

PERSONALITY TRAITS AS RISK FACTORS FOR OCCUPATIONAL INJURY IN HEALTH
CARE WORKERS

By

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To my parents who always stressed the value of education and instilled in their children a belief
that anything was possible

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LIST OF KEY TERMS

Accident	“That occurrence in a sequence of events that produces unintended injury, death or property damage. Accident refers to the event, not the result of the event” (National Safety Council [NSC], 2005).
Agreeableness	“The quality of being agreeable or pleasing, that quality which gives satisfaction or moderate pleasure to the mind of senses” (Merriam-Webster’s Online, 2005). A “dimension of interpersonal tendencies; fundamentally altruistic” (Costa & McCrae, 1992, p. 15).
Angry Hostility	“A deep seated ill will. Conflict, opposition, or resistance in thought or principle” (Merriam-Webster’s Online, 2005). “The tendency to experience anger and related states such as frustration and bitterness” (Costa & McCrae, 1992, p. 16).
Compliance	“The tendency to defer to others, to inhibit aggression and to forgive and forget” (Costa & McCrae, 1992, p. 18). “The disposition to defer to others” (Merriam-Webster’s Online, 2005).
Excitement Seeking	“The appetite for the thrills of bright colors and noisy settings” (Costa & McCrae, 1992, p. 17).
Extraversion	“The preference for attending to the outer world of objective events with an emphasis upon active involvement in the environment. The extrovert is sociable, lively, novelty-seeking, carefree and emotionally expressive” (Morris, quoted in Hansen, 1988). Extraverts like “excitement and stimulation and tend to be cheerful in disposition” (Costa & McCrae, 1992, p. 15).
Hazard	“A condition or physical situation with a potential for an undesirable consequence, such as loss of life or limb” (NSC, 2005).
Health Care Worker	Any person, including a student or trainee, whose activities involve contact with patients or with blood or other body fluids from patients in a health care setting (Centers for Disease Control [CDC], 2005).

Impulsiveness	“The quality of being impulsive. Acting under stress of emotion or spirit of the moment; acting without deliberation” (Merriam-Webster’s Online, 2005). “The inability to control cravings and urges” (Costa & McCrae, 1992, p. 16).
Injury	“Physical harm or damage to the body resulting from an exchange, usually acute, of mechanical, chemical, thermal, or other environmental energy that exceeds the body's tolerance” (NSC, 2005).
Licensed Nurse	Someone who has specific education and training in nursing and is licensed by a state professional board. Licensed nurses include both registered nurses (RN) and licensed practical nurses (LPN).
Medical Providers	Individuals who are educated to diagnose and treat medical conditions. Medical providers include physicians, nurse practitioners, nurse anesthetists, nurse midwives and physician assistants.
Neuroticism	The tendency to experience negative emotions such as fear, anger, guilt, and sadness. Individuals high in neuroticism also are less able to cope with life events and to control their impulses; emotional stability (Roberts & Hogan, 2001).
Occupational illness	Any abnormal condition or disorder, other than one resulting from an occupational injury, caused by exposure to environmental factors associated with employment. It includes acute and chronic illnesses or diseases that may be caused by inhalation, absorption, ingestion, or direct contact. (NSC, 2005)
Occupational injury	“Any such injury such as a cut, fracture, sprain, amputation, etc., which results from a work accident or from a single instantaneous exposure in the work environment” (NSC, 2005).
Risk	The potential for realization of unwanted, adverse consequences to human life, health property or to the environment; estimate of risk is usually based on the expected value of the conditional probability of the event

Safety	<p>occurring times the consequence of the event given that it has occurred. (Merriam-Webster’s Online, 2005)</p> <p>“The state of being relatively free from hazards that are likely to cause harm, injury or property damage” (NSC, 2005).</p>
Source of injury	<p>“The principal object such as tool, machine, or equipment involved in the accident and is usually the object inflicting injury or property damage. Also called agency or agent” (NSC, 2005).</p>
Technicians	<p>Individuals who have specific training in particular clinical area such as the laboratory, radiology, surgery and pharmacy. They assist licensed personnel with patient care procedures. Technicians include clinical laboratory technicians, radiology technicians, surgery technicians, cardiovascular technicians, emergency medical technicians and paramedics, diagnostic medical sonographers, respiratory technicians and pharmacy technicians.</p>
Therapists	<p>Individuals trained in methods of treatment and rehabilitation other than the use of drugs or surgery. Therapists include respiratory therapists, occupational therapists and physical therapists.</p>
Unintentional injury	<p>“The preferred term for accidental injury in the public health community; it refers to the result of an accident” (NSC, 2005).</p>
Unlicensed Assistive Personnel	<p>Unlicensed individuals who are trained to function in an assistive role to the licensed nurse or other health professional in the provision of patient/client activities as delegated (American Nurses Association, [ANA], 1997). UAPs include nursing assistants (NAs), health care assistants, patient care technicians (PCTs), medical assistants (MAs) and phlebotomists. Nurse interns (nursing students working outside their normal clinical rotations) also fall under this category.</p>
Work injuries	<p>(Including occupational illnesses) are defined as: those that arise out of and in the course of gainful employment regardless of where the accident or exposure occurs. Excluded are work injuries to private household workers and injuries occurring in connection with farm chores that are classified as home injuries (NSC, 2005).</p>

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Millions of dollars are spent each year as a result of injuries suffered by employees at work. Health care workers, particularly nursing personnel, are among the groups at greatest risk for injury. Research has shown individuals possessing certain personality traits to be more vulnerable to injury. Individuals who are considered extraverted, neurotic and disagreeable are hypothesized to be more at risk for injury although these findings have not been substantiated in health care workers. Therefore, the purpose of this study was to identify certain personality trait risk factors for occupational injuries in health care workers. This study used a case comparison design to test the hypotheses that group membership (injured vs. non-injured workers) could be predicted by the personality traits of excitement seeking, impulsiveness, angry hostility and compliance after controlling for age, tenure and job classification.

Seventy two subjects (29 cases and 43 controls) were enrolled in the study. Both groups were given the NEO Personality Inventory- Revised (NEO PI-R). Although the characteristics of the groups were similar, group membership (injured vs. non-injured) was not predicted by the personality traits of angry hostility, excitement seeking, impulsiveness and compliance (after controlling for age, tenure and job classification). The final model improved group prediction but not significantly.

CHAPTER 1 INTRODUCTION

Background of the Problem

The workforce of the United States in 2005 was estimated to be approximately 140 million adult men and women between the ages of 18 to 65 years. Fully 75% of adult men and between 30 and 50% of adult women are part of the workforce at any time (Bureau of Labor Statistics [BLS], 2005). Most spend between 40 and 50% of their waking hours at work. Each year millions suffer injuries at work; several thousand die or sustain permanent disability or disease. Costs to the economy are staggering. Estimated direct and indirect costs resulting from these injuries and diseases are \$131 billion annually or nearly 3% of the gross domestic product (National Safety Council [NSC], 2003). Although it is impossible for any job to be completely free from risk of injury, United States workers still suffer over 12,000 injuries per day (BLS, 2003).

The past decade has seen an increase in recognition and emphasis on promoting workplace safety and increased understanding of the risks from exposure to occupational hazards. Each year approximately 6 million U.S. workers suffer disease, disability, injury or death due to exposure to such hazards. This averages to approximately 5 cases per 100 full-time employees of which 93% are due to injury (BLS, 2003). Although government agencies such as the National Institute for Occupational Safety and Health (NIOSH) and the Occupational Safety and Health Administration (OSHA) work on behalf of worker safety, complete elimination of risk is difficult, if not impossible. Research has focused on limiting exposures, promoting safety techniques, and work redesign.

Costs of Safety/Injury

The costs related to occupational hazards are enormous. Direct costs, which include medical and hospitalization costs, as well as drugs and rehabilitative services, were approximately \$24 billion in 2000. Indirect costs are even greater. Indirect costs include loss of wages, costs of fringe benefits, employer retraining and workplace disruptions and are estimated to be over \$100 billion per year (NSC, 2001). These numbers rival the cost of cardiovascular disease and cancer, two of the greatest health issues facing Americans. In 2003, workers' compensation picked up 27% of all costs, although taxpayers paid 18% of the total costs through the Medicare, Medicaid and Social Security programs. Ultimately all Americans pay for the costs of occupational injury and disease through lower wages, lower profits and higher costs for consumers (Leigh, Markowitz, Fahs & Landrigan, 2000). Furthermore, these figures do not include the cost burden on caretakers and relatives providing assistance to the injured and ill (Arno, Levine & Memmott, 1999).

Health Care Workers

Health care workers are among those at highest occupational risk from injury or illness due to the complexities of their work. Exposures include blood borne pathogens and biological agents, chemical agents, physical stressors and psychosocial hazards. The health care industry is one of the fastest growing occupational fields and because of its rapid growth the incidence and prevalence of exposure has increased over the past ten years (NIOSH, 2005).

History of Occupational Health and Safety

The improvement in workplace safety along with the decline in occupational injuries and fatalities over the last 100 years has been called one of the most important public health successes of the 20th century (Centers for Disease Control [CDC], 1999). Work related injuries were first identified by Bernardino Ramazzini in the late 17th century. Ramazzini is regarded as

the father of occupational medicine and wrote the first treatise on occupational health called *Diseases of Workers* (Rosecrance & Cook, 1998). Ramazzini was the first to note the swollen hands of bakers from repeatedly kneading dough, as well as the development of hunch back posture in sedentary workers (Rosecrance & Cook, 1998). The Industrial Revolution of the 1800s ushered in factory work with its unsafe and unsanitary working conditions. Common law in place at that time assumed some degree of worker risk was expected and protected management from charges of negligence. However, a fire in a New York City factory in 1911 that killed over 140 women and children brought public awareness and outrage to poor and unsafe working conditions. The fallout from the Triangle Factory fire was the impetus for reform in occupational safety (Cornell University, 2005).

The first survey of workforce health conditions took place in 1912 and focused primarily on industrial accidents. Statistical record keeping, however, did not begin in earnest until the 1930s due to lack of conformity in regards to data (BLS, 2003). However, early surveys were voluntary and included only fatalities or major injury. The passage of the Occupational Safety and Health Act (OSH Act) of 1970 was a watershed event leading to improved recognition and monitoring of workplace hazards. The OSH Act was designed to ensure safe and healthy conditions for working men and women by establishing and authorizing enforcement of safety standards in the workplace. The act also gave authority to states to enact programs of their own and developed research and educational programs to increase knowledge of the subject as long as they met federal standards (OSHA, 2005). The act broadly defined occupational hazards and included not just death and injury but disease and disability as well. The act places the responsibility for ensuring a safe working environment on management and includes criminal fines for failure to comply with established standards. This emphasis was a shift from assigning

blame for worksite accidents on workers and instead focuses on indirect causes of accidents such as unsafe conditions, poor match between worker and job and poor compliance with safety standards. Yet despite these improvements in occupational safety, six thousand occupational fatalities and 6 million injuries occurred in 2003 (BLS, 2003).

The Role of NIOSH and OSHA

The OSH Act of 1970 was the driving force behind the creation of both NIOSH and OSHA. The National Institute for Occupational Safety and Health is a division of the Centers for Disease Control and is responsible for conducting research in injury prevention, providing training to health professionals, investigating occupational hazards, and developing educational and occupational guidelines to protect workers. OSHA falls under the jurisdiction of the U.S. Department of Labor and is the regulatory authority responsible for work site safety inspections, development of safety standards and regulations, safety controls and worker education (CDC, 1999).

Epidemiology

Of the 6 million injuries that occur each year, approximately one-third are disabling injuries, meaning that the injury resulted in at least one day of absence from work. The other two thirds of injuries are nondisabling and required no full days missed of work (Leigh et al., 2000). Tenure and experience play significant roles in who suffers injury. New employees, regardless of age, suffer a disproportionate number of injuries (Leigh et al., 2000). Men are injured more frequently and more severely than women; Hispanics and blacks suffer more injuries than non-Hispanic whites. Surprisingly, self-employed workers and those working in small businesses are at high risk for suffering injury.

The most dangerous occupations in the United States are in the agriculture, mining and construction industries, because of the large and heavy equipment involved. Types of hazards

vary depending upon the industry but are also influenced by economic structure, level of industrialization, climate conditions and traditions of safety within the discipline. However, recent data has shown the incidence of injury within these industries has declined over the past decade. In contrast, the health care industry has noted an increase in reports of occupational injury, in part due to its rapid growth (NIOSH, 2005). Nursing aides (NAs) are among workers suffering the most disabling injuries. (Leigh et al., 2000).

Workplace hazards for health care workers are divided into four classifications: biologic, chemical, physical and psychosocial. Biological agents include bloodborne pathogens such as human immunodeficiency virus and hepatitis virus as well as airborne viruses such as tuberculosis and severe acute respiratory syndrome (SARS). Needle stick injuries fall under biological hazards. Chemical hazards include reaction to latex to harm from exposure to antineoplastic drugs. Chemical hazards may also include gasses and smoke released during surgical procedures (from anesthesia gases and cauterizations, respectively). Physical harm may come from ionizing agents. Musculoskeletal injuries are also due to physical hazards, usually from heavy lifting or pulling or repetitive motion. Violence in the workplace is another example of physical harm. Lastly, stress at work, due to job responsibilities, excessive hours, and/or low wages is considered a psychosocial hazard (NIOSH, 2001).

The most common workplace injury across all occupational groups that contributed to days away from work in 2003 remained sprains and strains, particularly injuries involving the lower back (BLS, 2005). When combined with bruises and contusions, fractures and cuts and lacerations, sprains and strains accounted for nearly two thirds of causes for missed days. Sprains and strains as the leading cause of missed days remained constant across all occupational

groups. Nursing personnel, particularly NAs, are among the workers having the highest numbers of work-related injury due to overexertion (BLS, 2003).

Theories on Accidents and Safety

In order to prevent accidents and subsequently injuries, researchers have attempted to define why accidents occur. Many theories have been postulated but none universally accepted. Accidents are thought to be caused by a combination of several mistakes that occur during different parts of the decision making process. There may be a long incubation period where the same mistakes are made before an accident occurs. Accidents may be viewed as originating from a technical error or human error perspective. Technical errors focus on design, engineering and construction. Human error perspective focuses on intrinsic human factors such as cognition and behavior. Accidents can be classified on a continuum of severity. The order of severity is fatal accidents, serious accidents, first aid treatment, property damage and near accidents. Injury implies some degree of damage to an individual. It has been estimated that less than 10% of accidents result in injury (Taylor, Easter & Hegney, 2004).

One of the first theories on accidents came from Heinrich in 1931. His domino theory attributed 88% of accidents to unsafe acts of people, 10% due to unsafe conditions and 2% due to act of God. He proposed a continuum of factors that cascade from one sequence to the next, leading to an accident. His sequence begins with ancestry or social environment, followed by worker fault, unsafe act combined with physical or mechanical hazard, accident, and finally injury. Heinrich believed that removal any one sequence would stop the domino effect but that eliminating the unsafe act was paramount to preventing injury (Taylor et al., 2004).

