CHAPTER 2

LITERATURE REVIEW

Occupational Safety

Occupational safety is a concern for employees and employers alike. Workplace accidents are reported to result in thousands of deaths and permanent disabilities each year in the United States, as well as increased accident-related costs. For example, it has been estimated by the United States Department of Health and Human Services (1998) that 16 workers are killed and 36,000 are injured per working day in the United States. These numbers do not include the number of lost work days, restricted work days, or employee costs, which are estimated to be over 200 billion dollars. Most staggering is the estimate of approximately 250,000 potentially productive years of life and service lost each year in the United States to occupational accidents. Psychologically based health issues, such as stress and burnout, have received a great deal of attention in recent years by organizational researchers, but occupational safety and related issues have only received cursory attention (Zohar, 2003a).

Human error has traditionally been cited as the number one cause of accidents (Dekker, 2002; Slocombe, 1941) and is defined as "the failure of planned actions to achieve their desires ends" (Reason, Parker, & Lawton, 1998, p. 292). Human error is a catch-all phrase for errors, unsafe behaviors, and accidents that are attributable to a person, but does not provide much insight into the behavioral mechanisms that lead to unsafe behaviors. Dekker (2002) has eloquently stated that "human error is not an explanation for failure, but instead demands an explanation" (p. 372). Furthermore,

Reason (1997) has claimed that effective safety measures should focus on much more than just the individual (e.g., organizational deficiencies), who is typically at the receiving end of much of the trouble.

Dekker (2002) has recently summarized two views of occupational safety: the old view and the new view. The old view is akin to the traditional human error approach that relied on the belief that certain individuals are more prone to accidents than others. However, this approach failed to identify the accident-prone employee and has virtually been dismissed to the point that it is actively discouraged in today's premiere journals (J. Barling, personal communication, January 21, 2003). The new view on the other hand, sees human error and unsafe behaviors as symptoms and not direct causes. The new view has three tenants to it. First, human error is a symptom of something deeper (e.g., personality, work design). Secondly, system safety is not inherent. That is, people have to create safety because work systems are not always in concert with the multiple goals that employees pursue simultaneously. Lastly, "human error can be systematically connected to features of people, tools, tasks, and operating environments" (Dekker, 2002, p. 372).

This new view of human error suggests that occupational safety research needs to begin to address the factors that have previously been swept under the rug of human error (e.g., work design, personality, cognition, affect, motivation). The 'people, tools, tasks, and operating environments' comprising the new view can all be treated as inputs or antecedents of occupational safety. That is, each one of these things can be thought of as a symptom of occupational safety to varying degrees (Komaki, 1982; Reason, 1997).

The new view of occupational safety offers a substantial theoretical step forward and suggests that an interactional approach might be better suited to predict and explain

occupational safety. However, we still know little about the individual regulation of work behaviors with regard for occupational safety and how such behaviors might be influenced by (1) stable individual differences and (2) contextual and environmental factors at work. The current research examined two constructs (i.e., conscientiousness & safety climate) that have recently been examined in relation to occupational safety and furthermore integrated regulatory focus theory (Higgins, 1997) in an effort to explain the relationship between these safety antecedents and safety performance and productivity. Again, I am aware of no studies that have attempted to integrate self-regulation theories with occupational safety, but such an integration has been called for (e.g., Wallace & Chen, 2002; Zohar, 2003a). However, before describing research between safety antecedents and safety performance, a discussion of occupational safety criteria was warranted as it has been noted that "the criterion, or dependant variable, has long been the most neglected element in the modeling of the applied prediction problem" (Campbell, 1990, p. 714).

Performance

Job Performance.

One of the main tenants of Industrial/Organizational (I/O) Psychology is the prediction and explanation of human behavior at work. With that said, job performance is the primary criterion of interest to I/O Psychologists (Parker & Turner, 2002). Individual job performance has been defined as "behaviors enacted by an employee that are aimed at meeting organizational goals" (Parker & Turner, 2002, p. 70). Behavior and performance are not one in the same: "Behavior is what people do. Performance is the *expected* organizational value of what people do" (Motowidlo, 2003, p. 40).

Individual job performance has been suggested to be multi-dimensional by several researchers (e.g., Borman & Motowidlo, 1993; Motowidlo, 2003; Motowidlo, Borman, & Schmit, 1997; Sonnentag & Frese, 2003). Borman and Motowidlo (1993) have suggested that job performance contains two distinct domains: task performance and contextual performance. The distinction between the two domains is the manner and focus of behaviors that support organizational goals. Task performance consists of activities that transform raw materials into the goods and services that constitute the organization's product or activities that help maintain the technical core of the organization by replenishing the supply of raw materials and distributing finished goods (Borman & Motowidlo, 1993; 1997; Motowidlo et al., 1997). Contextual performance, on the other hand, consists of those activities that do not directly contribute to the organization's product, but rather promote the broader organizational structure and climate (e.g., social, psychological) in which the core functions. More recently, Schmitt et al. (2003) have expanded the performance domain to include adaptive performance (London & Mone, 1999; Pulaskos, Arad, Donovan, & Plamondon, 2000). Adaptive performance is defined by Schmitt et al. (2003) "as the proficiency with which employees self-manage novel work experiences" (p. 78). They claim that adaptability is a separate dimension of performance because it does not fit neatly into either task or contextual performance domains.

Parker and Turner (2002) have also argued for the expansion of the criterion space to accommodate the changing nature of work. They stated that individual job performance should be renamed to individual *work* performance to encompass the broader context of individual performance that is farther reaching than the two factor

structure proposed by Motowidlo and colleagues. They agree with Schmitt et al. (2003) and suggested including an adaptive component to the criterion space. However, they go further and additionally suggest adding a safety component. Burke, Sarpy, Tesluk, and Smith-Crowe (2002) have also differentiated safety from other forms of performance in their recent paper on general safety performance. They claim that safety is different from general job performance (task completion) and demands additional knowledge and skill (e.g., personal protection equipment; environmental regulations; safety regulations) in order to protect themselves, co-workers, the public, and the environment. To support this differentiation, Burke et al. developed and validated a general measure of safety performance that was only weakly to moderately correlated with other aspects of performance.

Safety Performance. Numerous studies have been conducted examining the antecedents of safety performance as well as more distal outcomes (e.g., accidents, micro-accidents). Most of these studies have assessed safety performance using some sort of questionnaire developed to assess safe work behaviors. It should be noted that while unsafe behaviors may be counterproductive to organizational goals, they should not be lumped together with counterproductive behaviors. This is because unsafe acts do not fall under traditional operationalizations of counter productive behaviors, which are generally considered to be intentional (i.e., withdrawal behaviors, blackmail, sabotage).

Safety performance should also be distinguished from accidents and injuries. That is, performance is an evaluation of behavior, which is distinct from the outcome of the behavior. For safety, the outcome is a tangible or a visible thing such as an accident or injury, whereas safety performance is the evaluation of behavior relative to safety in the

workplace. Thus, the term safety performance should not be inclusive of accidents and injuries. Zohar (2000; 2002a), among other (e.g., Wallace & Chen, 2002), have followed such a distinction in a few recent papers by treating safety performance as the evaluation of safety behavior and accidents as a more distal outcome. Additionally, the pattern of correlations between safe behavior (i.e., safety performance) and accidents (i.e., outcomes) is relatively moderate at best. (r = -.28 to -.46; Hechanova-Alampay & Beehr, 2001; Hofmann & Stetzer, 1996; Wallace & Vodanovich, 2003). However, many authors do conclude that unsafe work behaviors tend to lead to accidents.

Therefore, safety performance can be defined as evaluative "actions or behaviors that individuals exhibit in almost all jobs to promote the health and safety of workers, clients, the public, and the environment" (Burke et al., 2002, p. 432). Recently, Burke et al. (2002) devised a general safety measure and postulated several assumptions regarding safety performance. The first assumption is concerned with the scaling and evaluation of the measures of safety performance. It is assumed that general safety behaviors can be scaled in a manner that allow for the evaluation of the frequency with which workers engage in safety related behaviors. Second, safety behaviors are assumed to covary in meaningful ways that yield the potential for multiple factors of a higher order safety performance construct. A third assumption proposed by Burke et al. suggests that the factors of safety performance are distinguishable in terms of their antecedents and in fact do covary with other variables of interest differentially (e.g., accidents, illness, restricted work days). Thus, it appears that safety performance is also multidimensional. Over two studies, Burke et al. (2002) validated a four factor measure of safety performance. The four factors consisted of (1) using personal protective equipment (PPE), (2) engaging in

workplace practices to reduce risk (PRR), (3) communicating health and safety information (CHS), and (4) exercising employee rights and responsibilities (ERR).

Turner, Parker, and Williams (2002) suggested that safety performance is better conceptualized as a two factor model and demonstrated empirical support for this assertion. They stated that several studies have consistently found two types of positively correlated safety behavior dimensions: (1) safety compliance in task execution and (2) safety citizenship behaviors. This is similar to the distinction between task and contextual performance, the difference lies in the focus of safety behaviors: the task at hand (follow the safety rules) or workplace safety promotion (e.g., making safety suggestions to the safety officer). Safety compliance in task execution is similar to Burke's et al. (2002) dimensions of PPE and PRR, while safety citizenship behaviors are more similar to CHS and ERR. Burke et al. acknowledged this overlap, especially between PPE and PRR, but stated that the two dimensions should be separated when studying organizations that provide extensive safety training (e.g., PPE, safety responsibility, safety communication, safe work practices). However, Burke et al. also pointed out that the composite score of the general safety performance scale may be more meaningful when used as a higher order safety performance factor. The same might be true to arrive at safety behaviors during task execution by combining PPE and PRR (i.e., task safety performance) because this might be more theoretically relevant to one's study. For example, if a researcher is only interested in safe task execution, the researcher may choose to solely focus on work practices or behaviors that reduce risk (i.e., safe work behaviors). Or if a researcher is more concerned with safety communication, he or she should focus on the subscale of 'communicating health and safety information'. The current study is more concerned

with the tradeoff between safe task execution and speed of task completion and therefore will focus on safety behaviors and performance relative to task completion; not safety citizenship behaviors.

Speed-accuracy tradeoffs have been experimentally investigated for quite some time with many studies typically showing a negative relationship between the two (e.g,. Dickman & Meyer, 1988; Zenger & Fahle, 1997). Forster et al. (2003) found that *inaccuracy* increased as speed increased in several task types. For example, in a drawing task (i.e., connecting dots to arrive at a cartoon figure) a correlation of .30 was found between inaccuracy and speed.

However, less attention has been paid to an analogous relationship in organizations, the safety-speed tradeoff. Zohar (2000), among others (e.g., Cleveland, Cohen, Smith & Cohen, 1978; Planek, Driessen, & Vilardo, 1967), have begun to further uncover and discuss the tradeoff between safety and other competing goals in organizational settings (e.g., speed of task completion). That is, either safety or speed/productivity is stressed by the organization and typically when one is high the other is low. For example, Pate-Cornell (1990) found that due to job-evaluation procedures emphasizing speed and productivity over safety, workers and managers also emphasized productivity and speed over working safely. Pate-Cornell claimed that this was the biggest factor responsible for the organization's poor safety record.

Munchinsky (1997) has also described such a tradeoff in the coal mining industry. He observed miners taking many shortcuts to increase speed. However, many of the shortcuts were unsafe. For example, instead of placing electrical cable on elevated hooks in the mine to keep them out of harms way, they left them on the mine floor to save time

and increase productivity. While this did increase productivity, it left a potential lethal hazard in the work area. Hence, when work safety becomes contingent on production, workers infer a low priority for safety. But this is not a strict one to one relationship because safety is inherent to any organization as is productivity. Therefore, when production is stressed, employees will still maintain at least a minimal level of safety and vice versa. However, employees still experience a great deal of conflict between these two priorities and thus the intuitive tradeoff between safety and speed.

Self Regulation & Regulatory Focus Theory

Kanfer (1990, 1992), among other (e.g., Chen, Gulley, Whiteman, and Kilcullen; 2000; Phillips & Gully, 1997), has proposed that distal traits relate to performance and outcomes through more proximal state-like individual differences and processes. This call has been answered by several researchers. For example, Chen et al. (2000) examined the relationship of several distal individual differences (i.e., cognitive ability, general self-efficacy, & goal orientation) and their relationship to more proximal individual differences (i.e., specific self-efficacy, state anxiety) in predicting academic performance. Results demonstrated the expected pattern of relationships in that the proximal constructs tended to mediate the relationships between distal individual differences and performance. Phillips and Gully (1997) found a similar relationship in that self-efficacy and self-set goals (i.e., proximal constructs) mediated the relationship between cognitive ability, goal orientation, and locus of control (i.e., distal constructs) and performance. Barrick and his colleagues found that the relationship between the personality (i.e., FFM) and performance is mediated by several constructs such as one's striving orientation (i.e.,

status, accomplishment, communion; Barrick, Stewart, & Piowtrowski, 2002) and goal setting and goal commitment (Barrick, Mount, & Strauss, 1993).

Meta-analytic results have also tended to support this distal – proximal – performance relationship. For example, Chen, Casper, and Cortina (2001) found that self-efficacy mediated the relationship between cognitive ability and performance as well as the relationship between conscientiousness and performance. However, this relationship only held when the task was simple, not complex. Thus, Kanfer's (1990, 1992) suggestion has been well supported in many areas (e.g., academic performance, job performance), but has not been thoroughly investigated in the occupational safety domain.

By applying this 'mediation by process' framework to occupational safety, researchers may gain insight into the regulatory processes linking distal safety antecedents (e.g., personality, climate) to performance and outcomes. Process models appear to provide clues beyond the simple one-to-one relationship (e.g., conscientiousness to performance). They attempt to uncover a person's underlying qualities such as goals, motives, and foci that are manifested differently across situations (Mischel & Shoda, 1995). That is, while one's stable disposition predisposes a person to behave in a specified manner, the person's situation or environment might create variability in an otherwise stable behavior pattern (i.e., person*situation interaction). To highlight, the trait of conscientiousness is represented by a stable pattern of behaviors, but these behaviors might fluctuate based on one's environment. At work a person might be organized, hardworking, and generally meets task demands, whereas another person might follow such a behavior pattern at home (Feldman, 1999). Even at work, the

individual's behavior might fluctuate based on the external stimuli one is confronted with. For example, if an employee generally strives to complete tasks in a safe manner, but the supervisor stresses the speed of task completion it is possible that under such conditions the employee's behavior will be less safe than in other situations (e.g., supervisor stresses safety; Pervin, 1989).

Process models allow a researcher to better determine if stable predispositions are acted on in a specific environment or situation (e.g., work). Therefore, one could put forth an argument suggesting that distal individual differences and contextual variables influence decisions to engage safety activities (e.g., working safely or not) and these decisions to engage in safety activities can be influenced, positively or negatively, through various proximal regulatory processes and states (cf. Kanfer & Ackerman, 1996; Kanfer & Heggested, 1997; Wallace & Chen, 2002). Furthermore, it is possible that person-by-situation interactions better capture one's behavior in a specific context such as work (cf. Mischel, 1968).

Regulatory focus theory (RFT; Higgins, 1997) might be useful as a framework for investigating this theoretically interesting proposition. People are motivated to approach desired outcomes, but means to reaching the desired outcomes differ across people based on the focus or strategic concern one might possess. Regulatory focus theory delineates between two forms of goal pursuit that vary in the focus of regulatory activities: (1) promotion focus (i.e., focus on desired outcome of accomplishments & gains) and (2) prevention focus (i.e., focus on desired outcome of safety & responsibility). Higgins (1997) and Forster et al. (2003) have proposed that regulatory focus is a strategic tendency or concern that influences how persons approach and strive for desired

outcomes. A strategic concern or strategy "refers to a pattern of decisions in the acquisition, retention, and utilization of information that serves to meet certain objectives (i.e., to insure certain forms of outcome and to insure against others"; Bruner, Goodnow, & Austin, 1956, p. 54). Therefore, regulatory focus is a cognitively based focus that drives behaviors towards desired outcomes and away from undesired outcomes. Thus, in the larger approach and avoid domain, RFT has been suggested to reside in the approach domain (Higgins, Rooney, Crowe, & Hymes, 1994). That is, both promotion and prevention strategies allow one to reduce discrepancies, but use different means to reduce discrepancies between the current state and the desired end state or goal. Thus, different approach (promotion) and avoidance strategies (prevention) can be employed in the service of the same general approach system.

While RFT appears to be similar to other motivational and regulatory theories such as goal orientation (Dweck & Leggett, 1988; Elliot & Dweck, 1988; Vandewalle, 1997) it differs from these theories because the focus of RFT is on obtaining desired outcomes; not how or if they approach or avoid the goal all together. Any goal can be pursued with either a promotion or prevention strategy and therefore Higgins (1997) and Forster et al. (2002) have concluded that regulatory focus is independent of goal orientation. For example, a task performance goal could either be represented as a responsibility thereby creating a prevention focus (e.g., make sure this is done correctly) or represented as an accomplishment by creating a promotion focus (e.g., I would like to complete this). Empirical support for this assertion has been lacking until now. In a pilot study designed to develop and validate measures for this dissertation, a work oriented measure of regulatory focus was developed. Results demonstrated that regulatory focus is

distinct from goal orientation. For complete results of this pilot study please see Appendix A.

A person with a promotion focus strategy tends to strategically match behavior to a goal or standard by focusing on attaining a positive outcome without regard for possible negative consequences. That is, "individuals in a promotion focus, who are strategically inclined to approach matches to desired end-states, should be eager to attain advancement and gains" (Higgins, 1997, p. 1285) and are careful to not make any errors of *omission* (i.e., lack of accomplishments). Additionally, in a promotion focus environment persons experience pleasure when rewarded or praised for their accomplishments and experience pain when not praised for their accomplishments. In short, those employing a promotion focus are concerned with the attainment of aspirations and accomplishments by increasing the salience of positive outcomes and gains.

On the other hand, a person employing a prevention strategy strategically avoids behaviors that mismatch a goal or standard that might prevent the person from reaching the desired outcome (Higgins, 1997). Specifically, "individuals in a prevention focus, who are strategically inclined to avoid mismatches to desired end-states, should be vigilant to ensure safety and non-losses" (p. 1285). That is, they try to make sure they do not have any errors of *commission* (i.e., making a mistake) by increasing the salience of possible obstacles in an attempt to avoid negative outcomes (e.g., acting safe to avoid injury/mistakes) during task completion. Such a strategy is sensitive to the presence or absence of negative outcomes. The negative outcome is the focus here; not the positive as is the case with promotion focus. Employees in prevention focus environments experience pleasure when employers train employees new safety techniques and

preventative measures (Forster et al., 2003). These employees experience pain when they are punished for making mistakes or are careless. In essence, those employing a prevention focus are concerned with the attainment of responsibility and safety in task completion by increasing the salience of negative outcomes and consequences.

One's regulatory focus (i.e., prevention or promotion) is determined by at least three antecedents: needs, values, and situational framing (Higgins, 1997). RFT and its two dimensions can be traced to extant needs theories. Bowlby (1969) claimed that there are two fundamental regulatory needs that underlie goal directed action: nurturance (i.e., self-actualization) and security (i.e., safety). Recently Kluger, Yaniv, and Kuhberger (1999) reviewed RFT in relation to these theories. They gave particular consideration to empirical tests of Needs Theory (Maslow, 1965; Ronen, 1994), Values Theory (Schwartz, 1992), and Job Interests Theory (Holland, 1985) and found that all theories yielded a two-dimensional space. One dimension consists of safety needs, security values, and conventional job interests, while the other dimension consists of self-actualization, self-direction, and artistic/investigative interest. Kluger et al. (1999) concluded that Higgin's (1997) RFT reflects this differentiation and are considered precursors in his theory. That is, self-actualization leads to a promotion focus and security and safety needs and values leads to a prevention focus.

Strong obligations and ideals also influence one's regulatory focus (Higgins, 1997; Kluger, et al., 1999). If a person holds values consistent with one's ought self he or she tends to value duty and responsibility. Self-regulation of one's ought self represents a person's duties, responsibilities, and/or safety needs which lead to a prevention focus. If a person holds ideal values, he or she desires to be all that he or she can be. One's ideal self

involves regulatory activities that promote one's hopes, desires, and aspirations to meet nurturance needs, thus leading to a promotion focus. Lastly, the manner in which a situation is framed can also influence a regulatory focus. If a situation is framed in terms of gains and non-gains, a promotion focus is more likely to emerge because the situation is framed in terms of achievement and accomplishments (e.g., production). If a situation is framed in terms of losses and non-losses, a prevention strategy is likely to emerge because the situation is framed in terms of avoiding failure or harm (e.g., complete task safely).

In summary, there are three antecedents that determine a person's regulatory focus. A promotion focus is triggered by nurturance needs, strong ideals, and situational framing of gains vs. non-gains. A prevention focus is triggered by security and safety needs, strong obligations, and situational framing of losses vs. non-losses. Figure 1 pictorially outlines RFT.

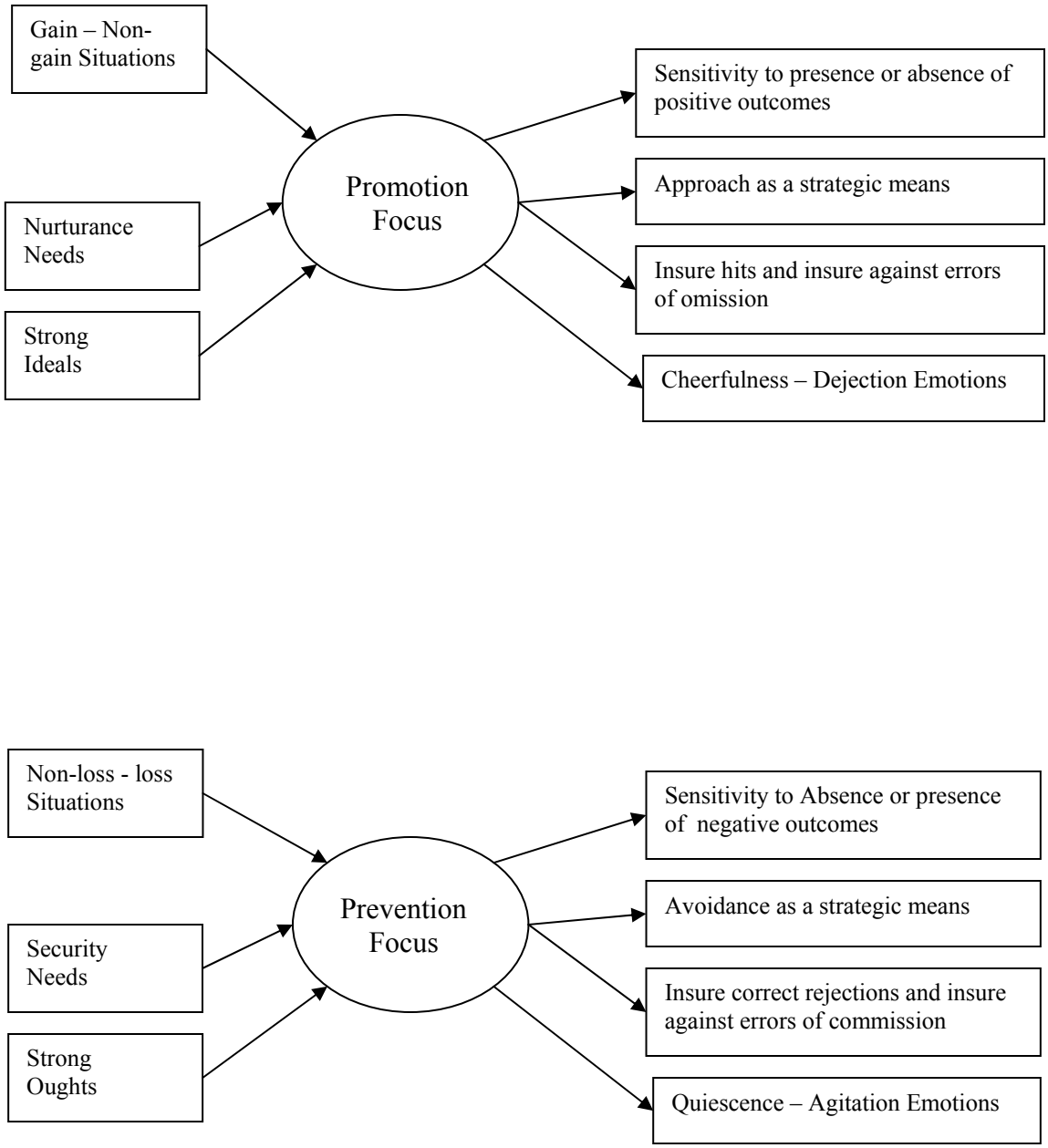


Figure 1. Regulatory Focus Theory: Prevention and Promotion

While it might sound like these two strategies are merely two sides of the same coin, Higgins (1997) has proposed that they actually have different cognitive patterns and different behavioral and emotional outcomes. Overall performance of a task is influenced by the operation of a mixture of prevention and promotion with individuals more prone to one focus than the other (Higgins, 1997). However, at any given moment during task execution the activation of one system (i.e., prevention or promotion) is likely to minimize the other. To highlight, take the common delivery driver as an example. A delivery driver desires to quickly and safely deliver a package. While driving the delivery truck the employee might employ a promotion focus (e.g., I know this path & can get their fast) but external stimuli (e.g., road construction) might facilitate a change of focus (e.g., better be careful, not sure about this). Therefore, it is believed that promotion and prevention are not contradictory to one another, but rather operate as separate systems. Higgins et al. (2001) have supported this assertion by finding essentially no correlation (e.g., r = -.007) between the two foci when using the Regulatory Focus Questionnaire, a measure of one's stable tendency to employ a prevention or promotion focus across situations. Additional evidence was provided in the pilot study for this dissertation regarding the development of a new measure of regulatory focus.

By integrating regulatory focus theory with occupational safety, researchers could also begin to explain some of the relationships that have been reported in the literature between individual differences, contextual variables, and occupational safety. One's regulatory focus has been conceptualized as either a "choric individual difference or an experimental variable manipulated by framing" (Forster et al., 2003). Higgins (1997) and colleagues (e.g., Forster et al., 2003) have argued that one's regulatory focus generally

predisposes a person to engage a certain strategy (i.e., promotion or prevention), but it does not necessarily determine the course of action one will *always* take. As noted above, sometimes situational or contextual variables influence this choice. For example, employer-employee interactions can chronically emphasize certain behaviors in pursuit of goals that reflect either promotion focus or prevention focus. This creates a stable work environment that is either promotion or prevention focused, but this stable environment can fluctuate based on other contextual variables. For example, leadership or climate can infer a regulatory focus by communication of gain/non-gain information (i.e., promotion focus) or by communicating loss/non-loss information (i.e., prevention focus). The focus of the information is positive (i.e., we have gained) or negative (we have lost). Such a switch of focus can be seen by many persons in many organizational settings. For example, when production falls behind, supervisors may communicate to their subordinates that they need to work faster and produce more (creating promotion focus) and sometimes even encourage unsafe behaviors (destroying prevention focus) to increase productivity. Likewise, supervisors might momentarily create a prevention focus when new technologies are introduced in the work environment (be careful, this is new). Therefore, one might treat regulatory focus as more proximal to safety performance and safety outcomes than more stable individual differences such as personality or organizationally based constructs such as climate.

