INFLUENCE OF ACCULTURATION AND INDIVIDUAL DIFFERENCES ON RISK JUDGMENTS OF CONSTRUCTION LABORERS

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ABSTRACT

In 2002 the number of reported nonfatal injury and illness cases in the construction industry involving days away from work was over 98,000 for European-Americans (non Hispanic) and 26,000 for Hispanics. Disproportionate to the number of injury and illness cases, the construction industry is comprised of 68% European-Americans, 7% African-Americans and 23% Hispanics (BLS, 2004a).

Based on the expected increase in employment of construction laborers and the increase in the number of injuries and fatalities among specific ethnic groups, a need exists to study disparities across cultural groups to determine the basis for injury and fatality differences between these ethnic groups. The purpose of this research was to contribute to the literature, an effective method for predicting the risk judgments of laborers employed by small construction firms. Predicting the risk judgments of laborers will assist in developing training programs to address these risk factors, which ultimately will reduce injury and fatality rates.

Thirty-six construction laborers , 18 European-American and 18 Hispanic, were recruited for the research. Both ethnic groups were divided into two groups; the control and experimental groups. The control groups viewed a generic concrete construction video and the experimental groups viewed a People-Based Safety video. Each of the participants completed a demographic form, questionnaires, and the narrative simulations (pre-test). Following the narrative simulations the participants rated the narrative simulations, watched a video designated by group, and completed the narrative simulations (post-test). The narrative simulations were used to assess their ability to make risk judgments based on the information presented in the video. The questionnaires completed measured various individual differences, and were administered to detect confounding factors that may not be directly attributed to ethnicity. These questionnaires included: Phinney's (1992) Multigroup Ethnic Identity Measure, Leonard, Hill, and

Karners' (1989) Risk Perception Scale, Janicak's (1996) Accident Locus of Control Scale, Rooney and Osipow's (1992) Self-efficacy Measure, and Zohar's (1980) Safety Climate Measure. Participant prior exposure to incidents as well as experience in the construction industry was also included. These measures were used to determine if differences in risk perception, locus of control, experience, acculturation, incident exposure, education, self-efficacy, and safety climate had an influence on the ability to make safe risk judgments. Information on topics construction laborers would like included in safety training as well as the preferred method of training was obtained through the use of focus groups. Eleven participants from the experimental group were recruited for the focus groups; 5 European Americans and 6 Hispanics. One focus group was conducted for each ethnic group.

Six hypotheses were tested in this study: (1) there would be no difference in the risk judgments of European-American and Hispanic construction workers when given a choice of language, (2) more experienced construction workers would have more difficulty making safe judgments, (3) construction workers who have had more experience with safety related critical incidents in the workplace would have more difficulty making safe judgments, (4) construction workers who have lower levels of risk perception would have more difficulty making safe judgments, (5) construction workers who have an internal locus of control would have more difficulty making safe judgments than those who have an external locus of control, and (6) high acculturation participants would score higher on the narrative simulations than low acculturation participants following the video intervention. The first and fourth hypotheses were supported by the research. There were no significant differences found between the risk judgments of European-American and Hispanic construction workers, and risk perception was positively correlated to risk judgments. The remaining hypotheses were not supported by the research.

The major findings of the research are (1) there were no differences in the risk judgments of European-American and Hispanic construction laborers, (2) risk perception and safety climate were significant predictors of construction laborer risk judgments, and (3) the risk judgments of participants were significantly higher for individuals viewing a

People-based Safety intervention. There are several advantages of having this information. First, the lack of differences between the two ethnic groups, demonstrates that both groups are able to make safe risk judgments when given the appropriate information in the correct form and language. Secondly, regression analysis using independent variables risk perception and safety climate, may be used to predict narrative simulation risk judgments. The positive relationship between risk perception and safety climate on safe risk judgments should encourage employers and trainers to increase employees' awareness of hazards on the job and increase employees' perception of the company safety climate. Hazards should be identified in addition to their consequences. Trainers should aim to increase workers' perception of risk by relying on past negative outcomes that have a personal nature even if they are infrequent events. Third, experience was positively correlated to participants' confidence in their risk judgments on the narrative simulations. Trainers should not exclude the more experienced employees during training. Continuous training will allow more experienced employees to re-familiarize themselves with old hazards and become aware of new hazards. It is just as important for more experienced employees to be updated on risks because they are more confident in how they react to hazardous situations. It is in the best interest of the company for the confident employees to be confident in safe risk judgments.

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CHAPTER 1. INTRODUCTION

In 2002, the number of reported nonfatal injury and illness cases in the construction industry involving days away from work was over 98,000 for European-Americans (non Hispanic) and 26,000 for Hispanics. Disproportionate to the number of injury and illness cases, the construction industry is comprised of 68% European-Americans, 7% African-Americans and 23% Hispanics (BLS, 2004a). **Table 1** shows the percentage of employees working in construction and extraction occupations relative to the total employed for the years 2002 and 2003 (BLS, 2004b). As a whole, construction and extraction occupations constitute almost 6% of the workforce in the United States. The percentage of European-Americans in these occupations is comparable to the European-American population in the United States. However, the percentage of African-Americans is slightly lower. The most noticeable observation amongst these ethnic groups is the substantially high percentage of Hispanics working in these occupations.

Table 1. Percentage of the Employed Population in Construction and Extraction Occupations by Race/Ethnicity.

Race/Ethnicity	**Percentage of the Employed Population in 2002**	**Percentage of the Employed Population in 2003**
European-American	6.2	6.3
Black or African-American	3.9	3.9
Hispanic or Latino	10.6	11.1
Total	5.8	5.9

From the year 2002 to 2012, there is an expected 14.2% increase in total employment of construction workers. The educational attainment of these construction workers is 79.5% with a high school education or less, 15.6% some college, and 4.8% Bachelor's degree or higher (BLS, 2004b). Based on these demographics, the assumption can be made that the majority of individuals employed in construction occupations will have had lower levels of education and will rely on applied and instructional training provided in the work setting.

1.1 Problem Statement

Based on the expected increase in employment of construction workers and the increase in the number of injuries and fatalities among specific groups, a need exists to study disparities across cultural groups to determine why some ethnic groups are more susceptible to injuries and fatalities. The type of training provided, if any, needs to be examined to determine a relationship between the preferred method of delivery and various ethnic groups' capabilities, and needs that will facilitate retention of information during training.

Table 2 demonstrates that construction workers are at an increased risk for injury and death when compared to other occupations in the US (BLS, 2004b).

Table 2. 2003 Fatalities by Industry.

Industry	**Number of Fatalities**	**Percentage of Total Fatalities**
Agriculture, Forestry, Fishing, and Hunting	707	12.72
Mining	141	2.54
Construction	1126	20.26
Manufacturing	416	7.48
All	5559	100.00

More specifically, construction laborers are at a greater risk of injury than those holding skilled positions in construction. According to the Classified Index of Occupations (BOC, 2004), laborers include those individuals who perform tasks involving physical labor associated with: building, highway, and heavy construction projects, tunnel and shaft excavations, and demolition sites; operation of hand and power tools, preparation and cleaning of sites, digging trenches, setting braces to support the sides of excavations, erecting scaffolding, cleaning up rubble and debris, removing hazardous waste materials, and those who assist other craft workers.

Laborers' increased risk may be attributed to their lower levels of skill and education, and access to safety training (Jackson & Loomis, 2002). Non-English speaking construction laborers are further disadvantaged when presented with training that is only offered in English or in a manner that is incompatible with their cultural attributes and

learning styles. Differences in the learning styles of European-Americans and Hispanics, found in the older literature, are listed in

Table 3. In addition to not learning how to protect themselves in an occupational setting because of language differences, they are putting their fellow employees in danger because of an inability of both groups to communicate effectively with one another (Vazquez & Stalnaker, 2004).

Table 3. Differences in Learning Styles Between European-Americans and Hispanics.

Source	**Behavior**	
	European-Americans	**Hispanics**
Castaneda and Gray (1974)	Group work and interaction	Individual work
Castaneda and Gray (1974)	Real life application of problems	Emphasize abstractions
David and Davison (1990)	Tactile learners	Needs further study
Castaneda and Gray (1974)	Visual learners	Needs further study
Castaneda and Gray (1974)	Personal - make individual's role in the situation apparent	Impersonal - focus on events, places, & facts
Grossman (1995)	Encourage the group to work as a team	Encourage competition
Griggs and Dunn (1996)	Variety as opposed to routines	Needs further study
Griggs and Dunn (1996)	Peer-oriented learning	Needs further study
Reinert (1976)	Use visual media - pictures, demonstrations, and models	Emphasize the use of text
Sutliff and Baldwin (2001) Svinicki and Dixon (1987);	Concrete experience	Abstract conceptualization
Sutliff and Baldwin (2001) Svinicki and Dixon (1987);	Small group discussions	Lectures

1.2 Research Justification

1.2.1 Construction Industry Injuries & Fatalities

As stated, construction workers have higher rates of nonfatal injuries than other US workers. Most injuries are associated with falls from heights, ladders, and scaffolds (Lipscomb, Li, and Dement, 2003). Several questions arise in trying to determine why there are so many deaths and injuries in these construction occupations. Are workers not provided with the proper personal protective equipment (PPE)? Are they not trained to work in hazardous environments? Does the training provided accurately simulate the environment in which they are embedded for construction work? The following literature has provided answers to some of these questions.

Huang and Hinze (2003) found falls most frequently occur on small-scale projects that involve new construction of commercial buildings and residential projects. Falls that many employers associate with human error often occur at lower elevations. The occupations associated with high incidence of injuries include laborers, roofers, carpenters, structural metal workers, painters, brick masons, electricians, supervisors, drywall installers, plumbers, and pipe fitters. The authors suggest that inadequate or inappropriate use of PPE, such as an unhooked body harness, contributed to more than 30% of the falls examined in the study.

An analysis of construction related fatalities in North Carolina from 1978 through 1994 suggest the leading causes of fatalities were from falls (26.7%), electrocutions (20.4%), and motor vehicle crashes (18.9%) (Jackson and Loomis, 2002). This study listed the leading occupations for fatalities to be construction laborers (33.9%), electricians (8.4%), truck drivers (7.2%), supervisors (5.7%), roofers (5.1%), carpenters (4.6%), and operating engineers (4.4%). The authors concluded that the laborers' high fatality rate, 49.5 per 100,000 worker years, was attributed to the broad job description of laborer. Further the assertion was made that laborers do not receive as much training as other individuals in the construction trades. The authors suggested laborers should receive more training and more specific job duties to reduce the risks associated with the occupation. More specific job duties would allow for on the job training that is specific to the tasks performed for that occupation.