The multiple causation theory postulates that there are many contributory causes leading to an accident and that it takes a certain combination of factors for an accident to occur. Multiple causation theory categorizes causes into behavioral and environmental factors. Behavioral

factors include attitudes, skills and knowledge. Environmental factors include worksite hazards and procedures that contribute to injury (Taylor et al., 2004).

The energy exchange model proposes that exchanged energy produces injury. The energy arises from the type of hazard involved. The energy may be mechanical, electrical, thermal or chemical. This theory is better suited for industrial accidents (Taylor et al., 2004).

The injury causation model uses a sequence of factors that contribute to an accident. The sequence begins with an error that contributes to an accident. If a hazard is present, the sequence may end with an injury. This model must include an error and a hazard for an injury to occur. Usually the error leads to an unplanned event or accident. However, if a hazard is present, the result may be an injury (Taylor et al., 2004).

Other theories of accident prediction include random chance theory that holds that accidents occur simply by chance with no discernable pattern. Random chance theory suggests that all workers are equally vulnerable to being involved in an accident and that preventative interventions are without value. Biased liability theory holds that once a worker is involved in an accident, he or she is more likely to be involved in another as compared to other workers (Taylor et al., 2004).

Accident proneness has been defined to imply “that even when exposed to the same conditions some people are more likely to have accidents than others, or that people differ fundamentally in their innate propensity for accidents” (Shaw & Sichel, 1971 cited in Hansen, 1988). Accident proneness theory holds that there is a subset of workers who are more susceptible to accidents.

The concept of accident proneness was introduced early in the 20th century, arising out of concerns of the large number of accidental deaths and injuries occurring in British war

production industries (Haight, 2001). During this time injuries and accidents were accepted as random events and their number could be predicting using mathematical principles established in the Poisson distribution. However, investigation into industry accidents discovered that the occurrence of accidents was not happening in normal distribution of Poisson's formula. Mathematicians began to develop a new model to predict accidents, which they labeled "accident proneness." Thus began the search to measure and predict accident proneness. Early research pointed to a correlation between accident proneness and "poor kinetic coordination and nervous instability." However, attempts at finding a reliable measure over the next 30 years failed. Accident proneness as a concept fell out of popular favor in the 1950s. Its reemergence in the 1970s corresponded with the drive to lower highway automotive accidents and make roadways safer. Safer cars were built, roadways were improved, yet highway accidents remained. This realization led the focus of interest being shifted to the driver as the cause of automobile accidents.

Marbe demonstrated in 1920 that people who had been involved in one accident were more likely to be involved in another accident than someone who had been in no previous accidents. Dunbar (quoted in Molnos, 1998) described accident-prone people as "impulsive, drawn to adventure and excitement and always in search of immediate pleasure." The accident-prone individual prefers spontaneity, resents authority figures, and is intolerant of discipline. He proposed that these reactions were in response to a strict childhood upbringing (Molnos, 1998).

Molnos (1998) states that most accidents are subconsciously intended and are motivated by guilt. The physical and psychological pain resulting from an accident is viewed as punishment to the individual, thus relieving the guilt. However, she also hypothesizes that accidents are an avoidance of responsibility.

Injury proneness, however, is more readily accepted as a personality trait but is recognized as more difficult to amend. Other traits that are relative to an individual's injury proneness include belongingness, self-efficacy, introversion/extroversion, perceptions of invulnerability, conscientiousness, need for approval, impulsivity and emotional intelligence (Geller, 2004).

The Safe Environment

Development of a safe, injury free workplace requires focus on three aspects of interest: the environment, the person and behavior. The environment includes the physical space, instruments, tools and equipment as well as the safety climate within the setting. Behavior includes the practices of all employees as each individual contributes to the overall safety of all others. Lastly, attitudes, beliefs, and personality of employees play a critical role. All three aspects interact and are dynamic and reciprocal (Geller & Wiegand, 2005).

Personality Theories

What defines a personality is a subject as broad and diverse as the study of psychology. Webster's defines personality as "the complex of characteristics that distinguishes an individual; the totality of the individual's behavioral and emotional characteristics" (Merriam-Webster online, 2005). The word personality comes from the Latin word *persona*, meaning mask. Therefore, personality can be viewed as the different masks a person wears. The term personality can be used in two differing ways. The first refers to the distinct impression a person makes on another. In this use, personality is similar to reputation and is defined from the perspective of the observer. Secondly, personality may also refer to the essence inside each person that explains behavior and creates an outward impression on others. In this sense, personality is a person's identity that he or she holds within (Roberts & Hogan, 2001). Personality has also been described as a "unique composite of inborn and acquired mental abilities, temperaments attitudes and other individual differences in thoughts, feelings, and

actions” (Aiken, 1999). These individual characteristics are considered stable over time, consistent and predictable (Aiken, 1999). The measurements of personality include affective characteristics such as emotion and temperament, cognitive variables such as intelligence and achievement as well as psychomotor skills (Aiken, 1999).

Personality assessments have been performed throughout time. There are references to personality screenings in the Bible, in ancient Greek and Roman writings (the four humours) and in manuscripts from the Middle Ages. Astrology, phrenology and palmistry are all attempts to explain or predict human behavior. The first scientific theories of personality did not appear until the late 19th and early 20th century and focused on intelligence and maladaptive personality traits. The study of personality psychology evolved as a distinct discipline due to the work of Allport in the 1930s. Although earlier psychological work included theories on personality, character and abnormal psychology, Allport’s text, *Personality: A Psychological Interpretation*, united varying theories into a larger field of study. Allport viewed personality psychology as the “study of the individual person” (Hogan, Johnson, & Briggs, 1997). Although controversies in its definition and importance in mainline psychology remain today, advocates agree that personality psychology features emphasis on three concepts: the whole person, motivation and individual differences (Hogan, Johnson, & Briggs, 1997).

Biological and genetic theories on personality development

Proponents of biological and genetic theories argue that personality development follows a predictable developmental process. The milestones may occur at slightly different rates and times but they do occur in a predetermined order. Support for a behavioral genetics basis stems from the high correlation of personality traits between monozygotic twins. Studies on monozygotic twins have found, on average, a .50 correlation among personality traits. In contrast, dizygotic twins were found to have a .30 correlation among personality traits

(Matthews & Deary, 1998). Other studies on monozygotic and dizygotic twins using the Five-Factor Model (FFM) of personality have found evidence to support heritability for the dimensions of conscientiousness, agreeableness, and openness to experience. Furthermore, the evidence to support heritability for the dimensions of neuroticism and extraversion was consistent and strong (Markon, Krueger, Bouchard & Gottesman, 2002). Studies on adopted twins have found that on extraversion, children are more likely to resemble their biological parents than adoptive parents (Matthews & Deary, 1998). Aggressiveness as a trait was found in monozygotic twins to be due to heritable causes (58% of variance) (Beatty, Heisel, Hall, Levine & LaFrance, 2002).

Evolutionary theories believe that certain traits or behaviors are found in individuals because their presence was necessary for survival. Over generations, these traits continually evolved and were reproduced. Aggression as a behavior was necessary to survive and adapt to the environment. Aggressive animals assured the survival of their progeny, resulting in the survival of the strongest. Whether or not this explanation is applicable to human evolution is uncertain (Hogan, Johnson & Briggs, 1997).

Eysenck attempted to discover a biological connection to personality development. He argued that a person was either extraverted or introverted based on the stimulation level of his or her reticular activation system (RAS) through cortical arousal. He hypothesized that introverts had highly stimulated RAS, resulting in an avoidance of sensory stimulation, making the individual more withdrawn and inward. Extraverts, by contrast, have an under-aroused RAS and as a result crave outside stimulation and excitement (Taub, 1998).

Hormones, testosterone specifically, has also been theorized to influence the development of certain personality traits. Once again, aggression has been linked to high levels of

testosterone in both males and females. However, researchers are uncertain if aggressive behavior is the result of increased levels of testosterone (Cohen-Bendahan, Buitelaar, van Goozen, Orlebeke & Cohen-Kettenis, 2004).

Environmental theories on personality

Environmental theories support social, cognitive and cultural influences as having the greatest impact on personality development. Their core beliefs hold that personality traits are learned tendencies developed through modeling and reinforcement that occurs over a lifetime. Behaviors are learned through experiences and by interaction with the environment (Nicholson, 1996).

Social learning theory emphasizes learning through social rewards, punishment, modeling and reinforcement. Social cognition theory adds a cognitive component to learned behavior. Personality development occurs when an individual performs an action in a certain situation. The resulting feedback on that action modifies the behavior and influences its subsequent repetition (Hogan, Johnson & Briggs, 1997).

Studies of monozygotic twins raised apart demonstrate the role of environment in personality development. The correlations of monozygotic twins raised in separate environments were twice as great as the correlations between similarly raised dizygotic twins (Matthews & Deary, 1998).

Interactive effects of genetics and the environment are also felt to play a role in personality development. A Swedish adoption twin study administered both a personality scale and an environmental scale to identical twins raised apart. After controlling for main effects of genetics and the environment, interactions were found to contribute 7% of the total variance in personality scores (Matthews & Deary, 1998).

Culture has also been proposed as having considerable influence on personality development. Cultural theories believe that personality dispositions are learned tendencies and that the influences of the family and social network play the greatest role in their development (Triandis & Suh, 2002).

Situation vs. person

The situation vs. person debate centers on how stable an individual's personality is over time. Will an individual display the same personality traits consistently when put in similar circumstances or will the circumstances dictate the behavior of the individual? Mischel first proposed the situational view of personality traits in the 1960s. This undermined the accepted view that personality dispositions were stable and could be used to explain behavior. His proposal that situations dictated behavior was based on research that correlated personality and behavior at .30. He argued that the small correlation meant that personality would not consistently predict behavior and that behavior would vary based on situations. Other situational researchers calculated that personality explained only 16-20% of behavior (Matthews & Deary, 1998; Nicholson, 1996).

Opponents to Mischel countered that correlations of .30-.40 actually predict an individual's behavior 70% of the time. Furthermore, it was argued that personality was better at predicting behavior over time and across all situations than in specific situations at specific times in part because individuals generally chose the situation they are in (Matthews & Deary, 1998).

Development of traits

Can personality be changed? The five factor model developed by Costa and McCrae holds that personality stems from biological causes (genes) that don't reach full maturity until adulthood (1999, cited in Sirvastava et al., 2002). Hence, there should be little noted change in adult personality over time. Costa and McCrae believe that personality traits are insulated from

the “direct effects of the environment” (1999, cited in Sirvastava et al., 2002) and reach maturity around age 30 barring cognitive injury. Adult personality traits remain stable in adulthood although they may change slightly in old age, again due to cognitive decline. Longitudinal studies performed on both young adults and older adults have found personality relatively stable. However, a literature review by Roberts and DelVecchio (2000, cited in Sirvastava et al., 2002) came to a different conclusion. They found that scores for conscientiousness and agreeableness tended to increase in adulthood while neuroticism scores decreased. Scores for openness to experience demonstrated mixed results and scores for extraversion remained relatively stable. Roberts argues that personality changes throughout life with different change patterns for men and women. He notes that individuals are active participants in their life events and that those experiences influences change. Work, marriage and parenthood are the biggest life changes that affect adults. Because these events happen at different times for different people, the effect on individual personality can occur at any age. These models do not presuppose consistency of personality traits through genetics but instead believe consistency comes through the influences of the social environment. Individuals are viewed as “open systems” that are both continuous and changing at the same time. This theory also proposes that societal, cultural and psychological influences diminish with aging and maturity (Roberts, Walton & Viechtbauer, 2006).

Industrial/Organizational Psychology

Industrial/organizational (I/O) psychology is the study of the psychology of work and includes the study of people, organizations, management, and behaviors (James & Mazerolle, 2002). Industrial psychology, also known as personnel psychology, includes the study of job performance and analysis, staffing and recruitment, and abilities. Organizational psychology studies organizational behavior and job satisfaction, leadership, motivation, job design, career

counseling as well as personality characteristics pertinent to a specific job (James & Mazerolle, 2002).

The application of personality psychology to industrial and occupational fields evolved in the late 1980s. Employers traditionally used personal interview and cognitive testing to predict worker performance and subsequent hiring. However, fears of discrimination led to the development of instruments able to measure predicted performance based on personality measures instead. The successful use of such an instrument on U.S. Army recruits broadened its use in the general population. Researchers began using psychological measures to predict outcomes such as job performance, job satisfaction and absenteeism of employees (Roberts & Hogan, 2001).

The ongoing debate between nature vs. nurture hampered the emergence of personality testing in the workplace. Mischel's conclusion that personality and behavior had only a .30 correlation became universally accepted in academia and led to the opinion that personality could not be used to predict behavior. Furthermore, literature reviews performed in the 1950s and 1960s used the same .30 correlation to claim that personality measures were of no value in personnel selection (Matthews & Deary, 1998).

The 1970s were the nadir in the genetics vs. environment debate in regards to personality measurement. Very few instruments were developed, funding was limited and morale low among proponents of testing. The instruments most in use were good at identifying negative traits such as neuroticism and hostility. However, if a person wasn't neurotic or hostile, the instrument revealed very little about that person.

The development that most expedited the use of personality testing was the emergence of personality assessment scales emphasizing normal personality. Prior to the 1950s, personality

assessment scales such as the Minnesota Multiphasic Personality Inventory judged abnormal personality. In fact, the use of psychopathology measurements to predict performance of Office of Strategic Services (OSS) agents during World War II was widely viewed as unsuccessful. The first measurement developed to predict high level performance, the California Psychological Inventory (CPI), was not developed until the 1960s (Matthews & Deary, 1998). Even today, the stigma associated with personality assessment in the workplace traces back to the belief that screeners are searching for abnormal or deviate traits.

Personality's reemergence as a desired tool for pre-employment screening came, not surprisingly, from employers. Companies and businesses began emphasizing not only technical skills and experience in job advertisements, but sought individuals with specific personality traits as well. Among the desirable traits sought were initiative, integrity and self-discipline. The stated goal of pre-employment screening was to predict the fit between the individual and the occupation, thus sparing both the employer and the employee of an unsuitable relationship and saving the employer money and the employee emotional distress.

Industrial and organizational (I/O) psychologists, who specialize in the study of human behavior in the workplace, spurred the rediscovery of personality testing to predict job performance. Four major factors contributed to the use of personality measurement in job screening. The first involved cognitive testing. Intelligence is widely regarded as the greatest predictor of occupational performance. However, cognitive measures have the potential to discriminate against disadvantaged populations. Thus to alleviate the political and social pressures on employers to avoid discrimination in the selection process, personality measures became popular. Unlike cognitive measures, race and gender are neutral in personality measures (Nicholson, 1996).