At this point, there has been no empirical work conducted that examines RFT with occupational safety with the exception of the pilot study conducted for this dissertation. However, the theory seems to beckon this integration as it appears to tackle the speed/safety tradeoff. For example, one employing a promotion focus might act

unsafe in pursuit of goals due to their achievement emphasis, but this person's action may not always (if ever) result in an accident as he or she might have figured out what he or she can get away with. This could actually increase the persons' accomplishments by increasing the efficiency or speed with which the person completes the task. However, it could reduce output if the person is injured therefore reducing the person's effectiveness. Likewise, if a person is prevention focused, he or she actively tries to avoid acting in an unsafe manner, thereby reducing the chances of being involved in an accident and ensuring task completion. In the short term this might reduce output due to the person working more vigilantly (i.e., slower), but increase effectiveness in the long run because the person is less likely to be involved in an accident (Forster et al., 2003; Wallace & Vodanovich, 2003). Results of the pilot study tend to support these expectations, but they need to be tested in a more rigorous setting. Additionally, the begging question remains: how can we maximize both speed of task completion and safe task execution?

Forster et al. (2003) have provided us an empirical glimpse at this relationship in that they found promotion focus individuals completed laboratory tasks much faster, but less accurate than prevention focused persons. Additionally, they found that as the goal approaches (i.e., goal looms larger phenomenon) promotion focused persons mistakes increased dramatically with increased speed, where as prevention focused persons mistakes decreased significantly with decreased speed. However and most interesting to the current study, they found that when tasks are relatively easy, speed and accuracy positively related to each other. This suggests that persons can maximize speed and safety for easy and routine job tasks. Based on this, Forster et al. (2003) stated that "employers can decide how to frame a task for their employees. For example, if the task is easy,

framing in terms of gains and non-gains [promotion focus] might work better than framing in terms of losses and non-losses [prevention focus]. However, if the task is difficult and if accuracy is crucial, then loss and non-loss framing would be more effective" (p. 15). This might generalize to job types as well. For those jobs that are relatively easy and routine, an organization or employer may gain more if they frame the job in promotion terms (i.e., gains & non-gains) because safety and accuracy may not be an overriding concern. Whereas, for those jobs that are complex and dynamic, employers might gain more if they frame the job in prevention terms (i.e., losses & non-losses).

It is possible that research in the occupational safety domain could greatly benefit from examining differences in regulatory focus. For example, in organizations that have safety issues (i.e., high number of accidents) it might be possible to improve safety by training leaders and supervisors to communicate safety procedures and increase the salience of possible negative outcomes; thereby framing the situation to produce a prevention focus via climate. In organizational settings, perhaps it is climate that acts as the framing tool for situational regulatory focus. For example, Zohar (2002b) conducted a study that found safety improved when leaders were made aware of safety issues and communicated these issues to subordinates. However, he did not examine if this created a regulatory style of prevention. Perhaps this was the regulatory mechanism that partially transformed unsafe behaviors to safe behaviors by focusing resources towards the goal of safe task execution rather than simply task completion. It is also possible that certain individual characteristics might be selected for that create a desired focus. For example, persons that are organized and tend to follow standard operating procedures might act

safer than those that are unorganized and sloppy. Such possibilities will be discussed below in more detail.

Distal Antecedents: Conscientiousness & Climate

Occupational safety has been a constant topic of study for organizational researchers for well over 100 years. A number of antecedents have been linked to occupational safety (i.e., safety performance & accidents) including dispositional affect (Iverson and Erwin, 1997), boredom (Frone, 1998; Mackworth, 1948), tenure (Frone, 1998; Hansen, 1989; Liao, Arvey, Butler, & Nutting, 2001), cognitive failure (Larson and Merritt, 1992; Wallace & Vodanovich, 2003b), and personality (Fallon, Avis, Kudisch, Gornet, & Frost, 2000; Wallace & Vodanovich, 2003b) as well as organizational or contextual variables such as climate (Hofmann & Stetzor, 1996; Zohar, 2000, 2002a) and leadership (Zohar, 2002b). Recently, two constructs have begun to receive more attention in the literature with regard to occupational safety: conscientiousness and safety climate. The following sections will review this work and integrate these constructs with regulatory focus theory in an effort to explain the distal relationships that have been found among conscientiousness and safety climate and occupational safety.

Conscientiousness.

Personality has recently received a lot of attention due to empirical findings suggesting personality can predict job performance (Barrick & Mount, 1991; Salgado, 1997). Recently, a great deal of research has focused on the Five-Factor Model (FFM) of personality. The FFM consists of Conscientiousness, Agreeableness, Extroversion, Openness to Experience, and Neuroticism (Costa & McRae, 1992; Goldberg, 1992) and represents the most basic personality taxonomy (Hough & Schneider, 1996). A host of

researchers have employed the FFM in investigations into personality and work performance relationships (e.g., Barrick & Mount, 1991; Hurtz, & Donovan, 2000; Judge, Martocchio, & Thoresen, 1997; Salgado, 1997) and in particular, conscientiousness has been shown to predict job performance in studies across a variety of occupations and occupational levels (Stewart, 1999), including meta-analytic studies (e.g., Barrick & Mount, 1991; Salgado, 1997). A conscientious person is believed to possess qualities that reflect dependability (e.g., thorough, careful, organized, responsible) as well as volitional constructs such as need for achievement (Barrick & Mount, 1991; Hough, 1992, Moon 2001). Thus, it is assumed that conscientiousness relates to internal motivational processes and therefore more conscientiousness persons perform better as they have higher levels of work motivation (Schmidt & Hunter, 1992; Stewart, 1999). Even with the overwhelming support for the relationship between conscientiousness and performance, limited research has been conducted examining the relationship between occupational safety and conscientiousness. This is quite surprising because conscientious persons should behave more safely at work due to the characteristics they possess and exhibit. Recent empirical work has begun to show initial promise for such a relationship, but more research is needed to verify this relationship as well as examine the relationship that facets of conscientiousness might share with occupational safety.

In a study conducted by Fallon et al. (2000) the relationship between conscientiousness and counterproductive work behaviors (i.e., integrity, safety, rehire rate, attendance) was examined. They did not find a significant relationship between conscientiousness, or any facets of conscientiousness (e.g., orderliness, dependability) and safety. It should be noted that the measure of safety performance was lumped

together with ratings of integrity and this most certainly compromised the measurement of workplace safety. A more recent study reported a significant negative relationship between accidents and conscientiousness (r = -.16; Cellar, Nelson, Yorke, & Bauer 2001). Arthur and Graziano (1996) found a significant, negative relationship between conscientiousness and being involved in driving accidents. Unlike Cellar et al. (2001), Arthur and Graziano (1996) used both undergraduates and employees from a temporary employment service. More recently, Arthur and Doverspike (2001) confirmed this negative relationship between conscientiousness and driving accidents. In an effort to overcome these conflicting results, Wallace and Vodanovich (2003b) conducted two separate studies using two diverse samples to more closely examine the relationship conscientiousness shares with occupational safety. Over these two studies it was found that conscientiousness significantly and negatively related to unsafe work behaviors and workplace accidents (average r = -.30 for unsafe behaviors & average r = -.16 for accidents).

The empirical evidence tends to show a weak to moderate negative relationship between conscientiousness and workplace safety, but the relationships among workplace safety and the more specific facets of conscientiousness are unclear at this point. Stemming from the larger debate of bandwidth or fidelity, researchers have debated the utility of conscientiousness facets for years (e.g., Hough, 1992, 1997; Ones, Viswesvaran, & Schmidt, 1993; Schmidt & Hunter, 1992). However, recent evidence has tended to support the use of conscientiousness facets (e.g., Moon, 2001; Stewart, 1999). This debates stems largely from the confusion surrounding the construct itself. Barrick and Mount (1991) pointed out this confusion in that some researchers refer to

conscientiousness as reflecting dependability (e.g., careful, planned, organized) while others refer to it's achievement properties (e.g., striving, persistent). In essence the trait of conscientiousness encompasses both achievement and dependability, which of course are positively related to each other ($r \approx .4$-$.5$) and can be considered general approach traits (Goldberg, 1999; Moon, 2001; Stewart, 1999).

Achievement. Researchers (e.g., Costa and McRae, 1992; Goldberg, 1999; Hough, 1992) have labeled a subtrait of conscientiousness as achievement and this is closely aligned with the volitional component of conscientiousness (Stewart, 1999). Persons reflecting this personality subtrait are described as hardworking, persistent and eager to achieve goals whether or not goals are self-set or assigned (Hollenbeck, Williams, & Klein, 1989). More specifically, the "achievement/work-oriented person works hard, sets high standards, tries to do a good job, endorses the work ethic, and concentrates on, and persists in, completion of the task at hand" (Hough, 1992, p. 144). The volitional aspect of conscientiousness has been shown to predict job performance in several studies (e.g., Hough, 1992) especially when employees are in a maintenance stage (i.e., can perform all major job tasks; Stewart, 1999). Moon (2001) found that achievement positively predicted one's escalating level of commitment. That is, those persons that scored high on achievement tended to keep investing resources even in the face of failure in order to save face because it is believed that these individuals are self-interested. However, he found a negative relationship between duty (dependability) and commitment levels.

While achievement is generally desired in most performance domains, it might lead to employees acting more unsafe in certain situations. For example, if a person is

concerned about achieving more and more in less and less time, he or she may engage in more unsafe behaviors (e.g., short-cuts) and thus endangering themselves and others. This might be due to such individuals utilizing a promotion focus.

Nurturance and self-actualization needs have been suggested to lead to a promotion focus by striving to reach one's ideal self (Higgins, 1997; Kluger et al., 1999). The achievement facet conscientiousness captures one's stable tendency to strive for more and more and possibly for nurturance needs and one's ideal self (e.g., persistent to achieve high standards). Therefore, it appears that the conscientiousness facet of achievement might be a strong predictor of a promotion focus due to the construct's operationalization capturing related needs and values (nurturance, ideals).

Dependability. Hough (1992) defined a dependable person as one who is "disciplined, well organized, planful, respectful of laws and regulations, honest, trustworthy, wholesome, and accepting authority" (p. 144). Additionally, such a person "prefers order and thinks before acting" (p. 144). Ashton (1998) found that duty negatively related work place deviance. Dependability (duty) has been shown to relate to one's desire to follow regulations (Hough, 1992) and this is especially important for dangerous work environments in which short-cuts and procedure violations can endanger employees' safety as highly dependable persons are methodical and practice effective time management (Moon, 2001; Stewart, 1999). This might be especially important when safety is an issue because it might enable employees to plan effectively to complete tasks more accurately and safely in a specified amount of time. Thus, it might be that these individuals utilize a prevention focus when engaging tasks.

Dependability is also desired in organizations. One who is duty driven is well organized and disciplined. Such duty might lead to goal striving that is 'by the book' and ultimately lead to task engagement and completion in a safer manner. For example, if a person is concerned about doing things the right way, he or she may engage in more safe behaviors and thus keeping themselves and others safe (at least from things under their control). This might be due to such individuals utilizing a prevention focus.

Safety and security needs and responsibility values (oughts) have theoretically been linked to a prevention focus (Higgins, 1997; Kluger et al., 1999). The conscientiousness facet of dependability captures one's stable tendency to strive for goals by following rules and regulations (e.g., duties, responsibilities). Therefore, it appears that the conscientiousness facet of dependability might be a strong predictor of a prevention focus due to the construct's operationalizations capturing related needs (safety) and obligations (responsibility).

Therefore, it is possible that these two facets of conscientiousness relate to occupational safety and work speed differently due to the strategic tendency or regulatory focus one tends to utilize in such settings. That is, those that are more dependable and dutiful may act more safely by utilizing a prevention focus than those that are concerned with achieving due to their utilization of a promotion focus. This idea will be revisited in Chapter 3.

Climate

Recently there has been a push to examine relationships at and across multiple levels of analysis (e.g., Chen & Bliese, 2002; Kozlowski & Klein, 2000) and this trend has continued into the occupational safety domain with several recent studies being

published examining organizational and group influences on individual safety (e.g., Hofmann & Stetzor, 1996; Zohar, 2000, 2002a). Safety research has begun to examine a more social or organizationally based construct and its impact on occupational safety. The construct is *safety climate*.

Organizational climate and culture are cognate sets of characteristics such as attitudes, values, and practices of members of an organization or social unit (Zohar, 2003a). Climate is distinct from, but related to, organization culture. Climate refers to the shared perceptions among members of an organization with regard to policies, procedures, and practices. In other words, climate is an "experientially based description of what people see and report happening to them in an organizational situation" (Ostroff, Kinicki, & Tamkins, 2003). Climate can be conceptualized at both the individual level (e.g., Barling, Loughlin, & Kelloway, 2002) and the group or unit level (e.g., Hofmann & Stetzer, 1996). Taken at the individual level, climate is assessed via individual level perceptions of climate (Barling et al., 2002) and taken at the group level, climate is the sharedness of such perceptions commonly operationalized under a specific leader, supervisor, or group (Zohar, 2002b). James, Hater, Gent and Bruni (1978) termed the individual level climate perception as *psychological climate* and defined it as "the individual's cognitive representations of relatively proximal situational conditions, expressed in terms that reflect psychologically meaningful interpretations of the situation" (p. 786).

Culture is broader and subsumes the policies, procedures, conditions, representations, and practices as it has its roots in the history of the society and organization, which in turn is more stable and resistant to change than climate (Ostroff et

al., 2003). Culture pertains to fundamental beliefs shared by employees, which are interpreted in various symbolic manners to understand organizational events and artifacts (Hatch, 1993).

Safety climate "relates to shared perceptions with regard to safety policies procedures, and practices" (Zohar, 2002b, p. 125). Safety climate is more narrowly defined and specific to the group or departmental level of analysis and not the organization as a whole (Cooper, 2000). Zohar (2002b) describes safety climate in terms of two independent parameters: (1) strength and (2) level. Strength of climate refers to the sharedness of beliefs regarding safety and varies from weak to strong. Level of climate, on the other hand, refers to the mean of climate on a continuum of relevant climate scores and varies from low to high. Zohar (2003a) distinguishes these terms by stating:

> …high safety climate relates to supportive policies concerning safety and health, though such a climate may be strong or weak, depending on the extent of agreement among employees in their respective organizations or subunits (p. 125).

An additional distinction is necessary to more fully understand safety climate and that distinction rests in the formality of the polices, procedures, and practices of safety in a unit of analysis. Formal policies and procedures are explicit, but are usually quite different from enforced (i.e., informal) practices. Employees usually follow the enacted or policy-in-action practices required by supervisors and not the formal policies, procedures, and practices requested by the organization as a whole. Hackman (1992) has discussed this issue in terms of ambient stimuli. Ambient stimuli are part of the background of team or group functioning. It cues group members to appropriate and inappropriate behaviors for the group. Over time, this helps to create group norms that partially direct group

members' focus and behavior to safety or productivity. In a high and strong safety climate, it is possible that there is a great deal of ambient stimuli for behaving safely and employees act on such stimuli. Thus, safety climate needs to be assessed in the functional role rather than the formal role. The same can be said for other climate facets as well (e.g., production climate). Most laypersons are aware of such distinctions, but an example would highlight this distinction. Almost every organization will stress safety in formal declarations such as 'safety first', but when production falls behind, safety is no longer first as supervisors tend to encourage employees to bend the rules a bit to increase production. In turn, this might reduce the safety climate. This can result in a strong (i.e., high agreement), but low (i.e., low mean) safety climate. *Enforced* safety policies, procedures, and practices reflect the relative priorities of the unit of analysis regarding safety and might fluctuate based on productivity.

Empirical work on safety climate began to receive attention with the seminal work of Zohar (1980) in which he operationalized safety climate and validated a measure of safety climate that predicted the effectiveness of a safety program. Empirical studies of safety climate and its relationship with occupational safety began to take off in the 1990's. Studies have examined both individual level perceptions of safety climate (e.g., Barling et al., 2002; Griffin & Neal, 2000; Thompson, Hilton, & Witt, 1998) as well as aggregate level relationships (e.g., Hofmann & Morgeson, 2003; Hofmann & Stetzer, 1996; Zohar, 2000). At the individual level a great deal of support has been gained for the relationship between psychological safety climate and accidents (e.g., Gillen, Baltz, Gassel, Kirsch, & Vaccaro, 2002; Thompson et al., 1998; Thomas, Melia, and Oliver;1999; Varonene & Mattila, 2000). Griffin and Neal (2000) found that the higher

order factor of safety climate, as assessed by managements' values, safety inspections, personnel, training, and safety communication, predicted safety knowledge that in turn predicted both safety compliance and safety participation in a sample of manufacturing and mining personnel. Barling, et al. (2002) also found that psychological safety climate perceptions related to workplace injuries. More specifically, they found that leadership, role overload, and safety consciousness all predicted safety climate, which in turn predicted workplace injuries over two studies.

However, these studies may have fallaciously reached these results by not examining the hierarchical nature of safety climate. That is, when using Ordinary Least Squares (OLS) on hierarchical or nested data the assumption of independence might be violated. The possibility of this violation needs to be assessed. That is, safety climate is largely dependant on the specific work environment one occupies and this possibly creates a clustering effect. Additionally, the construct of safety climate is defined as a *shared* perception and the degree of sharedness needs to be assessed. If there is evidence to aggregate (e.g., $r_{wg} \geq .70$) and if this is ignored then one might violate the assumption of independence. Perhaps these researchers were only concerned with psychological climate as discussed by and James and Jones (1974), but did not explicitly state this if this was the case. Such assessment techniques allow for clarity when assessing climate relationships and few studies have assessed this (cf. Zohar 2002a). Some studies have set out to assess group level safety climate, but failed to meet the prerequisites of aggregation (e.g., Zohar, 2002b), but many others have successfully met the prerequisites and aggregated to examine cross-level relationships.

For example, Hofmann and Stetzer's (1996) paper was one of the first to examine the cross-level effects of safety climate on the commission of unsafe behaviors in the workplace. They found that safety climate negatively related to unsafe behaviors in the workplace and workplace accidents (raw & transformed accidents). Zohar (2000), in part, replicated the findings of Hofmann and Stetzer (1996). In this study Zohar operationalized safety climate based solely on the supervisor and found two factors comprising this construct: supervisor action (i.e., positive and negative feedback regarding safety) and supervisor expectation (i.e., safety vs. productivity). At the group level of analysis, it was found that both action and expectation significantly predicted microaccidents (i.e., minor injuries requiring basic medical attention), but when examining the cross-level effects of safety climate on microaccidents, only action was found to be a significant predictor.

"Safety in industry is above all a responsibility of management, and unless understood other measures will not be successful in abolishing accidents and injuries" (Griffiths, 1985, p. 61). We are beginning to understand that managers create climate (cf. Lewin, Lippitt, & White, 1939), but we do not yet understand how climate might influence individual behavior regarding safety. It might be that those that create a strong and high safety climate frame situations as preventative (non-loss vs. loss) to insure security and safety that in turn guides employees to act safer. However, it could be that if a situation if framed in terms of gains and non-gains (i.e., production oriented climate) a promotion focus develops and employees strive to complete tasks in less and less time. This again highlights the competing goals of safety and productivity discussed by Zohar (2000; 2002). Thus, it might be more beneficial to examine two facets of climate, safety

climate and production climate, and how each shape's a person's regulatory focus due to such competing goals (i.e., produce or be safe). Similarly to safety climate, production climate can be operationalized as the e*nforced* production policies, procedures, and practices that reflect the relative priorities of the group regarding speed of task completion. A production climate and a safety climate are at odds with each because when one is emphasized, the other is typically minimized; thus these two competing climates are likely to negatively relate to each other (cf. Pate-Cornell, 1990; Zohar, 2000). It would appear that a high and strong safety climate would lead to a focus on prevention and a high and strong production climate would lead to a focus on promotion. Pilot data has tended to support this assumption as well as the negative relationship between the two competing climates.

Climate and Leadership Behaviors. The discussion of climate above suggests that climate is operationalized based on supervisor practices and policies. While this intuitively seems quite similar to leadership behaviors, Zohar (2000) has stated that the two are "qualitatively different constructs, relating to independent dimensions of behavior" (p. 590). Leadership behaviors are more stable across situations whereas climate perceptions are more malleable due to the relative emphasis or priority placed on competing job demands (i.e., be safe, be fast). Empirical work has tended to support these differences. For example, Zohar (2002b) found that certain leadership styles positively related to safety climate (e.g., transformational) while others displayed null or negative relationships with safety climate (e.g., laissez-faire). Additionally, in the pilot study reported in the appendix of the current dissertation, I found that safety positively related to leadership styles of consideration and initiating task structure, but production only

negatively related to consideration. Thus, Zohar's (2000) assertion that the two constructs are different has been well documented.

CHAPTER 3

THE CURRENT INVESTIGATION

The hypothesized theoretical model of relationships is presented in Figure 2[1]. Building upon extant theory, the hypothesized model of relationships attempts to capture the regulating foci that might transmit distal antecedents to occupational outcomes. That is, previous studies have found that the distal personality trait of conscientiousness predicts safety performance as does safety climate, but research has tended to overlook the regulatory processes and strategies that might link these distal traits and contextual variables to safety performance (i.e., task safety performance) and speed of task completion. In the following sections, the rationale for these relationships will be described in more detail.

[1] It should be noted that this is only a theoretical model and not a model to be tested; rather the relationships in the model will be tested.

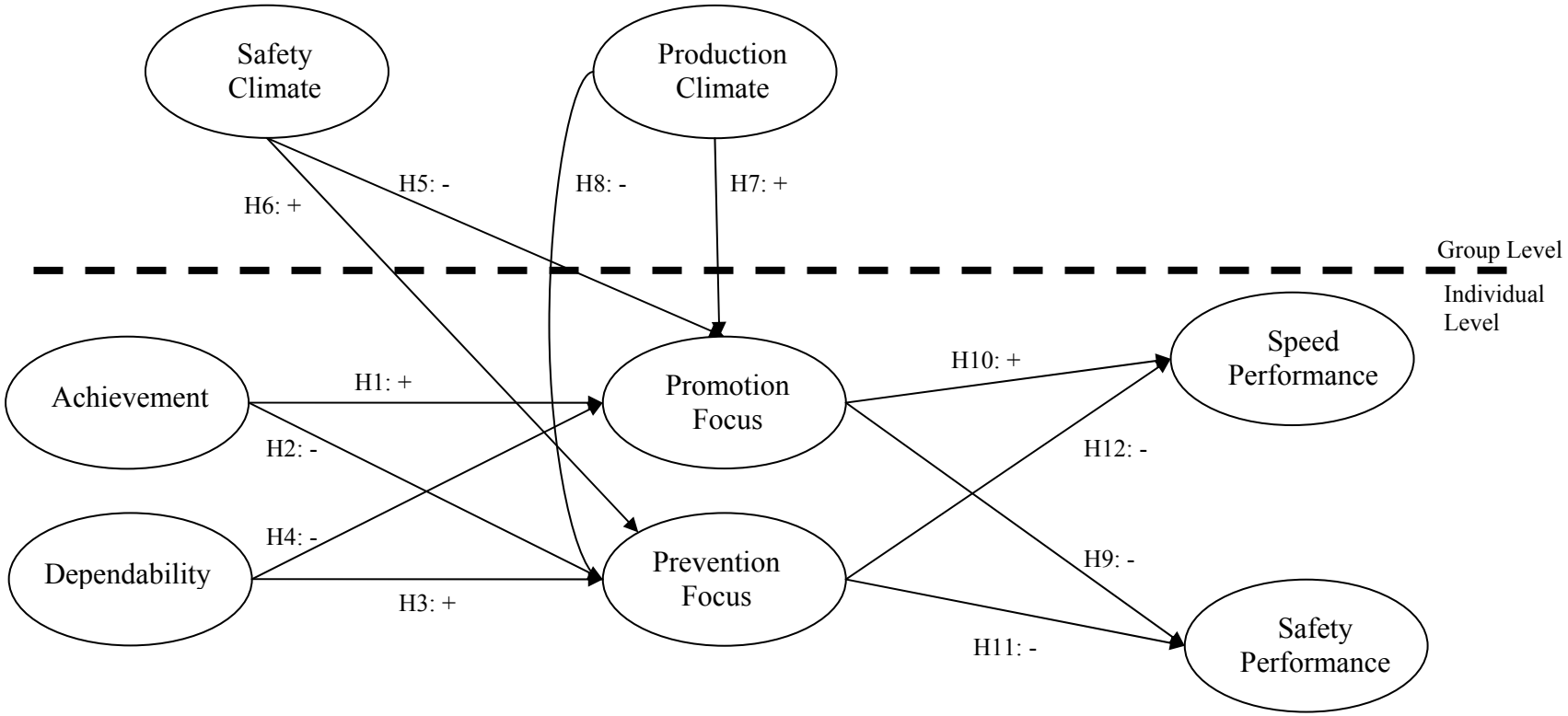


Figure 2. Hypothesized Model of Relationships

Predictors of Regulatory Focus

To reiterate, persons with a promotion focus try to match behaviors with a goal or standard by focusing on attaining a positive outcome without considering negative consequences (cf. Higgins, 1997). This type of regulatory focus tends to create a bias of saying 'yes'. In other words they have a 'risky bias' and tend to act before thinking (Forster et al., 2003). Persons that have a high need for achievement also tend to behave more risky in hopes of achieving more and more in less and less time. Such a high tendency for achievement leads employees to strive for continual improvement (Hough, 1992). This is similar to the precursors of promotion focus (i.e., ideal self, nurturance needs, & gain – non gain) in that persons trying to reach their ideal self and meet self-actualization needs continuously strive for more. Such a high level of striving may create a regulatory style that is focused only on the aspects of the job or task that are necessary to accomplish it as fast as possible. That is, such persons may devote resources to accomplishing the task as fast as possible, but fail to devote resources to ensure one's safety. With that said, it appears that those with a high need for achievement utilize a regulatory style that is focused on promotion, not prevention. Thus, it was expected that achievement, which is theoretically similar to the antecedents of promotion (i.e., nurturance needs, strong ideals, & gains), would positively relate to a promotion focus regulatory style and negatively relate to a prevention focus.