1.2.2 Hispanic Employment Patterns

In a study on occupational injuries of immigrant Latino workers (individuals who emigrated from Central America in the past two decades), Pransky, Moshenberg, Benjamin, Portillo, Thackrey and Hill-Fotouhi (2002) found Latinos were at relatively high risk for severe occupational injuries, compared to US workers as a whole. The authors attributed lack of trade-specific education, employer prejudices, and poor proficiency in English with this employment pattern. Despite the fact that 84% of these workers spoke little or no English, less than 30% were offered training in Spanish. The authors concluded that receiving safety training does not necessarily correlate with reduced incidence rates, as the few Latinos that do undergo training may not comprehend what it is they are expected to learn. Vazquez and Stalnaker (2004) built upon this

assertion by stating that low literacy skills may prevent comprehension of safety training material.

A study observing employment patterns of Hispanic construction workers by Anderson, Hunting, and Welch (2000) found Hispanic workers were disproportionately employed in the less skilled trades. Of the participants included in the study, 36% of the injured workers employed in the basic trades were Hispanic. Such a high representation of Hispanic injuries was not equal across trades. Hispanics accounted for only 3% of the injured mechanical trades; which is a reflection of low Hispanic representation in the mechanical trades. Mechanical trades people are more skilled than laborers as well as other trades in the construction industry. The authors concluded ethnicity is not a significant injury risk factor within a given trade, rather it is a risk factor for working in the more hazardous trades.

1.2.3 Company Size

Another contributing factor to the alarming rates of injuries and fatalities in the construction industry is company size. Research suggests companies with fewer than 10 employees have higher rates of injuries and fatalities (Derr et al., 2001). The authors suggested that smaller companies have increased risk for fatal injuries due to less strenuous safety programs, specifically fall safety protection. Further, in a study on Hispanic construction workers in Texas, Fabrega and Starkey (2001) found that both Hispanics and non-Hispanics working in construction businesses with fewer employees experienced the highest number of fatalities. Anderson et al. (2000) found minority employees are far more likely to work for these smaller construction companies, therefore putting themselves at greater risk. The authors suggest minority workers, immigrants in particular, work for these smaller construction companies because it is easier to get a job from small family owned companies. However, these small family-owned companies are more likely not to have finances to support extensive safety programs.

1.3 Research Purpose

1.3.1 Primary Purpose

The primary purpose of this research was to contribute an effective method for predicting the risk judgments of laborers employed by small construction firms. This was

approached by examining the influence of culture and individual differences on risk judgments. Similarly to the objective of the Center for Innovation in Construction Safety and Health at Virginia Polytechnic Institute and State University, this research considered the construction industry as a socio-technical system, reiterating that the components of the system are interdependent. Individuals included in this system were laborers, architects, engineers, laborers' family members, and management. These individuals interacted with both the environment and equipment in order for the system to function correctly as a single entity. Predicting the risk judgments of laborers will assist in developing training programs to address these risk factors, which will ultimately reduce injury and fatality rates.

The purpose of this study was to:

1. Determine whether there are differences in the risk judgments of European-American and Hispanic construction laborers.
2. Determine the extent to which differences in risk judgments can be attributed to acculturation, risk perception, industry experience, locus of control, and prior exposure to workplace incidents.

1.3.2 Secondary Purpose

This research addressed the role of other factors on the risk judgments of construction laborers. Specifically, this study determined whether differences in educational attainment, safety climate, and self-efficacy influenced laborers ability to make safe risk judgments in the workplace.

1.4 Research Questions

The study was designed to answer the following questions:

1. How are ethnicity and judgments about safety related?
2. How are job experience and judgments about safety related?
3. How are exposure to on the job incidents and judgments about safety related?
4. How are risk perception and judgments about safety related?
5. How are locus of control and judgments about safety related?
6. How are acculturation and the response to video interventions related?

1.5 Expected Results

The independent variables and their respective directions of correlation with risk judgment are shown in **Figure 1**. Risk perception and acculturation are expected to positively correlate to risk judgment. Locus of control, industry experience and prior exposure to accidents are expected to negatively correlate to risk judgment.

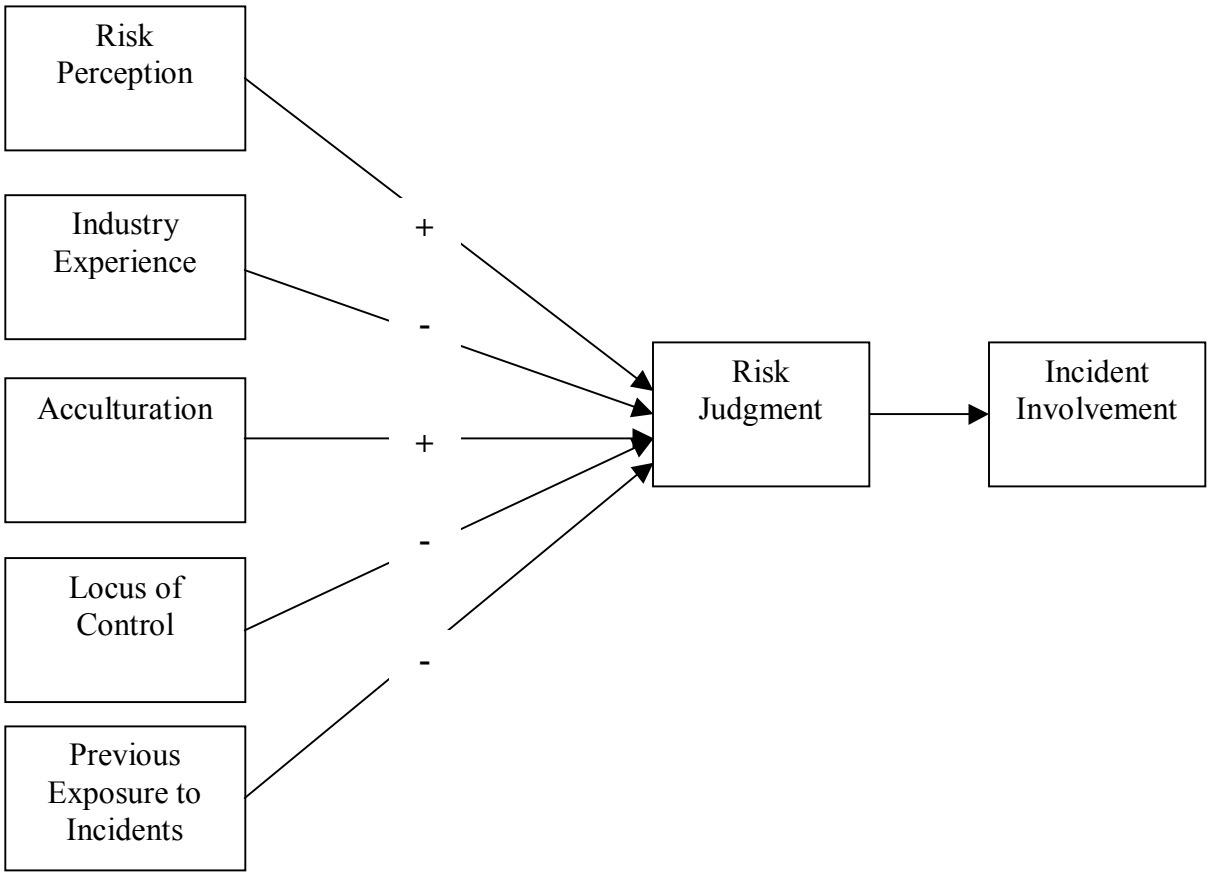

Figure 1. Hypothetical Model.

Risk perception is a subjective measure of the likelihood of an incident occurring and the consequences of this incident (Sjoberg et al., 2004). Industry experience was defined as the duration an individual has worked in the construction industry as a laborer. Acculturation, or ethnic identity, is a component of an individual's social identity based on membership in the majority group. It includes the individual's language use, social interaction with the majority group in addition to other cultures, and cultural attitudes (Romero and Roberts, 1998). Loosemore and Lam (2004) refer to locus of control as "…

an individual's perceived mastery of their environment and how far they see themselves in control of their destiny" (p. 388). Previous exposure to incidents included both a laborer's eye witness account of an incident on the job, as well as the individual's direct involvement in safety related critical incidents in the workplace.

1.6 Expected Deliverables

The expected deliverables of the research were:

1. Provide construction worker evaluation of the use of narrative simulations,
2. Determine construction worker preferences for form of instruction,
3. Determine the individual differences most influential on risk judgments per the narrative simulation scores,
4. Address implication for the inclusion of individual differences in safety training, and
5. Provide suggestions for the Identification & Assessment phase of Total Safety Management Implementation. See **Table 4**.

Table 4. Model for Implementation of Total Safety Management (Goetsch, 2005).

Planning and Preparation
1. Gain executive-level commitment
2. Establish the TSM steering committee
3. Mold the steering committee into a team
4. Give the steering committee safety and health awareness training
5. Develop the organization's safety and health vision and guiding principles
6. Develop the organization's safety and health mission and objectives
7. Communicate and inform
Identification and Assessment
8. Identify the organization's safety and health strengths and weaknesses
9. Identify safety and health advocates and resistors
10. Benchmark initial employee perceptions concerning the work environment
11. Tailor implementation to the organization
12. Identify specific improvement projects
Execution
13. Establish, train, and activate improvement project teams
14. Activate the feedback loop
15. Establish a TSM culture

1.7 Document Overview

The remainder of this document includes a review of the literature, the methods, results, discussion, and conclusion. The literature review discusses ethnic employment patterns, locus of control, risk perception, self-efficacy, safety climate, narrative simulations, focus groups, and acculturation measures. There is however, a lack of published information demonstrating relationships between these variables and the risk judgments of European-Americans and Hispanics. The methods section reveals the experimental design of this research, as well as the primary method of data collection. The results and discussion sections cover the data analysis and explanation respectively.