The second factor influencing the development of pre-employment screenings of personality was the emergence of the Five Factor Model (FFM). The FFM consolidated thousands of personality characteristics into the five broad dimensions of Extraversion, Neuroticism, Agreeableness, Conscientiousness and Openness to Experience. The FFM resulted in more consistent and reliable personality measures. The third influence was the publication of the results of Project A, a U.S. Army research project conducted in the 1980s that used personality testing for selection into entry level Army jobs. Lastly, two meta-analyses conducted in the 1990s helped sway psychology opinion that personality measures provided a valuable aid in explaining and predicting job performance (Goodstein & Lanyon, 1999).

Why use personality measures to prescreen employees? It is estimated that between 60-90% of businesses use some form of pre-employment screening, often disguised as “employee assessment testing” (Cox, 2003). Its purpose is to improve job performance and reduce turnover, absenteeism, injury and poor customer service. Years ago employers looked only for outgoing, skilled, motivated workers and discounted many others who didn’t fit a particular profile. Now businesses increasingly recognize that there is more than one type of ideal employee. Recruiting now focuses on the employee-occupation fit. There are diligent and meticulous employees who are excellent at accounting or computer programming but may have poor interpersonal skills. Conversely, an extraverted employee may do well in customer relations or sales but lack patience and attentiveness to detail needed for a desk job. High risk jobs, particularly in regards to injury, may also be better suited to a specific type of person. Injury risk is related to job performance in that compliance to established safety guidelines and careful diligence may decrease risk.

Ethical Considerations in Personality Testing

The two most important ethical considerations surrounding the use of pre-employment screening instruments involve the issues of privacy and discrimination. On opposite sides of the issues are workers who wish to be treated with dignity and with respect for their civil liberties and employers who are under pressure to produce economically (International Labour Office, 2003).

A 1971 U.S. Supreme Court decision, *Griggs vs. Duke Power*, was an important landmark in the use of pre-employment personality testing. Prior to this ruling, most personality testing was done using measurements that had limited scientific validity and were used primarily as a way to identify individuals with executive potential (Cox, 2003). *Griggs vs. Duke Power* declared that use of personality measurements (as well as intelligence tests) were unconstitutional and violated the 1964 Civil Right Act by “limit[ing], segregat[ing], or classify[ing] employees to deprive them of employment opportunities or adversely to affect their status because of race, color, religion, sex, or national origin” (U.S. Supreme Court, 1971). However, the *Griggs* decision did allow professionally developed ability tests to be administered if the tests were designed not to discriminate based on gender, race, religion or national origin. Included in the decision was a prohibition on the use of polygraph testing to evaluate honesty and reliability of employees. Yet, employers wanted to continue to evaluate these essential characteristics in potential employees. The wish to identify individuals with certain desirable traits led to the renewed interest in written personality measurements that assessed many of these same characteristics.

More recently, ethical concerns about pre-employment personality testing center on issues of privacy. Do employers have the right to obtain pre-employment information, including personality testing, from potential workers? If so, what kind of data protections must be set in

place to avoid violating confidentiality? Can the information be shared by human resources with managers, directors and supervisors without discriminating against the worker? Can a worker decline to be tested and still be competitive for employment? Will the obtained information be used to eliminate applicants who pose potential liability risk? Is informed consent given by an applicant in need of a job offered voluntarily and autonomously? Will the obtained information be to the benefit or detriment of the applicant? These are questions that involve privacy, confidentiality, fairness, informed consent or refusal and professional competence and responsibility and have no clear cut answers (Levy, Wegman, Baron & Sokas, 2005).

Businesses do have a social and legal responsibility to provide for a safe working environment. If a goal of pre-employment screening is to assure a good individual-job fit in hopes of improving productivity and decreasing risk of injury, then employers may have a legal obligation to pre-screen. Businesses have been held liable for injuries suffered in the workplace. If pre-employment screenings have the potential to physically protect workers from injuries, then businesses may have a legal and ethical obligation to perform them. Since the passage of the OSH Act of 1971, the legal responsibility for providing workplace safety has fallen squarely on the employer (Business for Social Responsibility, 2006; U.S. Department of Labor, 2000).

It has been proposed that pre-employment screening should be used only if it is an appropriate preventive tool that addresses a specific workplace problem, the tests are known to be accurate, reliable and have a high predictive value in the population screened and that medical removal protection for earnings and job security is provided (Levy et al., 2005). In order to protect workers, a proposed Bill of Rights for individuals who are subject to medical screenings by their employers (current or potential) has been proposed. The Bill of Rights proposes that all workers should have the right to 1) be told the purpose and scope of the examination, 2) be told

for whom the provider works, 3) be provided informed consent for all procedures, 4) be told how results will be conveyed to the employer, 5) be told about confidentiality protection, 6) be told how to obtain access to medical information in the worker's file and 7) be referred for medical follow up, if necessary (Levy et al., 2005).

Purpose of the Study

The purpose of this study was to investigate the relationship between occupational injury and personality characteristics. This study sought to identify an associative relationship between personality dimensions of extraversion, neuroticism and agreeableness and occupational injury reported by health care workers. Specifically, this study looked at sub traits of excitement seeking, impulsiveness, compliance and angry hostility as targeted predictors of occupational injury. This study compared the personality characteristics of health care workers who reported injuries to the employer's employee/occupational health office and to the investigator with control subjects who did not report injury (and were assumed to not have suffered an injury). If such a predictive relationship can be established, it can be utilized to develop safety programs geared toward those employees most at risk. The assumption of this study was that there was a relationship between the personality characteristics and occupational injury. Therefore, the research question for this proposal was as follows: Does possessing the personality traits of excitement seeking, angry hostility, impulsiveness and compliance increase the risk of a health care provider suffering an occupational injury?

Significance of the Study

Despite the increase in the number of jobs in the health care sector over the past decade, many specialties, particularly nursing, continue to suffer from acute staff shortages and an aging population. Injuries sustained in the workplace frequently contribute to staff dissatisfaction and lead to employee turnover and departures from the field altogether. Health care facilities such as

hospitals and nursing homes, recognizing the difficulty recruiting such staff, have begun to take pains to retain employees by limiting exposure to injury. Furthermore, the costs, both direct and indirect, resulting from worksite injuries, impact on facilities' ability to fund other needed programs. The implementation of safety programs has eased the risk of injury somewhat. However, neither behavioral nor engineering based programs have been successful in completely limiting risk to employees. This study approached the issue from a person perspective. It attempted to identify those employees most at risk for suffering injury by identifying specific personality indicators. By doing so, it is hoped that interventions can be implemented tailored to individuals most at risk.

Theoretical Framework

Social Ecology Theory

Social ecology theory considers the interrelationship between personal and environmental factors in human health and illness (Stokols, 1996). Its roots derive from public health and epidemiology but now also encompass aspects of sociology, psychology and education (Green, Richard & Potvin, 1995). Its use in injury prevention stems from the recognition that large scale public health issues such as occupational injury are too complex to be explained by a single orientation (Stokols, 1996). There is growing recognition that individual behavioral strategies to encourage safe practice may be ineffective in a culture with an unsupportive environment or unfavorable social norms (Schmid, Pratt & Howze, 1995). Therefore, interventions must be directed at multiple levels and multiple sections (Green et al., 1995). These multiple levels range from immediate peers and friends to cultural and organizational norms (McLeroy, Bibeau, Steckler & Glanz, 1988). Multiple sections include home, work, community and national environments (McLeroy et al., 1988).

Stokols (1996) describes several core principles of social ecology. The first principle accepts that environmental settings have multiple physical, social and cultural “dimensions” that influence health outcomes. By this principle the environment may have a cumulative effect on health as well as a specific influence. A second principle of social ecology holds that personal attributes such as genetics, psychological dispositions (personality) and behavior, along with environmental factors, influence health. Therefore, environmental conditions that adversely affect one individual may hold little significance to another. Consequently, researchers in social ecology have found that compatibility with one’s surroundings is an important predictor of well-being (Stokols, 1996). Social ecology also considers the premise of passive interventions in addition to more traditional active interventions (Stokols, 1996). Active interventions require that an individual perform voluntary and sustained effort to enact behavioral change. That is, the individual must actively work to change behavior. However, behavioral interventions requiring active participation have been difficult to sustain over prolonged periods of time. Passive interventions, by contrast, can be more effective in that they target larger numbers of individuals simultaneously and may not require voluntary or sustained effort on the part of the individual (Stokols, 1995). Public service announcements promoting injury prevention are examples of passive intervention. Lastly, social ecology approach to health promotion and injury prevention is highly integrated with other disciplines. No one perspective is considered singularly. Ecological approaches consider a variety of preventive strategies including public health and epidemiology, behavioral and social sciences, and cultural change models.

The PRECEDE-PROCEED Model

This study was based on a model to for occupational injury prevention that considered the influence of social, behavioral and environmental factors on health behavior. The model (Figure 1-1) is based on the PRECEDE-PROCEED process by Green and Kreuter (Green, 2004).

PRECEDE is an acronym for Predisposing, Reinforcing, and Enabling Constructs in Educational/Environmental Diagnosis and Evaluation. PROCEED refers to Policy, Regulatory and Organizational Constructs in Educational and Environmental Development and was added to the framework to acknowledge the importance of environmental factors as determinates on health and health behavior (Glanz, Rimer & Lewis, 2002). The framework includes two important propositions. The first, that health and health risks are caused by multiple factors and second, that because health and health risks are caused by multiple factors, interventions to affect environmental, behavioral or social change must also be multi-dimensional and include participation by the individual (Green, 1994). Because the risk of occupational injury continues to remain high in health care workers, and individual behavioral interventions have demonstrated limited sustained success, a social ecologic model was chosen to in an attempt to prioritize the importance of injury prevention in the workplace.

Epidemiological Triad

A second theoretical framework for this study was modeled after the epidemiological triad of host, agent and environment. The epidemiological triad views causation as being due to the interaction of all three components. Under the right environmental conditions, a susceptible host and an external agent may combine to cause injury (CDC, 1992). This study looked to find an association between certain host factors, specifically personality traits, and injury. The external agents will be the chemical, biological, physical or psychological hazards that health care workers are exposed to daily. The environment includes both the physical and social environment and includes job demands, staffing and shift work. The literature review for this proposal was modeled on the epidemiological triad. A second proposed model for this study is shown in Figure 1-3.

Hypotheses

- **H1:** Health care workers who score high or very high in the sub facet of excitement seeking (Extraversion) on the NEO Personality Inventory-Revised (NEO PI-R) personality inventory will significantly and positively be at increased risk of suffering an occupational injury.
- **H2:** Health care workers who score high or very high in the sub facets of impulsiveness and angry hostility (Neuroticism) on the NEOPI-R personality inventory will significantly and positively be at increased risk of occupational injury.
- **H3:** Health care workers who score low or very low in the sub facet of compliance (Agreeableness) on the NEOPI-R personality inventory will significantly and positively be at increased risk of occupational injury.

Variables

The predictive (independent variable) variables for this study will be the specific personality scores obtained from each health care worker. The variables of interest are angry hostility, impulsiveness, compliance and excitement seeking. The response (dependent) variable will be injury or non injury.

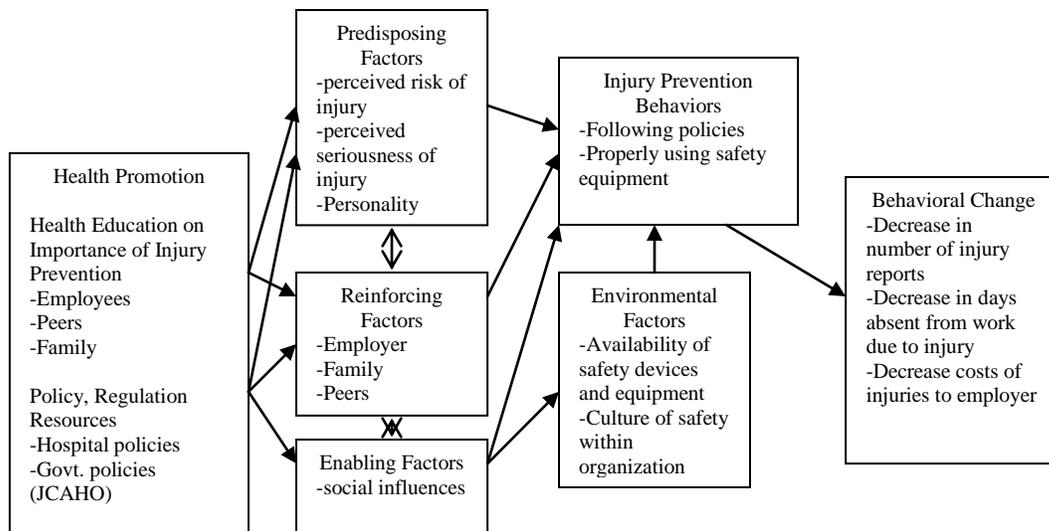


Figure 1-1. Planning model to prevent occupational injury

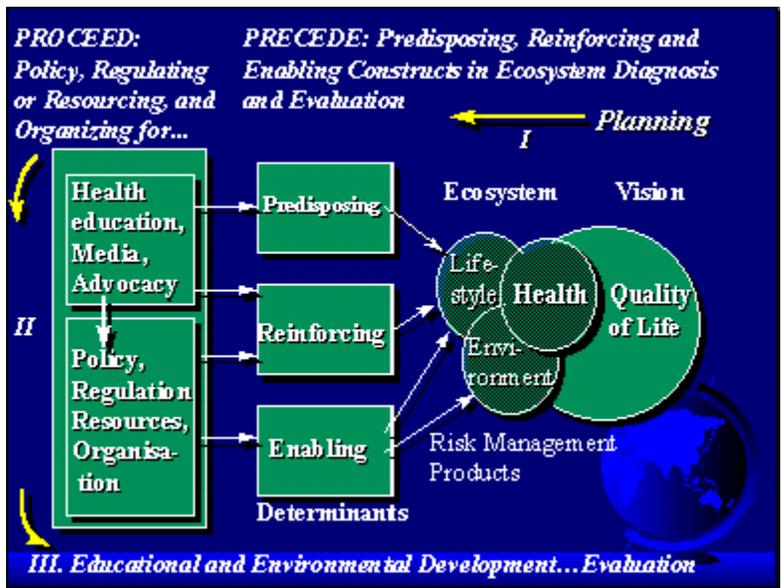


Figure 1-2. The PROCEED-PRECEDE Model. Reprinted with permission from Dr. Lawrence W. Green from <http://lgreen.net/>.