H1: The Achievement facet of Conscientiousness will positively relate to a Promotion Focus

H2: The Achievement facet of Conscientiousness will negatively relate to a Prevention Focus

Those concerned with safety, responsibility, and dependability have been suggested to have a regulatory focus of prevention (Higgins, 1997). A person employing a prevention strategy actively tries to avoid making any errors of commission to maintain one's ought self (duties, responsibilities, safety needs). They complete tasks more vigilantly as they are concerned with avoiding negative outcomes during task completion. This type of strategy produces an inclination to say 'no', or rather produces a 'conservative bias' (Forster et al., 2003). Such a regulatory style may produce a more conservative allocation of resources and thereby devote an adequate amount of resources towards safety. The Conscientiousness facet of dependability is also more conservative. According to Hough (1992) those reflecting dependability prefer order in their lives and 'think before acting'. Additionally, they tend to follow and be respectful of laws and regulations. The construct of dependability seems to be quite similar to the precursors of a prevention focus (i.e., strong oughts, security needs, & non-losses - losses) and therefore dependability was expected to positively lead to a prevention focus and negatively to promotion.

H3: The Dependability facet of Conscientiousness will positively relate to a Prevention Focus

H4: The Dependability facet of Conscientiousness will negatively relate to a Promotion Focus

While these relationships seem theoretically appealing, Moon, Hollenbeck, Humphrey, and Maue (2003), among others (e.g., Cohen & Cohen, 1975; Brass, 1985) have pointed out the need to reconcile these differential predictions because achievement and dependability are facets of the same higher order construct. That is, these two

constructs are strongly and positively related to each other. Therefore, Moon et al. (2003) stated that "the different and unique effect that each predictor has on the criterion is suppressed by the positive relationship between the predictors" (p. 354). Cohen and Cohen (1975) have labeled such a condition as 'cooperative suppression'. Brass (1985) has labeled this condition as 'mutual suppression' in that the shared variance between two highly related constructs (e.g., achievement & dependability) mutually suppresses the other's effect on the outcome (e.g., regulatory focus). In other words, the variance obtained by summing the squared bivariate relationships ($r^2_{x1y1} + r^2_{x2y1}$) is less than the squared multiple correlation between predictors and the outcome (R^2_{x1x2y1}; Cohen & Cohen, 1975; Moon et al., 2003). When examining the effects of neuroticism facets on decision making, Moon et al. (2003) found no significant bivariate relationships between neuroticism facets and the criterion. However, by following the suggestions of Cohen & Cohen (1975) and Brass (1985), they ran a simultaneous regression where each facet was included to remove the suppressing effects. With the suppressing effects removed, these authors found the pattern of relationships they had hypothesized. Therefore, it was necessary to simultaneously regress both achievement and dependability on promotion and prevention to remove any suppressing effects.

Another construct believed to predict regulatory focus is that of safety climate. Again, safety climate relates to the shared perceptions of enacted safety policies, practices, and procedures (Zohar, 2002b). A high safety climate is one in which the policies, procedures, and practices regarding safety are stressed by the immediate supervisor (i.e., supervisor action & supervisor expectation). Thus, a high safety climate is likely to lead employees to behave more safely as it attempts to stress the importance

of safe work behaviors by manifesting a sort of ambient stimuli that helps create group safety norms (cf. Hackman, 1992). In other words, a high safety climate encourages employees to perform the job accurately and safely. Safety climate appears to be at odds with a promotion focus due to the differing methods and recipients of allocating resources (i.e., safety vs. production). Therefore, it was expected that safety climate would negatively relate to a promotion focus.

H5: Safety Climate will negatively relate to a Promotion Focus

Safety Climate was also expected to positively relate to a prevention focus. Unlike the negative relationship expected between safety climate and promotion focus, it is believed that a high safety climate actually promotes a preventative regulatory focus. This is due to the climate emphasizing safety practices and not solely focused on production. Again, a high safety climate encourages employees to perform the job safely and accurately. This is quite similar to the focus of a prevention strategy in that those employing a prevention strategy are strategically concerned about safety and not committing errors or mistakes (Forster, et al., 2003; Higgins, 1997). This might be especially true in more volatile situations or environments (e.g., nuclear facility, air traffic controller, military work). Hence, it was expected that high safety climate would positively relate to a prevention focus.

H6: Safety Climate will positively relate to a Prevention Focus

As discussed above, a climate that stresses production will likely lead to a promotion focus. This is because situations in production climates are typically expressed or framed in gains. Higgins (1997), Forster et al., (2003), and Kluger et al., (1999) have stated that a promotion focus develops when a situation is framed

in terms of gains and non-gains. When supervisors stress production, they stress gains. Therefore, I expected a positive relationship between a production oriented climate and a promotion focus.

H7: Production Climate will positively relate to a Promotion Focus

A climate stressing production will lead to a promotion focus, not a prevention focus because of the supervisor's focus (i.e., gains not losses). A production climate might even go so far as to destroy a prevention focus. To frame a situation for prevention, Forster et al. (2003) has stated that one needs to stress non-losses and losses. A production climate does not frame the situation in such terms as they are typically expressed in how much the group or organization gains. Therefore, I expected a negative relationship between a production oriented climate and a prevention focus.

H8: Production Climate will negatively relate to a Prevention Focus

One might believe that mutual suppression will be an issue with climate and the differential relationships proposed with regulatory focus. However, pilot data has demonstrated only a small negative relationship between the two climate constructs (r = -.14, p < .05). Therefore, suppression was not expected. Regardless, a simultaneous regression was conducted to better arrive at unique effects.

Predictors of Performance: Safety & Speed

Higgins and colleagues (e.g., Forster et al., 2003; Higgins, 1997) have begun to describe and demonstrate different performance relationships between these two regulatory foci. For example, Forster et al. (2003) found that those

individuals employing a promotion focus, whether it be a stable inclination or experimentally induced state, completed tasks much quicker than those employing a prevention focus, but at the same time had far more errors of commission than those employing a prevention focus. However, in easy tasks it is possible for safety and speed to coexist. With regard to the current study, it appears that the majority of tasks are not simple (e.g., building maintenance, heavy equipment use) and do pose a serious safety threat. The following hypotheses rely on this assertion.

In the study by Forster et al. (2003) it appears that those employing a prevention strategy focused more resources and behaviors towards completing the task more accurately at the expense of time, rather than completing the task more quickly at the expense of errors and mistakes. These findings suggest that there is indeed a trade-off between speed and accuracy that is due to different regulatory concerns and this might be present in organizational settings as well with regard to safety and productivity. That is, those that employ a prevention strategy are likely to engage tasks in a safer manner due to concerns of avoiding negative outcomes (e.g., accident, injury) in task completion. Those employing a promotion strategy may not engage tasks in such a manner as they are more concerned with achieving positive outcomes (e.g., completing tasks quickly) at the cost of committing errors and mistakes (Forster et al., 2003). This ultimately might lead to involvement in more accidents for those utilizing a promotion focus strategy as they might charge into tasks with more reckless-abandon (i.e., risky bias) than those utilizing a prevention focus (i.e., conservative bias). It was

believed that a promotion focused strategy would negatively relate to safety performance and positively relate to speed and quantity of task completion. The reverse pattern of relationships was expected for a prevention focus. Thus, hypotheses 9, 10, 11, and 12 are presented.

H9: A Promotion Focus will negatively relate to safety performance

H10: A Promotion Focus will positively relate to speed performance

H11: A Prevention Focus will positively relate to safety performance

H12: A Prevention Focus will negatively relate to speed performance

Again, one might believe that mutual suppression might influence the results with regard to performance. Pilot data has demonstrated a small to moderate relationship between the two regulatory foci. Therefore, suppression was not expected, but a simultaneous regression was still conducted to better arrive at unique effects.

Mediation Tests

To further examine the role of regulatory focus in occupational safety and productivity I specifically tested mediation following Barron and Kenny's approach (1986; See Analysis strategy section). It has been proposed that self-regulatory processes and states mediate and/or carry the effects of distal individual differences to outcomes (e.g., Kanfer 1990) as well as contextual variables to outcomes (Zohar, 2003). Therefore, it was expected that regulatory focus will mediate the relationships between personality (e.g., achievement & dependability) and performance and the relationships between climate and performance. More specifically, it was expected that prevention will mediate the relationship between two of its anticipated antecedents (i.e., dependability & safety climate) and its anticipated performance

outcome (i.e., safety performance). Likewise, it was expected that promotion would mediate the relationship between two of its theorized antecedents (i.e., achievement & production climate) and its likely performance outcome (i.e., speed/productivity performance). Additionally, it is expected that conflicting antecedents and performance outcomes will also be mediated by prevention and promotion. Thus, hypothesis #13:

H13: Regulatory Focus will mediate the relationships among personality antecedents and performance outcomes and the relationships between climate antecedents and performance outcomes.

Person-by-Situation Tests

In addition to testing the proposed relationships displayed in Figure 2, additional tests were conducted that examined possible interactions between personality and climate and how they might influence regulatory focus (see Figure 3). It is possible that such interactions might allow for a better understanding of regulatory focus in the context of work (cf. Mischel, 1968). Higgins (1997) has proposed that one's regulatory focus is determined by needs, values, and situations. One can therefore assume that when all three respective determinants are present one's regulatory focus will be strongest.

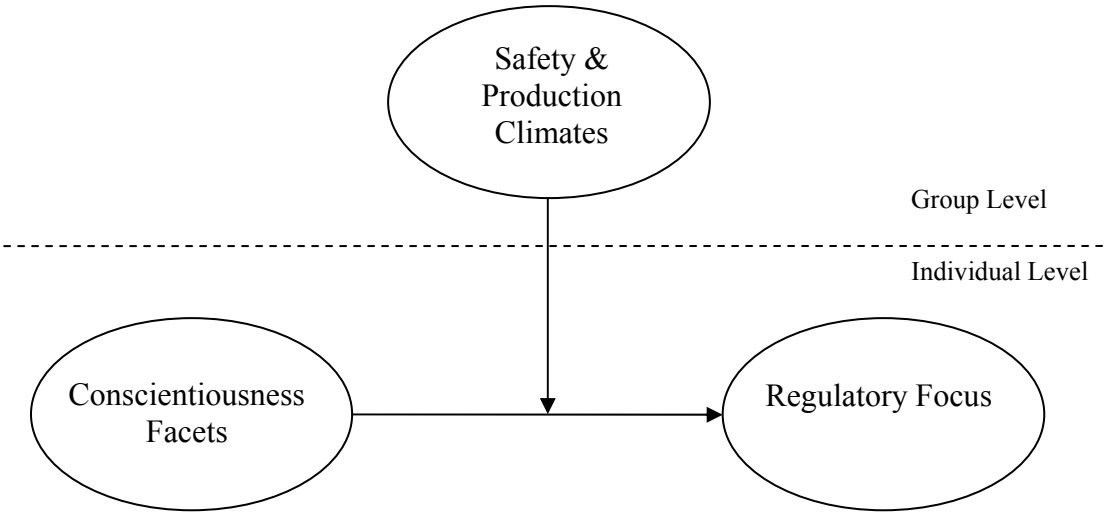


Figure 3. Person by situation interaction.

As discussed above, safety climate and dependability are likely to lead to a preventative focus. If highly dependable individuals find themselves in a high safety climate then a preventative focus is likely to be much higher than if such persons are in a low safety climate (see Figure 4). On the other hand, if an achievement oriented persons find themselves in a production climate they will have a stronger promotion focus than such persons in a low production climate (see Figure 5). Thus, hypotheses 13 and 14 are presented due to the possible enhancing effects of climate and personality on respective foci:

H14: Safety Climate will moderate the relationship between dependability and prevention focus such that the positive relationship between dependability and prevention focus will be stronger in a high safety climate than in a low safety climate.

H15: Production Climate will moderate the relationship between achievement and promotion focus such that the positive relationship between achievement and promotion focus will be stronger in a high production climate than in a low production climate.

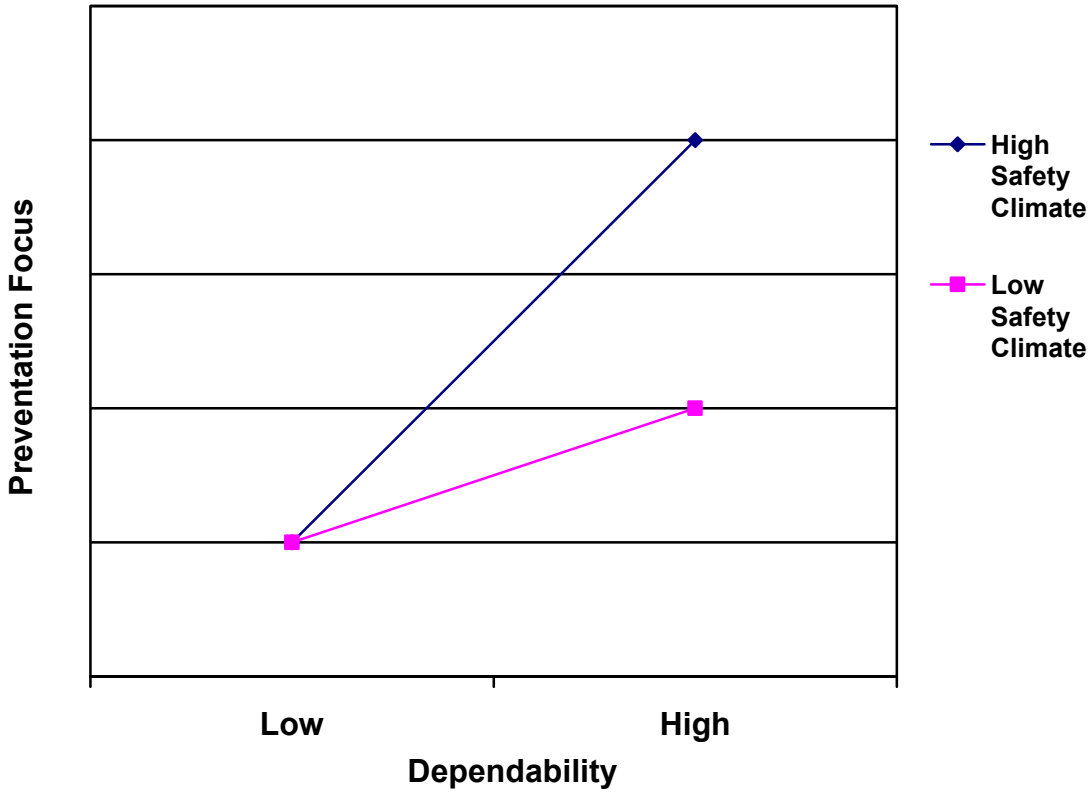


Figure 4. H14 Interaction between Dependability and Climate on Prevention

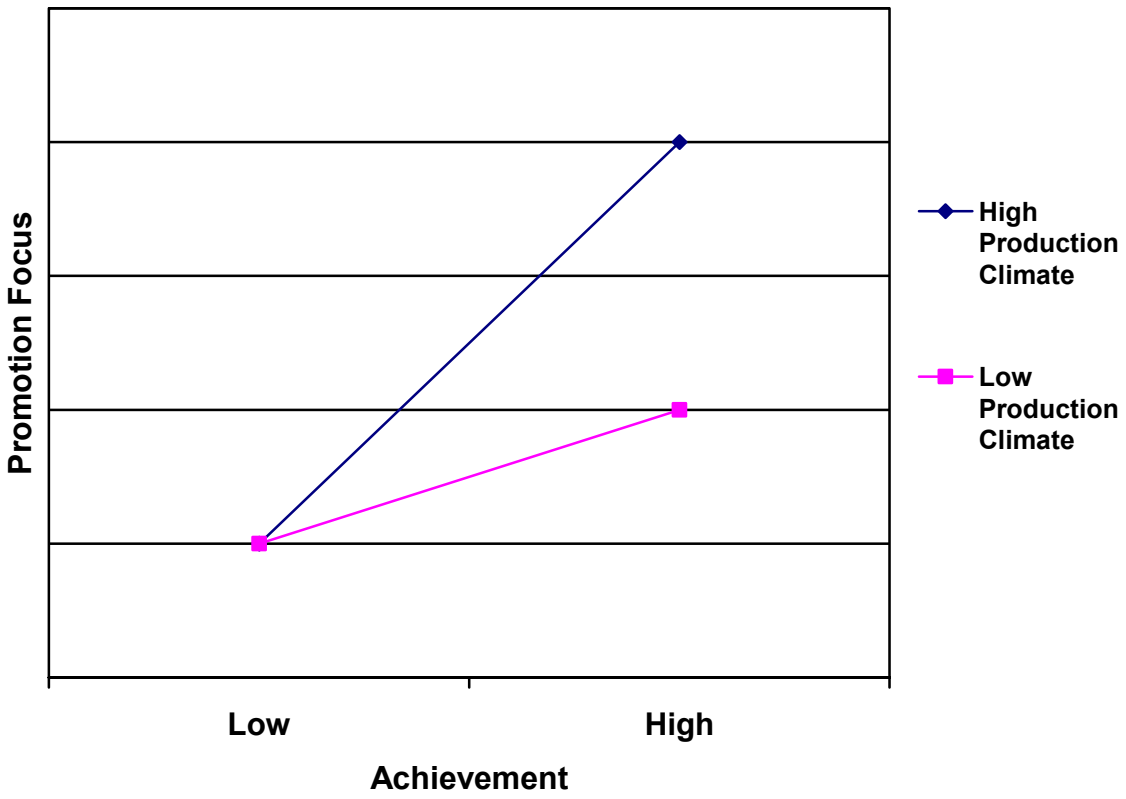


Figure 5. H15 Interaction between Achievement and Climate on Promotion

While I present these two hypotheses because they are likely the two that help explain when one's regulatory focus is highest, I tested additional interactions that might be present between what some have labeled as conflicting antecedents of regulatory focus (Kluger et al., 1999). That is, possible interactions might be found when needs and values for promotion are present with situations inducing a prevention focus (i.e., achievement & safety climate) and vice versa. While I could not make specific hypotheses about these relationships due to lack of theory, it was believed that in a context such as work the situation or climate might override personal characteristics. This belief was reached due to the findings of Forster et al. (2003) and Higgins et al. (2001) in that experimental manipulation successfully changed participants focus over several tasks.

I explored such interesting possibilities as I had some preliminary expectations regarding these relationships (see Figures 6-11). For example, it might be that the proposed negative relationship between achievement and prevention is nullified if the person occupies a high safety climate (Figure 6). Or the negative relationship between dependability and promotion is nullified by a high production climate (Figure 7). Similarly, it might be that the proposed positive relationship between achievement and promotion is moderated by safety climate in such a way that the positive relationship is canceled out by a high safety climate (Figure 8). Figure 9 depicts the moderated relationship between dependability and prevention in such a way that the positive relationship between the two constructs is weakened in the presence of a high production climate. Figure 10 displays the interaction between dependability and safety climate on promotion in such a way that the proposed negative relationship is

stronger in a high safety climate. Lastly, the negative relationship between achievement and prevention might be stronger if a person occupies a high production environment (Figure 11).

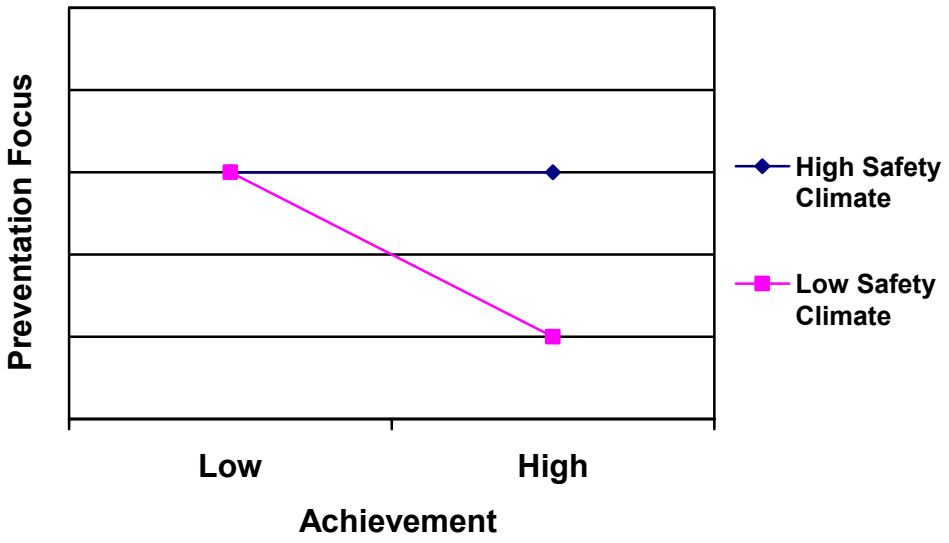


Figure 6. Expected Interaction between Achievement and Safety Climate on Prevention

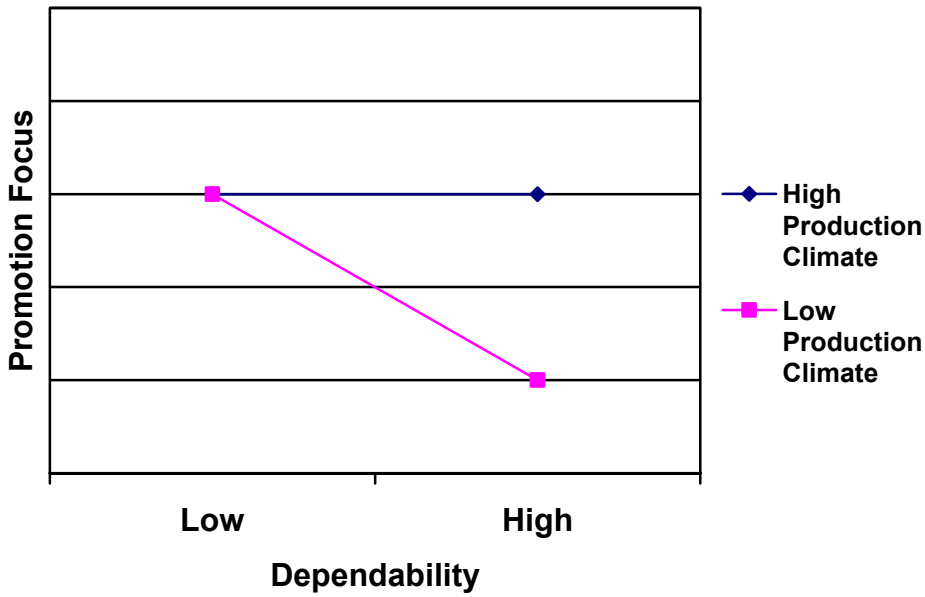


Figure 7. Expected Interaction between Dependability and Production Climate on Promotion

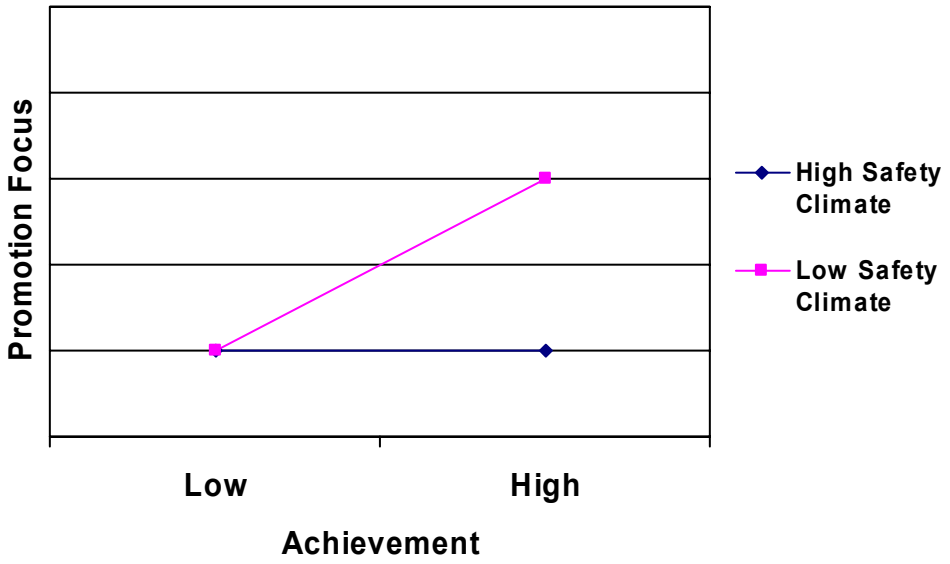


Figure 8. Expected Interaction between Achievement and Safety Climate on Promotion

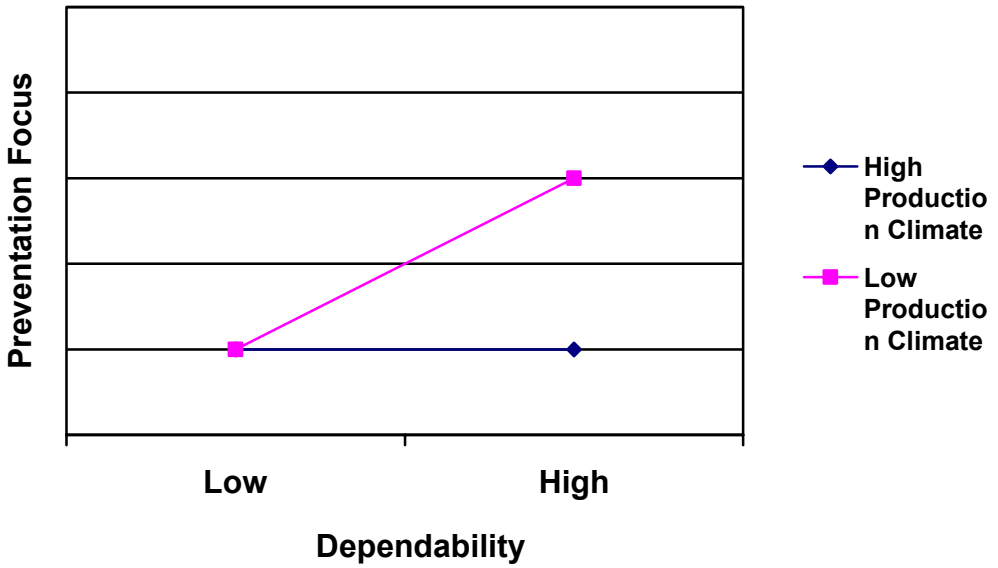


Figure 9. Expected Interaction between Dependability and Production Climate on Prevention

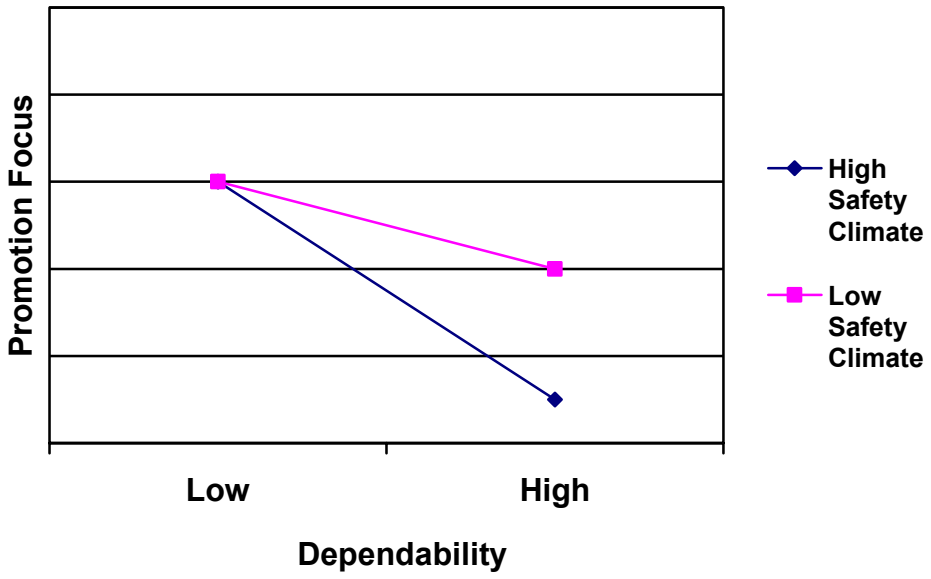


Figure 10. Expected Interaction between Dependability and Safety Climate on Promotion

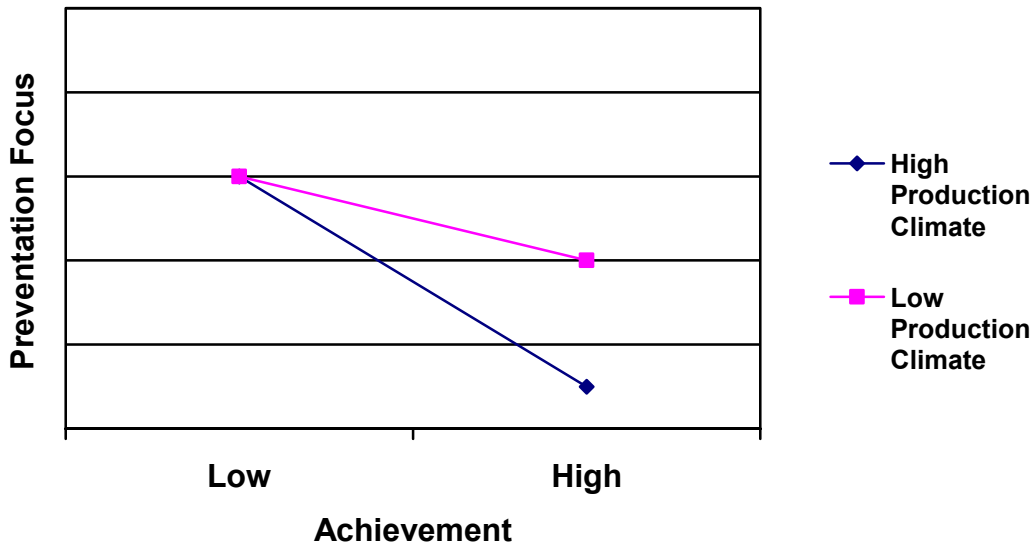


Figure 11. Expected Interaction between Achievement and Production Climate on Prevention

CHAPTER 4

METHOD

Participants

A large facilities department located in the Southeast United States agreed to participate in the current research in exchange for summary information the study provided. The sample consisted of 251 individuals (81.6% male, 17.6% female, 6 not reported) subdivided into 51 work units based on individuals reports of group leaders. A work unit is a small group comprised of 3-11 persons and answers to a group leader. The average age of the sample was 40.5 (SD = 11.5; 3 not reported). The sample was 50.3% European-American, 41.5% African-American, 5% Hispanic-American, 3.3% Asian-American, and 2% Other-American (5 not reported). Additionally, the average time in the current job was 5 years (SD=5.8) and 92.8% of the sample felt safety was a primary concern in their daily work.