CHAPTER 2. LITERATURE REVIEW

2.1 Ethnic Employment Demographics and Cultural Considerations in Training

2.1.1 Ethnic Employment Demographics

The construction industry has experienced substantial growth from the years 1996 to 2006. **Figure 2** and **Figure 3** show growth in the construction industry and growth in the construction industry Hispanic population respectively.

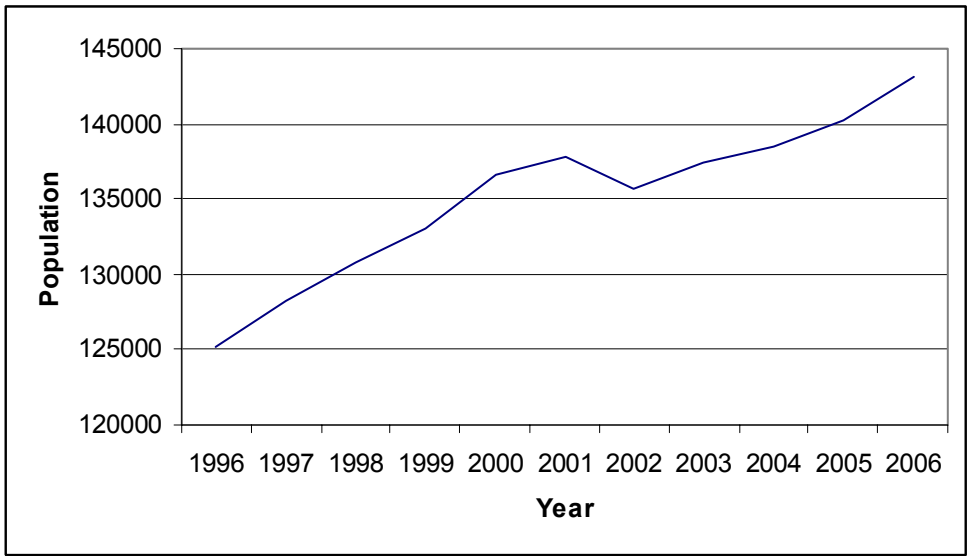

Figure 2. Construction Workforce Population 1996-2006.

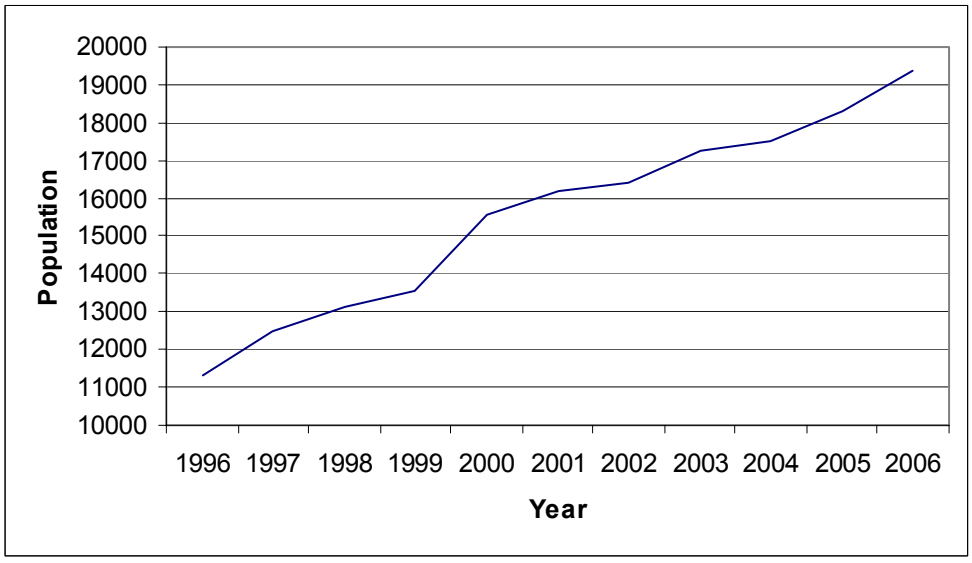

Figure 3. Construction Workforce Hispanic Population 1996-2006.

The construction workforce has grown over 14% from 1996 to 2006. The Hispanic construction workforce has grown over 70% from 1996 to 2006. Of those 16 and over in the US, over 63% of the European-American and 64% of the Hispanic population are employed. In 2005 the US workforce was comprised of 81% European-American and 12% Hispanic. By industry, the US workforce is comprised of 6% construction workers. European-American construction workers make up over 6% of the workforce, whereas Hispanic construction workers make up over 12% of the workforce (BLS, 2004c). The number of non-fatal occupational injuries and illnesses involving days away from work in construction and extraction occupations in 2004, totaled over 153,000. Over 58% of the cases in this group were European-American and over 18% Hispanic (BLS, 2004d).

2.1.2 Cultural Considerations in Training

Ruttenberg and Lazo (2004) conducted 47 in-depth interviews of Hispanics in residential construction work. The authors found that these Hispanic workers received training in English, and subsequently did not understand the majority of the material. Those that did understand a nominal amount of the content were not fluent in English enough to ask questions or participate in discussions. To add to the complexity of the language barrier, many of the Hispanic workers had limited literacy in Spanish. To address this issue the authors recommended reliance on visuals and verbal conversation.

Peer-based learning is one way to informally emphasize verbal interaction between co-workers. "In peer-based learning, construction workers learn from one another in the day-to-day setting, both through verbal and symbolic interaction and through engaging with material resources" (Styhre, 2006, p. 99). Peer-based learning allows the construction workers to draw on their own experiences and make it applicable to the use of equipment, tools, and PPE. Instead of merely showing the worker how to properly use a full body harness, the worker can reflect on an incident where a co-worker used a harness improperly or did not inspect the harness before use and the consequences of such actions. This information adds to the value of the training.

2.2 Locus of Control

Locus of control is the "…extent to which people perceive contingency relationships between their actions and their outcomes" (MacDonald, 1973, p. 169). Locus of control can be measured as a general characteristic of an individual or it may be applied to a

specific context. The model consists of two components, internal and external locus of control. Rotter (1966) listed the following as likely behaviors of internals relative to externals: engaging in actions to improve their environment, asking more questions, and remembering more information. Lajunen and Rasanen (2004) defined internal locus of control as "…the belief that events are consequences of one's own actions and therefore controllable, whereas people with external locus of control orientation believe that events are unrelated to their behavior and beyond their personal control" (p. 118).

Similarly, Loosemore and Lam (2004) defined internals as those who believe they are in control of their own destiny, and externals as those who believe outside factors are the primary contributors of events in circumstances of life. The authors also suggest that locus of control is a predictor of behavior motivation. In their study on the drivers of opportunistic behavior in the construction industry, Loosemore and Lam (2004) found inequalities in perceived levels of locus of control across occupations, gender, and ethnic groups. Higher level occupations (i.e., management), were reported as internals more often than lower level occupations (i.e., tradesmen). These results were expected but disturbing as all tiers of occupations in the construction industry should make contributions to the enforcement and monitoring of workplace safety.

2.3 Risk Perception

The two major components of risk include the likelihood of and severity of exposure to a hazard. Sjoberg et al. (2004) define risk perception as "…the subjective assessment of the probability of a specified type of accident happening and how concerned we are with the consequences" (p. 8). To perceive risk includes evaluations of the probability, as well as the consequences of a negative outcome. Unlike risk, employee risk perception encompasses a number of characteristics on an individual and organizational level. Mearns and Flin (1996) suggest these characteristics may be grouped according to three main categories: individual, job, and workplace characteristics. Individual characteristics include age, knowledge, experience, and subjective feelings about hazards and their respective consequences. Job characteristics include occupation, physical environment, and job stress. Workplace characteristics include hazard profile, safety culture and climate, social support, and safety systems. Holmes et al. (1998) developed a list of significant themes of occupational health and safety risk in the painting industry.

The themes are shown in **Table 5**. According to the authors, the degree of risky behavior an individual asserts depends on their acceptance of these themes. Vaughan (1995) suggests socioeconomic circumstances in addition to ethnicity contribute to risk perception based on various cultural groups' past social experiences. Thus, risk communication information, presented through safety training, must keep the social context in mind. Methods for communicating risk to one social group may be in conflict with appropriate methods for other stakeholders in an organization.

Table 5. Descriptions of Significant Themes of Occupational Health & Safety in the Painting Industry (Holmes et al., 1998).

Theme Code	Theme	Theme Description
A	Unknownness of risk- a quality of riskiness	Riskiness is a function of lack of knowledge about the hazard or the unknowability of the nature and outcomes of the hazard
B	Delayed effect disease outcomes of risk	The risk is understood in the context of the biomedical model of illness. Risk is linked to a disease outcome which has a delayed effect and may be life threatening or deleterious to the quality of life in the future.
C	Immediate effect injury outcomes of risk	The risk is understood in the context of the biomedical model of illness. Risk is linked to an injury outcome which has either the potential to be immediately life threatening or is immediate and serious.
D	Perceptions of control of risk by technical measures	The risk can be controlled by technical measures that constitute the top end of the Control Hierarchy.
E	Perceptions of control of risk by individuals measures	The risk can be controlled by individual measures that constitute the bottom to steps of the Control Hierarchy, e.g. personal protective equipment.
F	Inescapable part of the job - fatalist resignation	The risk is an inescapable feature of working life in the industry and people are powerless to do anything about it (fatalism).
G	Part of the job - acceptance of risk in the work environment	The risk is a normal aspect of work in the industry and must be accepted as such.
H	Risk is located in certain work situations	The risk is described in the context of location in specific working environment conditions and work situations that are described.
I	Risk is a function of occurrence	The risk is described in terms of its frequency of occurrence, e.g. it is common/rare.
J	Lived experiences of risk	The risk has been experienced personally by the participant.
K	Individual attitudes are the source of risk	Responsibility and the power to reduce risk lies with an individual's attitudes.
L	Risk is a function of economic factors	Risk is viewed as a function of economic and productivity factors in the broader economic environment.

According to Holmes et al. (1998), there are three approaches to categorizing risk: technical, psychological, and social. The technical approach focuses on technological

expertise to define and control risk. The psychological approach examines individual perceptions of risk. The social approach considers individual perceptions in the context of the surrounding group or social atmosphere. An individual's perception is likely to change in the context of friends, family, and fellow employees (Slovic, 1987).