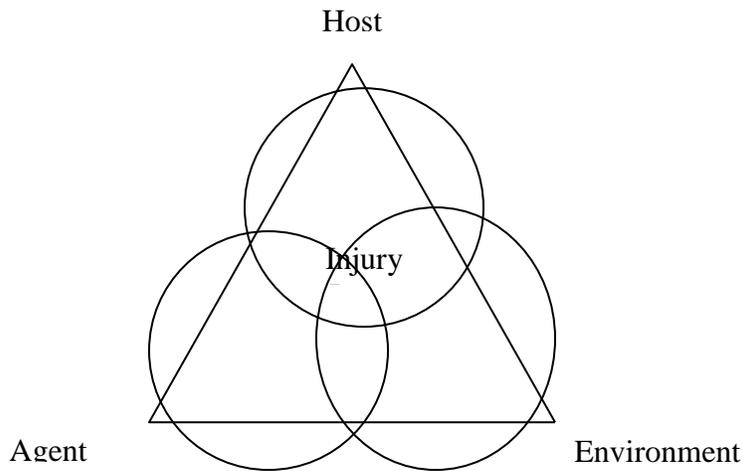


Figure 1-3. Epidemiological triad

CHAPTER 2 REVIEW OF LITERATURE

The last 30 years have seen an increase in initiatives designed to improve safety and decrease risk of injury in the workplace. Research conducted in this field has addressed the issue from different perspectives. This literature review will investigate occupational injuries using the epidemiological triad of host, agent and environment. The review will first focus on biological, chemical, physical and social hazards that act as agents and contribute to worksite injuries. Next the review will evaluate the environmental contributions to injury. These include organizational structures and physical designs of the workplace that increase risk of exposure. Lastly the review will evaluate injury risk due to host factors. Host factors include age, job tenure and individual differences, specifically personality dispositions.

Agent Factors

Traditionally in epidemiology, the term agent has referred to an infectious organism that causes disease in the host. However, agent can also refer to chemical or physical exposures that lead to increased susceptibility to injury (CDC, 1992). Health care workers face an array of exposures ranging from biological pathogens such as hepatitis and tuberculosis, chemicals such as latex and ethylene oxide, smoke released during surgical procedures and lastly from physical violence that occurs at work (NIOSH, 2005). All of these exposures may lead to either injury or illness.

Biological pathogens include viruses carried in blood and body fluids such as human immunodeficiency virus and hepatitis virus, airborne pathogens such as tuberculosis and severe acute respiratory syndrome (SARS). Transmission of bloodborne pathogens is generally caused by splashes into mucous membranes or skin or through subcutaneous needle sticks. Medical housestaff, nurse anesthetists, inpatient nurses, phlebotomists and surgical technicians are at

highest risk of transmission (Dement, Epling, Ostbye, Pompeii & Hunt, 2004). Waterson (2004) and Sencan et al. (2004) both found that nurses had the greatest risk of sharps injury of health care workers and those risk factors included giving shots in the patient room and in recapping needles (Waterson, 2004). Physicians are at greatest risk for splash injury (Sencan et al., 2004). The first hour of work and the last two hours of work provided the greatest exposure risk (Marcias, Hafner, Brillman, & Tandberg, 1996). Having a permanent position and having less nursing experience increased the risk of occupational blood exposure in French nurses (Rabaud et al., 2000). Use of universal precautions, particularly wearing surgical masks, decreased the risk of contracting SARS by health care workers (Wilder-Smith et al., 2005). Failure to use appropriate respiratory protection when performing high risk procedures was also a risk factor for acquiring tuberculosis infection in health care workers (Jelip et al., 2004). Overall, the greatest risk of injury from exposure to chemical or biological agents is lack of safety training, poor safety climate and poor safety practices in the organization (Gimeno, Felknor, Buau, & Delclos, 2005).

Chemicals used frequently in the health care industry include ethylene oxide, glutaraldehyde, anti-neoplastic drugs and latex. Ethylene oxide is a potential carcinogen used in gas sterilizers. Glutaraldehyde is a cold sterilizer used to clean heat sensitive equipment and may cause respiratory irritation. Drugs used to treat humans, particularly anti-neoplastic drugs, may increase risk of genetic mutations and cancer in exposed workers. In addition, smoke emitted during surgical/laser procedures contains chemicals harmful to human health. Lastly, latex is a natural rubber used in health care equipment. Repeated exposure may lead to contact dermatitis (NIOSH, 2005). Again, as was the case of biological agents, workers at greatest risk of injury are those who fail to use appropriate safety practices.

Worksite violence is an increasing threat to the well being of health care workers. Although there are four categories of violence (criminal intent, patient/staff, worker/worker and personal), violent acts by patients and/or their caregivers is most common. Workers caring for mentally ill or agitated patients or for patients suffering from dementia are at increased risk for verbal or physical injury (McPhaul & Lipscomb, 2004). Other risk factors include caring for patients with a history of alcohol/drug abuse, working in understaffed departments, especially during visiting hours and meal times, working in overcrowded departments with long waits for service, having inadequate security and unrestricted movement of the public, and having staff poorly trained to deal with volatile patients (McPhaul & Lipscomb, 2004). Staffers having increased patient contact suffered increased risk of injury whereas having strong supervisor support decreased risk of suffering workplace violent injury (Findorff, McGovern, Wall, Gerberich, & Alexander, 2004).

Stress is now widely viewed as an occupational agent that can contribute to injury (Hemingway & Smith, 1999; Johnston, 1995; Salminen, Kivimäi, Elovainio, & Vahtera, 2003; Trimpop, Kirkcaldy, Athanasou, & Cooper, 2000). Stress over health care changes within the work environment, such as inadequate staffing, contribute to increased musculoskeletal injury in nurses (Lipscomb, Trinkoff, Brady, & Geiger-Brown, 2004).

Environmental Factors

Environmental factors contributing to accidents and injuries are extrinsic factors that increase an individual's susceptibility and exposure risk (CDC, 1992). Environmental factors may include the physical work surroundings as well as organizational structure of a business. Regardless, environmental factors may increase the probability a worker has of suffering an injury. The greatest risk factor for worksite injury is working in a hazardous job (Frone, 1998; Kerr et al, 2001).

Much of the research on organizational factors contributing to employee injury has looked at the effects of scheduling and staffing. In general, long working hours, extended working hours and working overtime, contributes to increased risk of employee injury. Working overtime hours has the greatest impact (61% increase), extended working hours (up to 12 hours daily) increased risk of injury by 37% and working more than 60 hours per week increased the risk by 23% (Dembe, Erickson, Delbos, & Banks, 2005; Trimpop, Kirkcaldy, Athanasou & Cooper, 2000; Kirkcaldy, Trimpop & Cooper, 1997). Shift work is generally regarded as working off hours (nighttime or evenings) or rotating shifts (alternating day and night shifts). Shift work disturbs the body's normal circadian rhythms and can affect reaction time, concentration and motivation, increasing risk of accidents and injuries (Canadian Centre for Occupational Health and Safety, 1998). Night shift workers also report more fatigue, which has shown to affect performance and safety (Muecke, 2004). Although comparison are difficult, working off shifts does increase the risk of occupational injury and working rotating shifts has the highest risk (Frank, 2000; Muecke, 2004). Carrying a high workload as well as working under a poor organizational climate increased the risk of sustaining a needle stick injury in health care workers (Clark, Rockett, Sloane & Aiken, 2002). Working full time as opposed to part time also increased risk of injury (Engkvist et al., 2000). Institutions having lower workloads as measured by staffing levels (high staffing equates to lower workload) also correlated to decreased frequency of injuries (Cohen et al., 2004). Higher job satisfaction, higher control over practice and lower job demands are associated with fewer on-the-job accidents and injuries in nurses (Letvak, 2005).

High psychological job demands such as excessive work, conflicting demands and insufficient time to complete tasks have been identified as risk factors for occupational injury

(Swaen, van Amelsvoort, Bultmann, Slangen & Kant, 2004). Swaen et al. (2004) also identified low skill discretion (lack of challenging, creative work) and low decision authority (lack of freedom, control to make decisions) as contributing to risk of injury. Both job satisfaction and supervisor/coworker conflicts also were negatively associated with occupational injury (Kerr et al., 2001; Swaen et al., 2004). Workers reporting a greater job satisfaction had a slight tendency to return to work sooner after occupational injury (Murphy, 1994). An association between low decision latitude, low skill discretion, problems in interpersonal relationships and occupational injury in hospital workers has been observed (Salminen et al., 2003; Seago & Faucett, 1997). However, they also found that highly monotonous work predicted injury. A study in the Netherlands concurred, finding that high work pace and low intellectual discretion was associated with increased musculoskeletal injury (Houtman, Bongers, Smulders & Kompier, 1994).

In health care facilities, the use of equipment to alleviate strain on individuals also appears to decrease risk of injury. Lift teams and lifting devices shift the physical stressors away from individual workers. Their use has been demonstrated to decrease the incidence and severity of musculoskeletal injury in health care workers (Edlich, Winters, Hudson, Britt & Long, 2004; Li, Wolf & Evanoff, 2004). Although lifting devices have been shown to decrease injury risk, studies have shown them to be poorly utilized (Santaguida & Fernie, 1998). Use of lift teams has led to a decrease in the number of back complaints (OSHA, 2005). Facilities utilizing lift teams reported reductions in lost time, restricted time, workers' compensation claims and injuries to lifting team members. Electric and/or hydraulic beds have been utilized on nursing units with some success. Electric beds allow the nurse to bring the patient to her/him rather than have the nurse bend to reach the patient, thus alleviating strain on the back (Trinkoff, Brady & Nielsen,

2003). Workers receiving adequate training also were less likely to suffer injury (Engkvist et al., 2000).

Other protective equipment utilized to reduce injury in health care workers includes special eye, face and body wear designed to prevent splashes of biological or chemical agents into the face or skin. Newer intravenous systems deliver fluids and medications to patients without use of hypodermic needles and have resulted in fewer needle stick injuries and exposure to bloodborne pathogens. Facilities using such systems reported less risk of needlestick injury to employees (Wilburn & Eijkemans, 2004). Special sterilizers and scavenging systems have been installed in hospitals to decrease exposure to chemicals hazardous to health (NIOSH, 2005).

Working in specific environments also increases risk of injury. Those departments requiring staff personnel to perform heavy lifting demonstrate greatest risk of injury. Nurses working on orthopedic, intensive care, neurology and surgery units had highest risk of suffering back injuries whereas nurses who work in pediatrics and general medical units (which require less heavy lifting) suffer fewer reports of injury (Goldman et al., 2000, Engkvist et al., 2000). Having to perform patient transfers was among the highest predictors of suffering injury in nursing personnel (Engkvist et al., 2000).

Host Factors

Host factors are intrinsic characteristics of individuals that may be due to genetics, behavior or the environment. Host factors as causative agents vary based on the exposure, susceptibility and response of the individual (CDC, 1992). Host factors include age, gender, socioeconomic status, anatomy (height, weight), medical and psychological history and lifestyle behaviors. Personality is an intrinsic characteristic that is defined as a host factor.

Research on age as a predictor of injury is mixed. Generally, younger workers are more likely to be injured (Hansen, 1988). However, Kirschenbaum, Oigenblick and Goldberg (2000)

did not find age to be significant in testing a model of accident prediction. Harrell (1995) also did not find age to predict injury among farm workers. However, a study of French laborers found that increasing age decreased risk of injury but only until a certain age. After age 54, risk and severity of injury increased, perhaps due to decreasing physical and cognitive ability (Cellier, Eyrolle & Bertrand, 1995). Older women were also more likely to suffer serious injury after slips, trips or falls at work (Cherry et al., 2005). However, increasing age was found to be a protection against injury in nursing assistants (Meyers, Silverstein & Nelson, 2002). Whether this is due to the healthy worker effect is unknown. The healthy worker effect is believed to cause bias in studying age and longevity in workers. Workers who remain healthy, either through genetics or healthy habits, are more likely to remain in the workforce. Therefore, it is difficult to ascertain if increasing age is a protection against injury or if previously injured workers have left the workforce at a young age (Arrighi & Hertz-Picciotto, 1994).

Gender as a predictor of injury also demonstrates mixed results. Males have found to be injured more frequently but how much this is related to job risk is uncertain (Frone, 1998). Iverson and Erwin (1997) controlled for job risk and found women to more likely be injured. In contrast, Kirschenbaum and associates (2000) found male gender to be more predictive of injury. Their study also controlled for job hazards.

Tenure has been researched extensively as a predictor of injury. Experience has generally been inversely associated with accident involvement (Cellier et al, 1995, Liao et al., 2001). However, in testing their predictive model, Kirschenbaum and associates (2000) did not find tenure to be significant. Neither did Harrell (1995) in a study of farmers. A national longitudinal study of American youth workers found that having longer tenure increased the odds of being involved in an occupational injury or illness (Strong & Zimmerman, 2005). A

study of nurses found that less experienced nurses experienced greater frequency of injury (Arad & Ryan, 1986).

Physical characteristics such as height and weight have been studied in relationship to injury. Generally increasing body mass and weight is associated with greater risk of injury (Arad & Ryan, 1986; Engkvist et al., 2000; Fransen et al., 2002). Life style choices such as poor diet, lack of exercise and cigarette smoking may also be associated with increase risk of occupational injury (Rosecrance & Cook, 1998; Sacks & Nelson, 1994). However, a study by Smith, Wei, Kang and Wang (2004) found that occasional consumption of alcohol decreased the risk of musculoskeletal injury. Income has also been noted to be inversely associated with development of injury (Marras, 2000) although the model proposed by Kirschenbaum and associates (2000) found higher paid workers more likely to be accident-prone. Previous history of injury is among the highest predictors of injury (Marras, 2000; Venning, Walter & Stitt, 1987) as is poor physical health (Frone, 1998).

Personality, Accidents and Injuries

The study of the influence of personality on injury or accident proneness has been conducted in fields outside of health care. A variety of different scales have been utilized, each with specific foci. The Minnesota Multiphasic Personality Inventory (MMPI) scale measures deviant patterns of personality behavior while the Five Factor Model (FFM) personality scales evaluate normal personality dispositions (Aiken, 1999). Some studies have focused on one specific aspect of personality such as affectivity or locus of control. The results have varied broadly but there have been some consistencies.