Design & Procedure

This research can be broken down into two data collection periods. Initially, all employees completed measures of conscientiousness (i.e., facets of dependability & achievement), climate (safety & productivity), and regulatory focus (prevention & promotion) as well as provided basic demographic information (e.g., race, gender, age). The second phase of data collection consisted of gaining supervisor ratings of safety and speed/productivity. Each supervisor rated every employee that directly answers to him or her. Employee ratings were gained roughly 1 to 3 weeks after employee data were collected.

Measures & Development Strategy

Three of the measures described below were validated in a pilot study following Hinkin's (1998) organizational measure development plan. For a full report on this validation effort please see Appendix A. The description of measures reflects the final results of this validation. Results from the current investigation will address additional reliability and validity evidence (e.g., confirmatory factor analysis) from the employee sample described above.

Each measure I needed to develop was developed following the guidelines presented by Hinkin (1998). Hinkin suggests a 6 step development plan. Step 1 entails item generation and content validation. It should be noted that at least 4 to 6 items per construct is recommended by Hinkin, but depends on the evidence of later steps. Gaining content validity can be accomplished in a number of ways, but I asked SME's to sort items based on the definition of the construct. Any item that failed to be sorted correctly 75% of the time was dropped from the scale. Step 2 consisted of initial questionnaire administration and step 3 entailed further item reduction using a variety of techniques (e.g., internal consistency, exploratory factor analysis). Internal consistency was desired to be .70 or greater and each item should load at .40 or greater for the exploratory factor analysis. If items are found not meeting these criteria they too will be dropped. Hinkin's 4^{th} step called for a confirmatory factor analysis. Gaining construct validity of a new measure helps begin to identify a nomological network of associations and thus step 5. Lastly, Hinkin suggested replication.

The measures that I developed followed this process. More specifically, I asked SMEs (PhD & MA/MS level researchers) to sort items for all developed scales thus

satisfying step one. For steps 2, 3, and 5 I piloted the measures in a sample of employees from StudyResponse.com. The proposed larger study and primary focus of this dissertation will allow me to gain additional construct validity as well as reassess the factor structure of each measure I developed via confirmatory factor analysis.

Conscientiousness

The IPIP (Goldberg, 1999) scales of dependability and achievement were used to assess the respective subscales of conscientiousness. The reliabilities reported in previous studies have been found to be higher than other common measures of conscientiousness facets (e.g., NEO) and range from .7 to .8. Each scale contains 10 items and uses a 5-point Likert format (1 = strongly disagree; 5 = strongly agree).

Safety Climate

Zohar's (2000) recent measure of safety climate was modified to better capture safety climate. Some of Zohar's items were better suited to capture production demands and were therefore used in the production climate scale (see below). The scale assessed safety climate based on supervisory practices towards safety. Rather than focus on expectations and actions as Zohar did, I was more interested in general safety climate used by other researchers (e.g., Griffin & Neal). The scale contains 7 items, uses a 5-point Likert format (1 = completely disagree; 5 = completely agree), and was shown to be internally consistent ($\alpha = .88$) in the pilot study.

Production Climate

Continuing down the line of reasoning that Zohar (2000) followed for the development of his safety climate scale, I developed a brief measure that captures production climate. Specifically, I adapted Zohar's (2000) safety climate measure to

more adequately capture supervisory practices and policies regarding production (i.e., speed of task completion). The scale contains 5 items, uses a 5-point Likert format (1 = completely disagree; 5 = completely agree), and has been shown to be internally consistent ($\alpha = .78$).

Regulatory Focus

The measure of regulatory focus was also developed and validated in the pilot study. The measure contains two factors: (1) promotion focus and (2) prevention focus. The promotion factor contains 10 items and the prevention factor contains 11 items. The scale uses a 5-point Likert format (1 = never; 5 = constantly) and both factors were found to be internally consistent in the pilot study (promotion $\alpha = .88$ & prevention $\alpha = .86$).

Safety & Productivity/Speed Ratings

Ratings of safety and productivity were developed with the assistance of SMEs. Safety items were drawn from Burke et al's. (2002) general safety performance measure and Hofmann & Stetzor's safety scale. Production/speed performance items were written to reflect the speed of task completion. The scales use a 5-point Likert format (1 = never; 5 = constantly). Each measure has been shown to be a separate factor via exploratory factor analysis and has demonstrated adequate internal consistency (production/speed $\alpha = .75$ & safety performance $\alpha = .91$).

Analysis Strategy

Psychometrics

Prior to hypothesis testing I assessed the psychometrics of all measures. It was desired to have adequate internal consistency (i.e., $\geq .70$) and stable factor structures for all measures. I assessed factor structures in LISREL using confirmatory factor analysis.

Additionally, I to assessed the viability for aggregation of climate measures. It should be noted that I retained many of the items that I reported I dropped in the validation to reassess their properties.

Aggregation Issues

The first step in multilevel modeling is the assessment of necessary prerequisites or rather the viability of higher level variables. Following Chan's (1998) typology of composition models, climate can be theoretically conceptualized to represent a *referent shift model* of aggregation because the focus is on the group rather than the individual. Chan stated that "organizational climate is essentially the same as psychological climate, except that the former refers to the *shared* perceptions among the individuals" (p. 237); the referent has changed. Zohar (2003a) has proposed three steps to determine if aggregation is viable: (1) show sufficient within-group homogeneity, (2) show between-group heterogeneity, & (3) the unit of analysis naturally occurs. According to Zohar, if these steps are not met then aggregation is not warranted and the construct, climate, can and should be treated as a lower level construct (i.e., psychological climate). Each of these steps will be addressed in more detail in the next few paragraphs.

Step 1 states that a researcher needs to show sufficient within-group homogeneity. Within-group properties can be assessed in two ways: agreement and reliability. Within-group agreement refers to the extent that individual's ratings are interchangeable. In other words, all ratings appear to be the same. To assess agreement James, Demaree, & Wolf (1984; 1993) developed the $r_{wg(j)}$ statistic. If $r_{wg(j)}$ is equal to or greater than .70, then aggregation is warranted as there is sufficient within-group agreement. Reliability on the other hand refers to the relative consistency of ratings. Two common indices exist for

reliability: ICC(1) and ICC(2). Bryk and Raudenbush (1992) stated that ICC(1) is the proportion of variance that can be explained by group membership. For example, if an ICC(1) value of .18 is obtained, a researcher could claim that 18% of the variance in our variable of interest is due to group membership. ICC(2) is an estimate of the reliability of the means and if ICC(2) value is greater than or equal to .70 we can assume groups means are reliably different (Bliese, 2000).

To assess between group heterogeneity, one can employ an ANOVA test. This is actually the same test that is used to test the significance of ICC(1) values. In this design, the independent variable (IV) is 'group' or whatever clustering agent one is interested in and the dependent variable (DV) is the variable of interest. If the ANOVA is significant, then there are reliable differences across groups (i.e., significant heterogeneity).

If steps 1 and 2 have been satisfied a researcher can claim that there is sufficient within-group homogeneity and between-group heterogeneity and move to the third step recommended by Zohar (2003a). That is, are the higher level units natural or artificial? If we are dealing with work groups or teams, then we need to make sure they are defined as such by the organization or the tasks they perform and not based on statistical clustering.

Hypothesis Testing

To assess my hypotheses I employed Random Coefficient Modeling using Version 3.0 of the Non-linear and Linear Mixed Effects program for S-PLUS and R (Pinheiro & Bates, 2000). Random Coefficient Models (RCMs) are better suited to test cross-level relationships than traditional OLS regression and are well suited to test single level models as well (Gavin & Hofmann, 2002). Depending on one's theory and hypothesized relationships, these relationships can be tested in four general steps or a

combination of steps theory deems appropriate: (1) test for intercept variability, (2) predict intercept variability, (3) test slope variability, and (4) predict slope variability. Step 1 has already been discussed above as prerequisites for multi-level modeling and aggregation, but in essence step 1 tests whether the variable of interest is non-independent. One can gain more confidence in step 1 by testing the significance across teams. This can be tested by contrasting two competing models: a fixed intercept model (i.e., $\beta_{oj} = \gamma_{00} + r_{ij}$) and a random intercept model (i.e., $\beta_{oj} = \gamma_{00} + U_{oj} + r_{ij}$). If we find a significant -2 log likelihood difference, we can claim that intercepts vary significantly between groups. Steps 2, 3, and 4 are the new components and essentially assess and test the predictive ability of the cross-level relationships. Step 2 assesses main effects (e.g., climate predicting regulatory focus), step 3 assesses slope variability (e.g., whether the personality-regulatory focus slope varies across groups), and step 4 tests for moderation (e.g., climate moderates the relationship between personality and regulatory focus; Gavin & Hofmann, 2002).

The following equations highlight tests for individual level relationships (equation 1), cross-level main effects (equation 2), and cross-level interactions (equation 3). More specifically, equation 1 represents a level 1 relationship in which personality is predicting individual Regulatory Focus. Equation 2 represents a level 2 relationship in which climate predicts variance in the level 1 intercepts (i.e., β_{oj} ; main effects for regulatory focus) and equation 3 represents a level 2 relationship in which safety climate predicts variance in level 1 slopes (i.e., β_{1j} ; moderation of the personality-regulatory focus relationship).

Level 1 Model: $Focus = \beta_{oj} + \beta_{1j} Personality_{ij} + e_{ij}$ (1)

Level 2 Model: $\beta_{oj} = \gamma_{00} + \gamma_{01}(Climate_j) + U_{oj}$ (2)

$$\beta_{1j} = \gamma_{10} + \gamma_{11}(Climate_j) + U_{1j} \quad (3)$$

While theory is important to guide our testing, it is possible to test all three equations at one time. However, it might be theoretically relevant to test for specific main effects or specific moderating effects such as I have laid out in my hypotheses. Testing for main effects only has been labeled *intercepts-as-outcomes* (i.e., step 2; Gavin & Hofmann, 2002) and this is how I will test hypotheses 1-12. And therefore the moderating effects are not included. This is displayed in equation 6, by excluding γ_{11} and U_{1j}.

Level 1 Model: $Focus_{ij} = \beta_{oj} + \beta_{1j} Personality_{ij} + e_{ij}$ (4)

Level 2 Model: $\beta_{oj} = \gamma_{00} + \gamma_{01}(Climate_j) + U_{oj}$ (5)

$$\beta_{1j} = \gamma_{10} \quad (6)$$

On the other hand, one can also test for *slopes-as-outcomes* (Kreft & de Fleeuw, 1998; Gavin & Hofmann, 2002). This model is displayed previously in equations 1-3. One can add in the group level variable to equation 6 and this allows slopes to vary randomly. Predicting slopes-as-outcomes in essence tests for moderation among the variables of interest and thus I will assess hypotheses 14 and 15 in such a manner as well as other exploratory interactions.

To assess hypothesis #13, I will use the approach suggested by Barron and Kenny (1986). In this approach, mediation is supported if four steps or criteria are met. First, a distal construct must relate to the outcome. However, Kenny, Kashy, and Bolger (1998) later claimed that this relationship might not need to be significant if such relationships are quite distal. In other words, an indirect effect may still be found. Secondly, the distal

predictor must relate to the mediator. Thirdly, the mediator must relate to the outcome after controlling for the distal predictor. Fourthly, to claim full mediation the relationship (if one was found) between the distal predictor and the outcome is no longer significant in the presence of the mediator. However, if both relationships are significant, then partial mediation can be claimed.

CHAPTER 5

RESULTS

The results section is presented in three parts. First the psychometric properties of measures used in the study are presented. This section includes assessments of internal consistency for all measures as well as confirmatory factor analyses for the measures I developed. Next I will assess the viability of the climate constructs at the group level by assessing group agreement and reliability as well as differences across groups (Zohar, 2003). In the next section, the hypotheses described above will be assessed as well as additional exploratory tests using random coefficient modeling. All descriptive data and zero-order correlations can be found in Table 1.

Table 1.

Descriptives and correlations among variables

Variables	M	SD	1.	2.	3.	4.	5.	6.	7.	8.
1. Promotion	3.9	.74	*.89*							
2. Prevention	4.2	.90	.06	*.96*						
3. Safety Climate	3.4	.63	-.03	.47*	*.85*					
4. Prod. Climate	2.8	.59	.17*	-.40*	-.49*	*.81*				
5. Achievement	3.9	.65	.19*	.23*	.20*	.02	*.74*			
6. Dependability	3.8	.85	-.04	.31*	.37*	-.14*	.47*	*.73*		
7. Safety	3.7	.67	-.20*	.44*	.26*	-.31*	.10	.27*	*.85*	
8. Speed	3.1	.65	.30*	-.23*	-.06	.13*	.06	.07	-.17*	*.69*

Note. * $p < .05$; Prod. = Productivity; Safety = Supervisor Safety Ratings; Speed = Supervisor Speed/Productivity Ratings; Climate variables have been aggregated.

Psychometrics

Regulatory Focus Questionnaire. The 21 item RFQ described above and in the Appendix yielded acceptable internal consistency for prevention ($\alpha = .96$) and promotion ($\alpha = .89$). Using LISREL 8.5 (Jöreskog & Sörbom, 1993), the factor structure identified in the Pilot Study (see Appendix) was tested via confirmatory factor analysis. Additionally, the two factor model (i.e., prevention & promotion) was tested against a single factor structure comprised of all items loading on a single regulatory focus construct. Results revealed that the two factor model fit the data well: $\chi^2_{188} = 380.07$, CFI = .93, RMSEA = .07, SRMR = .06. The single factor model did not fit the data well: $\chi^2_{189} = 977.76$, CFI = .69, RMSEA = .22, SRMR = .20. Additionally, to test the fit between nested models Chi-Square difference tests can be employed. The difference in Chi-Square was found to be significant ($\Delta\chi^2_1 = 597.69$, $p > .05$) which suggests the two factor structure fits the data significantly better. Thus, I retained the two factor structure originally proposed. Additionally, all loadings were significant and greater than .6.

Climate Measures. The internal consistency for both climate measures was found to be adequate. Specifically, safety climate had an internal consistency of .85, while production climate had an internal consistency of .81. Using confirmatory factor analysis, I retested the factor structure of the climate measures that was found in the Pilot Study. As with the RFQ, I assessed model differences between a one factor solution (i.e., climate) and the two dimensions of climate proposed (i.e., safety & productivity). The one factor model did not fit the data well: $\chi^2_{53} = 559.84$, CFI = .74, RMSEA = .19, SRMR = .12. The fit for the two factor model was much better: $\chi^2_{52} = 166.35$, CFI = .91,

RMSEA = .09, SRMR = .07. Additionally, the Chi-Square difference test was found to be significant: $\Delta\chi^2_1 = 393.49$, $p > .05$. All loadings for the two factor model were significant.

Performance. Two indices of performance were constructed and initially validated in the Pilot Study. The internal consistency of the safety performance measure was found to be adequate ($\alpha = .85$), but the internal consistency for the speed performance measure was just below the traditional cutoff of .70 (i.e., .69). However, the internal consistency found in the pilot study was higher (i.e., .78). When examining the factor structure of the performance measures, I again employed confirmatory factor analysis. The one factor model (i.e., combined performance) did not fit the data well: $\chi^2_{44} = 361.32$, CFI = .78, RMSEA = .17, SRMR = .14. The fit for the two factor model was much better: $\chi^2_{43} = 121.78$, CFI = .94, RMSEA = .08, SRMR = .11. The Chi-Square difference test also supported the two factor model: $\Delta\chi^2_1 = 239.54$, $p > .05$. All loadings were significant.

Conscientiousness Facets. Each of the conscientiousness facets was found to have acceptable internal consistency. Achievement had an internal consistency of .74. Dependability had an internal consistency of .73.

Aggregation of Climate

Following the data analysis plan for aggregation laid out above, it is necessary to demonstrate group viability for the two climate constructs. Zohar (2003a) suggests three steps to determine if aggregation is viable: (1) show sufficient within-group homogeneity, (2) show between-group heterogeneity, & (3) the unit of analysis naturally occurs. Using a uniform null distribution the average $r_{wg(j)}$ value for safety climate was .79 (range: 0-0.99; SD = .27) and the average value for production climate was .74 (range: 0-.99; SD = .28). Even though a small number of groups did not agree (i.e., $r_{wg(j)}$ values < .70) as

noted by the range of values, the mean $r_{wg(j)}$ values suggest that on average groups did agree.

ICCs were computed using the formula reported in Bliese (2000) and parts derived from a one-way analysis of variance where climate was the focal variable and group ID was the independent variable: ICC(1) = [MSB-MSW]/[MSB+(k-1)*MSW]; ICC(2) = [MSB-MSW]/MSB[2]. ICCs for safety climate, ICC(1) = .45, ICC(2) = .78; $F_{50,200} = 4.5$, $p < .05$, were higher than ICCs for production climate, ICC(1) = .25, ICC(2) = .61; $F_{50,200} = 2.5$, $p < .05$. These results support the viability of safety and production climate as group level constructs. Specifically, the $r_{wg(j)}$ values support high agreement within groups as do the ICC(1) values for reliability and differences were found across groups (ICC(2) & ANOVA tests). While the ICC(2) value for production is below the recommended .70 cutoff for reliable group means, climate is operationalized as a group level construct and all other aggregation evidence tends to support aggregation. Therefore, I proceeded to tests my hypotheses with climate at the group level.

Hypothesis Testing

By examining the correlations presented in Table 1 support was gained for many of the hypotheses that were presented. However, these relationships do not shed much light on the uniqueness of relationships. Additionally, the mutual suppression effect discussed by Moon et al. (2003) is not taken into account nor is the group aspect of climate. Therefore it is necessary to test all relationships with all hypothesized predictors included in the model.

---

[2] MSB = Mean Square between groups; MSW = Mean Square within groups; k = average number of group members.

Predictors of Prevention Focus. Safety climate and dependability were hypothesized to positively predict a prevention focus (i.e., H3 & H6, respectively) and production climate and achievement were hypothesized to negatively predict a prevention focus (i.e., H2 & H8, respectively). Results revealed significant relationships for all predictors. However, the direction of the relationship achievement shares with prevention was not negative, but rather positive. However, this relationship does not appear to be as strong as the relationship that dependability shares with prevention. Specifics results are displayed in Table 2.

Table 2.

Predictors of Prevention Focus

Variable	Estimate	*SE*	*df*	*t* - test	*p-value*
(intercept)	2.45	.77	198	3.19	.00
Safety climate	.34	.14	48	2.46	.01
Dependability	.23	.07	198	3.50	.00
Production Climate	-.36	.15	48	-2.54	.01
Achievement	.20	.07	198	2.70	.00

Note. R^2 for Level 1 predictors = .15; R^2 for Level 2 predictors = .38[3].

Predictors of Promotion Focus. Achievement and production climate were hypothesized to positively predict a promotion focus (i.e., H1 & H7, respectively). Dependability and safety climate were hypothesized to negatively predict a promotion focus (i.e., H4 & H5,

[3] R^2 values were computed using: $1 - (Var_{w/\ predictor} / Var_{w/o\ predictor})$; For Level 1 predictors the denominator used was the within-group variance & Level 2 the between-group variance. Thus, R^2 values are not computed relative to the total variance in the outcome and therefore cannot be interpreted in the same light as traditional OLS regression (e.g., 15% of prevention is captured by dependability & achievement; Hofmann, Griffin, & Gavin, 2000). Rather Level 1 R^2 should be interpreted as amount of within-group variance accounted for in the focal variable by Level 1 predictors and Level 2 R^2 should be interpreted as the amount of between-group variance accounted for in the focal variable by Level 2 predictors. Additionally, when modeling slopes-as-outcomes (i.e., interactions) the use and interpretation of these values does not apply (Kreft & de Leeuw, 2000).

respectively). Results supported hypotheses one and seven, but not hypotheses four and five. Detailed results are presented below in Table 3.

Table 3.

Predictors of Promotion Focus

Variable	Estimate	*SE*	*df*	*t* - test	*p-value*
(intercept)	2.33	.61	198	3.80	.00
Safety climate	.06	.11	48	.53	.59
Dependability	-.06	.07	198	-1.05	.29
Production Climate	.22	.11	48	1.99	.05
Achievement	.27	.08	198	3.47	.00

Note. R^2 for Level 1 predictors = .06; R^2 for Level 2 predictors = .05.

Predictors of Performance. It was hypothesized that prevention would positively relate to safety (i.e., H11) whereas promotion would negatively relate to safety performance (i.e., H9). Results supported both hypotheses. For speed performance, a positive relationship was hypothesized for promotion (H10) and a negative relationship for prevention (i.e., H12). Similarly, to safety performance, both relationships were found to be significant. Specific results are displayed in Table 4.

Table 4.

Predictors of Performance

Variable	Estimate	*SE*	*df*	*t* – test	*p-value*
DV=Safety Performance					
(intercept)	3.04	.26	198	11.83	.00
Prevention	.30	.04	198	6.77	.00
Promotion	-.16	.05	198	-3.18	.00
- R^2 for Level 1 predictors of Safety Performance = .07.					
DV=Speed Performance					
(intercept)	2.77	.27	198	10.28	.00
Prevention	-.17	.05	198	-3.78	.00
Promotion	.28	.05	198	5.34	.00
- R^2 for Level 1 predictors of Safety Performance = .10.					

Mediation Tests. To assess the mediating effects of prevention and promotion I employed the steps discussed by Kenny et al (1998) and summarized above. The first four models are ones in which prevention mediates the relationships between climate and personality and performance and the last four are promotion mediated models. These models are depicted in Figures 12-19. It should be noted that some of the mediation tests could be tested in one mediation analysis, but they will not due to possible suppression effects. In an interesting caveat to mutual suppression, the variance obtained by summing the squared bivariate relationships ($r^2_{x1y1} + r^2_{x2y1}$) is *greater* than the squared multiple correlation between predictors and the outcome (R^2_{x1x2y1}; Moon, personal communication, February, 2004; Smith, Ager, & Williams, 1992; Velicer, 1978). Thus, the separate mediation analyses presented below.