Qualities that influence risk perception within these three approaches include voluntariness, knowledge about the risk, personal control of the risk, foreseeability, and chronic effects of the risk. Voluntariness refers to the individual's acceptance of the presence of the risk by choosing to be in the environment where the risk is located. Knowledge of the risk is the extent to which the individual is aware of the risk and its consequences. Personal control of the risk may be linked to locus of control; the extent to which the individual believes he has the ability to protect himself from the risk. The chronic effect is the ability for the risk of the hazard to affect many people at once.

The attributes of risk have different meanings to different social groups. There appear to be differences in the way lay people and technical people, specifically employees and employers, perceive risks and the methods appropriate for conveying these risks. Holmes (1998) found two major differences in the way employers and employees distinguished between measures of risk control. These differences were the technical control measures that focus on changing the work environment and individual control measures that focus on changing the worker. Employers focused on the use of PPE and safety training in opposed to employees, who were focused on personal control measures to delay the effect of diseases. Employers and lay people center their attention on statistics conveying incidence rates and fatalities, whereas employees' judgments of risk center on catastrophic potential (Slovic, 1987).

An additional means for classifying risk judgment is the controllability by human intervention. Research suggests the risks deemed controllable are risks judged by their voluntariness, foreseeability, and to the degree knowable to the individual and science. Risks perceived to be uncontrollable are judged by the qualities of severity of consequences and frequency of occurrence (Hale & Glendon, 1987).

2.4 Self-efficacy

"…efficacy involves a generative capability in which cognitive, social, and behavioral subskills must be organized into integrated courses of action to serve innumerable purposes" (Bandura, 1986, p. 391). Stated by Stanley et al. (2002), self-efficacy is an individual's beliefs that he is capable of carrying out certain actions. The four determinants of self-efficacy beliefs are performance attainments, vicarious experiences, verbal persuasion, and physiological states (Bandura, 1986).

Self-efficacy is raised by performance attainments through successes and lowered by repeated failures. Occasional failures will not lower self-efficacy if a strong sense of self-efficacy was based on prior successes. Self-efficacy is increased or decreased by witness of vicarious experiences of others. Observing the accomplishments of others will increase self-efficacy, however, observing failure of others will lower self-efficacy. Verbal persuasion increases self-efficacy by convincing individuals they are capable of performing the specified behavior. Those individuals who are verbally persuaded are more likely to persist when difficulties arise, than those who are not predisposed to social persuasion.

Self-efficacy expectancies vary along three dimensions: magnitude, strength, and generality (Bandura, 1986). Magnitude refers to the number of steps of increasing difficulty a person perceives he is able to perform. Strength refers to the degree to which the individual believes he can perform the behavior. Generality refers to the extent to which success or failure influences future self-efficacy expectations (Maddux, 1995).

Bandura (1986) suggests self-efficacy is best measured by assessing magnitude and strength. This method is considered the traditional measure of self-efficacy. The traditional method assesses magnitude using yes/no questions, and a percentage to represent confidence. The Likert method assesses magnitude of performance. The simplified method encompasses the Likert measure but neglects magnitude. In a study assessing traditional, Likert, and simplified measures of self-efficacy, Maurer and Andrews (2000) concluded that the previously mentioned scales provided empirically similar results in terms of reliability and validity. While the traditional and Likert methods provided more diagnostic information, the simplified method required fewer responses.

2.5 Safety Climate

Safety climate is the objective measurement of attitudes and perceptions toward occupational health and safety issues, and may be broken down into work practices, work style, operator training, and industrial hygiene (Coyle et al., 1995). The initial dimensions of safety climate were identified as perceived management attitudes on safety, effect of safe work practice on promotion, social status of individuals, status of safety officer, status of safety committee, importance/effectiveness of safety training, risks at the workplace, and enforcement versus guidance (Zohar, 1980).

The generality of safety climate has been disputed in addition to its dimensions. When questioned whether safety climate should be rejected because of lack of generality across organizations, the authors replied no (Coyle et al., 1995). Even though comparisons across organizations prove to be challenging, identification of safety climate factors for individual organizations provide management with ideas of the areas deserving attention and change. Further, increased safety climate inherently leads to reduction of costs associated with workplace injuries. The costs may be reduced by modifying the attitudes of both management and labor toward occupational health and safety (Coyle et al., 1995).

2.6 Acculturation Measures

Several scales have been developed in an attempt to measure ethnicity and an individual's state of acculturation into the mainstream culture. The scales measuring acculturation have limited external validity as they can not be compared because they each measure different aspects of culture and personality. Some take into consideration geographical region and biological traits, while others consider first choice of language. Deyo et al. (1985) provided the following recommendations for the development of acculturation scales:

1. Characterize varying degrees of English use
2. Correlate in the expected directions with other aspects of acculturation and health behavior
3. Be useful in an indigent population with low educational attainment
4. Be non-threatening (for example, questions regarding place of birth or nationality might be seen as threatening, since a number of residents in our region or their families do not have legal citizenship)

The scale developed by Deyo et al. (1985) for use in health care research consisted of three statements addressing locus of control and four questions addressing language. The questions and statements are shown below:

1. What language would you prefer to speak? (English, Spanish, or both equally)
2. What language is most often spoken in your home? (English, Spanish, or both equally)
3. What was your first language as a child? (English or Spanish)
4. Do you read any English? (yes, anything; some; very little; none)?
5. Good health is largely a matter of good luck
6. No matter what you do, if you are going to get sick you will get sick
7. Everyone has a set time to live, and death cannot be avoided when that time comes

The authors suggest comparisons be made between their scale and other measures of acculturation to determine which dimensions within the measures are most valuable and may be used across various groups for specific purposes. While the measure developed by Deyo et al. (1985) was easily understood by individuals with low levels of educational attainment, it failed to consider facets of culture other than language and locus of control. If one is truly attempting to measure self-identity with a particular culture or ethnic group, a scale assessing multiple dimensions of culture must be used.

Phinney's (1992) Multi-Group Ethnic Identity Measure assesses an individual's ethnic identity using measures common to all ethnic groups so that the scale does not have to be altered to reflect the target ethnic group under consideration. These common measures include self-identification, behaviors, belonging, and attitudes toward other groups. The ideal scale should assess subjective measures of the individual under consideration. This scale should depict acculturation from the perspective of the individual not society. It should include components that assess the ethnicities of parents, language preference, religion, and geographical region. The measure should also allow for identification with more than one group.

One likely reason for the differences in the acculturation scales is the reliance on a unidimensional model where persons are considered acculturated or not (Carvajal et al., 2002). The assumption an individual is acculturated or not is an ethnocentric way of thinking, it presumes the culture or cultures an individual identifies with is irrelevant if it is anything other than the mainstream. In a study on the acculturation of Latinos,

Caravajal et al. (2002) grouped individuals into one of four acculturation groups using median splits into two independent cultural orientation scales. The four groups are listed below. These scales were based on the Bidimensional Acculturation Scale. One scale measured the degree of Latino orientation and the other the degree of other group orientation.

1. Bicultural (median or above in both the Latino and Other Group orientation scales)
2. Latino-focused (median or above in the Latino orientation scale only)
3. Other-focused (median or above in the Other Group orientation scale only)
4. Marginalized (below the median in both cultural orientation scales)

These classifications were deemed appropriate for the following reasons:

1. Some persons may remain more oriented to their original culture than their new culture of influence after many years of being immersed with both cultures
2. Some persons may become more oriented to their new culture than their previous culture
3. Some persons may be oriented and adapted to both cultures
4. Some persons may become disengaged from and non-adapted to both cultures

2.7 Narrative Simulations

A critical component in determining whether an individual has learned the appropriate information in an educational atmosphere is assessment. Assessment is an evaluation technique used to judge whether suitable information has been clearly and completely conveyed from the instructor to the student. Similar to the traditional elementary classroom environment, assessment is desirable upon completion of job safety training. Assessments, used in the labor industry, include quizzes that contain short multiple choice and true/false questions. These questions are usually framed in an explicit manner rarely challenging the employee to think about the context of the work environment. These types of questions lead employees to believe a specific course of action, or type of equipment, is always appropriate or inappropriate for use. These questions lack content, employee feelings and beliefs, perceived pressures, and are impractical in the real world (Kidd and Parshall, 2004). Scenarios, or narrative simulations, may be used as a substitute for these questions lacking substance, by emulating a real life work environment where an accident is likely to occur. In this type

of environment, the appropriate choice of action is not always the most ideal and the employee must choose between the lesser of two evils.

A different teaching and assessment tool could be a narrative simulation which is a textual reality-based exercise that gives its reader a mental model of a series of events leading to an incident without physically embedding the individual in the hazardous environment (Cole, 1994). The narrative simulation should include a plot, theme, characters, goals, and obstacles (Cole, 1997). The purpose of the narrative simulation is to allow the employee to assess a hazardous environment and make judgments based on the information given. Narrative simulations differ from case studies in that case studies analyze incidents based on a summary of a problem, given background information. However, narrative simulations do not reveal all pertinent information leading to the incident. The narrative simulation requires the person to gather information, interpret data, make choices and decisions, remember and use relevant facts and information (Cole et al., 1993). An example narrative simulation exercise (Wojcik, Kidd, Parshall, and Struttmann, 2003) is shown below:

Background

Joe is a carpenter working for Rogers' Remodeling. He has 2 years experience. The company owner, Mike Rogers, has recently sent Joe out on jobs alone. Mike has confidence in Joe's craftsmanship. Mike assigned Joe to a job of remodeling and expanding a kitchen. Joe is to remove old cabinets and install new ones.

You are an experienced carpenter who has been with the company for 10 years. You've been assigned to work with Joe later in the day after you finish at another job. Before Joe went out, Mike told him to be careful and do a good job. Mike also told Joe that you would be coming by later in the day to help him hang the cabinets.

Problem

Joe arrives on the job. The kitchen area is a mess. There are pieces of scrap 2 x 4s lying on the floor. Drywall scraps and concrete from jackhammering are lying around. There are PVC pipes for the new lines on the floor. Joe realizes that it would take at least a couple of hours to clean up this mess.