The MMPI consists of 10 clinical scales measuring psychiatric disorders and consists of such titles as Hysteria (strong reaction to stress), Social Introversion and Psychopathic Deviant (socially maladaptive) (Aiken, 1999). The MMPI is used primarily in the legal community but

has been utilized in occupational settings as well. Bigos (1991) found that the scales for Hysteria, Psychopathic Deviate (anti-social behavior) and Schizophrenia, along with a history of low back pain, predicted report of back injury in manufacturing employees. A separate report on the same study looked specifically at scale 3 (Hysteria) and its subsets as predictors of back injury and found that scoring high on the Lassitude/Malaise subscale provided the greatest predictive value. The subscales Denial of Social Anxiety and Need for Affection also predicted report of back injury. However, the subscale Somatic Complaints failed to predict report of back injury leading the authors to surmise that emotional and psychological factors play an important role in predicting report of injury (Fordyce, Bigos, Battié & Fisher, 1992). Firefighters who exhibited traits of social introversion (Social Introversion scale), maladjustment (Psychopathic Deviate scale) and hysterical reaction to stress (Hysteria) were more likely to sustain an injury. Furthermore, those firefighters who scored highly on social maladjustment (Psychopathic Deviate scale) reported longer duration of injury. Surprisingly, firefighters who scored high on the Schizophrenia scale reported shorter duration of injury (Liao, Arvey, Butler & Nutting, 2001). In summary, both the Hysteria and Psychopathic Deviate scales appear to predict occupational injury. Scoring high on the Hysteria scale is associated with individuals who demonstrate an excessive response to stress. They may appear well adjusted but under stress may avoid responsibility. They may be socially isolated and immature (Fordyce et al., 1992). High scores on the Psychopathic Deviate scale are associated with social maladjustment, rebelliousness and impulsivity. It is hypothesized that individuals demonstrating these traits, social maladjustment and social anxiety, may predict occupational injury and accidents by engaging in reckless behavior.

The Five Factor Model (FFM) measures five broad dimensions of personality. The FFM categorized thousands of existing personality measurements into five general “dimensions”: Extraversion, Agreeableness, Conscientiousness, Neuroticism and Openness (James & Mazerolle, 2002; Roberts & Hogan, 2001). The FFM or “Big Five” was first proposed over 60 years ago but has only recently reappeared in the personality literature. Louis Thurston, President of the American Psychological Association, in 1934 proposed narrowing down the sixty adjectives used to define personality into five broad categories. His idea was not pursued further until Cattell refined the broad categories in the 1940s. Finally in the 1980, Goldberg aided by Costa and McCrae developed what is now widely accepted as the Big Five model (Wiggins, 1996).

The dimensions are Openness to Experience, Conscientiousness, Extraversion, Agreeableness and Neuroticism (James & Mazerolle, 2002). Extraversion includes facets of assertiveness, activity, excitement seeking. High scores on extraversion are associated with talkative and assertive individuals who are highly social. Agreeableness encompasses trust, compliance, and altruism. In contrast, scoring low on agreeableness is related to poor socialization and is associated with individuals who are angry, immature and impatient. Conscientiousness values competence, self-discipline, and dutifulness. Self control, integrity and honesty are important characteristics in this dimension. Neuroticism includes anxiety, hostility, and impulsiveness. Persons testing high on neuroticism are viewed as fearful, anxious and depressed and may engage in indecisive and withdrawal behavior. Lastly, openness to experience consists of aesthetics, feelings, ideas and values (James & Mazerolle, 2002). Individuals scoring high in openness to experience are more open to change, value differing opinions and have a thirst for knowledge. Each dimension also consists of several sub facets that

measure more specific traits. As such the dimensions are very broad so there is great variation among individuals, yet individual traits are stable over time. There has also been shown to be a heritable component to the traits, meaning genes play a role in their development. The dimensions have been tested and proven reliable within different cultures and languages (Wiggins, 1996).

Although all dimensions have been studied in accident/injury research, conscientiousness, extraversion, agreeableness and neuroticism have received the most attention. Employees who are conscientious are expected to follow safety precautions and not act impulsively, lessening risk of injury. They may also demonstrate greater self discipline and control. Extraverts are viewed as more outgoing, social individuals. However, extreme extraversion, marked by over confidence, intolerance and aggression, is thought to increase the risk of accidents due to risk taking behaviors and carelessness. Introverts are more internally controlled and as such are expected to be more vigilant in performing tasks (Hansen, 1988). Disagreeable individuals are frequently viewed as social misfits and often exhibit negative, hostile emotions at work. Lastly, individuals exhibiting neurotic behaviors such as anxiety and nervousness are thought to be more susceptible to accidents.

These findings have been demonstrated in many studies although not all consistently within the same study. An early study by Fine (1963) supported the hypothesis that extraverts would be involved with more traffic accidents than introverts. Lajunen (2001) also looked at traffic and occupational fatalities and found that extraversion positively correlated with traffic accidents although neuroticism was negatively associated with accidents. Furthermore, he looked at national traffic fatality data and found similar results. Extraversion again predicted traffic fatalities within 34 countries. The results for neuroticism were mixed. He was unable to

demonstrate a relationship between personality factors and occupational fatalities. Extraverts were also more likely to present for services at a minor trauma center seeking medical care (Craske, 1968).

A cross sectional study of French nurses found that those scoring highest for disinhibition, defined as “extroverted, socially disinhibited, stimulation-seeking behavior,” and susceptibility to boredom, were at risk for occupational blood exposure. Two other personality dispositions, danger and adventure seeking and seeking new experiences, did not correlate with risk of occupational blood exposure. Occupational blood exposure included both sustaining and reporting exposure (Rabaud et al., 2000).

A study of university undergraduates found an inverse relationship between traits of conscientiousness and agreeableness with “at fault” and “not at fault” accidents. Students who demonstrated greater characteristics of conscientiousness and agreeableness were less likely to be involved in any accident. However, no significant relationship between neuroticism, extraversion and openness to experience with accidents was found (Cellar, Nelson, Yorke & Bauer, 2001). Traits of extraversion (distraction), neuroticism (sensitization or high emotional reaction to stressors) and avoidance coping styles predicted physical injuries necessitating hospitalization in a general population (Marusic, Musek & Gudjonsson, 2001). The authors hypothesized that individuals scoring high on extraversion were more easily distracted, contributing to injury. They also hypothesize that individuals scoring high on sensitization overestimate their tendency toward anxiety and thus are predisposed to misjudgments and accidents.

A model on worksite injury prediction found that individuals with greater social support were less likely to be involved in accidents (Kirschenbaum et al., 2000), a finding confirmed in

other studies (Cellar, Yorke, Nelson & Carroll., 2004; Iverson & Erwin, 1997; Liao et al., 2001; Marusic et al., 2001). When mediated by self-efficacy, agreeableness was associated with involvement in fewer accidents, perhaps because of greater compliance with safety procedures (Cellar et al., 2004).

The FFM has also been applied to children and has demonstrated similar results in association with accident-related injuries. In a case control study of children ages 6-14 who sustained accidental injury requiring overnight stay at hospitals, Vollrath et al. (2003) found that cases scored higher on extraversion and lower on conscientiousness. This suggests that children who are outgoing and energetic but possess lower concentration levels and lower desire to achieve are more at risk for accidental injury. The same study found no association with aggressiveness, impulsiveness or emotional instability to accidental injury.

The personality traits of managers also predicted injury and accident rates within their departments. Twenty-three managers at a manufacturing plant were given a FFM personality inventory. Managers demonstrating traits related to neuroticism (anxiety, nervousness) had higher injury rates in their departments, perhaps because they push employees harder to increase productivity which results in injury. In contrast, departments having managers who exhibit traits of conscientiousness and extraversion were inversely associated with injury rates. Conscientious managers are thought to be more likely to follow safety practices. Extraverted managers may have greater communication skills with their employees, decreasing injury rates (Thoms & Venkataraman, 2002).

Overall, research has supported the theory that extraverted persons are more vulnerable to accidents and injuries. The evidence on neuroticism is less clear, however. Although increased anxiety is felt to divert attention from tasks at hand leading to accidents, neurotic behavior may

instead lead to fewer accidents because heightened anxiety may contribute to greater concentration (Hansen, 1988). Conscientiousness has consistently demonstrated an inverse relationship with accidents. Conscientious individuals follow safety guidelines, are self-disciplined and deliberate and are less likely to take risks contributing to accidents (Wiggins, 1996; Harrell, 1995). Agreeableness, specifically compliance, has been associated with involvement in fewer accidents (Cellar et al., 2004).

Personality affectivity (mood) is an emotion based dimension through which a person views his or her environment. Affectivity is based on experience and offers the individual a bias through which life is perceived. An individual with a positive affect views life through positive emotions and is seen as possessing an engaged, enthusiastic, confident personality. An individual possessing a negative affect experiences negative emotions. He or she focuses on disappointments and may exhibit feelings of anxiety and anger (Hogan, Johnson, & Briggs, 1997). Studies on affect and occupational injury report positive relationships. An early study by Davids & Mahoney (1957) found that a negative attitude toward work increased susceptibility to accidents. A positive affect, along with the ability to actively control the environment, decreased the incidence of occupational injury among manufacturing workers in Australia. In contrast, a negative affect, coupled with less direct coping mechanisms, increased the incidence of occupational injury (Iverson & Erwin, 1997). Negative affect was also found to predict work related injuries in adolescents although the results were not significant (Frone, 1998). Possessing a negative affect is thought to be related to the sub facets of anger hostility, anxiety and vulnerability of the neuroticism dimension (Garrity, 2003).

Locus of control (LOC) has been the focus of several studies looking at accident and injury rates. The concept was first proposed by Rotter in 1966 and has been applied to many

behavioral fields. Locus of control measures an individual's expectancies of control.

Individuals possessing internal loci of control believe their own behavior is responsible for rewards whereas a person with an external locus of control believes external forces outside their control reward behavior (fate, chance) (Matthews & Deary, 1998). In theory, a worker who feels little control over his work situation will more likely be involved in an accident.

Conversely, a worker who feels in control of his environment should take a more active role in preventing accidents (Hansen, 1988). Weubker (1986) found that employees with severe accident histories were more externally focused, although she did not control for demographics such as job hazards, age and other factors. In a retrospective study of hospital employees, workers with the highest external safety locus of control reported the most work injuries (Jones & Wuebker, 1985). In a separate study workers reporting more control of their environments, coupled with having a positive affect, had less risk of occupational injury (Iverson & Erwin, 1997). Other studies on both blue and white collar workers report similar findings (Janicak, 1996; Salminen & Klen, 1994). Thus, these studies support the theory that individuals possessing an external locus of control have higher probability of being involved in an accident. The concept of control is related to the sub facets of self-discipline and order found in the dimension of conscientiousness.

The concept of self-efficacy was studied along with the FFM in a survey of automobile driving accident rates of college undergraduates. Self-efficacy is the belief an individual has in themselves that they possess the skills and aptitude to accomplish certain tasks. The concept was first proposed by Bandura in 1966 and has been applied to many behavioral settings. This study sought to predict if students felt they could avoid experiencing a workplace accident in the next

ten years. Students scoring high on neuroticism along with low self-efficacy viewed themselves as less likely to avoid being in an accident in the future.

Aggressive behavior is viewed as the tendency to act out anger and frustration (Hansen, 1988). Although numerous studies have linked aggression with automobile driving accidents, aggression in association with occupational accident has not been heavily studied. Similar to aggression is the concept of social maladjustment. This characteristic includes antisocial behavior, immaturity, disregard for others, irresponsibility, hostility and authority problems (Hansen, 1988). Liao et al. (2001) found that firefighters scoring high on social maladaptive behavior reported longer duration of injury. An aggressive person can be viewed as socially maladaptive and non compliant to society norms. Compliance is a sub facet of agreeableness. Impulsiveness is a tendency to act quickly without thinking logically of possible consequences. Impulsivity is a sub facet of the dimension of neuroticism and while neuroticism has demonstrated mixed results in predicting accident involvement, a recent study did find an association between impulsivity and accident involvement in nuclear industry workers (Garrity, 2003). Impulsivity has been studied extensively in pilots and drivers, but there is little research linking impulsivity with occupational accidents and injuries. Impulsivity is a sub facet of neuroticism.

The Five Factor Model in the Workplace

The resurgence in the use of personality profiling in the workplace has occurred only in the last two decades. Prior to this, many psychologists in the field of Industrial/Organizational (I/O) Psychology viewed personality testing as not reliable or predictive enough for everyday use. However, the refinement of the five-factor model of personality has encouraged its widespread use for predicting success or failure in many occupational endeavors.

I/O psychologists acknowledge that competence in the workplace involves more than cognitive intelligence. Human ability involves social and emotional intelligence as well (Roberts & Hogan, 2001). However, success or failure in the workplace is also dependent upon multiple factors beyond ability. The factors are work context, which includes interpersonal relationships, physical work conditions and structural job characteristics: work style of the worker (achievement oriented, conscientious, etc); and organizational context (type of industry, social processes) (Roberts & Hogan, 2001). The importance of personality in work success or failure is obvious. Employers want to hire individuals who will likely succeed in their role. Furthermore, the advances in technology, including the increased complexities of tasks, requiring longer and more costly orientations, make the desire for strong hires all the more desirable (James & Mazerolle, 2002).

Beginning in the 1990s, studies have been undertaken evaluating the use of the FFM in work related concepts such as job performance, job satisfaction and absenteeism. Conscientiousness was shown to be a predictor of manager's job proficiency (Barrick & Mount, 1991). Conscientiousness was also found to be significant, along with emotional stability, in predicting job performance in supervisors (Ones, Viswesvaran, & Schmidt, 1993). In service related fields, agreeableness and emotional stability (neuroticism) predicted performance (McDaniel & Frei, 1994). A later meta-analysis also found conscientiousness had the highest validity as a predictor of job satisfaction across occupational categories (Hurtz & Donovan, 2000). The FFM has also been applied to absenteeism. Judge, Martocchio and Thoresen (1997) studied university employees and found that conscientiousness and extraversion predicted absenteeism although the relationship was mediated by absenteeism history. Employees scoring high on neuroticism did not predict absenteeism. However, high extraversion scores positively

predicted absenteeism and high conscientiousness scores negatively predicted absenteeism. A meta-analysis evaluating the FFM and job satisfaction found the strongest predictors being neuroticism and extraversion (Judge, Heller & Mount, 2002). Conscientiousness also correlated with job satisfaction although not significantly.

The FFM has also been used to measure workplace counterproductive behaviors including accidents, deviate behavior and turnover (Salgado, 2002). A meta-analysis found that conscientiousness predicted deviate behaviors and turnover whereas extraversion, openness to experience, agreeableness and emotional stability (neuroticism) predicted turnover with emotional stability being the best predictor. There was no predictive value for accidents or absenteeism in this study. Colbert et al. (2004) also found that employees testing low on conscientiousness, emotional stability and agreeableness moderated the relationship between negative perception of the workplace and workplace deviate behavior.

Summary of Literature Review

Although many of the findings of this literature review have mixed interpretations, several variables stand out. Extraversion as a personality dimension consistently predicted an individual's involvement in accidents. Whether this is due to an outgoing, active, excitement-seeking, assertive nature or a lower level of vigilance is unclear. Few studies differentiated between the different facets of extraversion. However, logic would dictate that individuals who are less vigilant and careful in following safety behavior may suffer greater risk of accident. Risk taking behavior, although an extreme of extraversion, is most likely the common trait attributable to accident involvement.