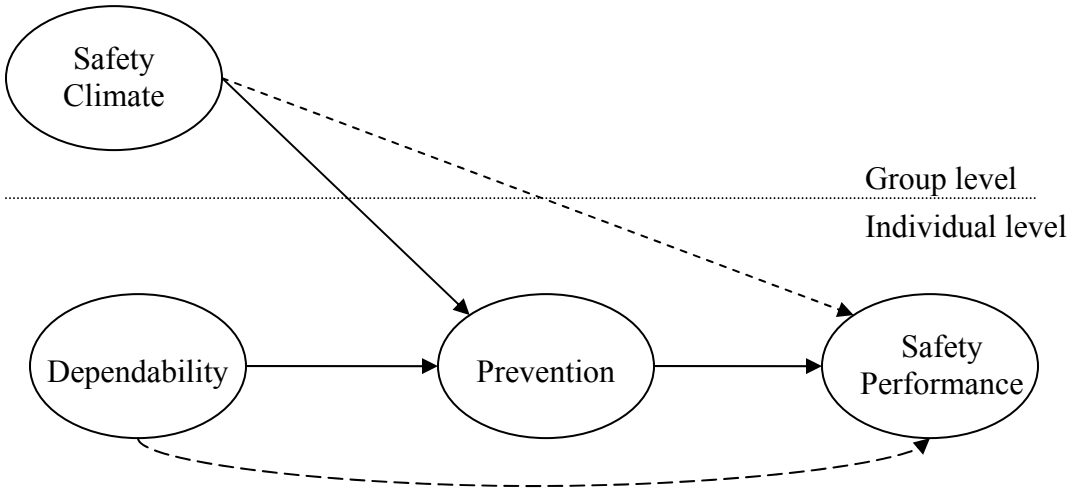


Figure 12. Mediating Role of Prevention for Safety Climate and Safety Performance and Dependability and Safety Performance

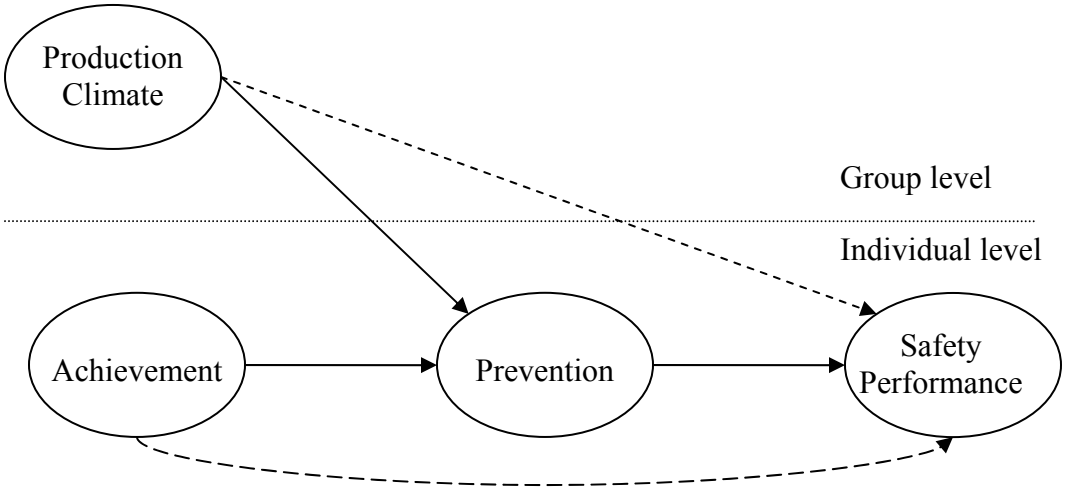


Figure 13. Mediating Role of Prevention for Production Climate and Safety Performance and Achievement and Safety Performance

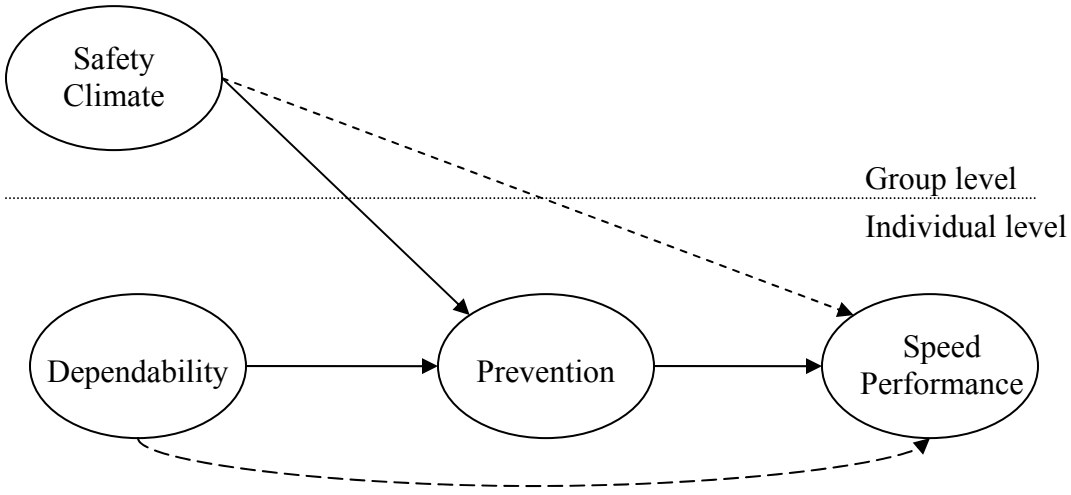


Figure 14. Mediating Role of Prevention for Safety Climate and Speed Performance and Dependability and Speed Performance

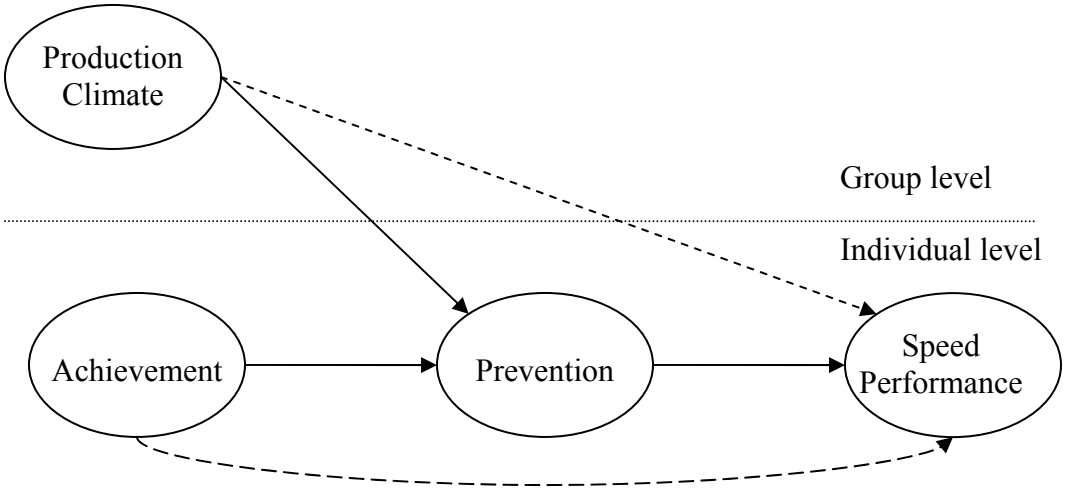


Figure 15. Mediating Role of Prevention for Production Climate and Speed Performance and Achievement and Speed Performance

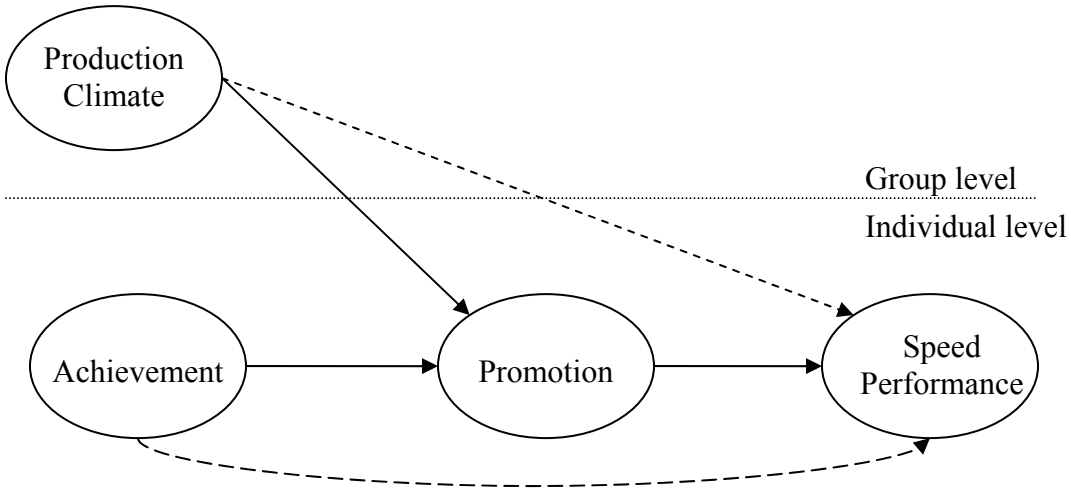


Figure 16. Mediating Role of Promotion for Production Climate and Speed Performance and Achievement and Speed Performance

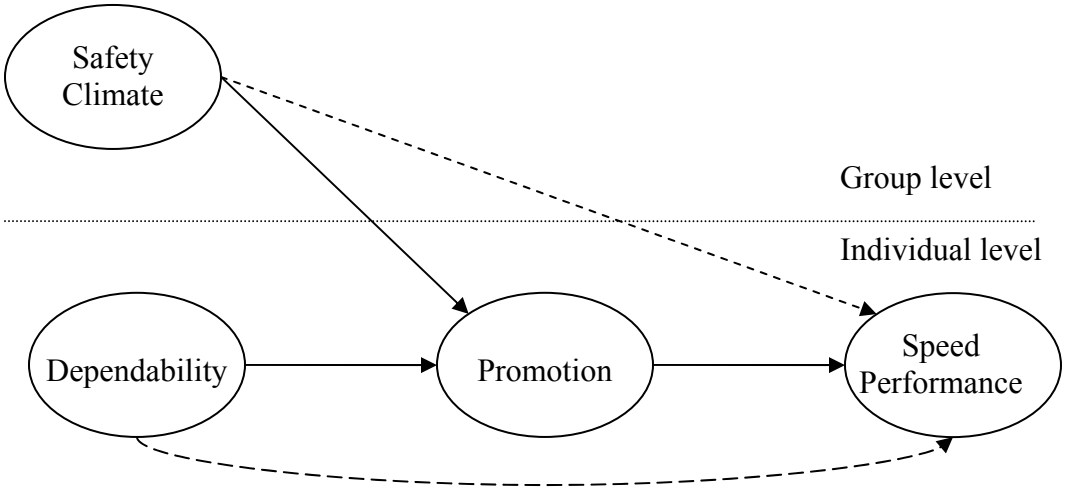


Figure 17. Mediating Role of Promotion for Safety Climate and Speed Performance and Dependability and Speed Performance

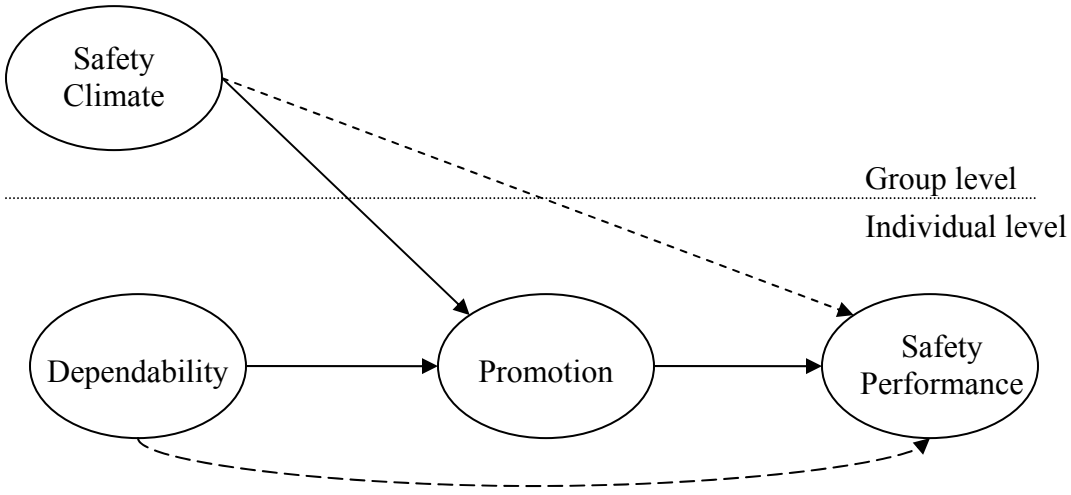


Figure 18. Mediating Role of Promotion for Safety Climate and Safety Performance and Dependability and Safety Performance

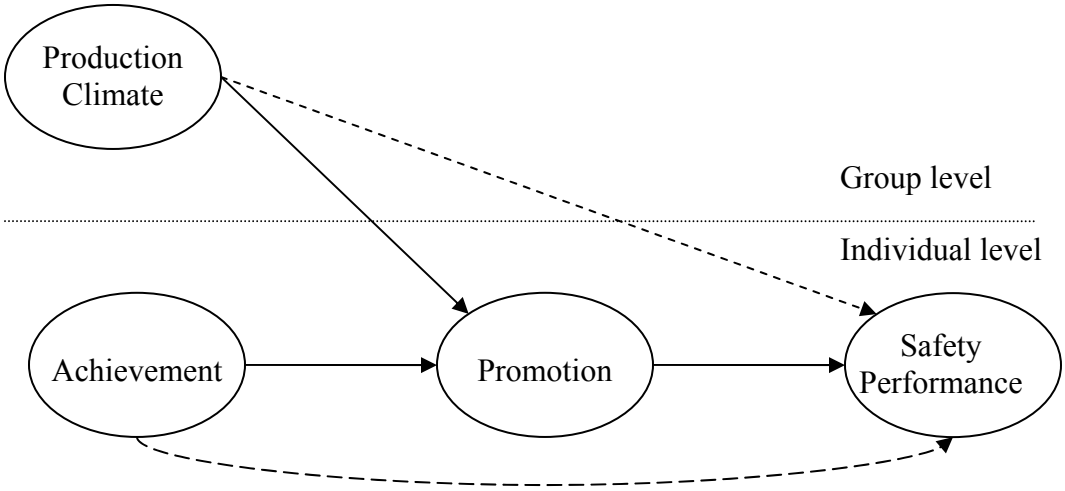


Figure 19. Mediating Role of Promotion for Production Climate and Safety Performance and Achievement and Safety Performance

Results for these models are summarized below in Table 5-12. Beginning with the mediating role of prevention for safety climate and dependability, step 1 shows that safety climate significantly predicted safety performance, but dependability did not. Following the recommendation of Kenny et al. (1998) I proceeded with mediation tests because these authors stated that it is not necessary for the relationships in step 1 to be significant for mediation to exist; the indirect effect(s) may still be present and significant. In step 2, predicting the mediator, both dependability and safety climate were found to be significant. From the prevention focus results (Table 5), one can see that prevention was significant when entered into the equation in the third regression. However, dependability was nonsignificant, as one expect, but safety climate remained a significant predictor of safety performance. These results suggest two things. First, that prevention only partially mediated the cross-level relationship between safety climate and safety performance. In other words, safety climate directly and indirectly influences safety performance. Secondly, that an indirect effect might still be present for dependability predicting safety performance via a prevention focus.

To test for an indirect effect, three test statistics[4] were computed: the Sobel test (Sobel, 1982) and Goodman (I) and (II) tests (Goodman, 1960). All three tests in combination are likely to yield a better assessment of significant indirect effects and therefore all three are reported. The results for the indirect effect of safety climate on safety performance were: Indirect effect = .30*.23 = .07, Sobel = 3.38 ($p < .05$), Goodman (I) = 3.34 ($p < .05$), and Goodman (II) = 3.42 ($p < .05$). The results for the

---

[4] Sobel test equation: z-value = $a*b/\text{SQRT}(b^2*s_a^2 + a^2*s_b^2)$
Goodman (I) test equation: z-value = $a*b/\text{SQRT}(b^2*s_a^2 + a^2*s_b^2 + s_a^2*s_b^2)$
Goodman (II) test equation: z-value = $a*b/\text{SQRT}(b^2*s_a^2 + a^2*s_b^2 - s_a^2*s_b^2)$

indirect effect of dependability on safety performance (.49*.23=.11) were all significant: Sobel = 2.92 ($p < .05$), Goodman (I) = 2.87 ($p < .05$), and Goodman (II) = 2.95 ($p < .05$). These results suggest that the indirect effects of safety climate and dependability on safety performance are significant and meaningful.

Table 5.

Mediating Role of Prevention for Safety Climate and Safety Performance and Dependability and Safety Performance

Variable	Estimate	*SE*	*df*	*t* – test	*p-value*
Step 1:					
DV=Safety Performance					
(intercept)	2.47	.35	199	6.99	.00
Safety Climate	.21	.05	49	4.17	.00
Dependability	.12	.10	199	1.22	.23
- R^2 for Level 1 predictors = .07; R^2 for Level 2 predictors = .07.					
Step 2:					
DV=Prevention					
(intercept)	1.41	.46	199	3.08	.00
Safety Climate	.30	.06	49	4.78	.00
Dependability	.49	.13	199	3.80	.00
- R^2 for Level 1 predictors = .12; R^2 for Level 2 predictors = .30.					
Step 3:					
DV=Safety Performance					
(intercept)	2.13	.32	198	6.54	.00
Safety Climate	.14	.05	49	2.80	.01
Dependability	.02	.09	198	.18	.85
Prevention	.23	.05	198	4.56	.00
- R^2 for Level 1 predictors = .13; R^2 for Level 2 predictors = .33.					

Support for the mediating role of prevention with regards to achievement and production climate were also significant. Table 6 highlights these results. Step 1 revealed that production climate significantly predicted safety performance, but achievement only marginally predicted safety performance. Again, I proceeded with the mediation tests because indirect effects might still be significant. Step 2 yielded significant effects for both production climate and achievement. Step 3 found that prevention was significant and Step 4 found that the effects of production climate were reduced in the presence of the mediator and achievement was still non-significant. This suggests that prevention mediates the negative effects of production climate on safety performance and that there is a possible indirect effect for achievement.

Again, to assess indirect effects I employed the three tests described above. Results for production climate were: Indirect effect -.58*.25 = -.15; Sobel = -3.32 ($p <$ .05), Goodman (I) = -3.29 ($p < .05$), Goodman (II) = -3.37 ($p < .05$). Results for achievement's indirect effect (.32*.25 = .08) were much the same: Sobel = 3.37 ($p < .05$), Goodman (I) = 3.33 ($p < .05$), Goodman (II) = 3.41 ($p < .05$).

Table 6.

Mediating Role of Prevention for Production Climate and Safety Performance and Achievement and Safety Performance

Variable	Estimate	*SE*	*df*	*t* – test	*p-value*
Step 1:					
DV=Safety Performance					
(intercept)	4.17	.36	199	11.4	.00
Production Climate	-.31	.09	49	-3.12	.00
Achievement	.10	.05	199	1.77	.07
- R^2 for Level 1 predictors = .01; R^2 for Level 2 predictors = .26					
Step 2:					
DV=Prevention					
(intercept)	4.64	.47	199	9.78	.00
Production Climate	-.58	.13	49	-4.38	.00
Achievement	.32	.07	199	4.53	.00
- R^2 for Level 1 predictors = .08; R^2 for Level 2 predictors = .35					
Step 3:					
DV=Safety Performance					
(intercept)	3.02	.40	198	7.41	.00
Production Climate	-.16	.09	49	-1.76	.08
Achievement	.02	.05	198	.39	.69
Prevention	.25	.05	198	5.09	.00
- R^2 for Level 1 predictors = .07; R^2 for Level 2 predictors = .40					

Support for the mediating role of prevention with regards to safety climate and dependability and speed performance was also found (see Table 7). Step 1 revealed that neither safety climate nor dependability significantly predicted speed performance. Again, I proceeded with the mediation tests because indirect effects might still be significant. Step 2 yielded significant effects for both safety climate and dependability. Step 3 found that prevention was significant and Step 4 found that the effects of production climate were still non-significant. However, there are possible indirect effects that might be found.

Results for safety climate were: Indirect effect .30*-.17 = -.05; Sobel = -2.81 (p < .05), Goodman (I) = -2.77 (p < .05), Goodman (II) = -2.85 (p < .05). Results for dependability's indirect effect (.49*-.17 = -.08) were much the same: Sobel = -2.52 (p < .05), Goodman (I) = -2.48 (p < .05), Goodman (II) = -2.58 (p < .05).

Table 7.

Mediating Role of Prevention for Safety Climate and Speed Performance and Dependability and Speed Performance

Variable	Estimate	*SE*	*df*	*t* – test	*p-value*
Step 1:					
DV=Speed Performance					
(intercept)	3.19	.32	199	9.95	.00
Safety Climate	-.06	.09	49	-.76	.45
Dependability	.04	.05	199	.79	.42
- R^2 for Level 1 predictors = .00; R^2 for Level 2 predictors = .01.					
Step 2:					
DV=Prevention					
(intercept)	1.41	.46	199	3.08	.00
Safety Climate	.30	.06	49	4.78	.00
Dependability	.49	.13	199	3.80	.00
- R^2 for Level 1 predictors = .12; R^2 for Level 2 predictors = .30.					
Step 3:					
DV=Speed Performance					
(intercept)	3.46	.30	198	11.24	.00
Safety Climate	.02	.08	49	.24	.80
Dependability	.02	.04	198	.32	.72
Prevention	-.17	.05	198	-3.36	.00
- R^2 for Level 1 predictors = .12; R^2 for Level 2 predictors = .32.					

While mediation was not supported for the mediating role of prevention with regards to production climate and achievement for speed performance (see Table 8), indirect effects were still found. Results for production climate were: Indirect effect -.58*-.17 = .09; Sobel = 2.49 (p < .05), Goodman (I) = 2.45 (p < .05), Goodman (II) =

2.53 ($p < .05$). Results for achievement's indirect effect (.32*-.15 = -.05) were much the same: Sobel = -2.51 ($p < .05$), Goodman (I) = -2.47 ($p < .05$), Goodman (II) = -2.55 ($p < .05$).

Table 8.

Mediating Role of Prevention for Production Climate and Speed Performance and Achievement and Speed Performance

Variable	Estimate	*SE*	*df*	*t* – test	*p-value*
Step 1:					
DV=Speed Performance					
(intercept)	2.73	.36	199	7.62	.00
Production Climate	.09	.09	49	1.05	.29
Achievement	.03	.06	199	.48	.62
- R^2 for Level 1 predictors = .00; R^2 for Level 2 predictors = .01.					
Step 2:					
DV=Prevention					
(intercept)	4.64	.47	199	9.78	.00
Production Climate	-.58	.13	49	-4.38	.00
Achievement	.32	.07	199	4.53	.00
- R^2 for Level 1 predictors = .08; R^2 for Level 2 predictors = .35					
Step 3:					
DV=Speed Performance					
(intercept)	3.45	.42	198	8.16	.00
Production Climate	.01	.09	49	.07	.92
Achievement	.03	.06	198	.35	.68
Prevention	-.15	.05	198	-3.03	.00
- R^2 for Level 1 predictors = .02; R^2 for Level 2 predictors = .38.					

Support for the mediating role of promotion was also found and specific details can be found below in Tables 9, 10, 11, & 12. With regards for the mediating role of promotion for production climate and achievement on speed performance, step 1 found that neither production climate nor achievement were significant predictors of speed performance. I proceeded with meditation tests as highlighted above. Step 2 shows that both predictors significantly related to the mediator (i.e., promotion). Lastly, in the third regression promotion was found to be significant, while production climate and achievement remained nonsignificant. This suggests that there are indirect effects on speed performance stemming from production climate and achievement.

Again, to assess indirect effects I employed the three tests described above. Results for production climate were: Indirect effect .21*.25 = .05; Sobel = 1.94 ($p <$ .051), Goodman (I) = 1.90 ($p < .057$), Goodman (II) = 1.97 ($p < .05$). Results for achievement's indirect effect (.24*.25 = .06) were all significant: Sobel = 2.82 ($p < .05$), Goodman (I) = 2.78 ($p < .05$), Goodman (II) = 2.86 ($p < .05$). These results suggest that the indirect effects of achievement and production climate on speed performance are significant.

Table 9.

Mediating Role of Promotion for Production Climate and Speed Performance and Achievement and Speed Performance

Variable	Estimate	*SE*	*df*	*t* – test	*p-value*
Step 1:					
DV=Speed Performance					
(intercept)	2.73	.36	199	7.62	.00
Production Climate	.09	.09	49	1.05	.29
Achievement	.03	.06	199	.48	.62
- R^2 for Level 1 predictors = .00; R^2 for Level 2 predictors = .00					
Step 2:					
DV=Promotion					
(intercept)	2.41	.39	199	6.07	.00
Production Climate	.21	.10	49	2.08	.04
Achievement	.24	.07	199	3.44	.00
- R^2 for Level 1 predictors = .06; R^2 for Level 2 predictors = .03					
Step 3:					
DV=Speed Performance					
(intercept)	2.13	.37	198	5.74	.00
Production Climate	.04	.09	49	.47	.63
Achievement	-.03	.06	198	-.51	.60
Promotion	.25	.05	198	4.65	.00
- R^2 for Level 1 predictors = .08; R^2 for Level 2 predictors = .07					

Tests for the mediating role of promotion for dependability and speed performance and for safety climate and speed performance failed to support mediation and are presented in Table 10. No tests for indirect effects were conducted due to the failure of step 2 (i.e., X does not relate to M).

Table 10.

Mediating Role of Promotion for Safety Climate and Speed Performance and Dependability and Speed Performance

Variable	Estimate	*SE*	*df*	*t* – test	*p-value*
Step 1:					
DV=Speed Performance					
(intercept)	3.19	.32	199	9.95	.00
Safety Climate	-.06	.09	49	-.76	.45
Dependability	.04	.05	199	.79	.42
- R^2 for Level 1 predictors = .00; R^2 for Level 2 predictors = .00					
Step 2:					
DV=Promotion					
(intercept)	3.94	.36	199	10.85	.00
Safety Climate	-.02	.11	49	-.23	.81
Dependability	.02	.06	199	.39	.70
- R^2 for Level 1 predictors = .00; R^2 for Level 2 predictors = .00					
Step 3:					
DV=Speed Performance					
(intercept)	2.21	.37	198	5.98	.00
Safety Climate	-.06	.08	49	-.75	.45
Dependability	.03	.05	198	.74	.45
Promotion	.25	.05	198	4.73	.00
- R^2 for Level 1 predictors = .02; R^2 for Level 2 predictors = .02					

Tests for the mediating role of promotion for dependability and safety performance and for safety climate and safety performance failed to support mediation and are presented in Table 11. No tests for indirect effects were conducted due to the failure of step 2 (i.e., X does not relate to M).

Table 11.

Mediating Role of Promotion for Safety Climate and Safety Performance and Dependability and Safety Performance

Variable	Estimate	*SE*	*df*	*t* – test	*p-value*
Step 1:					
DV=Safety Performance					
(intercept)	2.47	.35	199	6.99	.00
Safety Climate	.21	.05	49	4.17	.00
Dependability	.12	.10	199	1.22	.23
- R^2 for Level 1 predictors = .07; R^2 for Level 2 predictors = .07.					
Step 2:					
DV=Promotion					
(intercept)	3.94	.36	199	10.85	.00
Safety Climate	-.02	.11	49	-.23	.81
Dependability	.02	.06	199	.39	.70
- R^2 for Level 1 predictors = .00; R^2 for Level 2 predictors = .00					
Step 3:					
DV=Speed Performance					
(intercept)	2.86	.39	198	7.24	.00
Safety Climate	.21	.05	49	4.22	.00
Dependability	.12	.09	198	1.27	.20
Promotion	-.10	.05	198	-1.99	.05
- R^2 for Level 1 predictors = .07; R^2 for Level 2 predictors = .12					

Lastly, tests for the mediating role of promotion with regards to production climate and safety performance and achievement and safety performance were conducted. These results are presented below in Table 12. Step 1 found that production climate significantly related safety performance while achievement only marginally related to safety performance. Step 2 found significant results, while step 3 found that promotion significantly related to safety performance in the presence of production climate and achievement. These results suggest that promotion partially mediated the relationship between production climate and safety performance. Tests for indirect effects

yielded marginal support for an indirect effect from production climate to safety performance: Indirect effect .21*-.14 = -.03; Sobel = -1.80 (p = .07), Goodman (I) = -1.75 (p =.08), Goodman (II) = -1.86 (p = .06). Results for achievement's indirect effect (.24*-.14 = .03) were all significant: Sobel = -2.45 ($p < .05$), Goodman (I) = -2.40 ($p < .05$), Goodman (II) = -2.50 ($p < .05$).