Question A

What should Joe do in this situation? (Choose as many as you think are correct)

1. *Call the boss to tell him about the clutter and ask what he should do.*
2. *Clean it up himself.*
3. *Don't do anything about the mess, just get started.*
4. *Just clear him immediate work area.*

Answers to question A

(Choose as many as you think are correct)

1. *Correct. Mike needs to know the situation. He may need to send extra help or reschedule other work he had planned. He can't help solve a problem unless he knows about it.*
2. *Correct. Even though it is not his mess, working around all that clutter will slow Joe down and increase his chance of injury.*
3. *Joe shouldn't start the job until the job site is picked up. Remember, he will be adding to the mess by removing old cabinets.*
4. *This may help some, but still leaves clutter that Joe will have a hard time seeing when he takes down the old cabinets and moves them out. He may trip or fall and get injured due to the clutter.*

The simulations may be fictional or based on case studies of real workplace accidents. Investigations, surveillance studies of occupational injury events, or focus groups may be used to gather examples of workplace incidents when a need exists to develop fictional stories. In the focus group environment, reality-based incidents may be obtained from employees. The expertise of the researcher may not be as valuable as real life events witnessed on the job by employees. The benefit of using these simulations is that employees respond to outcome-based methods more strongly than to statistics. Laymen are unable to relate to incidence rates and injury reports in the same manner that they can identify with visual or textual representations of workplace accidents (Vazquez and Stalnaker, 2004).

After reading or hearing the narrative simulation, individuals are given the opportunity to judge the correct choice of action from a short list of actions. The scoring of the answers to these questions may then be used to assess whether the employees understood information they were supposed to learn in training. Alternative forms of the narrative simulations require persons to generate written answers to questions rather than to recognize good and bad responses from the list of choices (Wala and Cole, 1987). However, this format provides little feedback. Both written response and multiple-choice responses require employees to gather information and make decisions. Not only are these narrative simulations used to assess information retention, they are also designed to influence employees' attitudes and behavior concerning on the job safety (Cole, 1997).

2.8 Focus Groups

The use of focus groups for the collection of qualitative data is widespread in the disciplines of Human Factors and Psychology. These research designs offer the benefits

of obtaining data that is not easily expressed in terms of numbers, frequencies, or performance measures. This qualitative data is often used for the exploration of topics and the development of questionnaires.

Characteristics of participants should be considered in determining the makeup of a focus group. It is critical participants of the same focus group have enough in common to feel comfortable speaking and sharing their opinions (Stewart and Shamdasani, 1990). Often characteristics such as age, gender, class, level of education, ethnicity, and experience help facilitate active discussion because individuals feel more confident expressing their opinions when commonality exists (Sim, 1998). In a study on pesticide risk reduction in farmworkers, farmworkers were placed into the experimental or control group based on community membership. The authors suggested individuals who worked and lived together were more likely to communicate extensively (Acosta et al., 2005). Kitzinger (1994) emphasized commonality by conducting focus groups that included participants that were friends and co-workers. Including such participants, preempted dialog that related participant comments to shared events. One of the disadvantages of commonality is the group polarization effect (Turner, 1991). The group polarization effect occurs when the majority of the group shares the same views. As a result, opposing viewpoints and opinions are suppressed by magnifying the opinions of the majority.

In addition to the moderator, a different individual should be present to take detailed notes of both verbal and non-verbal information. Throughout the session the moderator should probe responses to stimulate discussion among the participants without leading them towards a particular opinion or conclusion. At the end of each focus group session, the moderator should recapitulate the issues identified to clarify and confirm any issues that may be unclear. Further, focus group interviews should be recorded on audiotape. Multiple focus groups should be conducted to establish content validity of reoccurring themes (Bristol and Fern, 1996; Kidd and Parshall, 2000; Kitzinger, 1994; Morgan, 1995; Sim, 1998).

The following recommendations have been suggested, in the literature, when conducting focus group interviews. The number of participants in the focus group should range from 8 to 12 individuals. Both the arguments for and against the use of focus

groups for data collection are listed below (Kitzinger, 1994; Morgan, 1995; Bristol and Fern, 1996; Sim, 1998; Kidd and Parshall, 2000):

Arguments in Favor of Focus Group Usage

- Focus group participants relate their experiences and reactions among peers with whom they share some commonalities
- Focus group participants comment on each other's point of view, often challenging each other's motives
- Focus group studies are not as expensive as ethnographic studies
- First-person or eyewitness accounts are valued above hearsay
- Segmented sessions based on commonality facilitate an analysis of the similarities and differences across groups that represent potentially different points of view

Arguments Against Focus Group Usage

- There may be some overlap of critical information if multiple people begin to speak at once, causing valuable information to be missed
- Individuals in groups do not speak or answer questions in the same way that they do in other settings
- It is difficult to gauge whether an issue constitutes a theme for the group or merely a strongly held viewpoint of one or a few members
- Difficulty maintaining group attendance
- Equivalence is an issue when multiple moderators or coders are used to record and analyze data
- Differences in moderator experience and interviewing style may affect the flow, texture, and content of focus group interviews
- Sampling - participant representativeness of the target population
- Recruiting
- Data analysis techniques

Based on the arguments for and against focus groups, one must proceed with caution when determining if focus group interviews are appropriate for a specific research question. The objective of the research as well as the type of questions to be answered must be considered. Using focus groups to collect data from Latino construction workers may be beneficial for several reasons. Individuals may be more prone to provide feedback when verbally questioned, opposed to completing data collection packets containing free response questions where participants must write their responses. Secondly, written responses do not allow the researcher the opportunity to ask additional questions that feed off of participants' prior responses. Lastly, hearing the concerns of

other participants may encourage individuals to share their own apprehensions and experiences.

2.9 Literature Review Summary

The literature suggests growth in the Hispanic representation of the construction industry. In order to accommodate this growth, the training needs of the workforce should be examined. Cultural considerations as well as individual differences should be examined to determine their impact on risk judgments. If these factors influence the risk judgments of construction workers, it may be used to help employers and trainers communicate and train workers effectively.

Data on construction workers' opinions of safety and perceptions of their work environment may influence safety related risk judgments made on the job. A need exists for a method or system that predicts the risk judgments of construction workers. This research examined individual differences as predictors of construction laborers' risk judgments made in narrative simulations.

Statistics on injuries and fatalities do not provide information on how the components of the construction system interact. The three components of the system (people, environment, and machinery), interact with and affect one another both positively and negatively. This research aimed to integrate these three components by examining factors that affect the system. Instead of isolating people, this research examined participants' feelings on personnel, machinery, and the environment they work in, by measuring acculturation, risk perception, locus of control, industry experience, incident exposure, self-efficacy, safety climate, and education. Each of these factors encompassed one or more of the three components of the system. These factors were then used to predict the risk judgments of participants.

CHAPTER 3. METHODS, DATA ANALYSIS, RESULTS

The purpose of the research was to identify and develop an effective method for predicting the risk judgments of laborers employed by small construction firms and to determine if ethnicity would influence construction laborers' response to a training intervention. The goal of the first portion of the purpose was achieved through consideration of whether differences existed in the risk judgments of European-American and Hispanic construction laborers, and the extent to which differences in risk judgments were attributed to acculturation, industry experience, locus of control, risk perception, prior exposure to workplace incidents, education, self-efficacy, and safety climate. The goal of the second portion of the purpose was achieved by examining differences in the risk judgments of the two ethnic groups following the training.

3.1 Participants

The participants selected for the study were European-American and Hispanic construction workers who spoke English or Spanish. Participants included laborers in the construction industry. Participants were employed by small construction firms with little to no safety training. The amount of safety training was assessed in the employee demographic sheet (Appendix Form C). All participants were recruited from construction companies in Virginia and were compensated $7.50 per hour of their time. Participants ranged in age from 18 to 52 years and were male or female. Thirty-six participants were recruited; 18 European-Americans and 18 Hispanics, to achieve a power of 0.80 and test size $\alpha = 0.10$. The number of participants was estimated using the following equation for the independent variable with the largest standard deviation.

$$n = \frac{(Z_\alpha + Z_\beta)^2 \sigma^2}{\Delta^2}$$

$Z_\alpha - Z_{0.10} = 1.282$
$Z_\beta - Z_{0.20} = 0.84$
σ – standard deviation of the sample mean of risk perception = 5.88
Δ – tolerance level = 4
n - sample size = 9.73

The variable with the largest standard deviation, based on preliminary data collected in a pilot study, was risk perception. The tolerance level was determined by taking the absolute value of the difference of the means of the pre-narrative simulation score and the

post-narrative simulation score for the pilot study. The sample size required was slightly larger than nine participants. The total participants required for the study was nine participants, doubled for each ethnic group and video condition.

3.2 Equipment and Apparatus

A television and VCR were required for participants to view the construction safety training video.

3.3 Procedure

Participants completed a demographic sheet, questionnaires, narrative simulations (pre-test), and the narrative simulation rating form before viewing one of two videos approximately 20 minutes long. A subset of the participants participated in focus groups. The research procedure is shown in **Figure 4.** Half of the participants viewed a video developed on the concept of People-based Safety and the other half of the participants watched a generic video on concrete construction. Each video was available in both Spanish and English.

The seven underlying principles of People-based Safety (Geller, 2006) are:

Principle 1: Start with Observable Behavior
Principle 2. Look for External and Internal Factors to Improve Behavior
Principle 3. Direct with Activators and Motivate with Consequences
Principle 4. Focus on Positive Consequences to Motivate Behavior
Principle 5. Apply the Scientific Method to Improve Intervention
Principle 6. Use Theory to Integrate Information
Principle 7. Consider the Internal Feelings and Attitudes of Others

People-based Safety has an emphasis on what people do and how they do it, internal and external factors, activators and consequences of behavior, observing safe and unsafe behaviors, and empowering individuals by focusing on positive outcomes. Further, People-based Safety is broken into four skill components: acting, coaching, thinking, and seeing. The acting skill component was the core of the People-based Safety video used in this research. The focal point was acting for injury prevention (Geller, 2005).

Following the video, the participants completed the narrative simulations (post-test). All participants were able to read to some degree. Participants with low literacy levels received assistance going through the packet from the translator. A description of the concept of People-based Safety follows (Coastal Training Technologies Corporation, 2004).

"People-Based Safety™ is an innovative new approach to safety that goes beyond behavior-based safety to focus on human thoughts and attitudes to promote safe behavior. Transforming the way employees conceptualize the way they work helps them approach each task in a safer manner. It makes them more aware of the dangers associated with their work and the best way to approach them.