The literature review on impulsiveness does appear to predict accident involvement, although it has primarily been studied in drivers and pilots and not exclusively in occupational settings. Individuals exhibiting impulsivity are more likely to react without careful thought or

deliberation. In the five factor model, impulsivity is a sub facet of neuroticism. Although neuroticism as a personality dimension consistently fails to predict accident or injury, impulsivity or recklessness is widely hypothesized to predict accidents.

Workers displaying traits of social maladaptive behavior including negative affect, hostility, immaturity and irresponsibility are at risk for becoming injured on the job. These findings were present on studies using both the FFM and the MMPI. Therefore, agreeableness has been found to be negatively associated with accident involvement.

CHAPTER 3 METHODS

This study was conducted to evaluate the predictive nature of personality dispositions and the occurrence of occupational injury, specifically in health care workers. It was conducted prospectively and the data of interest was to be collected within a short time period of the injury report (six weeks). By doing it so, the data was hoped to more accurately reflect subject dispositions at the time of the injury and not be influenced by recall bias. Although difficulties with recruitment necessitated expanding the timeframe from injury occurrence to study participation to six months, it was still expected that this information would better predict the occurrence of occupational injury.

Research Design

This study was conducted using a case comparison design. Although there have been prospective studies in this field, most research studying personality and worksite injuries have used cross sectional designs with broadly generalized results. Most commonly the research has collected both personality information and injury reports simultaneously and has depended upon subject recall for injury history. Other studies obtained injury data retrospectively through employer records. However, the personality inventory was not collected until much later and as a result may not be as reflective of personality traits present at the time of injury. Lastly as evident in the literature review, specific personality dispositions have not been studied as frequently as the broad personality dimensions. It was hypothesized that by the use of a prospective case comparison design, specific exposures could be tested against a comparison group to more precisely define the significant personality characteristics contributing to worksite accidents and injuries. Also, by obtaining the personality information near the time of the injury, the identified traits will more likely reflect true dispositions.

Research Setting

The setting for this study was two community hospitals in the north central Florida region. Ocala Regional Medical Center (ORMC) and Munroe Regional Medical Center (MRMC), both located in Ocala, Florida, serve primarily Marion County. Both hospitals offer an array of general services that include surgery, medicine, obstetrics and gynecology and pediatrics. ORMC employs approximately 1000 staff that supports 270 hospital beds. Its occupational health office reports approximately 100 injury reports per year. MRMC, the larger of the two facilities, employs 2400 staff to support 421 patient beds and reports approximately 200 injury occurrences annually. Each hospital has an occupational/employee health office/safety office that monitors collection of data on accidents and injuries. Both hospitals employ a variety of health care workers including nurses, nursing assistants, physical therapists, respiratory therapists, surgical technicians, nurse practitioners and physicians.

Sample

Power analysis for this study using a level of significance of $p < 0.05$ and a power of .80 required a sample size of 100 cases and 100 comparisons. However, due to recruitment difficulties that will be discussed later, the study was halted with a final sample size of 29 cases and 43 comparisons.

Sample Criteria

The inclusion criteria for cases were as follows:

- Health care workers who perform at least 80% of their working time in direct patient care
- Health care workers who work minimally 20 hours per week.
- Health care workers who report an injury claim to the occupational health office during the study period of 6 months. (This was later modified and will be discussed in under procedures).

The inclusion criteria for comparisons were as follows:

- Health care workers who perform at least 80% of their working time in direct patient care.
- Health care workers who work minimally 20 hours per week.
- Health care workers who have not had an occupational injury claim within the previous six months from the recruitment period.

Measures

Personality Inventory

The NEO Personality Inventory- Revised (NEO PI-R) was designed by Costa and McCrae (Psychological Assessment Resources [PAR], Inc., 2005) to measure personality traits based on the Five Factor Model of personality. The inventory was developed and refined over a number of years beginning in the 1970s and today is widely viewed as a reliable, stable measure of normal adult personality. The current revised version used in this study was first published in 1990. The NEO PI-R has been used in hundreds of studies and translated into over 25 different languages. Its application includes fields of clinical psychology, behavioral genetics and aging, industrial/organizational psychology and health behavior. The measure consists of five domains: Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness. In addition, each domain consists of measures for six sub facets, providing specific information about each domain. The scores on the six sub facets of each domain are tallied for an overall domain score. The domain of Neuroticism consists of the sub facets of anxiety, angry hostility, depression, self-consciousness, impulsiveness and vulnerability. Extraversion encompasses warmth, gregariousness, assertiveness, activity, excitement-seeking and positive emotions. Openness to Experience includes fantasy, aesthetics, feelings, actions, ideas and values. The domain of Agreeableness carries the sub facets of trust, straightforwardness, altruism, compliance, modesty and tender-mindedness. Lastly, Conscientiousness includes competence,

order, dutifulness, achievement striving, self-discipline and deliberation. The following are examples of questions found in the NEO PI-R:

“I’m pretty set in my ways.”

“I don’t take civic duties like voting very seriously.”

“I sometimes lose interest when people talk about very abstract, theoretical matters.”

“In meetings, I usually let others do the talking.”

“I have trouble resisting my cravings.”

“I love the excitement of roller coasters.”

“I’m hard headed and stubborn.”

“I often get disgusted with people I have to work with.”

There are 240 items (questions), as well as three validity items, and the inventory is appropriate for adults with a minimum of a 6th grade reading level. Each item is scored on a five point scale ranging from “strongly disagree” to “strongly agree.” Once the inventory is completed, the carbonated front sheet is removed, revealing a numbering system that divides the questions by sub facet. The scores are then tallied and categorized into the appropriate sub facet and domain. This provides a raw score for each domain and sub facet. The raw scores are then transferred to a profile form for conversion from raw scores to *t*-scores. The *t*-scores of each sub facet and domain are then listed into one of five levels: very high, high, average, low, and very low. An individual completing the inventory can expect to receive both domain and sub facet scores with an explanation that their scores are very high, high, average, low or very low compared to the average person who has taken the inventory. Of all individuals who have taken the NEO PI-R, approximately 38% score in the average range, 24% score in each of the high range and low range and 7% score in each of the very high range or very low range (PAR, 2005).

The entire test can be completed in approximately 35-45 minutes. The internal consistency coefficients for the domain scales range from 0.85-0.96. The internal consistency coefficients for the facet scales range from 0.56-0.90 (PAR, 2005).

Job Relative Risk

Each subject was given a questionnaire to determine injury risk for their job. The questionnaire consisted of eight questions that asked the subject to rate their risk on a 5-point scale ranging from never to very often. The questions asked the subjects to report their risk of exposure to various biological, chemical and physical hazards occurring on the job. The questionnaire, adapted from Frone (1998) and Garrity (2003), was labeled Job Risk Questionnaire and is found in Appendix A.

Demographic Information

Each subject completed a questionnaire seeking demographic information on age, gender and tenure at the worksite. Information on number of hours worked weekly was also collected. Age was collected in years and months and was self explanatory. Tenure was also collected in years and months and was collected to represent number of years working in present position at current hospital. This information was used to obtain frequency distributions on both the cases and comparisons as well as to confirm eligibility criteria for the study (full time employees). The subjects also identified their job title, which was categorized by the investigator into one of five groups: licensed nurse, unlicensed assistive personnel (UAP), technician, therapist and provider. Because the array of job titles varies from each hospital, it was decided that the subject would list their formal job title and then the investigator would determine which category was appropriate. Licensed nurse include Registered Nurses and Licensed Practical Nurses. Unlicensed assistive personnel included nursing assistants, patient care technicians and nursing technicians. Surgical technicians, radiographic technicians (X-Ray technicians) and laboratory

technicians comprised the technician group. Therapists included respiratory therapists, occupational therapists and physical therapists. Lastly, providers included physicians, nurse practitioners, physician assistants and nurse anesthetists. This instrument was labeled Demographic Questionnaire and is found in Appendix B.

Procedures

Date collection procedures for this study changed and evolved over the course of subject recruitment. Originally, cases were to be recruited through posted flyers in the occupational health office waiting areas. The subject was expected to call the investigator and arrange for a time and place to complete the instruments. The data collection was to be performed by the investigator alone. However, this method proved unsuccessful and resulted in the recruitment of only one subject. Therefore, it was decided to utilize the staff of the occupational health offices to assist in recruiting subjects. The occupational health nurses would provide study information to potential subjects when the employee presented with an injury. If the employee agreed to participate, the occupational health nurses would give the subject a packet of the study instruments to complete and return. Once the employee returned the completed study, they would be given a \$20 gift card as compensation. The investigator would then collect the completed materials at a later date. Although this recruitment method eventually was put in place, its implementation was delayed due to difficulty in obtaining Institutional Review Board (IRB) approval for the change from the originally approved protocol. Proof of Health Insurance Portability and Accountability Act (HIPAA) qualification of the occupational health nurses had to be demonstrated to IRB prior to its granting approval. Because this process took several weeks and multiple IRB revision submissions to facilitate, it presented a delay in case subject recruitment. Therefore, it was elected to proceed with recruitment of comparisons. Controls were to be recruited by posted flyers in break rooms of nursing units and departments. Although

this method was successful (due to the active involvement of the investigator in promoting and discussing the study while posting the flyers), it also had the benefit of identifying potential subject cases. Many employees (staff who qualified as either cases or comparisons) readily consented to participate in this study once it was explained by the investigator. The investigator was able to confirm if the subject met eligibility as a case or a comparison for the purposes of the study. Upon agreeing to participate, each subject was then given a packet consisting of the three instruments to complete. A time and date was arranged for the investigator to return to the nursing unit, collect the materials, and provide the \$20 gift card compensation. This method gave the subject time to take the instruments home, complete them at their leisure and return them when done. Although subject recruitment, particularly in regards to cases, did not occur as originally planned, the three methods of case recruitment (posted flyer in the occupational health office, utilization of occupational health nurses to recruit cases, and use of posted flyers in nursing units and departments) eventually resulted in an adequate number of subjects to terminate recruitment after 6 months. Subject recruitment began August 2006 and ended January 2007.

Data Collection Procedures

Data was collected primarily by the investigator with the assistance of the occupational health nurses. However, only the investigator tallied the instruments and recorded the results on an Excel spreadsheet. Scoring the NEO PI R instrument required adding up points based on subject response for the 240 items. Each question reflected one of 30 specific sub facets of the instrument (anger hostility, compliance, impulsiveness, excitement seeking, for example). Therefore tallying the instrument gave scores for each of the 30 sub facets. The six sub facets for each particular domain (Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness) were then scored. The result was an overall domain raw score and raw

scores on each specific sub facet. Once the scoring of the instrument was complete, the raw numbers were transferred to another instrument that provided *t*-scores for each domain and sub facet. The final *t*-scores were then recorded on an Excel spreadsheet. The NEO PI R instrument contains numerous reliability checks to ensure that the data was scored correctly. Scores were added and then added a second time during the conversion of the raw data to *t*-scores.

The demographic information obtained from the Demographic Questionnaire (Appendix B) was also tallied and coded. Age was coded by months. Tenure was also coded into months. Job classification was categorized into licensed nurse, unlicensed assistive personnel, technicians, therapists and medical provider. Gender was coded female or male.

The Job Risk Questionnaire (Appendix A) was not used in the final analysis of data. This instrument was deleted at the advice of the statistician who advised that not enough subjects were recruited to allow for significant assessment of the tool. Therefore, the instrument was not coded and analyzed.

Once the subject data was collected and tallied, the information was transferred to the SPSS software program, version 11.5 (SPSS Inc., Chicago, IL) for analysis.

Procedures for the Protection of Human Subjects

This study was submitted to the Institutional Review Board (IRB) at the University of Florida as an exempt study on April 7, 2006. After several resubmissions of requested information, initial approval was granted on June 21, 2006. Changes in the recruitment flyer to enhance subject recruitment necessitated additional revision submissions throughout the summer and fall timeframes. Lastly, a revision requesting utilization of the occupational health nurses in subject recruitment was submitted October 5, 2006. This revision received approval on December 14, 2006 after the investigator provided proof of the occupational health nurses' HIPAA training.

Once initial IRB approval was received the study was presented to the appropriate personnel at the two participating hospitals. ORMC granted approval to use its facilities in August 2006. This hospital does not have a formal nursing research committee in place. Therefore the approval process required only going through the Chief Nursing Officer (CNO). She did, however, refer the study to the hospital's legal department for approval. Once this process was complete, the CNO notified nursing and departmental directors (including occupational health) of the investigator's approval to conduct the research. Therefore subject recruitment began at ORMC in August 2006.

MRMC has a formal nursing research committee in place. A research protocol was submitted and the investigator spoke to the committee in person twice about her proposed study. Following nursing research committee approval, the study protocol was submitted to the various hospital departments (including legal). Final hospital approval was granted August 2006. Subject recruitment at MRMC began August 2006.

Informed consent was obtained from each subject participating in the study. However, as an exempt study, a written consent form was not required. The subject's participation in completing the questionnaire conferred consent. Although this study required the collection of confidential data, no intervention was conducted on human subjects. This study did not affect any course of treatment, compensation or employment benefits of any participant. All data collected was done so in a confidential manner. No identifying labels were placed on any of the paperwork except when individual feedback on the personality inventory was requested. HIPAA regulations were not violated as no information from the employer was given to the researcher. The subjects voluntarily contacted the researcher with their desire to participate in the study and were allowed to withdraw at any time after consenting to the study if so desired. (Several

subjects did just this. When the investigator returned to their nursing unit to collect the completed materials, two subjects no longer wished to participate). No individual information gathered during the course of the study was shared with employers. The final results of the study will be provided to the participants and the employers if they desire to receive them.

Bioethical principles of self-determination, nonmaleficence, beneficence and justice were observed during the course of this study. Self-determination or respect for autonomy recognizes the dignity and autonomy of all individuals (Beauchamp & Childress, 2001). All subjects enrolled in this study did so of their own accord. As the target population is a working population, special populations such as children, the elderly and infirmed were excluded from participation. Only English speaking and literate individuals were asked to participate in this study; therefore, each subject was be able to consent to participate of their own will, without requiring assistance from others.

Nonmaleficence is an obligation to protect research subjects from harm due to their participation in this study (Beauchamp & Childress, 2001). As no intervention was being conducted as part of this study, no direct harm was possible. Indirect harm was possible, however, due to political or economic pressures from the employer. However, care was taken to respect both HIPAA regulations and subject confidentiality. All data was collected outside the employment setting unless otherwise requested by the subject. The employer was not notified of the subject's consent to participate.

Beneficence in biomedical research requires that subjects be awarded some benefit from participating in this study (Beauchamp & Childress, 2001). As the purpose of this study was to identify potential risk factors to occupational injury, it was to the benefit of subjects to participate. As health care workers, all subjects are at risk for suffering occupational injury in

the future. Findings from this study may lead to development of programs or policies that may decrease risk of injury and ultimately benefit the subjects.