Table 12.

Mediating Role of Promotion for Production Climate and Safety Performance and Achievement and Safety Performance

Variable	Estimate	*SE*	*df*	*t* – test	*p-value*
Step 1:					
DV=Safety Performance					
(intercept)	4.17	.36	199	11.4	.00
Production Climate	-.31	.09	49	-3.12	.00
Achievement	.10	.05	199	1.77	.07
- R^2 for Level 1 predictors = .01; R^2 for Level 2 predictors = .26.					
Step 2:					
DV=Promotion					
(intercept)	2.41	.39	199	6.07	.00
Production Climate	.21	.10	49	2.08	.04
Achievement	.24	.07	199	3.44	.00
- R^2 for Level 1 predictors = .02; R^2 for Level 2 predictors = .03					
Step 3:					
DV=Safety Performance					
(intercept)	4.44	.38	198	11.69	.00
Production Climate	-.28	.09	49	-2.98	.04
Achievement	.09	.06	198	1.81	.07
Promotion	-.14	.04	198	-2.06	.04
- R^2 for Level 1 predictors = .03; R^2 for Level 2 predictors = .33					

Overall, all of these mediation tests and indirect effect tests suggest that both prevention and promotion do indeed play an important process role as both were found to

carry indirect effects from antecedents to performance outcomes. These results will be revisited in the discussion section.

Person-by-Situation Interaction Tests. Two cross-level interactions were hypothesized (i.e., H14 & H15). However these two expected interactions did not reach significance ($p = .22$; $p = .25$, respectively). Exploratory tests for possible interactions between climate facets and conscientiousness facets revealed no significant interaction effects. However, the majority of interactions seemed to follow the expected pattern of relationships and results are presented below in Table 9 and 10 for prevention and promotion, respectively. Additional data and future research is needed to better evaluate such exciting possibilities.

Table 13.

Interaction Results for Prevention

Variable	Estimate	*SE*	*df*	*t* – test	*p-value*
Safety Climate*Dependability					
(intercept)	-.44	1.86	198	-.23	.81
Safety Climate	1.04	.54	49	1.92	.06
Dependability	.84	.45	198	1.85	.06
Safety Climate* Dependability	-.15	.12	198	-1.22	.22
Safety Climate*Achievement					
(intercept)	-1.25	2.12	198	-.59	.55
Safety Climate	1.25	.62	49	2.01	.04
Achievement	.91	.52	198	1.75	.08
Safety Climate* Achievement	-.17	.15	198	-1.13	.26
Production Climate*Dependability					
(intercept)	6.97	1.75	198	3.97	.00
Production Climate	-1.41	.60	49	-2.33	.02
Dependability	-.41	.43	198	-.96	.33
Production Climate *Dependability	.26	.15	198	1.38	.12
Production Climate*Achievement					
(intercept)	7.08	2.09	198	3.38	.00
Production Climate	-1.51	.73	49	-2.06	.04
Achievement	-.29	.51	198	-.57	.56
Production Climate *Achievement	.23	.17	198	1.32	.19

Table 14.

Interaction Results for Promotion

Variable	Estimate	*SE*	*df*	*t* – test	*p-value*
Production Climate*Achievement					
(intercept)	4.16	1.89	198	2.20	.03
Production Climate	-.57	.67	49	-.85	.39
Achievement	-.19	.49	198	-.40	.68
Production Climate *Achievement	.20	.17	198	1.14	.25
Production Climate*Dependability					
(intercept)	4.20	1.32	198	3.16	.00
Production Climate	-.13	.46	49	-.30	.76
Dependability	-.23	.34	198	-.69	.48
Production Climate *Dependability	.09	.12	198	.80	.42
Safety Climate*Dependability					
(intercept)	4.48	1.27	198	3.52	.00
Safety Climate	-.18	.36	49	-.49	.62
Dependability	-.12	.32	198	-.38	.70
Safety Climate* Dependability	.04	.09	198	.46	.64
Safety Climate*Achievement					
(intercept)	1.46	1.92	198	.75	.44
Safety Climate	.31	.56	49	.54	.58
Achievement	.72	.51	198	1.43	.16
Safety Climate* Achievement	-.10	.14	198	-.71	.48

CHAPTER 6

DISCUSSION

By applying an interactionist approach (Cronbach, 1957; Endler, 1977) and following Dekker's (2002) new view of occupational safety, the current study has found that both individual differences and contextual variables play an important and unique role in predicting and explaining why some employees are fast and some are safe. This is also one of the first studies that I know of that has examined a process model (Feldman, 1999; Mischel & Shoda, 1995) of occupational safety, which has helped explain how certain distal individual and organizational characteristics directly and indirectly influence employee safety and task completion rate. Below I revisit the findings of the current study, describe some of the study's limitations, and note avenues for future research to address these limitations and expand on the current findings.

The current study has led to many exciting and sometimes contradictory findings. To begin with, the measures that were developed in the validation study seemed to generalize quite well with this new sample. That is, the psychometric properties were found to be much the same. With the exception of the speed performance measure, all internal consistencies were found to be above the traditional cutoff of .70. However, the speed performance measure barely missed this cutoff (i.e., .69) and I did not think this to be that markedly a difference. The factor structures of the three measures I adapted and developed were found to be the same using a confirmatory approach. Hinkin (1998) has stated that confirming a factor structure is an important step in the development of

organizational surveys. In short, over the two studies, these three measures have met all of Hinkin's (1998) validation steps with much success.

The results of the hypotheses tests were mixed. If this were strictly a numbers game, it seems I hit on 67% of my hypotheses and missed the other 33%. Specifically, I found support for hypotheses 1, 3, 6, 7, 8, 9, 10, 11, 12, (i.e., main effects) and 'qualified' support for hypothesis 13 (i.e., mediation/indirect effects). Supporting the prevention domain of regulatory focus, I found that prevention was positively predicted by safety climate and dependability and that it in turn positively predicted safety performance and negatively predicted speed performance. Likewise, I found additional support for the promotion domain of regulatory focus in that production climate and achievement positively predicted promotion and that it in turn positively predicted speed performance and negatively predicted safety performance.

In support of hypothesis 13, I found that prevention partially mediated the relationships between safety climate and safety performance and fully mediated the relationship between production climate and safety performance. Additionally, indirect effects on safety performance were found for safety climate, dependability, production climate, and achievement via a prevention focus as well as indirect effects on speed performance from safety climate, dependability, production climate, and achievement. I also found support for mediating and indirect effects via promotion between production climate and speed performance and between achievement and speed performance as well as indirect effects for production climate and achievement on safety performance. I did not find any mediating or indirect effects for promotion with regards to safety climate or dependability. These results provide good support for Higgins' (1997) proposed

antecedents and behavioral outcomes of prevention and promotion as well as Kanfer's (1990) suggestion that distal constructs relate to performance and outcomes through more proximal regulatory processes.

I did not find support for hypotheses 2, 4, and 5. Theoretically this is quite interesting. Higgins (1997) as well as Kluger et al., (2000) have stated that prevention and promotion are orthogonal constructs and support for this has been shown in previous research (e.g., Higgins, et al., 2001) and in the current study (r = -.06). Yet, as noted by Kluger et al. (2000), proposed antecedents of prevention and promotion negatively relate to each other. This was the case for the climate facets and Higgins (1997) has stated that while these antecedents negatively relate to each other, they "have distinct relations with promotion focus and prevention focus" (p. 1282). This tends to suggest that conflicting antecedents do not negatively influence one's focus. However, this would not explain the negative relationship between production climate and prevention or the positive relationship achievement shares with prevention. Expectancy theory (Vroom, 1964) might help clarify the negative relationship between production climate and prevention. Perhaps in a work environment, employees hold self expectations to produce because in essence that is why they are there; to produce. This could dissuade a prevention focus, which may be perceived to reduce output. This line of reasoning could also help explain the null relationship between safety climate and promotion. That is, it could be that safety climate only promotes a prevention focus, but does not dissuade a promotion focus due to overriding self expectations. Future research is needed to test this theoretical reasoning.

Another seemingly contradictory finding was the positive relationship between achievement and prevention. However, upon further review, a prevention focus falls into

the larger approach domain (Higgins, et al., 1994) and should be concerned with achievement, but perhaps not as strongly as a promotion focus. Support for this post-hoc evaluation can be found in Table 2 and 3 where achievement was more strongly related to promotion than prevention.

Perhaps the most significant findings in the present study were the intermediary roles that prevention and promotion played (i.e., acting as 'carriers' for indirect effects). By testing mediation and subsequent indirect effects, I was able to get more at the process than strictly looking at one-to-one relationships. Previous work on the relationship between conscientiousness and safety performance has found conflicting results. Some researchers have found no relationship (e.g., Fallon et al., 2000) where as others have found a significant and negative relationship with unsafe behaviors (e.g., Wallace & Vodanovich, 2003b). In the current study, there were no direct relationships between the two facets of conscientiousness and safety performance or speed performance, but there were indirect effects. By using process models we might be better able to rectify some of the contradictory findings of previous research as it appears that distal individual differences do indeed relate to performance via regulatory processes.

Safety climate has repeatedly been shown to positively relate to safety performance. I replicated this finding and extended it by demonstrating that some of the effects of safety climate are transmitted to safety performance via prevention focus. This lends further credence to the assertion I made in the introduction regarding Zohar's (2002b) finding that safety improved when leaders communicated safety issues to subordinates and this could have been accomplished by the leaders creating a prevention focus in their subordinates. While I cannot concretely answer this assertion, my results

lend a great deal of support. Only future research will be able to definitively address this assertion.

On a related note, it might also be that additional mediators exist that transmit some of the remaining effects of safety climate on safety performance not captured by prevention focus. Literature on cognitive interference/breakdown (Kanfer & Ackerman, 1996, Sarason, 1975) suggests that anxiety and worry about current performance and off-task concerns can disrupt attention and impede task execution and performance. Perhaps anxiety is reduced when supervisors stress safety and concern for employees, which might ultimately reduce the dispersion of resources between on and off task processes. This might allow employees to more fully devote resources towards task accomplishment rather than aimlessly worrying about supervisor expectations (cf. Sarason, 1975; Wallace & Chen, 2002). It would be beneficial to include 'off-task' regulatory processes into the current theoretical model to expand on the current findings.

Similarly, promotion was found to be a carrier of production climate's effects to speed and safety performance as well as carry the effects achievement to speed and safety performance. The lack of a direct relationship between production climate and speed performance was a bit surprising, but by following the suggestions of Kanfer (1990; 1992) and looking at distal-proximal-performance relationships, I found indirect relationships via regulatory focus.

If the mediation/indirect effect results were the most exciting, the most disappointing results were the lack of interactions. Out of curiosity, I plotted all the tested interactions and they seemed to be in the expected direction, but never reached

significance. There are several possible reasons for these non-significant results and the most obvious is lack of power.

Moderated multiple regression tests are notoriously low on power (McClleland & Judd, 1993). One of the possible reasons for lack of power might be the small number of groups. Cohen's power tables (1988), with power set at .80 and $\alpha = .05$, suggests that the required sample size for a large effect (.35) is 26, for a moderate effect (.15) is 55, and for a small effect (.02) is 392 (Aiken & West, 1991). I was expecting a medium effect, but one caveat of these requirements is the assumption of no measurement error. Effect sizes drop as measurement error increases and subsequently, the sample required to detect the effect increases. For example, if the reliability drops from 1.0 to .80 the effect size is reduced by half and the necessary sample therefore needs to be doubled in order to have enough power to reach the same conclusions under the condition of no measurement error (Aiken & West, 1991). This suggests that under the current conditions I would need a larger sample of groups to detect the interactions (e.g., > 100) and perhaps this is the simplest solution. Another possibility might be to investigate these interactions in the lab in order to increase efficiency by using extreme group designs (McClleland & Judd, 1993). Regardless, I do believe that such interactions are a possibility.

Several interesting findings emerged between all of the 'facet-like' constructs in this study. That is, all of the constructs in the study can be considered approach-type constructs when considering the larger approach and avoid domains (Carver & Scheir, 1981), but differ in how or what they approach. Sometimes like constructs were supportive or complimentary of each other (achievement & dependability) or conflicting with each other (safety v. production climate). Achievement and dependability are

general trait approach constructs, are positively related to each other, and can therefore be considered supportive of each other. Production climate and safety climate were conceptualized as competing climates and thus a negative relationship, whereas prevention and promotion were operationalized as independent. The performance domains were considered to be separate performance domains and a small negative relationships was found between them. This could have been expected because the work completed in this sample is inherently dangerous and in such an environment it is difficult to be fast and safe[5] (Forster et al., 2003; Pate-Cornell, 1990). Similar to prevention and promotion, these results suggest that in the larger approach domain (i.e., discrepancy reducing), different approach and avoid strategies (safely, quickly) can be employed in the service of larger approach goals (complete tasks).

These differences might have also affected some of the results due to the different pattern of correlations among 'like-facets'. The mediation analyses could have been affected due to indirect effects having opposite signs than the direct effects (Smith et al., 1992). For example, the direct effect of achievement on speed performance was .03 (ns), but the indirect effect was -.05 ($p < .05$). Such a scenario might lead to the effects 'canceling each other out' and therefore the lack of a significant direct relationship and failure of mediation. Perhaps future technologies will allow for this model to be tested using multilevel structural equation modeling, which might alleviate these issues.

Practical Implications

[5] The performance ratings in the pilot study were moderately correlated ($r = .37$) but this was most likely due to self-report bias (i.e., employees believed that they were both fast & safe) and/or easier work. In this study supervisors rated performance.

There are several practical implications that can be derived from the results of the current study. Forster et al. (2003) claimed that if a task or job is easy and/or safety is not an overriding concern, tasks could be framed in terms of gains and non-gains (i.e., a promotion focus). Performance might be maximized in such a work context where safety is not a concern. However, if safety is a concern in a task or job, then accuracy and safety is crucial for optimal productivity and the task and/or job should be framed in terms of non-loss/loss (i.e., prevention). While Forster et al. arrived at this conclusion using simple laboratory tasks, I have reach the same conclusion using real employees in jobs where safety is a major concern (i.e., 92.8% of participants reported that safety was a concern). Therefore, employers might reap more benefits (i.e., higher production, fewer accidents) if jobs that are relatively easy and routine are framed in promotion terms (i.e., gains & non-gains) and those jobs that are complex and dynamic, such as in the current study, are framed in prevention terms (i.e., non-losses & losses).

Depending on the job, supervisor training aimed at prevention and promotion focus might allow organizations to improve their accident rates and production/task completion rates. For example, for organizations experiencing safety issues (e.g., poor safety performance, high accident rate) one might train supervisors to instill a higher and stronger safety climate (i.e., communicate safety procedures & increase the salience of possible negative outcomes) that would in turn produce a prevention focus. Likewise, in organizations where safety is not a concern, it might be possible to train supervisors to communicate production procedures and goals in an effort to instill a promotion focus and ultimately increase the speed at which tasks are completed. Future lab and field

research is needed to assess these manipulations and see if expected outcomes are affected (e.g., accidents, production).

As stated in the literature review, it might also be possible to select for certain individual characteristics that lead to a desired focus. Of the two in the current study, it appears that dependability leads to a prevention focus, but achievement leads to both a prevention and promotion focus. Thus, for those organizations that deal in volatile work (e.g., chemical production, nuclear power) or work that deals with public safety (e.g., bus driver) it might be beneficial to select for highly dependable persons. Such highly dependable persons are organized and tend to follow standard operating procedures and should ultimately approach and focus on tasks in a safer manner than those that are unorganized and sloppy. Achievement could be selected for where safety is not an overriding concern. By integrating both the selection and training approach, organizations could possibly maximize the effectiveness of type of focus and possibly associated outcomes as well. However, since this is the only study that I am aware of to investigate and find these results, I would caution practitioners on implementation until further research has replicated these results. Thus, these results should be treated as tentative until confirmation has been reached.

Limitations of the Study

As with any study, there were limitations. One of which is the reliance on concurrent performance ratings. While the ratings were collected 1-3 weeks after employees completed their measures, this did not allow for a truly predictive study. This limits the causal inferences drawn from the study, because regulatory focus was not manipulated and just barely preceded the measurement of safety performance and speed

performance. Longitudinal and experimental replications would help increase the validity of our findings. However, this is substantial step over many studies that have relied upon self-report of safety ratings, even with many authors suggesting these ratings to be better (e.g., Barling et al., 2002).

On a related note, stronger inferences could have been drawn if there had been a time lag between data collection for personality and climate facets and regulatory focus. That is, personality and climate only concurrently predicted regulatory focus. If these measures had been spaced out by time stronger inferences could have been made.

As noted above, these results should be treated as tentative until future research can replicate these results. Another limitation related to this point, is the reliance on one sample. While the validation study demonstrated some generalizability, participants in that study were distributed across many organizations and geographic regions. It would be beneficial to examine these relationships in a similar organization where safety is a concern as well as an organization where safety is not an overriding concern.

Lastly and as previously discussed, power might have been less than desirable to find the hypothesized interactions. While many of the expected relationships were found, it is believed that the low number of groups is the primary reason the cross-level person*situation interactions were not found.

Future Research

Perhaps the most pressing issue that directly relates to the current study is the need of future research to gain additional data to more fully evaluate the cross-level interactions that I believe to be influential in predicting promotion and prevention. Aside

from that endeavor, there are also numerous possibilities for future research and I will discuss many of these below.

To further validate prevention and promotion, hard accident and production data are needed. This would allow organizational researchers to better evaluate the benefits of each type of foci. Based on the findings in the present study and previous work, I would expect prevention to negatively relate to accidents and promotion to strongly and positively relate to production. Additionally, I would expect prevention to moderately relate to production. Ideally, I would have liked to collect these data for the current study, but to ensure enough variability in accidents I would need to have waited for several months (> 12 months). Similarly, how would performance ratings predict outcomes? I would expect safety performance to predict accidents and speed or productivity ratings to predict production. It would be quite interesting to see if productivity ratings positively predicted accidents and safety ratings positively predicted production.

Another possible avenue for research would be to investigate the relative effects of the higher order personality construct of conscientiousness and those of the facets. If 'big C' is a better predictor of promotion and prevention, then perhaps it should be the choice of researchers and not the more specific facets. However, I would not expect this to be the case. Previous work (e.g., Moon, 2002) has found support for the facets as has this study. Regardless, this needs to be tested and documented.

Building off of the validation study, it would be quite interesting to investigate the peg that regulatory focus might fit in the larger goal-choice/goal-striving process. The validation study has demonstrated that regulatory focus is independent of goal-orientation and that both prevention and promotion are approach constructs. Additional support is

provided by Lee, Sheldon, and Turban (2003). They have demonstrated that goal orientation predicts one's mental focus. Specifically, they found that learning goal orientation and performance prove positively predicted mental focus while avoid negatively predicted mental focus. While these relationships were quite weak, the study places regulatory focus in the goal striving domain after goal orientation, which suggest that one's goal orientation leads to one's regulatory focus. A logical next step would be to investigate such a model using regulatory focus (i.e., prevention & promotion) and not solely on one's general mental focus (did you focus on the task or not).

I would also recommend that future research go back to the lab. It would be quite beneficial for researchers to manipulate climate and see how such manipulations influence one's regulatory focus. Similarly, it might prove useful to manipulate leadership as it has been proposed and shown to lead to climate development (cf., Hofmann & Morgeson, 1999; Wallace, Popp, & Mondore, 2004; Zohar, 2002b). Lab studies such as these should also allow researchers to better uncover those illusive cross-level interactions.

Lastly, I would encourage researchers to cross-validate all of these findings in additional samples. Ideally, these studies would include samples in which safety is a concern and safety is not a concern. This will allow organizational researchers to more fully understand the processes involved in the time old tradeoff of working fast and working safe.

Conclusion

A multitude of research has examined several antecedents of occupational safety, but very limited work has attempted to examine why or how such relationships exist.

This dissertation attempted to do just that by integrating regulatory focus theory into a cross-level process model. This research supports the notion that aspects of self-regulation are more proximal to performance and mediate (directly and/or indirectly) distal-performance relationship. Especially interesting in this study is the finding the regulatory processes are more proximal to safety performance and speed performance than either individual characteristics or group characteristics. This is important, because it has allowed and will continue to allow for greater integration among theories of work motivation, occupational safety, individuals, and work groups. These results show initial promise for both training and selection for improving (1) organizational safety and (2) organizational productivity. I encourage researchers to use this study as a stepping stone to gain further insight into the tradeoff between work safety and work speed in an effort to improve worker safety and organizational effectiveness.

APPENDIX A: PILOT STUDY

Validation Study

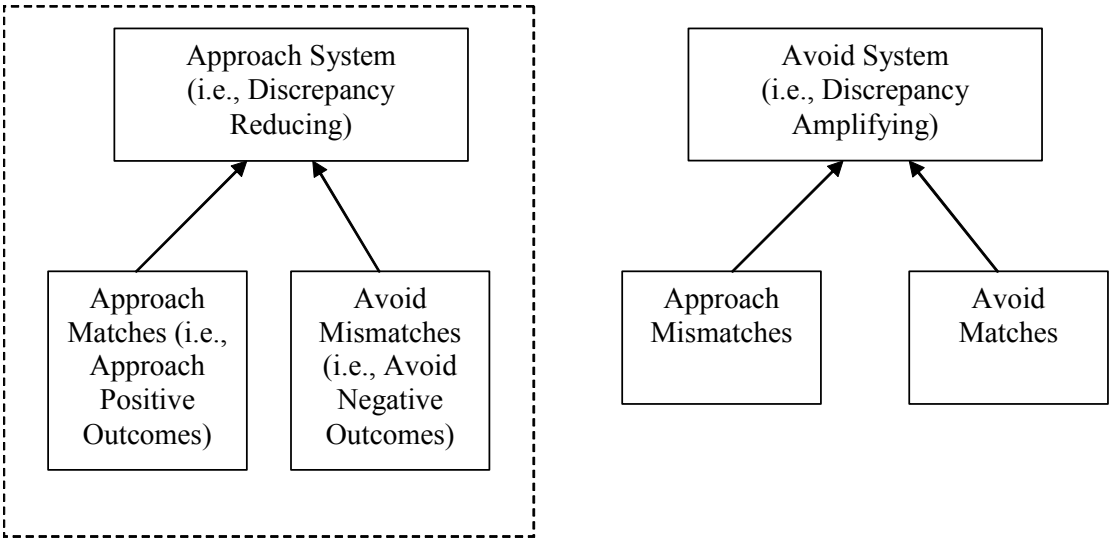
This report is designed to convey the development and validation of three measures I will use in my larger dissertation project. Specifically, I developed and validated measures of regulatory focus (i.e., promotion focus & prevention focus), climate (i.e., safety & production climate), and performance (i.e., safety performance & speed performance). Below I outline the necessity of this work by construct followed by the methods employed and the results that were obtained.

Regulatory Focus Validation

As described in my dissertation, regulatory focus theory delineates between two forms of goal pursuit that vary in the focus of regulatory activities and desired outcomes. On the one hand a person might employ a promotion focus strategy thereby tending to focus on those things that will lead to desired outcomes representing accomplishments and gains. On the other hand, one might employ a prevention focus strategy that will lead to desired outcomes such as personal safety. Higgins (1997) and Forster et al. (2003) have proposed that regulatory focus is a strategic tendency or concern that influences how persons approach and strive for desired outcomes. A strategic concern or strategy "refers to a pattern of decisions in the acquisition, retention, and utilization of information that serves to meet certain objectives (i.e., to insure certain forms of outcome and to insure against others"; Bruner, Goodnow, & Austin, 1956, p. 54). Therefore, regulatory focus is a cognitively based focus that drives behaviors towards desired outcomes and away form undesired outcomes.

Higgins, Roney, Crowe, & Hymes (1994) have suggested that RFT is an approach type of construct when focusing on the larger approach and avoid systems (Carver &

Scheir, 1981). More specifically, they suggested that promotion is more in tune with approach-approach (i.e., desire to approach the task & complete the task by approaching means necessary to accomplish the task) and prevention is more in tune with approach-avoid (i.e., approach task and complete by avoiding those things that may deter successful task execution). Both promotion and prevention desire to reduce the discrepancy between the current state and the end state, hence the overall approach domain, but the manner in which they complete a task differs. Thus, different approach and avoidance strategies can be used in the service of the same general approach system. The figure below pictorially displays the overall approach and avoid systems.



Numerous studies have examined regulatory focus but most have relied on manipulations to induce one focus or the other. A few studies have been conducted that measure regulatory focus with a short questionnaire (e.g., Higgins, Friedman, Harlow, Idson, Ayduk, & Taylor, 2001). However, this measure was developed to assess a stable individual difference variable and is not suited to assess the constructs in a work-oriented

environment. This type of measure was needed in the current study due to the focus on employee behavior and how one focuses on his or her work.

To validate this measure (and all other measures), I followed Hinkin's (1998) organizational measure development plan. This plan is laid out in detail in the main portion of this dissertation (see p. 41-43). In short, I needed to create items based on the content domain, explore the psychometrics of the scale (e.g., internal consistency, factor analysis) and demonstrate construct validity. To gain construct validity I assessed the following nomological network of associations.

Nomological Network for Regulatory Focus

All expected relationships can be seen in Table 1 below. I describe these expectations below by construct.

Table 1. Expectations for regulatory focus construct validation

Constructs:	Promotion	Prevention
Learning goal	+	+
Performance approach	++	+
Performance avoid	-	--
RFT – Promotion	++	+
RFT – Prevention	+	++
On Task	++	+
Off Task	-	--
Neg Affect	-	-
Safety Performance	+	++
Speed Performance	++	+
Safety Climate	-	+
Production Climate	+	-

Goal Orientation

While RFT appears to be similar to goal orientation (Dweck & Leggett, 1988; Elliot & Dweck, 1988; Vandewalle, 1997) it differs from goal orientation because the

focus of RFT is on obtaining desired outcomes by focusing on certain aspects of the task in order to attain desired outcomes; not how or if they approach or avoid the goal or task. Any goal can be pursued with either a promotion or prevention strategy and therefore Higgins (1997) and Forster et al. (2003) have concluded that regulatory focus is independent of goal orientation. Initial empirical support has been provided by Lee, Sheldon, and Turban (2003). They have shown that goal orientation predicts one's mental focus (i.e., degree to which someone is able to concentrate on an activity). Specifically, they found that learning goal orientation and performance prove positively predicted mental focus while avoid negatively predicted mental focus. These relationship were all weak and perhaps by differentiating between 'types of mental focus' (i.e., promotion & prevention) one might be better able to capture these relationships and place regulatory focus in a larger nomological network of associations. Based on these findings and the theoretical suggestions by Higgins (1997) and Forster et al (2003), I expect positive relationships between learning goal orientation, performance prove goal orientation and promotion and prevention, but negative relationships between performance avoid and promotion and prevention.