The program is based on four key skill areas—Acting, Coaching, Thinking and Seeing (ACTS). By mastering these important skills, employees develop a new awareness about safety that will guide them as they work and motivate them to care about their co-workers' safety, too."

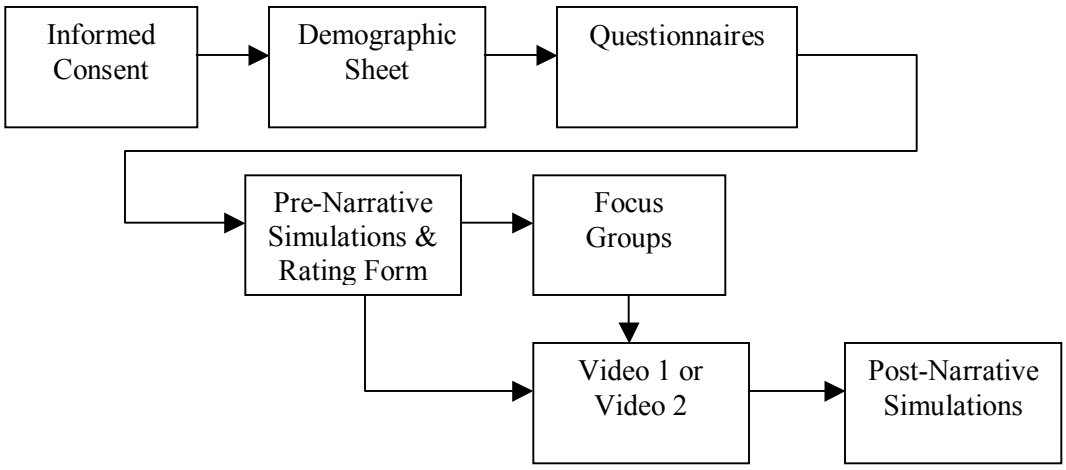

Figure 4. Research Procedure.

3.4 Experimental Design

The research was a repeated measures between subjects design. It was designed and developed to use multiple regression as a means of analysis. Multiple regression was chosen to reveal the contribution of each of the independent variables to the dependent variables. The independent variables were acculturation, risk perception, locus of control, experience, safety related critical incident exposure, educational attainment, self-efficacy, and safety climate. The predictor variables and their respective types are shown in **Table 6**.

Table 6. Factor Levels and Types.

Factor Name	Level	Type
Acculturation	Continuous Variable	Between Subjects) Fixed Effects)
Risk Perception	Continuous Variable	Between Subjects (Fixed Effects)
Locus of Control	Continuous Variable	Between Subjects (Fixed Effects)
Experience	Continuous Variable	Between Subjects (Fixed Effects)
Safety Incident Exposure	Continuous Variable	Between Subjects (Fixed Effects)
Education	Continuous Variable	Between Subjects (Fixed Effects)
Self-efficacy	Continuous Variable	Between Subjects (Fixed Effects)
Safety Climate	Continuous Variable	Between Subjects (Fixed Effects)

3.5 Research Questions

The research addressed the following questions:

1. How are ethnicity and judgments about safety related?
2. How are job experience and judgments about safety related?
3. How are exposure to on the job safety related critical incidents and judgments about safety related?
4. How are risk perception and judgments about safety related?
5. How are locus of control and judgments about safety related?
6. How are acculturation and the response to video interventions related?

3.6 Hypotheses

1. For research question one, it was hypothesized there would not be a difference in the risk judgments of Hispanic and European-American construction laborers when given a language preference for training material. This hypothesis was tested by comparing the scores of the narrative simulations of Hispanics with those of European-Americans. It was expected the Hispanics would score comparably to the European-Americans on the narrative simulations. Vazquez and Stalnaker (2004) suggested that receiving safety training does not correlate to comprehending training for Hispanic employees, due to lack of consideration of other factors. When additional factors such as the training method of delivery, ethnicity of instructor, language barriers, and literacy skills of trainees are considered the comprehension of material is expected to be equal across ethnic groups.
2. For research question two, it was hypothesized the more experienced construction workers would have more difficulty making safe judgments when placed in a hazardous environment. This hypothesis was tested by comparing the self-reported years in industry to the scores on the narrative simulations. It was expected that those who have had a greater number of years experience in construction would score lower on the narrative simulation. This outcome was expected as Zimolong (1985) found that the risks most underestimated in the workplace were those found in work environments that were the most familiar to employees. Familiarity with the work environment led to underestimation of the hazards associated with the job tasks.

3. For research question three, it was hypothesized the construction workers who have had more experience with safety related critical incidents in the workplace would have more difficulty making safe judgments when placed in a hazardous environment. This hypothesis was tested by comparing the self-reported number of safety related critical incidents experienced and witnessed to the scores on the narrative simulations. It was expected those who have had greater exposure to safety related critical incidents would score lower on the narrative simulation. This outcome was expected owing to the relationship between familiarity and underestimation of risks.

4. For research question four, it was hypothesized construction workers who have lower levels of risk perception would have difficulty making safe judgments when placed in a hazardous environment. This hypothesis was tested by comparing the scores of a modified version of Leonard et al.'s (1989) Risk Perception Scale (Appendix E) to the scores on the narrative simulations. It was expected those who scored higher on the risk perception scale would score higher on the narrative simulation.

5. For research question five, it was hypothesized construction workers who have an internal locus of control would have more difficulty making safe judgments when placed in a hazardous environment. This hypothesis was tested by comparing the scores of Janicak's (1996) Accident Locus of Control Measure (Appendix F) with the scores on the narrative simulations. It was expected that those who have an internal locus of control would score lower on the narrative simulations. This outcome was expected as individuals with an external locus of control are more likely to comply with instructions even when they conflict with personal expectations, and thus are more predictable in dealing with unexpected events (Durand and Shea 1974).

6. For research question six, it was hypothesized that the video interventions would have more of a positive affect on highly acculturated construction laborers. It was expected that high acculturation participants would score higher on the narrative simulations than low acculturation participants following the video intervention.

3.7 Independent Variables

A complete list of the independent variables and their respective descriptions can be found in **Table 7**. Variables acculturation, risk perception, locus of control, industry

experience. incident exposure, education, self-efficacy, and safety climate were included in the analysis for the research.

Table 7. Independent Variable Descriptions.

Variable Name	Variable Description
Acculturation	The sum of the 19 questions in the modified Likert-type Multi-group Ethnic Identity Measure was the calculated score (those with low scores were not as acculturated as those with high scores)
Risk	The sum of the 13 questions in the modified Likert-type Risk Perception Scale was the calculated score (those with low scores had low risk perception and those with high scores had high risk perception)
LOC	The sum of the 24 questions in the multiple choice Accident Locus of Control Measure was the calculated score (those with low scores were external locust of control and those with high scores were internal locust of control)
Experience	Experience in the construction industry was self-reported in years.
Incidents	Prior exposure to safety incidents was calculated as the number of self-reported incidents where the participant was involved in an incident or witnessed an incident.
Self-efficacy	The sum of the six questions in the Likert-type Self-efficacy Measure was the calculated score (those with low scores had low self-efficacy and those with high scores had high self-efficacy)
Safety Climate	The sum of the seven questions in the Likert-type Safety Climate Measure was the calculated score (those with low scores had low safety climate and those with high scores had high safety climate)
Education	Self-reported highest grade level or degree completed (grades are numbered 1-12 with an increase of one for every year of college)

3.7.1 Ethnicity & Acculturation

The ethnicity of participants was self-reported. Participants were asked to record the ethnicity with which they most closely identified, rather than choose from a pre-determined list of ethnic groups. For the purposes of this study, the ethnicities of interest were European-American and Hispanic. In addition to self-reporting the ethnicity, the participants also completed the Multi-group Ethnic Identity Measure (Phinney, 1992) to determine their level of acculturation with the dominant culture. The acculturation scale served as a secondary measure for ethnicity. The Multi-group Ethnic Identity Measure

(Appendix D) was modified to support a 0-4 Likert-type rating format with opposing anchors. The score of the scale was the sum of all items rated on the scale.

3.7.2 Risk Perception

Risk perception was measured using Leonard et al.'s (1989) Risk Perception Scale. This scale was modified to target more specific hazards relevant to the construction industry. The Risk Perception Scale (Appendix E) was designed to support a 0 – 8 Likert-type rating format with opposing anchors. The score of the scale was the sum of all items rated on the scale.

3.7.3 Locus of Control

Locus of control was measured using Janicak's (1996) Accident Locus of Control Measure. This scale included 24 measures requiring the participant to choose from one of two statements that most closely fit the individual. All statements in the Accident Locus of Control Measure (Appendix F) that were external responses were given a value of one and all statements that were internal responses were given a value of two. The score of the measure was the sum of all items.

3.7.4 Industry Experience

Participant experience in the construction industry was self-reported in the employee demographic sheet (Appendix C). Experience in the construction industry was measured in years.

3.7.5 Safety Related Critical Incident Exposure

Exposure to previous safety related critical incidents was self-reported on the employee demographic sheet. Participants specified the number of workplace safety related critical incidents they had been involved in or witnessed, in addition to a description of the incident.

3.7.6 Additional Variables

Additional variables that were measured by the demographic sheet or questionnaire, included educational attainment, self-efficacy, and safety climate. Educational attainment was collected by a self-reported item on the employee demographic sheet (Appendix Form C(a)). Participants were required to specify the highest grade completed or degree received. Self-efficacy was measured using items from Rooney and Osipow (1992). The Self-efficacy Scale (Appendix G) was designed to support a 0 – 4 Likert-

type rating format with opposing anchors. The score of the scale was the sum of all items rated on the scale. Safety climate was measured using items from Zohar (1980). The Safety Climate Scale (Appendix H) was designed to support a 0 – 4 Likert-type rating format with opposing anchors. The score of the scale was the sum of all items rated on the scale.

3.7.7 Distribution of Variables

Kolmogorov-Smirnov tests were conducted to determine if the independent variables followed a normal distribution. Variables incident exposure, education, and industry experience did not resemble a normal distribution. Transforms of these variables were analyzed to determine if the transforms of the variables modeled normal distributions. Variable industry experience was the only variable, of the three, that resembled a normal distribution following the transform. Therefore, variables incident exposure and education were excluded from further analysis. From this point forward, the variable industry experience will be designated ExperienceLN. This variable represents the natural log of experience. All future references to experience reflect this transform.