The principle of justice requires that all subjects be treated equally and that both the benefits and burdens of the research be distributed fairly (Beauchamp & Childress, 2001). In this study, all subjects were given the same personality inventory and demographic questionnaires and were offered the same monetary compensation. Therefore, the principle of justice was not violated.

Data Analysis

The first step in the data analysis was to obtain the univariate statistics (descriptive statistics) on the subjects and measures. Means, standard deviation and percentages were analyzed on the overall sample and the group (injured vs. non-injured). The same analysis was conducted on the NEOPI-R for both the domains and sub facets. Bivariate analysis was conducted between groups (injury vs. non-injury) by use of the *t*-test and cross tabs. The analysis also looked at covariates such as age and tenure between groups. The *t*-test was chosen because the variables of age and tenure were continuous. The bivariate analysis between groups and job classification was evaluated by cross tabulation as job classification is a categorical variable.

The final model was a regression model. The independent variables in this study were the cumulative average *t*-scores on the sub facets of excitement seeking, impulsiveness, angry hostility and compliance from the NEOPI-R. The dependent variable was injury vs. non injury. Covariates such as age, tenure and job classification were computed in the analysis. The domains of Neuroticism, Extraversion, Openness to Experience, Agreeableness and Conscientiousness were also tested on the dependent variable. Because the dependent (or response) variable is dichotomous, binary logistic regression was conducted on each group to

determine if there is a predictive relationship between the independent variables and injury occurrence. Following the regression, each independent variable was analyzed for the probability values for injury. No injury was used as the reference (constant). Odds ratios were conducted on each predictive variable to determine probability of contributing to injury.

Power Analysis

Power analysis was calculated by utilizing an effect size of 0.4. Although it is possible that the effect size needed to be smaller based on previous studies that used an effect size of 0.25, obtaining the required number of cases did prove to be difficult. Using an effect size of 0.4 required 100 subjects in each group.

CHAPTER 4 ANALYSIS AND RESULTS

The data analysis for this study was conducted using the SPSS statistical software program, version 11.5 (SPSS Inc., Chicago, IL). Descriptive statistics were first obtained to provide summary measures for the data. Bivariate statistics were analyzed to compare the two groups (injured vs. non-injured). Binary logistic regression was conducted to answer the research question and test the study hypotheses.

As previously discussed, subjects were recruited from two area hospitals in Ocala, FL, Munroe Regional Medical Center (MRMC) and Ocala Regional Medical Center (ORMC). A total of 80 subjects (34 cases and 46 comparisons) were recruited. Twenty nine cases (85%) were recruited from MRMC and five (15%) from ORMC. Of the comparisons, 28 (61%) were employed at MRMC and 18 (38%) at ORMC. For the overall sample, 57 subjects (71%) were recruited from MRMC and 23 subjects (29%) from ORMC.

Of the 34 cases recruited, all but one was female. Of the five job classifications, all but one case (a lab technician) was either a nurse or unlicensed assistive personnel (UAP). Subsequently, to improve the statistical analysis, the one male case and one lab technician case were eliminated from the data (which also resulted in the elimination of one male comparison and two lab technician comparisons). Additionally, three case subjects were eliminated for failure to complete questionnaires fully. The end result was 72 cases (29 cases and 43 comparisons) available for final analysis.

Demographic Statistics

Seventy two subjects were included in the study. All (100%) were female. The mean age and tenure for all subjects is presented in Table 4-1. Of the 72 subjects, 29 were in the injured group and 43 subjects were in the non-injured group. The breakdown between job classification

was approximately 66% nurse vs. 34% unlicensed assistive personnel in each group and the overall sample. The mean age and tenure for each group (injured vs. non-injured) is also presented in Table 4-1. The average age of the injured group was older than the non-injured group although not significantly so. Additionally, the average tenure of the injured group was greater than the non-injured group but also not significantly.

Bivariate statistics was performed between the two groups (injured vs. non-injured) to evaluate differences between the two groups. Age, tenure and group were analyzed by use of the independent samples *t*-test. Levene's test for equality of variance was not significant for age ($p=0.552$). Tenure was also not significant ($p=0.969$) for Levene's test. The *t*-test for equality of means was also not significant for age ($p=0.351$) or tenure ($p=0.471$).

Cross tabs was conducted on job classification as it was not a continuous variable. Cross tabulation between groups (injured vs. non-injured) and job classification (nurse vs. unlicensed assistive personnel) was also not significant. Pearson's chi-square for this statistic showed a significance of $p=0.865$.

Personality Statistics

Data analysis was also conducted on the personality domains of the NEOPI-R. Means and standard deviations were obtained on the domains of Neuroticism, Conscientiousness, Agreeableness, Openness to Experience and Extraversion for the overall sample as well as for group (injured vs. non-injured). All means except for the Neuroticism score (44.93) for the non-injured group fell within the average means for each personality domain. However, rounding up this number places it within the average range. *T*-scores ranging from 45-55 are considered average. This information is provided in Table 4.2.

The means and standard deviations were also obtained for the specific personality sub facets within each personality domain. The means of the personality sub facets considered in

this study (excitement-seeking, impulsiveness, angry hostility and compliance) also scored within the average means of the inventory for the overall sample and for each group (injured vs. non-injured). *T*-scores in the 45-55 range are considered average. The *t*-scores for vulnerability in the injured group (42.51) and trust in the non-injured group (42.86) were both in the low range. The overall scores in the sub facets of vulnerability (44.69) and trust (44.95) also scored in the low range. This information is found in Table 4-3.

Research Question

The research question of this study asked: Does possessing the personality traits of excitement seeking, angry hostility, impulsiveness and compliance increase the risk of a health care provider suffering an occupational injury? For the purposes of this statistical analysis, the research question was reframed as to ask if the sub facets of excitement seeking, angry hostility, impulsiveness and compliance predicted group membership (injured vs. non-injured) after controlling for age, tenure and job classification. Binary logistic regression is able to directly predict the probability of an event occurring (Hair, Anderson, Tatham & Black, 1998). It is used when the dependent variable has only two groups (the independent variables can be unlimited). Logistic regression uses coefficients to predict the probability that an event will or will not occur. It converts beta coefficients into logistic coefficients, also known as odds. Odds ratios calculate the probability of an event occurring divided by the probability of no event occurring. A positive coefficient increases the probability of an event occurring, whereas a negative coefficient decreases the probability of an event occurring. The confidence interval (CI) provides an estimated range of values. If the CI contains the value of 1.0 within its range, the variables cannot be said to be a useful predictor (Hair et al., 1998).

To answer the research question, a binary logistic regression was conducted to assess if excitement-seeking, impulsiveness, angry hostility and compliance correctly predicted subjects

as injured or non-injured after controlling for age, tenure and job classification (nurse vs. unlicensed assistive personnel). As shown in Table 4-4, random assignment correctly predicted 59.7% of group membership (step 0). Age, tenure and job classification were next entered into the first block of the regression equation and did not significantly predict group membership (chi square = 1.17, $p=0.76$). Age, tenure and job classification correctly predicted 6.9% of the injured subjects and 93.0% of the non-injured subjects, with an overall correct classification of 58.3%.

Excitement-seeking, impulsiveness, angry hostility and compliance were entered in the second block of the regression equation and again did not significantly predict group membership (chi square = 1.74, $p= 0.78$). Excitement-seeking, impulsiveness, angry hostility, compliance, age, tenure and job classification corrected predicted 24.1% of the injured subjects and 88.4% of the non-injured subjects, with an overall correct classification of 62.5%.

Beta coefficients are coefficients resulting from standardized data and serve to calculate the predicted change in the dependent variable. They may also be used to compare the relative strength of the independent variables. The small standard errors indicate that the sample size may have been too small to significantly predict group membership. The Wald statistic is used with logistic regression to test for the significance of the coefficient. It is a test of individual prediction. Table 4-5 demonstrates that none of the variables individually predicted group membership (injured vs. non-injured). No variable had a significance of $p<0.05$. Therefore, the research question was not supported.

Table 4-1. Demographic statistics for job classification, age and tenure for the overall sample and by group (injured vs. non-injured)

	Overall (N=72)	Injured (n=29)	Non-Injured (n=43)	Significance
Job Classification				
Nurse	48 (66.7%)	19 (65.5%)	29 (67.4%)	$p=0.865$
UAP	24 (33.3%)	10 (34.5%)	14 (32.6%)	$p=0.865$
Age	40.9 years ($SD= 10.8$)	42.3 years ($SD= 10.3$)	39.9 years ($SD=11.1$)	$p=0.552$
Tenure	7.54 years ($SD=6.7$)	8.23 years ($SD=6.3$)	7.07 years ($SD=7.00$)	$p=0.969$

Table 4-2. Means and standard deviation of the personality domains for the overall sample and by group (injured vs. non-injured)

	Overall (N=72)		Injured (n=29)		Non-injured (n=43)	
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>
Neuroticism	46.19	10.55	47.04	11.50	44.93	9.00
Extraversion	51.87	8.62	51.41	8.96	52.55	8.20
Openness	48.51	10.29	47.81	8.96	52.55	8.20
Agreeableness	50.36	10.68	48.86	11.54	52.58	8.99
Conscientiousness	52.52	10.56	52.06	10.96	53.20	10.09

Note: T-scores > 65= very high. T-scores 35-44= low. T-scores 56-65 = high.
T-scores <35 = very low. T-scores 45-55 = average. T-scores 35-44 = low

Table 4-3. Means and standard deviation for the personality sub facet scores for the overall sample and by group (injured vs. non-injured)

Domain	Sub facet	Overall (N=72)		Injury (n=29)		Non-injury (n=43)	
		M	SD	M	SD	M	SD
Neuroticism	Anxiety	48.66	10.67	49.20	9.45	48.30	11.35
	Angry Hostility	48.16	10.03	47.34	8.29	48.72	11.12
	Depression	47.01	10.05	45.03	8.69	48.34	10.77
	Self-Consciousness	46.76	9.90	45.27	9.59	47.76	10.09
	Impulsiveness	47.19	10.27	47.41	9.54	47.04	10.85
	Vulnerability	44.69	8.90	42.51	8.03	46.16	9.25
Extraversion	Warmth	49.18	9.72	50.10	9.92	48.55	9.65
	Gregariousness	52.13	11.66	50.34	10.42	53.34	12.40
	Assertiveness	52.75	7.85	54.17	7.96	51.79	7.72
	Activity	50.37	6.85	48.51	7.52	51.62	6.14
	Excitement seeking	52.93	8.62	53.51	8.34	52.53	8.88
	Positive Emotions	51.12	10.14	52.62	8.78	50.11	10.95
Openness	Fantasy	50.18	9.14	47.51	9.08	51.97	8.84
	Aesthetics	49.79	10.13	50.75	9.56	49.13	10.55
	Feelings	48.83	11.20	50.48	8.90	47.72	12.49
	Actions	48.95	10.01	52.82	10.17	46.34	9.13
	Ideas	49.11	12.01	52.51	8.31	46.81	13.57
	Values	47.08	8.69	45.34	8.01	48.25	9.03
Agreeableness	Trust	44.95	10.85	48.06	8.71	42.86	11.72
	Straightforwardness	52.56	8.63	53.68	6.90	54.81	9.63
	Altruism	51.52	9.76	53.00	11.71	50.53	8.20
	Compliance	49.22	12.07	50.68	11.24	48.23	12.63
	Modesty	50.65	8.63	51.03	8.34	50.39	8.92
	Tender Mindedness	53.80	12.24	55.75	12.53	52.48	12.00
Conscientiousness	Competence	53.69	10.30	53.58	9.49	53.76	10.92
	Order	48.63	11.18	48.41	12.04	48.79	10.70
	Dutifulness	50.75	10.58	53.41	11.19	48.95	9.88
	Achievement Striving	54.70	10.77	53.10	9.05	55.79	11.77
	Self-Discipline	50.36	9.75	50.72	9.29	50.11	10.15
	Deliberation	54.08	9.65	55.34	9.90	53.23	9.49

Note: T-scores > 65= very high. T-scores 45-55= average, T-scores <35 = very low. T-scores 56-65=high. T-scores 35-45=low.

Table 4-4. Classification by group (injured vs. non-injured) by excitement-seeking, impulsiveness, angry hostility and compliance (Step 2) after controlling for job classification, age and tenure (Step 1)

	Observed Group	Predicted Group		% Correct
		Injured	Non-injured	
Step 0	Injured	0	29	0.0
	Non-injured	0	43	100.0
	Percentage			57.9
Step 1	Injured	2	27	6.9
	Non-injured	3	40	93.0
	Percentage			58.3
Step 2	Injured	7	22	24.1
	Non-injured	5	38	88.4
	Percentage			62.5

Table 4-5. Logistic regression on excitement seeking, impulsiveness, compliance and angry hostility predicting group membership (injured vs. non-injured) after controlling for age, tenure and job classification (nurse vs. UAP)

Step	Predictors	B	S.E.	Wald	Sig.	Exp(B)	95% CI for EXP(B)	
							Lower	Upper
Block 1	Age	-.002	0.002	0.577	0.447	1.00	0.99	1.00
	Tenure	-.001	0.004	0.045	0.833	1.00	0.99	1.01
	Job Classification	-.252	0.541	0.217	0.641	0.77	0.27	2.22
Block 2	Age	-.002	0.002	0.727	0.394	1.00	0.99	1.00
	Tenure	-.001	0.004	0.041	0.839	1.00	0.99	1.01
	Job Classification	-.353	0.602	0.344	0.558	0.7	0.12	2.28
	Impulsiveness	-.022	0.032	0.463	0.496	0.98	0.91	1.04
	Angry Hostility	-.018	0.040	0.056	0.813	1.01	0.93	1.10
	Compliance	-.018	0.030	0.342	0.342	0.98	0.93	1.00
	Excitement seek.	-.029	0.032	0.833	0.833	0.97	0.93	1.04

CHAPTER 5 CONCLUSIONS AND RECOMMENDATIONS

Occupational injuries to nursing personnel and other medical providers will continue to take a significant toll on the health care industry over the next decade. Nursing shortages, whether due to burnout, retirement or injury, continue to plague both hospitals and nursing homes. Loss of experienced personnel from injury or illness impacts the provision of quality patient care and ultimately leads to dissatisfied consumers and staff and higher operating costs. The issue of staff safety has not gone unnoticed. Numerous safety programs have been implemented and although these programs have improved worker safety, risk has not been eliminated fully. Therefore, this study looked to address the issue of worker safety from the host or person perspective. It hoped to identify staff at higher risk for occupational injury by testing specific personality traits and ultimately lead to the development of tailored safety programs aimed specifically at the individual.

This study used a case comparison design to evaluate if possessing the personality traits of excitement seeking, impulsiveness, compliance and angry hostility increased an individual's risk for sustaining an occupational injury. Seventy two health care workers met the study criteria.