With respect to a performance prove goal I expect that a stronger positive relationship will emerge between promotion and performance prove rather than between prevention and performance prove. This is due to the belief that promotion focus persons desire to get ahead and gain a lot. This is similar to the orientation of a performance prove person in that they desire to demonstrate competence (VandeWalle, 1997), in part by accomplishing tasks. In other words, both can be conceptualized as approach-approach constructs and thus the stronger relationship.

With regard to performance avoid, a desire on avoiding negation of one's competence, I expect negative relationships due to such an individual's tendency or desire to escape task engagement, possess high levels of anxiety, and withdraw effort from task engagement. Neither a promotion or prevention focus can be captured by avoiding the task or reducing effort and thus the expectation of negative relationships. However, a stronger negative relationship might be found between prevention and performance avoid due to avoiding nature of the constructs, albeit avoiding different things (i.e., performance avoid avoiding the task & prevention avoiding mismatches to task completion).

On & Off Task Effort

Both promotion and prevention fall into the larger approach domain (Higgins, 1997). Thus, they are focusing on completing the task and devoting resources towards task accomplishment. However, the direction of resource allocation differs. When applying a promotion strategy, resources are directed to gain positive outcomes during task completion (i.e., resources are directed towards those things that will maximize gains). When applying a prevention strategy, resources are directed to avoid negative outcomes and obstacles to ensure task completion (i.e., focusing on those aspects of the task to ensure safety & non-losses). Thus, I expect positive relationships between on task effort and promotion and prevention. However, based on the different foci of resource allocation, I expect on task effort to be more strongly related to promotion than prevention. The reverse pattern of relationships is expected with regards to off task effort.

Trait-Like Regulatory Focus

Due to the nature of the regulatory focus, I expect stronger positive relationships between like constructs (i.e., trait-like promotion and promotion strategy, trait-like prevention and prevention strategy) rather than opposing constructs.

Negative Affect

Negative Affect is a general dimension of subjective distress and unpleasurable engagement that subsumes a variety of aversive states, including anger, contempt, disgust, guilt, fear, and nervousness" (Watson, Clark, & Tellegen, 1988, p. 1063). Accordingly, such persons divide resources between off-task cognitions such as worry and on-task behaviors whereas those with more positive affect tend to focus more fully on task-relevant stimuli by not dividing their resources (Sarason, 1975). As such, regulation deficits result from attention being allocated to off-task behaviors and not to task engagement (Mikulincer, 1989). Therefore I expect both prevention and promotion to be negatively related to negative affect.

Climate

As discussed at length in the literature review of the dissertation, I expect safety climate to positively relate to prevention and negatively relate to promotion. I expect the reverse pattern of relationships among production climate and prevention and promotion. However, results with regard to climate, should be interpreted as psychological climate (i.e., individual perceptions of climate, not group climate). Due to the nature of data collection, I was not able to aggregate this data. The larger portion of the dissertation will enable me to accurately assess climate as a group level construct.

Performance

Again, as discussed in detail in the literature review of the dissertation, I expect a prevention focus to positively relate to safety performance. Likewise, I expect a promotion focus to positively relate to speed performance (i.e., how much and how quickly tasks are completed). I expected negative relationships between prevention and speed and promotion and safety.

Climate Validation

The other predictor measures I needed to validate were my measures of climate; specifically, safety climate and production climate. The safety climate measure has been validated in prior research (Zohar, 2000), but the measure of production climate is new. Thus, I needed to demonstrate these climates were distinct from each other as well as show differential relationships with leadership behaviors. The expected pattern of relationships to be tested can be seen in Table 2.

Table 2. Expectations for climate construct validation

Constructs	Safety Climate	Production Climate
Consideration	+	-
Initiating Structure	+	-
Safety Performance	++	0
Speed Performance	0	++

Nomological Network for Climate

Safety Climate "relates to shared perceptions with regard to safety policies procedures, and practices" (Zohar, 2002, p. 125). Safety climate is not concerned with formal policies and procedures, which are usually explicit, but rather enforced (i.e., informal) practices. Employees usually follow the enacted or policy-in-action practices

required by supervisors and not the formal policies, procedures, and practices requested by the organization as a whole. Thus, safety climate needs to be assessed in the functional role rather than the formal role. The same can be said for other climate facets as well (e.g., production climate). *Enforced* safety policies, procedures, and practices reflect the relative priorities of the unit of analysis regarding safety and might fluctuate based on productivity. Additionally, such policies, procedures, and practices rely on supervisory input to create a sort of ambient stimuli (Hackman, 1992) and one might confuse such practices with group leadership.

Leadership

Zohar (2000) has discussed the distinction between supervisory practices, such as climate, and group leadership. Leadership perceptions relate to stable behavioral attributes that are invariant across tasks whereas climate perceptions relate to the relative emphasis or priority of tasks. Zohar claimed that "climate and leadership are qualitatively different constructs, relating to independent dimensions of supervisory behavior" (p. 590). Zohar, has demonstrated that certain leadership styles relate to safety climate when the exchange between supervisor and employee is perceived as positive. For example, transformational leadership has been shown to positively relate to safety climate (Zohar, 2002, Barling, Loughlin, & Kelloway, 2002). Other leadership styles have not been thoroughly investigated, but offer an opportunity to validate Zohar's (2000) claim. It seems fruitful to revisit the Ohio State leadership studies to demonstrate Zohar's claim by examining the relationship safety climate and production climate share with leadership styles of consideration and initiating structure. Consideration is the degree to which a leader shows concern and respect to his or her employees as well as being respectful and

appreciative of efforts. Initiating structure is the degree to which a supervisors defines employee roles and expectations (Fleishman, 1973).

Social exchange theory (Blau, 1964) suggests that an implicit obligation for future reciprocity develops when one party (e.g., leader) benefits another party (e.g., employee) and this relationship strengthens over time. In the safety climate literature social exchange theory seems to be highly relevant as numerous researchers (e.g., Zohar, 1980, 2000; Hoffman & Morgeson, 1999; Mueller, DaSilva, Townsend, & Tetrick, 1998) have stated that management's commitment to safety and one's demonstration of such values is a major factor that affects worker safety and ultimately the success of any safety initiative. Following the social exchange theory (Blau, 1964) it seems that the more concern and better interaction the better the safety climate.

Both consideration and initiating structure leadership styles can be conceptualized as positive leadership styles. A recent meta-analytic study demonstrated that both styles positively related to group performance, satisfaction with leader, follower job satisfaction, and follower motivation (Judge, Piccolo, & Illies, in press) Thus, it seems that both styles demonstrate concern and should therefore positively relate to safety climate. While the concern coupled with consideration is obvious, the concern coupled with initiating structure is less obvious and is focused more on the work rather than the person. Regardless, both styles demonstrate stable patterns of concern and positive exchange relationships. Thus, I expect positive relationships between consideration, structure, and safety climate. However, I expect negative relationships between production climate and these two leadership styles because production climate stresses

work completion at the cost of personal concern, safety, and generally poor exchanges take place (e.g., I don't care just get the work done). There is no reciprocal relationship.

Performance

In the larger dissertation I discuss the relationships expected between safety climate and safety performance, as well as empirical support for this relationship. Therefore, I expect a positive relationship between safety climate and safety performance. Likewise, I expect a positive relationship between production climate and speed performance.

Method

Participants

All participants were recruited from a web based panel of participants. StudyResponse.org is a web site devoted to connecting behavioral researchers to participants for survey administration. There are almost 40,000 registered participants with numerous occupational groups to choose from for a nominal fee. For the current study I sampled 1000 employees in three occupational groups: (1) transportation/warehousing, (2) Construction/Mining, & (3) Agriculture/Forestry/Fishing. These occupations were chosen as they have historically been labeled as dangerous and demanding jobs. A return rate of 25% was obtained, but 38 of the surveys were not complete giving me a total useable sample of 212. This return rate is not uncommon using this panel. The average age was 38.9 (SD = 10.0) with 110 females, 99 males, and 3 not reported. The average tenure in the current position was 11.3 months (SD=8.1). Additionally, 78% of the sample claimed safety was a major issue in their daily work.

Measures

Measures used in the current report can be found in the Measure Appendix.

Regulatory Focus

Twenty-one items were written to assess regulatory focus: 10 items for prevention and 11 items for promotion. Items were written based on the content domain of each focus. Initial content validation by subject matter experts (15 I/O graduate students & 3 PhD I/O Psychologists) revealed no poor items. Content validation consisted of sorting items based on construct definitions.

Goal Orientation

Vandewalle's (1997) goal orientation measure was used. It contains three factors: learning goal orientation (5 items), performance prove goal orientation (4 items), and performance avoid goal orientation (4 items).

On and Off Task Effort

Kanfer, Ackerman, Murtha, & Dugdale's (1994) measure of on and off task effort was used. Items were reworded to reflect general job tasks rather than specific tasks required by an air traffic controller. I used 8 on task items and 6 off task items.

Trait-Like Regulatory Focus

An 11 item scale designed by Higgins et al., (2001) was used to assess trait-like regulatory focus. The scale inquires about childhood and developmental experiences that might have helped shaped one's focus to prevention or promotion. The scale has been shown to be reliable is previous work with 5 items representing promotion and 6 items for prevention

Negative Affect

Negative affect was assessed using the markers of negative affect from the Positive Affect Negative Affect Schedule (PANAS; Watson et al., 1988). It consists of 10-items inquiring about the frequency of negative feelings experienced while at work

Performance

Two measures of performance were developed: safety performance and speed performance. The measure of safety performance used was adapted from Hofmann and Stetzor's (1996) general safety scale and general items from Burke, Sarpy, Tesluk, & Smith-Crowe's (2002) scale. Both previous scales had been well validated. I felt items from both scales could be combined to arrive at a better general safety performance measure. The safety performance measure contains 7 items. Speed performance items were written to reflect how quickly employees complete tasks and how many tasks they complete. The scale contains 6 items. To ascertain distinct performance measures, I will examine the factor structure of these scales as well. Content validity has already been gained using the same sample of SMEs as for regulatory focus. No items failed to meet the 75% cutoff.

Climate

Two measures of climate were developed by adapting previous measures. Specifically I adapted Zohar's (2000) safety climate measure and developed a production climate measure. This left me with 8 safety climate items and 10 production climate items. For the production climate items I intentionally over sampled the content domain in hopes of reducing the scale via factor analysis. Content validity has already been gained using the same sample of SMEs as for regulatory focus and performance. No items failed to meet the 75% cutoff.

Leadership Behaviors.

The Leadership Behavior Description Questionnaire (LBDQ; Stogdill, 1963) contains 40 items with two factors: Consideration and Initiating Structure.

Procedure

All measures were located on a web page were participants could complete the measures at their leisure after receiving a recruitment e-mail. Once the measures were completed the participant submitted their responses. All data was loaded into SPSS directly and recoded as needed automatically.

Data Analysis Plan

For this initial validation, I desired to cover four of Hinkin's (1998) steps. Step one (i.e., content validity) has already been completed. The next step is initial item reduction via internal consistency analysis. After which I will explore the factor structure. Initially, I will examine the scree plots associated with each factor analysis as well as factors with large eigenvalues (> 1) using a principle components analysis. After examining the unrotated factor structure I will examine the structure using a varimax rotation. I will remove any item that fails to load greater than .40 or any item that cross-loads greater than .40. Ideally, this will leave me with support for the factor structure of each measure. Once I have reached a simple structure I will reexamine the internal consistency of each scale to ascertain if it is at least .70 or greater. The next step will be to examine the nomological network of associations proposed above.

Results

Internal Consistency

All developed scales possessed adequate internal consistencies with the exception of the production climate scale (α=.61). Three items had poor item-total correlations and were dropped resulting in a much improved internal consistency value (α=.83). All values were again computed after the factor analyses and can be found in the correlation table (Table 8).

Exploratory Factor Analyses

Regulatory Focus

The factor analysis identified 5 factors for regulatory focus (i.e., eigenvalues > 1.0), but two of the factors had very large eigenvalues (i.e., >3.5) while the other three had eigenvalues less than 2. Additionally, when examining the scree plot it appeared that the three smaller factors were in the scree (i.e., rocks at the bottom) while the two larger factors were not. Therefore, I decided to request a two factor solution using a varimax rotation. This analysis left me with two clean factors accounting for a total of 48% of the variance. The first factor accounted for 25% of the variance and the second factor accounted for 23% of the variance. Loadings for these factors can be found in Table 3. All items loaded on the correct scale and there were no high cross loadings or negative loadings. Therefore, I retained all items.

Table 3. Regulatory Focus Factor Analysis

Items	Prevention	Promotion
1.	**.68**	-.04
2.	**.63**	.25
3.	**.62**	.08
4.	**.64**	.25
5.	**.68**	.03
6.	**.64**	.22
7.	**.67**	.05
8.	**.59**	.27
9.	**.69**	-.13
10.	**.69**	-.06
11.	**.61**	.32
12.	.18	**.65**
13.	.19	**.73**
14.	.05	**.57**
15.	-.07	**.85**
16.	-.02	**.82**
17.	.01	**.69**
18.	.10	**.62**
19.	.26	**.66**
20.	.12	**.57**
21.	.06	**.73**

Climate

The unrotated solution suggested a two factor solution. Much like the regulatory focus analysis there were two large factors and one small factor. I decided to request a two factor solution using varimax rotation. This analysis yielded a clean structure for safety but not for production climate. Several production climate items had high cross-loadings and were subsequently dropped. This left me with 5 production climate items and 7 safety climate items. I again ran the factor analysis with the revised items and this analysis yielded a much cleaner solution. This solution accounted for 60% of the variance with safety climate accounting for 36% and production climate accounting for 24%. The item loadings for this solution are presented in Table 4.

Table 4. Climate Factor Analysis

Items	Safety Climate	Production Climate
1.	**.82**	-.07
2.	**.82**	-.02
3.	**.81**	-.01
4.	**.75**	.16
5.	**.76**	.21
6.	**.68**	-.21
7.	**.69**	-.18
8.	.17	**.73**
9.	.04	**.81**
10.	.01	**.82**
11.	-.18	**.79**
12.	-.08	**.48**

Performance

Similar to the previous factor analyses, two larger factors emerged with a smaller third factor. Thus, I requested a two factor solution with a varimax rotation. This yielded a solution with a few cross-loadings. I removed these items and reanalyzed the factor

structure. This yielded a clean structure accounting for 67% of the variance with safety performance accounting for 43% and speed performance accounting for 24% (see table 5 for item loadings).

Table 5. Performance Factor Analysis

Items	Safety Performance	Speed Performance
2.	**.57**	.06
3.	**.76**	.23
4.	**.91**	.15
5.	**.93**	.15
6.	**.91**	18
7.	**.86**	.08
9.	.16	**.82**
10.	.11	**.92**
11.	.06	**.78**
12.	.21	**.67**
14.	.34	**.59**

Nomological Network of Associations

The nomological network of associations supported the majority of relationships that were expected. All correlations, descriptives, and internal consistencies are presented in Table 8.

Regulatory Focus

Table 6 contains the pattern of correlations with regard to the expectations.

Table 6. Expectations and results of regulatory focus construct validation

	Promotion		Prevention	
Constructs:	Expectations	Results	Expectations	Results
Learning goal	+	.40*	+	.28*
Performance prove	++	.37*	+	.08
Performance avoid	-	-.03	--	-.18*
RFT – Promotion	++	.18*	+	.06
RFT – Prevention	+	.06	++	.04
On Task	++	.67*	+	.39*
Off Task	-	-.01	--	- .14*
Neg Affect	-	-.11	-	-.30*
Safety Performance	+	.04	++	.42*
Speed Performance	++	.46*	+	.24*
Safety Climate	-	.13	+	.21*
Production Climate	+	.14*	-	.09

Note. Double signs (e.g., ++) are compared to the opposing relationships. For example, it was expected that the positive relationship would be stronger for promotion and performance prove than prevention and performance prove.

Goal Orientation

Positive relationships were found between learning goal orientation and both promotion (r =.40) and prevention (r =.28) focus as expected. Promotion was found to be positively related to performance prove (r =.37), as expected, but not significantly related to performance avoid (r =-.03). Prevention was found to be negatively related to performance avoid (r =-.18), as expected, but not to performance prove (r =.08). The results tend to support the approach-approach aspect of promotion focus and the approach-avoid aspect of prevention focus. These results go a long way in distinguishing regulatory focus from goal orientation and are the first results to empirically demonstrate these relationships.

Trait Regulatory Focus

Relationships with Higgins' measures of regulatory focus were not as clean as one would expect. I expected strong positive relationships between like factors, but this was not the case. There was only one significant relationship and that was between promotion factors (r =.18). Perhaps these results are due to the vast differences in the measures. Higgins' measures pertain to childhood experience and developmental paths whereas my measure relates to how one focuses resources during task and work engagement. Additionally, it appears that my new measure better relates to constructs expected to relate to promotion and prevention than Higgins' measures. For example, Higgins' prevention only related to safety performance and while this is noteworthy, the relationship was small (r =.15). Promotion on the other hand tended to relate to a great deal more. Interestingly, it related to safety performance and speed performance in about the same magnitude. One would expect promotion to be more strongly related to speed

performance than safety performance. Therefore, it seems that this measure is not well suited to capture work related behaviors.

On and Off Task Effort

Promotion was found to be strongly related to on task effort (r =.67) as was prevention (r =.39). On the other hand only prevention had a negative relationship with off task effort (r =-.14) while promotion did not. This further strengthens the argument that prevention fits into the approach-avoid domain, while promotion fits into the approach-approach domain.

Negative Affect

Negative Affect was only found to significantly relate to prevention (r =-.30). The relationship between promotion and negative affect was only marginally significant, but quite weak (r =-.11). Again, this lends support for the approach-approach dominion of promotion and approach-avoid dominion of prevention.

Performance

Most interesting were the relationships with performance measures. While they were self-report, self-reports of safety performance have been shown to be highly related to supervisory reports of safety performance (Wallace & Vodanovich, 2003). Promotion was strongly related to speed performance (r =.46), while prevention was strongly related to safety performance (r =.42). Additionally, prevention was moderately related to speed performance (r =.24), but no significant relationship was found between promotion and safety performance.

Climate

It was expected that safety climate would positively relate to prevention and negatively relate to promotion. The reverse expectations were presented for production climate. It was found that safety climate related to prevention (r = .21), but did not significantly relate to promotion. On the other hand, production climate related to promotion (r = .14), but did not significantly relate to prevention.

Climate

Table 7 contains the pattern of correlations with regard to the expectations for climate.

Table 7. Expectations and results of climate construct validation

	Safety Climate		Production Climate	
Constructs:	Expectations	Results	Expectations	Results
Consideration	+	.59*	-	-.27*
Initiating Structure	+	.47*	-	-.04
Safety Performance	+	.27*	0	-.09
Speed Performance	0	.02	+	.13†

Leadership Behaviors

The main focus of this portion of the validation was to discriminate climate variables from stable leader behaviors. For the most part this was accomplished. For example, safety climate positively related to consideration (r =.59), initiating structure (r =.47), and safety performance (r = .27), while production climate negatively related to consideration (r = -.27) and marginally related to speed performance (r = .13, p = .06). However, there is a great deal of sharedness between leadership behaviors and safety climate. Social exchange theory might suggest that such steady leadership behaviors lead to a better climate and thus develops a reciprocal relationship between leaders and employees where employees feel obliged to behave in a safe manner. A production

climate is not likely to emerge from positive leadership behaviors (i.e., concern, positive exchanges) and thus the lack of relationships. Perhaps other forms of leadership lead to a production climate, especially those that are not perceived as positive (e.g., laissez-faire, corrective) One must remember that these results only reflect psychological climate, not group climate.

Table 8. Correlations among all variables

Variables	M	SD	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
1. promotion	38.2	6.6	*.88*															
2. prevention	50.2	4.4	.28*	*.86*														
3. L.GO.	25.9	3.6	.40*	.28*	*.78*													
4. P.GO.	16.7	4.7	.37*	.08	.26*	*.83*												
5. A.GO.	10.2	4.9	-.03	-.18*	-.30*	.20*	*.89*											
6.Higgins Promotion	20.9	2.9	.18*	.06	.36*	.01	-.31*	*.60*										
7. Higgins Prevention	14.3	1.7	.06	.04	.08	-.06	.01	.07	*.71*									
8. On-Task	30.5	4.9	.67*	.39*	.40*	.35*	.01	.29*	.05	*.83*								
9. Off-Task	16.8	4.3	-.01	-.14*	-.16*	.23*	.55*	-.36*	-.08	.02	*.73*							
10. Negative Affect	16.1	5.1	-.11	-.30*	-.25*	-.10	.32*	-.21*	-.12	-.15*	.32*	*.86*						
11. Safety Perf.	25.6	4.5	.04	.42*	.13	.01	-.24*	.29*	.15*	.21*	-.28*	-.27*	*.91*					
12. Speed Perf.	15.6	2.5	.46*	.24*	.32*	.12	-.30*	.27*	.09	.36*	-.24	-.12	.37*	*.75*				
13. Consideration	47.5	8.3	.12	.09	.17*	.16*	-.05	.25*	.05	.29*	-.07	-.15*	.14*	.06	*.78*			
14. In. Structure	52.1	9.4	.06	.16*	.01	.09	-.03	.14*	.12	.25*	.01	-.07	.25*	.05	.55*	*.86*		
15. Safety Climate	19.3	5.7	.13	.21*	.14	.04	-.04	.01	-.05	.32*	-.06	-.20*	.27*	.02	.59*	.47*	*.88*	
16. Prod. Climate	16.9	4.2	.14*	.09	-.05	.09	.17*	-.05	.00	.16	.20*	.19*	-.09	.13	-.27*	-.04*	-.14*	*.78*

Discussion

This report documents the initial validation of the three measures: a new work oriented measure of regulatory focus, two climate scales designed to assess safety climate and production climate, and two performance measures (i.e., safety performance and speed performance). A great deal of support has been gained for all three measures. Specifically, by following the organizational measure development plan proposed by Hinkin (1998) I have obtained reliable and valid measures of the constructs and specific factors for each construct I intended. There were some unexpected findings and as previously discussed some of these findings lend support to validity of the measures. For example, prevention did not relate to performance prove, but did relate to performance avoid, which supports the notion that prevention is an approach-avoid construct. Similarly, promotion related to performance prove, but not to performance avoid, which supports promotion as an approach-approach construct.

In the larger portion of the dissertation I will revisit the psychometrics of each scale and employ the factor structure to confirmatory factor analysis. Ideally this approach will yield similar results. I will also gain additional construct and criterion related validity by examining the proposed model in the introduction of my dissertation.

APPENDIX B: EMPLOYEE MEASURES

Regulatory Focus Questionnaire

The following items are examples of different approaches or concerns you might have when working**.** Using the scale below, please rate how often you focus on these thoughts and activities.

Never	Rarely	Occasionally	Often	Constantly
(1)	(2)	(3)	(4)	(5)

PLEASE NOTE:

- There are no right or wrong answers. Simply describe yourself honestly
- In deciding on your answer, consider how you complete your work

I focus on:

1. _____ following rules and regulations at work
2. _____ being ready for any changes in my work (e.g., new procedures/equipment)
3. _____ completing work tasks correctly
4. _____ doing my duty at work
5. _____ following standard operating procedures while working
6. _____ my work responsibilities
7. _____ completing my work in a cautious manner
8. _____ fulfilling my work obligations
9. _____ ensuring safety while working
10. _____ completing work tasks safely
11. _____ on the details of my work
12. _____ finishing work tasks quickly
13. _____ accomplishing a lot at work
14. _____ getting my work done no matter what
15. _____ completing a lot of work assignments quickly
16. _____ getting a lot of work finished in a short amount of time
17. _____ work activities that allow me to get ahead at work
18. _____ my work accomplishments
19. _____ completing my work in an eager manner
20. _____ getting ahead in my job/career
21. _____ how many job tasks I can complete

Conscientiousness Facets

Below are phrases describing people's behaviors. Please use the rating scale below to describe how accurately each statement describes ***you***. Describe yourself as you generally are now, not as you wish to be in the future.

strongly disagree	**disagree**	**neither agree nor disagree**	**agree**	**strongly agree**
(1)	**(2)**	**(3)**	**(4)**	**(5)**

1. _____ Try to follow the rules
2. _____ Keep my promises
3. _____ Pay my bills on time
4. _____ Tell the truth
5. _____ Listen to my conscience
6. _____ Break rules
7. _____ Break my promises
8. _____ Get others to do my duties
9. _____ Do the opposite of what is asked
10. _____ Misrepresent the facts
11. _____ Go straight for the goal
12. _____ Work hard
13. _____ Turn plans into actions
14. _____ Plunge into tasks with all my heart
15. _____ Do more than what's expected of me
16. _____ Set high standards for myself and others
17. _____ Demand quality
18. _____ Am not highly motivated to succeed
19. _____ Do just enough work to get by
20. _____ Put little time and effort into my work

Climate Measures

The following statements pertain to your supervisor's behavior at work. **Indicate to what extent you agree with each of the statements below**. Please use the following scale to record your answers in the space beside each item:

Completely Disagree	Disagree	Neither Agree Nor Disagree	Agree	Completely Agree
(1)	(2)	(3)	(4)	(5)

1) _____My supervisor says a good word whenever he sees a job done according to the safety rules.
2) _____My supervisor seriously considers any worker's suggestions for improving safety
3) _____My supervisor approaches workers during work to discuss safety issues
4) _____My supervisor gets annoyed with any worker ignoring safety issues, even minor rules
5) _____My supervisor watches more often when a worker has violated some safety rule
6) _____As long as there is no accident, my supervisor doesn't care how the work is done
7) _____My supervisor pays more attention to safety problems than most other supervisors in this company
8) _____My supervisor encourages us to get the job done as quickly as possible.
9) _____My supervisor does not like it when tasks take more time to complete than he/she thinks they should
10) _____My supervisor asks us to work fast
11) _____My supervisor doesn't care how the work is completed as long as it is completed quickly (dropped)
12) _____Whenever pressure builds up, my supervisor wants us to work faster
13) _____My supervisor pays less attention to productivity than most other supervisors (dropped)
14) _____My supervisor only notices things that slow down our work (dropped)
15) _____As long as work remains ahead of schedule, my supervisor doesn't care how this has been achieved

Additional Information:

1. What is your age: _____
2. Is safety a concern in your job: Yes / No
3. How long have you been employed in your current job? _____
4. What is your race: _____
5. What is your gender : _____
6. How many work accidents have you been involved in over the past 3 years: _____
7. What type of work do you do: _____

APPENDIX C: SUPERVISOR RATINGS

Employee Name (person being rated):_____

Your Name (Name of person completing the rating): _____

Below are several work-related behaviors. Using the scale found at the top of the survey, please indicate how often this employee performs the behavior at work by circling the appropriate number.