3.8 Dependent Variables

A complete list of the dependent variables and their respective descriptions can be found in **Table 8**.

Table 8. Dependent Variable Descriptions.

Variable Name	Variable Description
Pre-NS	Each multiple choice option in the individual narrative simulations was designated a numerical value (see Appendix I). The score of the pre narrative simulation was the sum of the numerical values for all four pre-narrative simulations.
Pre-Confidence	The confidence of the option selected in the narrative simulation was a value of one to five (not very strongly to strongly) selected from a Likert-type scale. These values were summed from each narrative simulation to provide the total score.
Post-NS	Each multiple choice option in the individual narrative simulations was designated a numerical value. The score of the post narrative simulation was the sum of the numerical values for all four post-narrative simulations.
Post-Confidence	The confidence of the option selected in the narrative simulation was a value of one to five (not very strongly to strongly) selected from a Likert-type scale. These values were summed from each narrative simulation to provide the total score.

3.8.1 Narrative Simulation Score

Participants received a score upon completion of each of the narrative simulations. The total score was the sum of the responses of all case studies presented in the narrative simulations. The scores assigned to each multiple choice option can be found in Appendix I. Values for responses indicated by the OTHER category were evaluated by the researcher by comparing how safe the participant's response description was relative to the multiple choice options presented. The numeric score allocated to each answer choice was ranked (from greatest to least) based on the following: notifying the supervisor of the hazard, complete removal of the hazard, consulting a more experienced co-worker on how to address the hazard, using personal protective equipment to reduce exposure to the hazard, and leaving the hazard for another co-worker. The selection criteria was based on a priority framework for hazard control. The framework aims to protect individuals from hazards via the following criteria in order of preference; (1) design out, (2) guard against and (3) warn (Sanders & McCormick, 1993). Hazards may be designed out by implementing engineering controls resulting in the removal of the hazard. Guarding against and warning individuals requires the use of administrative

controls and personal protective equipment. Administrative controls do not completely remove the hazard, but they aim to reduce exposure of the hazard. Personal protective equipment places a barrier between the individual and the hazard (Salvendy, 1987).

Participants received two total narrative simulation scores; pre-test and post-test. The primary researcher worked with two safety specialists to determine the realism of the case studies included in the narrative simulations. The safety specialists worked for Environmental, Health and Safety Services at Virginia Tech. The specialists reviewed the narrative simulations and provided insight on their length, ability to visualize the scenario, overall content, and applicability to construction laborers. One of the narrative simulation exercises is shown below. All four of the narrative simulations, their respective alternate forms, and scoring may be found in Appendix I.

You are a carpenter new to the job and your boss suddenly asks you to stop what you are doing and take over a task that your co-worker was performing in the morning. Your co-worker was sent home because of illness. You are asked to install sheathing and plywood to the buildings being constructed. In order to perform the task you must work on a wooden portable scaffold. The scaffold was placed on the forks of a hydraulic lift for easier use. You are unsure of the weight the scaffold is able to hold but you do know the co-worker that was sent home was using the same scaffold with the same load. What would you do? Circle the response that most closely resembles what you would do?

A. Use the scaffold. It must be safe; my co-worker was using it earlier the same day.
B. Ask a co-worker what load the scaffold is able to hold.
C. Notify my supervisor that I am unsure if the task is safe.
D. Find a safer scaffold that I am more familiar with.
E. Other _____

3.8.2 Narrative Simulation Confidence

Participants were asked to indicate how confident they were about their choice of action for each of the narrative simulations. The total confidence score was the sum of the individual confidences for each narrative simulation. Participants indicated their confidence for both the pre and post-test. Both the numeric and semantic designations for the confidence ratings are shown below.

How strongly do you feel about your answer? Use the numbers given below to indicate how strongly you feel about your answer.

Not Very Strongly				*Very Strongly*
1	*2*	*3*	*4*	*5*

3.8.3 Narrative Simulation Rating

A narrative simulation rating form was provided to the participants upon completion of the simulations. The rating form (Appendix J) included items on problem authenticity, simulation length, clarity of directions, readability of the simulation, and exercise quality.

3.9 Analysis Overview

In order to address the research questions, Statistical Package for the Social Sciences (SPSS) was used to analyze the data. In this chapter, statistical analyses and demographic information on the participant pool are presented. Cronbach's Alpha values were determined for each questionnaire included in the data set. Following the reported Cronbach's Alpha values, correlations of the predictor variables with the criterion variables, correlations of each of the predictor variables with each of the other predictor variables, the regression models, t-tests and the results of the Analysis of Variances (ANOVA) are given. For all analyses, excluding the power and sample size calculations, the alpha level was set at a significance of 0.05. This chapter concludes with the results of the narrative simulation rating form and a post hoc sample size calculation.

3.10 Participant Demographics

Table 9 presents characteristics of the participants of the research. These characteristics include the means of the participants' age, form of safety training received, and experience in the construction industry. Frequencies of the participants' household income, years with current employer, and years experience in the industry are provided in **Figure 5** through **Figure 7**.

Table 9. Characteristics of Participants.

	Age (years)	Safety Training (0-8)	Experience in Industry (years)
Mean	24.33	2.39	6.21
Median	21.00	2.00	3.50
Standard Deviation	7.75	1.68	7.21
Minimum	18.00	0.00	0.08

Maximum	52.00	7.00	34.00

Participant information was self-reported. Participant age and experience in the construction industry were reported in years, while the remaining demographics were reported in terms of ranges. The form of safety training received was determined by selecting all forms that applied from the following list of options.

Safety Training (check all that apply)

Vocational safety training _____
On the job instructions _____
Pamphlets _____
Posters or written rules _____
From trade association _____
From a union _____
Apprentice program _____
Other _____

A value of one was given for each form selected, allowing for a score ranging from zero to eight. The time with the current employer was determined by selecting from one of four ranges. The four ranges are presented below.

How long have you been with your current employer? (choose one)

Less than a year _____
1 to 5 years _____
6 to 10 years _____
Greater than 10 years _____

The household income was determined by selecting from one of five ranges. The five ranges are presented below.

$20K – $29,999 _____
$30K - $39,999 _____
$40K - $49,999 _____
$50K - $74,999 _____
> $75,000 _____

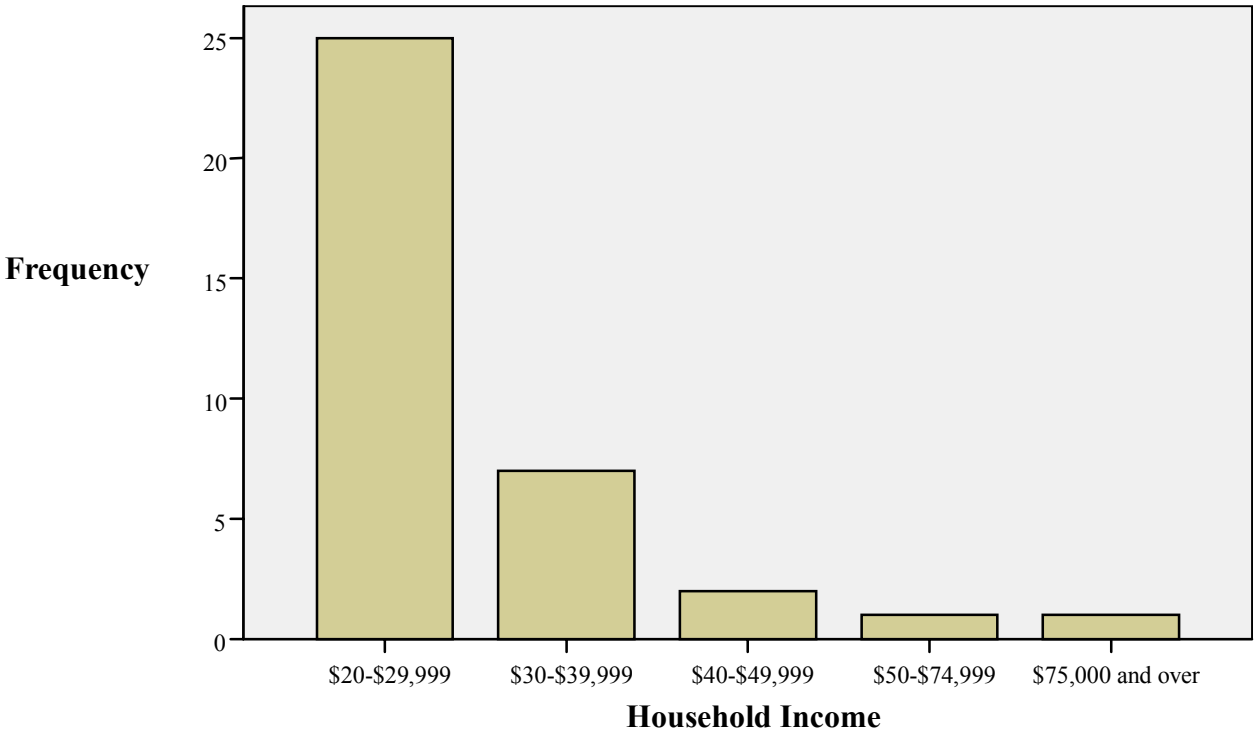

Figure 5. Demographic Characteristics of Participants – Household Income.