Discussion of Findings

The 72 subjects were divided into either an injury or non-injury group. This was done based on the subject's report of an occupational injury within the preceding six months. Although there were more subjects in the non-injury group (43 vs. 29), the bivariate statistics did not demonstrate significance between the two groups. The division between nurse vs. unlicensed assistive personnel in each group was similar (65.5% nurses vs. 34.5% unlicensed assistive personnel for the injured group) vs. (67.4% nurses vs. 32.6% unlicensed assistive personnel for the non-injured group). The injured group was slightly older than the non-injured group (42.32

years vs. 39.89 years). Although the difference was not significant, this finding is in contrast with the literature that found older workers less likely to suffer occupational injury (Hansen, 1988). Meyers, Silverstein and Nelson (2002) also found increasing age protected nursing assistants from injury. The injured group also had a longer tenure (8.23 years) vs. the non-injured group (7.07 years). Again, this result was not significant but was inconsistent with the literature review that found less experienced nurses more likely to suffer occupational injury (Arad & Ryan, 1986).

The analysis of the NEOPI-R revealed consistently average scores on all domains and sub facets. *T*-scores on the five domains of Neuroticism, Extraversion, Openness to Experience, Agreeableness and Conscientiousness were found to be within the average range on the five point scale (very high, high, average, low, very low) for both the overall sample and each group. With the exception of the sub facets of vulnerability and trust, all other sub facet *t*-scores were found to be within the average range for the overall sample and each group. The injured group scored low for vulnerability as did the overall group. The non-injured group scored in the average range. This finding is not surprising given that many individuals who have been injured find themselves in fear of re-injuring themselves (Dembe, 2001; Tarasuk, & Eakin, 1994). Furthermore, having to deal with the medical and occupational staff may leave the injured employee feeling helpless and not in control. These findings may leave the member with feelings of vulnerability. The non-injured group (as well as the overall group) scored low on the trust sub facet. The injured group scored in the average range. This is perhaps a reflection on a non-injured individual's completing the questionnaire and having concerns regarding what the information may be used for (Das & Teng, 2004).

Binary logistic regression was used to predict membership into the two groups (injured vs. non-injured). Group alone predicted 59.7% of group membership meaning that chance alone would predict nearly 60% of group membership. However, controlling for job classification, age and tenure did not improve prediction into groups ($p=0.70$). Controlling for these variables only correctly predicted 2 of 29 injured subjects (6.9%) and 40 of 43 (93%) of non-injured subjects; the overall predictive percentage remained at 58.3%. However, group prediction was improved by entering impulsiveness, compliance, angry hostility and excitement seeking into the model. These variables improved the prediction of injured cases from 2 of 29 to 7 of 29 (an increase to 24%). However, prediction of non-injured subjects decreased to 88.4% (38 of 43 subjects). The overall prediction did, however, improve to 62.5%. Although this result was not significant ($p=0.78$), the model was able to improve group prediction from 6.9% to 24.1%.

Reviewed individually, none of the personality variables (compliance, angry hostility, excitement seeking and impulsiveness) predicted group membership. The significance ranged from $p=0.342$ (compliance) to $p=0.833$ (excitement seeking). Because none of the variables significantly predicted group membership, odds ratio could not be conducted on the findings.

Hypotheses

None of the hypotheses presented in this study were supported. The following is a discussion of the individual hypotheses:

- **H1:** Health care workers who score high or very high in the sub facet of excitement seeking (Extraversion) on the NEOPI-R personality inventory will significantly and positively be at increased risk of suffering an occupational injury.

This hypothesis was not supported by the results of the study. The sub facet of excitement seeking did not predict group membership ($p=0.83$). However, as will be discussed later, it is possible that low observed power lead to a Type II error.

- **H2:** Health care workers who score high or very high in the sub facets of impulsiveness and hostility (Neuroticism) on the NEOPI-R personality inventory will significantly and positively be at increased risk of occupational injury.

This hypothesis was not supported by the results of the study. The sub facets of impulsiveness ($p=0.430$) and angry hostility ($p=0.813$) did not significantly predict group membership. Again, the possibility of a Type II error may have influenced results.

- **H3:** Health care workers who score low or very low in the sub facet of compliance (Agreeableness) on the NEOPI-R personality inventory will significantly and positively be at increased risk of occupational injury

This hypothesis was not supported by the result of the study. The sub facet of compliance ($p=0.342$) did not significantly predict group membership. Again, a low sample size may have contributed to a Type II error.

Limitations of Study

Study Design Limitations

All studies have some degree of limitation. One limitation of this study included the difficulty in determining when an actual injury occurred. Many injuries are cumulative injuries and their report by employees is influenced by a variety of factors. It is difficult to pinpoint exactly when an injury is sustained. Therefore, this study accepted that time of sustaining of an injury and time of reporting an injury may differ. For the purposes of this study, report of injury was found to be more easily quantified. However, even this became difficult to determine. The initial plan for subject recruitment was to solicit subjects through the occupational health office by posted flyer. The expectation was that an injured employee would see the flyer and contact the investigator to participate. Because this method proved unsuccessful, utilization of the occupational health staff ensued but even this did not provide a large number of subjects. Ultimately it took the active participation of the investigator to recruit an adequate number of subjects as well as extending the timeframe from injury report to participation in the study from

six weeks to six months. Therefore, the final personality scores are not as reflective of personality at the actual time of injury as hoped.

As mentioned, subject recruitment for cases proved to be extremely difficult in this study. The final number of cases (29) fell significantly short of power analysis projections (100). Fortunately occupational injuries are not a routine occurrence. Estimates for the number of expected injures for the two participating hospitals was 300 per year, perhaps only half of these being health care workers. Yet in six months of subject recruitment, a far smaller number was recruited. As with all studies, the more involved the investigator can be with subject recruitment the more successful recruitment will be. Unfortunately HIPAA regulations limited the involvement of the investigator until the subjects contacted her.

The decision to remove the male case subject and the lab technician case subject served to improve statistical analysis. However, it limited the study's results applicable to only women and either nurses or unlicensed assistive personnel. Although the goal of this research was to test the association between personality traits and occupational injuries in all health care workers, the final study was limited to only women and nursing personnel.

The investigator also used a convenience, nonrandom sampling technique for recruiting subjects. Most of the subjects were recruited directly by the investigator during her presence on the nursing unit. Frequently the investigator would arrive on a nursing unit to collect a completed questionnaire packet only to find other staff wanting to participate. This often resulted in more subjects being recruited from some nursing units than others. Furthermore, although the investigator attempted to recruit subjects from all shifts, inevitably most of the subjects worked on the day shift. Use of this type of sampling can threaten the external validity of the study.

There is also a great deal of literature addressing psychosocial aspects relating to the work environment. Work variables such as role ambiguity, job boredom, autonomy, job dissatisfaction and coworker/supervisor support have been identified as influencing job performance, including susceptibility to accidents (Barrick & Mount, 1991; Judge, Heller & Mount, 2002; Judge, Martocchio & Thoresen, 1997). This study did not control for these confounding variables.

Statistical Analysis Limitation

As discussed previously, power analysis for this study, based on the number of variables under consideration, recommended a sample of 100 cases and 100 controls. The final subject number was 29 cases and 43 controls. It is possible that the significance in this study was not found due to inadequate sample size. Type II errors occur when study findings fail to reject a false null hypothesis. This means that a null hypothesis is not true, but the study fails to support this. For this study, the null hypothesis would state that there is no association between the personality traits of compliance, excitement seeking, angry hostility and impulsiveness and injury occurrence. A Type II error would reject this hypothesis even if the null hypothesis was false. Type II errors generally occur from not having enough subjects in the sample size to sufficiently test the hypothesis.

Strengths of the Study

One of the strengths of this study included the consistency within the target population of the two participating hospitals. Both hospitals provide comparable services and employ similar staff. This provided a study sample that was relatively consistent in tenure, age and gender. Furthermore, the instrument in use, the NEOPI-R, is a well established and easy to use personality inventory that has strong reliability and consistency coefficients. The scoring of the

instrument answer sheets was performed by the investigator alone, guaranteeing consistency in scoring.

Conclusions

Clear implications for clinical practice cannot be drawn from this study. Based on this study, there was no association between specific personality traits and risk for occupational injury in health care workers. However, nurses and other health care workers do continue to receive injuries on the job, and many studies have demonstrated an association between personality traits and injuries. Although the NEO PI-R is a respected and commonly utilized personality inventory, there was no documentation in the literature of its use with health care workers. In fact, most of its use in Industrial/Organizational Psychology has been in identifying leadership potential, person-job fit, job performance, job absenteeism, etc. There is only one study that used the NEO PI-R to predict occupational injury (Cellar, Nelson, Yorke & Bauer, 2001), and the subject focus of that study was undergraduate students. The majority of research that studied occupational injury used one or two small personality measures (similar to sub facets) to predict occupational injury rather than a large, comprehensive personality inventory (Frone, 1998; Iverson & Erwin, 1997; Janicak, 1996; Marusic, Musek & Gudjonsson, 2001). Additionally, none of these researchers studied health care workers. This investigator found only one study that looked at the association between personality and injury in health care workers (Rabaud et al., 2000), and this study did not utilize the NEO PI-R in evaluating the nurses' behaviors.

It is possible to conclude that the research findings are a result of a poor choice in the utilization of the personality inventory. The NEO PI-R has not been widely utilized in predicting occupational injury. Different study results may have been found by use of different personality instruments, specifically those focusing on the sub facets in question. Furthermore,

unlike professions such as the military, NASA and nuclear energy, health care workers have not been subjected to personality study. It is possible that because health care workers come from a variety of cultures, educational levels, socioeconomic groups, etc., there is no common thread among them that can be used to predict injury occurrence.

Recommendations for Further Research

Unfortunately this study did not find significance in its hypotheses that possessing the personality traits of excitement seeking, compliance, impulsiveness and angry hostility predict occupational injury in health care workers. However, as the literature review pointed out, there have been numerous studies demonstrating the association between personality traits and occupational injury in other fields. The use of the NEO PI-R inventory in this particular study has also been discussed including the possibility that it was the wrong inventory to use in this subject group and for this outcome. However, because the prevention of occupational injury is such an important goal, further research on health care workers is imperative. If possible, this study may be continued or replicated in the future, particularly with no time constraints and perhaps utilizing a larger number of hospitals. It would be particularly helpful to have occupational health staff as co-investigators of the study to enhance subject recruitment.

Additionally, it may be beneficial to identify the personality characteristics of health care workers in general before beginning any study on occupational injury. There may be specific traits that are common among health care workers or within their specific subset (nurses, physical therapists, etc.). This background information can then be used to study the association between these characteristics and occupational injury and hopefully discover positive findings. Lastly, a different instrument, particularly one that studies specific indicators or traits, may provide the best tool for conducting this research.

Implications for Clinical Practice

Because this study did not find significance in any findings, its application to clinical practice is difficult to ascertain. However, there has not been an extensive amount of research studying personality traits of health care workers and their association with occupational injury. Most similar studies were conducted in fields such as agriculture and construction that utilize heavy equipment. Personality screening is conducted routinely in the military and other professions requiring extensive training. If the cost of occupational injury continue to plague the health care industry, it would not be unreasonable to seek valid screening tests assessing an employee's risk of occupational injury before assigning individuals to work in high risk areas.

APPENDIX A
JOB RISK QUESTIONNAIRE

Please answer the following questions to the best of your ability. The information is confidential and will not be shared with anyone at your job. You are also asked not to share the information. Please circle the response that best describes how often in the last six (6) months you have experienced each situation in your present job.

Job Title: _____

1. Have you been exposed to situations on the job that could cause you to lose your balance and fall?
1 2 3 4 5
never seldom sometimes often very often
2. Have you been exposed to situations on the job that expect you to carry, lift, push or pull heavy loads?
1 2 3 4 5
never seldom sometimes often very often
3. Have you been exposed to equipment and machinery on the job that could injure you?
1 2 3 4 5
never seldom sometimes often very often
4. Have you been exposed to needles and other sharp objects on the job that could injure you?
1 2 3 4 5
never seldom sometimes often very often
5. Have you been exposed to blood and body fluids on the job that could injure you?
1 2 3 4 5
never seldom sometimes often very often
6. Have you been exposed to airborne agents on the job that could injure you?
1 2 3 4 5
never seldom sometimes often very often
7. Have you been exposed to chemicals on the job that could injure you?
1 2 3 4 5
never seldom sometimes often very often
8. Have you been exposed to violence on the job that could injure you?
1 2 3 4 5
never seldom sometimes often very often

APPENDIX B
DEMOGRAPHIC QUESTIONNAIRE

Please provide the following information to the best of your knowledge. The information is confidential and will not be shared with anyone at your job. You are also asked not to share the information given.

Job Title: _____

1. Please circle your gender: Male Female
2. Please list your age in years and months: _____years _____months
3. Please list number of years working in present position: _____years _____months
4. Number of hours worked weekly (average): _____
5. Have you suffered an occupational injury in the past six (6) months? Yes No

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BIOGRAPHICAL SKETCH

Hilary Stevens Morgan received her bachelor of science in nursing degree from Vanderbilt University in 1979. She began her nursing career as a staff nurse in the labor and delivery unit at University Medical Center (now Shands Jacksonville) in Jacksonville, FL.

In 1983, Ms. Morgan earned her master's degree in maternal child nursing from Boston College. During this time, she was also educated as a Women's Health Nurse Practitioner (WHNP) for which she gained certification in 1984. She began working as a WHNP at the Clay County Health Department, Green Cove Springs, FL where she also practiced as a public health nurse.

Ms. Morgan joined the Nurse Midwifery practice at University Medical Center in 1985, working as a Women's Health Nurse Practitioner. In 1987 she completed the Nurse Midwifery core courses through the University of Florida College of Nursing and became a Certified Nurse Midwife (CNM). Ms. Morgan was appointed Administrative Director of the Nurse Midwifery practice in 1990 and served in that post for 7 years. During this time, she also received an appointment as clinical faculty for the University of Florida College of Nursing. In 1997 she left University Medical Center and the University of Florida, and began working in a private OB/GYN practice in Ocala, FL, where she remains today. She has held an adjunct faculty position with Jacksonville University School of Nursing since 2002.

Ms. Morgan is a Captain in the Nurse Corps of the United States Navy (Reserve Component). She currently serves as Officer-in-Charge of Operation Health Support Unit Jacksonville, Detachments N and R, in Jacksonville, FL. Her military honors include the Navy Achievement Medal and the Navy Commendation Medal. She is an active member of the Naval Reserve Association (NRA) and the Association for Military Surgeons of the United States (AMSUS).

Ms. Morgan is immediate past chair of the North Central FL chapter of the American College of Nurse Midwives (ACNM). She is also a member of the Association of Women's Health, Obstetric and Neonatal Nurses (AWHONN), the Florida Nurses Association (FNA), and Sigma Theta Tau International Society for Nurses. She holds certifications as a CNM from ACNM and as a WHNP from AWHONN.