1. _____ Performing a job for which there is a better method (dropped)
2. _____ Leaves a work site before completely storing all tools, materials, or hazards
3. _____ Carries out work in a safe manner
4. _____ Uses all the necessary safety equipment
5. _____ Uses the correct safety procedures for carrying out job tasks
6. _____ Ensures the highest levels of safety when carrying out his/her job
7. _____ Uses appropriate personal protective equipment as indicated by the site health and safety plan
8. _____ Completes job tasks quickly
9. _____ Accomplishes a great deal of work in a short time period
10. _____ Finishes work tasks ahead of other workers
11. _____ Takes short-cuts to complete job tasks (dropped)
12. _____ Fails to finish work tasks
13. _____ Fails to meet work deadlines

REFERENCES

Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions.* Thousand Oaks, CA: Sage.

Arthur, W., & Doverspike, D. (2001). Predicting motor vehicle crash involvement from a personality measure and a driving knowledge test. *Journal of Prevention and Intervention in the Community, 22*, 35-42

Arthur, W. & Graziano, W. G. (1996). The five-factor model, conscientiousness, and driving accident involvement. *Journal of Personality, 63*, 593-618.

Ashton, M. C. (1998). Personality and job performance: The importance of narrow traits. *Journal of Organizational Behavior, 19*, 289-303.

Barling, J., Loughlin, C., & Kelloway, E. K. (2002). Development and test of a model linking safety-specific transformational leadership and occupational safety. *Journal of Applied Psychology, 87*, 488-496.

Barrick, M. R., & Mount, M. K. (1991). The big-five personality dimensions in job performance. *Personnel Psychology, 44*, 1-26.

Barrick, M. R., Mount, M. K., & Strauss, J. P. (1993). Conscientiousness and performance of sales representatives: A test of the mediating effects of goal setting. *Journal of Applied Psychology, 78,* 715-722.

Barrick, M. R., Stewart, G. L., & Pitrowski, M. (2002). Personality and job performance: Test of the mediating effects of motivation among sales representatives. *Journal of Applied Psychology, 87,* 43-51.

Baron, R. M. & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*, 1173-1182.

Blau, P. (1964). *Exchange and power in social life.* New York: Wiley.

Bliese, P. D. (2000). Within-group agreement, non-independence, and reliability: Implications for data aggregation and analyses. In K. J. Klein and S. W. J. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions*, pp. 349-381. San Francisco, CA: Jossey-Bass.

Borman, W. C., & Motowidlo, S. J. (1993). Expanding the criterion domain to includes elements of contextual performance. In N. Schmitt & W. C. Borman (Eds.) *Personnel selection in organizations* (pp. 71-98). San Francisco: Jossey-Bass.

Bowlby, J. (1969). *Attachment* (Vol. 1). New York: Basic Books.

Brass, D. J. (1985). Technology and the structuring of jobs: Employee satisfaction, performance, and influence. *Organizational Behavior and Human Decision Processes, 35*, 216-240.

Brewer, N., & Ridgeway, T. (1998). Effects of supervisory monitoring on productivity and quality of performance. *Journal of Experimental Psychology, Applied, 4*, 211-227.

Bruner, J. S., Goodnow, J. J., & Austin, G. A. (1956). *A study of thinking.* New York: Wiley.

Bryk, A. S., & Raudenbush, S. W. (1992). *Hierarchical linear models*. London, Sage.

Burke, M. J., Sarpy, S. A., Tesluk, P. E., & Smith-Crowe, K. (2002). General safety performance: A test of a grounded theoretical model. *Personnel Psychology, 55*, 429-457.

Campbell, J. P. (1990). Modleing the performance prediction problem in industrial and organizational psychology. In M. D. Dunnette & L. M. Hough (Eds.). *Handbook of industrial and organizational psychology* (Vol. 1 2nd ed. Pp. 687-732). Palo Alto, CA: Consulting Psychologists Press.

Cellar, D. F., Nelson, Z.C., Yorke, C. M., & Bauer, C. (2001). The five-factor model and safety in the workplace: Investigating the relationships between personality and accident involvement. *Journal of Prevention & Intervention in the Community, 22,* 43-52.

Chan, D. (1998). Functional relations among constructs in the same content domain at different levels of analysis: A typology of composition models. *Journal of Applied Psychology, 83*, 234-246.

Chen, G. & Bliese, P. (2002). The role of different levels of leadership in predicting self- and collective efficacy: Evidence for discontinuity. *Journal of Applied Psychology, 87*, 549-556.

Chen, G., Casper, W. J., & Cortina, J. M. (2001). The roles of self-efficacy and task complexity in the relationships among cognitive ability, conscientiousness, and work-related performance: A meta-analytic examination. *Human Performance, 14*, 209-230.

Chen, G., Gully, S. M., Whiteman, J., & Kilcullen, R. N. (2000). Examination of relationships among trait-like individual differences, state-like individual differences, and learning performance. *Journal of Applied Psychology, 85,* 835-847.

Cleveland, R. J., Cohen, H. H., Smith, M. J., & Cohen, A. (1978). *Safety program practices in record-holding plant.* Cincinnati, OH, National Institute of Occupational Safety and Health.

Cohen, J. (1998). *Statistical power analysis for the behavioral sciences* (2nd Ed.). Hillsdale, NJ: Lawrence Erlbaum.

Cohen, J. & Cohen, P. (1975). *Applied multiple regression/correlation analysis for the behavioral sciences*. New York: John Wiley & Sons.

Costa, P. T. & McCrae, R. R. (1992). *NEO PI-R professional manual.* Odessa, FL: Psychological Assessment Resources Cronbach, L. J. (1957). Two disciplines of scientific psychology. *American Psychologist*, *12*, 671-684.

Crowe, E., Higgins, E. T. (1997). Regulatory focus and strategic inclinations: Promotion and prevention in decision-making. *Organizational Behavior and Human Decision Processes, 69*, 117-132.

Dekker, S. W. A. (2002). Reconstructing human contributions to accidents: the new view on error and performance. *Journal of Safety Research, 33*, 371-385.

Dickman, S. J., & Meyer, D. E. (1988). Impulsivity and speed-accuracy tradeoffs in information processing. *Journal of Personality and Social Psychology, 54*, 274-290.

Dweck, C. S., & Leggett, E. L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review,* 95, 256-273.

Endler, N. S. (1977). The role of person-by-situation interactions in personality theory. In I. C. Uzgiris and F. Weizmann (Eds.), *The structuring of experience.* New York: Plenum Press.

Elliot, E. S. & Dweck, C. S. (1988). Goals: An approach to motivation and achievement. *Journal of Personality and Social Psychology*, *54*, 5-12.

Fallon, J. D., Avis, J. M., Kudisch, J. D., & Gornet, T. P. (2000). Conscientiousness as a predictor of productive and counterproductive behaviors. *Journal of Business and Psychology, 15*, 339-349.

Feldman, J. M. (1999). Four questions about human social behavior. In J. Adamopoulos & Y. Kashima (Eds.), *Social Psychology and cultural context* (pp. 43-62). Thousand Oaks, CA: Sage Publications.

Fleishman, E. A. (1973). Twenty years of consideration and structure. In E. A. Fleishman & J. G. Hunt (Eds.), *Current developments in the study of leadership* (pp. 1-40). Carbondale, IL: Southern Illinois University Press.

Forster, J., Higgins, E. T., & Bianco, A T. (2003). Speed/accuracy decisions in task performance: Built in trade-off or separate strategic concerns. *Organizational Behavior and Human Decision Processes, 90*, 148-164.

Frone, M. R. (1998). Predictors of work injuries among employed adolescents. *Journal of Applied Psychology, 83*, 565-576.

Gavin. M. B., & Hofmann, D. A. (2002). Using hierarchical linear modeling to investigate the moderating influence of leadership climate. *Leadership Quarterly, 13*, 15-33.

Gillen, M., Baltz, D., Gassel, M., Kirsch, L., & Vaccaro, D. (2002). Perceived safety climate, job demands, and coworker support among union and nonunion injured construction workers. *Journal of Safety Research, 33*, 33-51.

Goldberg, L. R. (1999). A broad-bandwidth, public domain, personality inventory measuring the lower-level facets of several five-factor models. In I. Mervielde, I. Deary, F. De Fruyt, & F. Ostendorf (Eds.), *Personality Psychology in Europe*, (Vol. 7, pp. 7-28). Tilburg, The Netherlands: Tilburg University Press.

Goldberg, L. R. (1992). The development of markers for the big-five factor structure. P*sychological Assessment, 4*, 26-42.

Goodman, L. A. (1960). On the exact variance of products. *Journal of the American Statistical Association*, *55*, 708-713.

Griffin, M. A. & Neal, A. (2000). Perceptions of safety at work: A framework for linking safety climate to safety performance, knowledge, and motivation. *Journal of Occupational Health Psychology,3*, 347-358.

Griffiths, D. K. (1985). Safety attitudes of management. *Ergonomics, 28*, 61-67.
Hackman, R. (1992). Group influences on individuals in organizations. In M. D. Dunnette (Ed.), *Handbook of Industrial and Organizational Psychology*, 2nd Edition (Vol. 3, pp. 199-267). San Diego, CA: Psychological Corporation.

Hackman, R. (1992). Group influences on individuals in organizations. In M. D. Dunnette (Ed.), *Handbook of Industrial and Organizational Psychology*, 2nd Edition (Vol. 3, pp. 199-267). San Diego, CA: Psychological Corporation.

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

Hatch, M. J. (1993). The dynamics of organizational culture. *Academy of Management Review, 18*, 657-693.

Hechanova-Alampay, R., & Beehr, T. A. (2001). Empowerment, span of control, and safety performance in work teams after workforce reduction. *Journal of Occupational Health Psychology, 6*, 275-282.

Higgins, E. T. (1997). Beyond pleasure and pain. *American Psychologist, 52*, 1280-1300.

Higgins, E. T., Friedman, R. S., Harlow, R. E., Idson, L. C., Ayduk, O. N., & Taylor, A. (2001). Achievement orientations from subjective histories of success: promotion pride versus prevention pride. *European Journal of Social Psychology, 31*, 3-23.

Higgins, E. T., Roney, C., Crowe, & Hymes, C. (1994). Ideal versus ought predilections for approach and avoidance: Distinct self-regulatory systems. *Journal of Personality and Social Psychology, 66*, 276-286.

Hinkin, T. R. (1998). A brief tutorial on measures for use in survey questionnaires. *Organizational Research Methods, 1*, 104-121.

Hofmann, D. A., Griffin, M. A., Gavin, M. B. (2000). The application of hierarchical linear modeling to organizational research. In K. J. Klein and S. W. J. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions*, pp. 467-511. San Francisco, CA: Jossey-Bass.

Hofmann, D. A., & Morgeson, F. P. (1999). Safety-related behavior as a social exchange: The role of perceived organizational support and leader-member exchange. *Journal of Applied Psychology, 84*, 286-296.

Hofmann, D. A. & Stetzer, A. (1996). A cross-level investigation of factors influencing unsafe behaviors and accidents. *Personnel Psychology, 49*, 307-339.

Holland, J. L. (1985). *Making vocational choice: A theory of careers*. NJ: Prentice Hall: Englewood Cliffs.

Hollenbeck, J. R., Williams, C. R., & Klein, H. J. (1989). An empirical examination of the antecedents of commitment to difficult goals. *Journal of Applied Psychology, 74*, 18-23.

Hough, L. M. (1992). The "Big-Five" personality variables – Construct confusion: Description versus prediction. *Human Performance, 5*, 139-155.

Hough, L. M. (1997). The millennium for personality psychology: New horizons or good old daze. *Applied Psychology: An International Review, 47*, 233-261.

Hough, L. M., & Schneider, R. J. (1996). Personality traits, taxonomies, and applications in organizations. In K. R. Murphy (Ed.), *Individual differences and behavior in organizations* (pp. 31-88). San Francisco, CA: Jossey-Bass Inc.

Hu, L. & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6,* 1-55

Hurtz, G. & Donovan, J.. (2000). Personality and job performance: The Big Five revisited. *Journal of Applied Psychology, 85(6),* 869-879.

Iverson, R. D., & Erwin, P. J. (1997). Predicting occupational injury: The role of affectivity. *Journal of Occupational and Organizational Psychology, 70*, 113-128.

James, L. R., Demaree, R. G., & Wolf, G. (1984). Estimating within-group inter rater reliability with and without response bias. *Journal of Applied Psychology, 69,* 85-98.

James, L. R., Hater, J, Gent, M., Bruni, J. (1978). Psychological climate: Implications from cognitive social learning theory and interactional psychology. *Personnel Psychology, 31, 783-813.*

Johnson, G. A. (1975). The relative efficacy of stimulus versus reinforcement control for obtaining stable performance change. *Organizational Behavior and Human Decision Processes, 14*, 321-341.

Joseph, R. A., & Hahn, E. D. (1995). Bias and accuracy in estimates of task duration. *Organizational Behavior and Human Decision Processes, 61,* 202-213.

Judge, T. A., Martocchio, J. J., & Thoresen, C. J. (1997). Five-factor model of personality and employee absence. *Journal of Applied Psychology, 82*, 745-755.

Judge, T. A., Ronald, F. P., & Illies, R. (in press). The forgotten ones?: The validity of consideration and initiating structure in leadership research. *Journal of Applied Psychology.*

London, M., & Mone, E. M. (1999). Customer driven employee performance. In D. R. Illgen & E. D. Pulaskos (Eds.), *The changing nature of performance* (pp. 119-153). San Francisco: Jossey-Bass.

Kanfer, R. (1990). Motivation theory in industrial and organizational psychology. In M. D. Dunnette (Ed.), *Handbook of Industrial and Organizational Psychology*, 2nd Edition (Vol. 1, pp. 75-170). San Diego, CA: Psychological Corporation.

Kanfer, R. (1992) Work motivation: New directions in theory and research. In C. L., Cooper & I. T. Robertson (Eds.), *International review of industrial and organizational psychology* (Vol. 7, pp 1-53).

Kanfer, R., & Ackerman. (1996). A self-regulatory skills perspective to reducing cognitive interference. In I. G. Sarason, G. R. Pierce, & B. R. Sarason (Eds.), *Cognitive interference: Theories, methods, and findings.* (pp. 153-171). Mahwah, NJ: Lawrence Erlbaum.

Kanfer, R., Ackerman, P. L., Murtha, T. C., Dugdale, B. & Nelson, L. (1994). Goal setting, conditions of practice, and task performance: A resource allocation perspective. *Journal of Applied Psychology, 79*, 826-835.

Kanfer, R. & Heggested, E. D. (1997). Motivational traits and skills: A person-centered approach to work motivation. In B.M. Staw, L.L. Cummings (Eds), *Research in organizational behavior* (Vol 19, 1-56). Greenwich, CT: JAI Press.

Kenny, D. A., Kashy, D.,& Bolger, N. (1998). Data analysis in social psychology. (In D. T. Gilbert, S. T. Fiske, & G. Lindzey (Eds.), *The handbook of social psychology* (4th ed., pp. 233–265). Boston: McGraw-Hill.)

Kluger, A. N., Yaniv, I., & Kuhberger, A. (1999). *Needs, self-regulation, and risk performance.* Paper presented at the 15th annual convention of the Society of Industrial and Organizational Psychology.

Komaki, J. L., Collins, R. L., & Peen, P. (1982). The role of performance antecedents and consequences in work motivation. *Journal of Applied Psychology,* 67, 334-340.

Kozlowski, S. W. J., & Klein, K. J. (2000). A multilevel approach to theory and research in organizations: Contextual, temporal, and emergent processes. In K. J. Klein & S. W. J. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions,* pp. 3-90. San Francisco, CA: Jossey-Bass.

Kreft, I., & de Leeuw, J. (1998). *Introducing multilevel modeling.* London: Sage.

Larson, G. E., & Merritt, C. R. (1991). Can accidents be predicted? An empirical test of the cognitive failures questionnaire. *Applied Psychology: An International Review, 40*, 37-45.

Lewin, K., Lippett, R., & White, R. K. (1939). Patterns of aggressive behavior in experimentally created social climates. *Journal of Social Psychology, 10*, 271-299.

Liao, H., Arvey, R. D., Butler, R. J., & Nutting, M. (2001). Correlates of work injury frequency and duration among firefighters. *Journal of Occupational Health Psychology, 6*, 229-242.

Mackworth, N. H. (1948). The breakdown of vigilance during prolonged visual search. *Quarterly Journal of Experimental Psychology, 1,* 6-21.

Maslow, A. H. (1965). *Eupsychian management*. Homewood: The Dorsy Press.

McClelland, G. H., & Judd, C. M. (1993). Statistical difficulties in detecting interactions and moderator effects. *Psychological Bulletin, 114*, 376-390.

Mikulincer, M. (1989). Cognitive interference and learned helplessness: The effects of off-task cognitions on performance following unsolvable problems. *Journal of Personality and Social Psychology, 57*, 129-135.

Mischel, W. (1968). *Personality and assessment.* New York: Wiley.

Mischel, W., & Shoda, Y. (1995). A cognitive-affective system theory of personality: Reconceptualizing situations, dispositions, dynamics, and invariance in personality structure. *Psychological Review, 102*, 246-268.

Moon, H. (2001). The two faces of conscientiousness: Duty and achievement striving in escalation of commitment dilemmas. *Journal of Applied Psychology, 86*, 533-540.

Moon, H., Hollenbeck, J. R,. Humphrey, S. E., & Maue, B. (2003). The tripartite model of neuroticism and the suppression of depression and anxiety within an escalation of commitment dilemma. *Journal of Personality, 71*, 347-368.

Motowidlo, S. J. (2003). Job performance. In W. C. Borman, D. R. Ilgen, & R. J. Klimoski (Eds.), *Handbook of psychology: Industrial and organizational psychology* (Vol., 12, pp. 39-53). Hoboken, NJ: John Wiley & Sons.

Motowidlo, S. J., Borman, W. C., & Schmitt, M. J. (1997). A theory of individual differences in task and contextual performance. *Human Performance, 10,* 71-83.

Mueller, L., DaSilva, N., Townsend, J., & Tetrick, L. (1999). *An empirical evaluation of competing safety climate measurement models.* Paper presented at the 1999 annual meeting of the Society for Industrial and Organizational Psychology, Atlanta, GA.

Munchinsky, P. (1997). *Psychology applied to work*. (6^{th} ed.). Wadsworth.

Ones, D. Z., Viswesvaran, C. & Schmidt, F. L. (1993). Comprehensive meta-analysis of integrity test validates: Findings and implications for personnel selection and theories of job performance. *Journal of Applied Psychology, 78*, 679-703.

Ostroff, C., Kinicki, A. J., & Tamkins, M. M. (2003). Organizational Culture and Climate. In W. C. Borman, D. R. Ilgen, & R. J. Klimoski (Eds.), *Handbook of psychology: Industrial and organizational psychology* (Vol., 12, pp. 565-593). Hoboken, NJ: John Wiley & Sons.

Parker, S. K., & Turner, N. (2002). Work design and individual work performance: Research findings and an agenda for future inquiry. In S. Sonnentag (Ed.), *Psychological Management of Individual Performance* (pp. 69-93). John Wiley & Sons, Ltd.

Pate-Cornell, M. E. (1990). Organizational aspects of engineering system safety: The case of offshore platforms. *Science, 250*, 1210-1217.

Pervin, L. A. (1989). Persons, situations, interactions: The history of a controversy and a discussion of theoretical models. *Academy of Management Review, 14*, 350-360.

Phillips, J. M., & Gully, S. M. (1997). Role of goal orientation, ability, need for achievement, and locus of control in the self-efficacy and goal-setting process. *Journal of Applied Psychology, 82*, 792-802.

Pinheiro, J. C., & Bates, D. M. (2000). *Mixed-effects models in S and S-PLUS.* New York:Springer_Verlag.

Planek, T., Driesson, G., & Vilardo, F. J. (1967, August). Evaluating the elements of an industrial safety program. *National Safety News,* 60-63.

Pulaskos, E. D., Arad, S. Donovan, M. A. & Plamadon, K. E. (2000). Adaptibility in the workplace: Development of a taxonomy of adaptive performance. *Journal of Applied Psychology, 85*, 612-624.

Reason, J. T. (1997). *Managing the risks of organizational accidents.* Aldershot, UK: Ashgate.

Reason, J. T., Parker, D., & Lawton, R. (1998). Organizational controls and safety: The varieties of rule-related behavior. *Journal of Occupational & Organizational Psychology, 71*, 289-304.

Ronen, S. (1994). An underlying structure of motivational need taxonomies: A cross-cultural confirmation. In M. Dunnette & L. *Hough (Eds.), Handbook of industrial and organizational psychology* (pp. 242-269).

Salgado, J. F. (1997). The fives-factor model of personality and job performance in the European community. *Journal of Applied Psychology, 82*, 30-43.

Sarason, I. G. (1975). Anxiety and self preoccupation.(In I. G. Sarason & C. D. Spielberger (Eds.), *Stress and anxiety* (Vol. 2, pp. 27—44). Washington, DC: Hemisphere.

Schmitt, N., Cortina, J. M., Ingerick, M. J., & Wiechmann, D. (2003). Personnel Selection and employee performance. In W. C. Borman, D. R. Ilgen, & R. J. Klimoski (Eds.), *Handbook of psychology: Industrial and organizational psychology* (Vol., 12, pp. 565-593). Hoboken, NJ: John Wiley & Sons.

Slocombe, C. S. (1941). The psychology of safety. *Personnel Journal, 20*, 42-49.

Sobel, M. E. (1982). Asymptotic intervals for indirect effects in structural equations models. In S. Leinhart (Ed.), *Sociological methodology 1982* (pp.290-312). San Francisco: Jossey-Bass.

Sonnentag, S. 7 Frese, M. (2003). Stress in organizations. In W. C. Borman, D. R. Illgen, & R. J. Klimoski (Eds.) *Handbook of psychology: Industrial and organizational psychology* (Vol., 12, pp. 453-492). Hoboken, NJ: John Wiley & Sons.

Schmidt, F. L., & Hunter, J. (1992). Causal modeling of processes determining job performance. *Current Directions in Psychological Science, 1*, 89-92.

Schwartz, S. H. (1992). Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. In M. Zanna (Ed.), *Advances in Experimental Social Psychology* (Vol. 25, pp. 1-65). New York: Academic Press.

Smith, R. L., Ager, J. W., & Williams, D. L. (1992). Suppressor variables in multiple regression/correlation. *Educational and Psychological Measurement, 52*, 17-29.

Stewart, G. L. (1999). Trait bandwidth and stages of job performance: Assessing differential effects for conscientiousness and its subtraits. *Journal of Applied Psychology, 84*, 959-968.

Stogdill, R. M. (1963). *Manual for the Leader Behavior Description Questionnaire, Form XII*. Columbus, OH: Bureau of Business Research, Ohio State University.

Thomas, J. M., Melia, J. L., & Oliver, A. (1999). A cross-validation of structural equation model of accidents: Organizational and psychological variables as predictors of work safety. *Work & Stress, 13*, 49-58.

Thompson, R. C., Hilton, T. F., & Witt, L. A. (1998). Where the safety meets the shop floor: A confirmatory model of management influence on workplace safety. *Journal of Safety Research, 29*, 15-24.

Turner, N., Parker, S. K., & Williams, H. M. (2002). Self-managing teams and safety performance: An employee-level investigation. In G. Chen & D. Hoffman (Co-Chairs) and D. Hoffman (Discussant), *Safety in the New Millennium: Multilevel Examination of Safety in Organizations*. Symposium presented at the 62nd Annual Meeting of the Academy of Management, Denver, CO.

VandeWalle, D. (1997). Development and validation of a work domain goal orientation instrument. *Educational and Psychological Measurement, 57*, 995-1015.

Varonene, U., & Mattila, M. (2000). The safety climate and its relationship to safety practices, safety of the work environment and occupational accidents in eight wood-processing companies. *Accident Analysis and Prevention, 32*, 761-769.

Velicer, W. F. (1978). Suppressor variables and the semipartial correlation coefficient. *Educational and Psychological Measurement, 38*, 953-958.

Vroom, V. H. (1964). *Work and motivation.* New York: Wiley.

Wallace, J. C., & Chen, G. (2002, August). Development and validation of the Workplace Cognitive Failure Scale: Implications for organizational safety and performance. In G. Chen & D. Hoffman (Co-Chairs) and D. Hoffman (Discussant), *Safety in the New Millennium: Multilevel Examination of Safety in Organizations*. Symposium presented at the 62nd Annual Meeting of the Academy of Management, Denver, CO.

Wallace, J. C., Popp, E., & Mondore, S. (2004, August). *Antecedents of safety climate: Management-employee relations and perceived organizational support.* Paper to be presented at the 64th Annual Meeting of the Academy of Management, New Orleans, LA.

Wallace, J. C. & Vodanovich, S. J. (2003a). Can accidents and industrial mishaps be predicted? Investigating workplace performance. *Journal of Business and Psychology, 17*, 503-514.

Wallace, J. C., & Vodanovich, S. J. (2003b). Workplace safety performance: Conscientiousness, cognitive failure, and their interaction. *Journal of Occupational Health Psychology, 8*, 316-237.

Watson, D. Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*, 1063-1070.

Zenger, B., & Fahle, M. (1997). Missed targets are more frequent than false alarms: A model for error rates in visual search. *Journal of experimental Psychology: Human Perception and Performance, 23*, 1783-1791.

Zohar, D. (2000). A group-level model of safety climate: Testing the effect of group climate on microaccidents in manufacturing jobs. *Journal of Applied Psychology, 85*, 587-596.

Zohar, D. (2002a). Modifying supervisory practices to improve subunit safety: A leadership-based intervention model. *Journal of Applied Psychology, 87*, 156-163.

Zohar, D. (2002b). The effects of leadership dimensions, safety climate, and assigned priorities on minor injuries in work groups. *Journal of Organizational Behavior, 23*, 75-92.

Zohar, D. (2003a). Safety Climate: Conceptual and Measurement Issues. In J. C. Quick & L. Tetrick (Eds.), *Handbook of occupational health psychology* (pp. 123-142). Washington, DC: APA.

Zohar, D. (2003b). The influence of leadership and climate on occupational health and safety. In D. A. Hofmann & L. E. Tetrick (Eds.), *Health and safety in organizations* (pp. 201-230).San Francisco: Jossey Bass.

VITA

Julian Craig Wallace was born in Chattanooga, TN in 1974. He completed his doctoral work in I/O Psychology at Georgia Tech and his Masters degree form the University of West Florida. He obtained his undergraduate degree from the University of Tennessee at Chattanooga in 1998. His research has focused on a broad range of areas, but has primarily revolved around two domains: (1) job performance and (2) legal and justice issues in organizations. His work has appeared in numerous peer reviewed journals such as *Journal of Occupational Health Psychology, Personality and Individual Differences, Journal of Business and Psychology,* and *Public Personnel Management.* Upon completion of his Doctorate, Craig will join the psychology and management faculty at Tulane University in New Orleans, where he will continue to investigate work performance and organizational justice issues as well as work on his golf game in hopes of making the PGA tour.