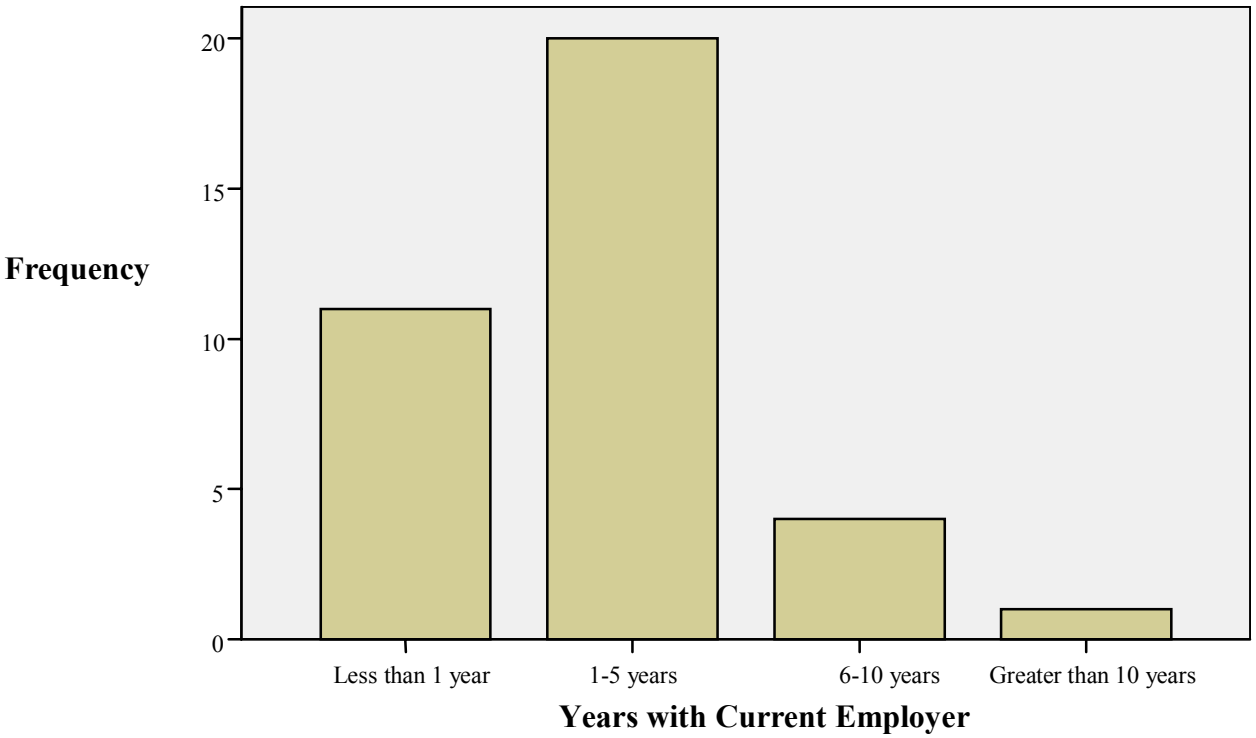

Figure 6. Demographic Characteristics of Participants – Years with Current Employer.

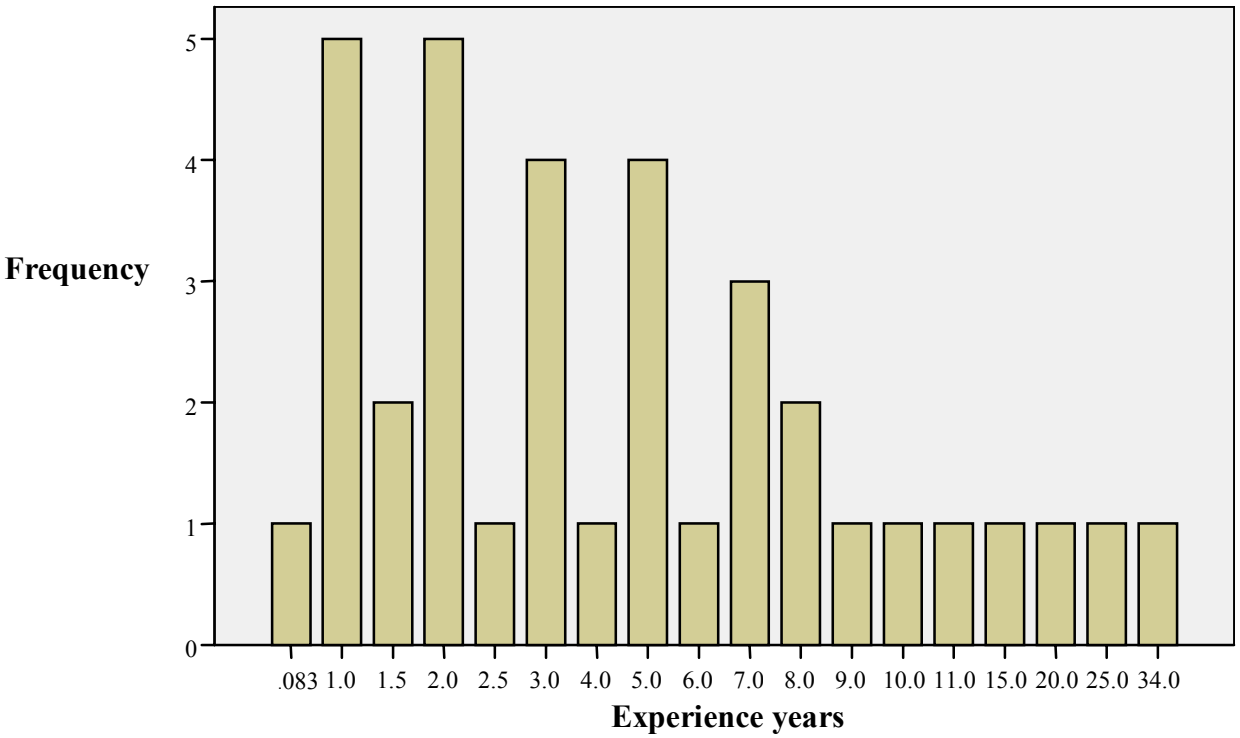

Figure 7. Demographic Characteristics of Participants – Years Experience in the Construction Industry.

3.11 Cronbach's Alpha

Cronbach's Alpha values were determined for each questionnaire included in the data set in order to verify that each reliably measured a single unidimensional construct. **Table 10** lists the Cronbach's Alpha values achieved in this research for the Multi-group Ethnic Identity, Risk Perception, Accident Locus of Control, Self-efficacy, and Safety Climate measures. All measures had an acceptable reliability coefficient of 0.70 or higher with the exception of the Self-efficacy measure.

Table 10. Cronbach's Alpha Reliability Coefficients.

Measure	Cronbach's Alpha
Multi-group Ethnic Identity Measure (MEIM)	0.72
Risk Perception	0.88
Accident Locus of Control	0.85
Self-efficacy	0.53
Safety Climate	0.71

The reliability coefficient of each of the measures could have been raised slightly by excluding one or more items. The MEIM could have had a reliability coefficient increase from 0.72 to 0.74 by removing item two, 0.74 by removing item nine, or 0.73 by removing item 16. Items two, nine, and 16 are listed below.

> **Item 2**: I am active in organizations or social groups that include mostly members of my own ethnic group.
> **Item 9**: I really have not spent much time trying to learn more about the culture and history of my ethnic group.
> **Item 16**: I am involved in activities with people from other ethnic groups.

The Risk Perception Scale could have had a reliability coefficient increase from 0.88 to 0.89 by deleting item eight. Item eight is shown below.

> **Item 8**: Working with individuals who do not speak the same language as you.

The unreliability of this item may be attributed to the scale measuring more than one dimension. This dimension may have been related to differences between the languages spoken by the two ethnic groups. The first language of the majority of the Hispanic participants was Spanish. Several of the Hispanics were able to speak a limited amount of English, allowing them to communicate with the European-Americans. However, there was no indication the European-Americans were able to convey information to the Spanish speakers.

The Accident Locus of Control Measure could have had a reliability coefficient increase from 0.85 to 0.87 by excluding item three. Item three is shown below.

> **Item 3**: A. People earn the respect they deserve. B. No matter how hard a person tries, their worth generally goes unrecognized.

The Self-efficacy Measure could have had a reliability coefficient increase from 0.53 to 0.64 by excluding item five. Item five is shown below.

Item 5: I am confident I can speak accurately.

The unreliability of this item may be attributed to differences between the languages spoken by the two ethnic groups. Both ethnic groups may have accessed their ability to speak accurately in terms of the English language. However, English was not the first language for most of the Hispanic participants. The first language of the majority of the Hispanic participants was Spanish.

The Safety Climate Measure could have had a reliability coefficient increase from 0.71 to 0.72 by excluding item four. Item four is shown below.

> **Item 4**: My supervisor pays less attention to safety problems than most other supervisors in this company.

3.12 Descriptive Statistics of Independent and Dependent Variables

Descriptive information on each of the independent variables and the dependent variables can be found in **Table 11**.

Table 11. Means of Independent and Dependent Variables.

Variable	Mean	Std. Dev.	N
Acculturation	48.08	8.79	36
Risk	68.22	17.27	36
LOC	40.11	4.96	36
ExperienceLN	1.28	1.15	36
Self-efficacy	19.58	6.36	36
Safety Climate	17.64	19.49	36
Pre-NS	14.38	3.51	36
Pre-Confidence	15.00	4.18	36
Post-NS	15.60	3.07	36
Post-Confidence	14.94	3.92	36

3.13 Correlation Analysis

Pearson correlations were conducted, as a preliminary analysis, to predict which independent variables would be included in the regression models. **Table 12** displays the correlation value and significance level of each of the independent variables with each of the dependent variables. Acculturation had a moderate positive correlation with the pre-narrative simulation score *(p=0.01)*. Risk perception had a moderate positive correlation with the pre-narrative simulation score *(p=0.02)* and the post-narrative simulation score

(p=0.00). Construction worker industry experience had a moderate positive correlation with the pre-narrative simulation confidence *(p=0.01)* and the post-narrative simulation confidence *(p=0.01)*. Self-efficacy had a moderate positive correlation with the pre-confidence score *(p=0.03)*. Safety climate had a moderate positive correlation with the pre-narrative simulation score *(p=0.00)*.

Table 12. Pearson Correlations of the Independent Variables with the Dependent Variables.

	Pre-NS	Pre-Confidence	Post-NS	Post-Confidence
Acculturation	0.43**	-0.28	0.26	-0.26
Risk Perception	0.38*	0.19	0.52**	0.31
LOC	0.03	0.27	0.02	0.32
ExperienceLN	0.05	0.43*	0.02	0.44**
Self-efficacy	-0.01	0.37*	-0.10	0.25
Safety Climate	0.48**	0.01	0.32	0.15

Note: **p<0.01, *p<0.05

Pearson correlations were also conducted to establish existing relationships between independent variables. **Table 13** displays the correlation value and significance level of each of the independent variables with each of the other independent variables.

Table 13. Pearson Correlations between Independent Variables.

	Acculturation	Risk Perception	LOC	ExperienceLN	Self-efficacy	Safety Climate
Acculturation	1	0.27	-0.10	-0.14	-0.12	0.31
Risk Perception		1	-0.11	0.31	-0.07	0.05
LOC			1	0.13	-0.02	0.36*
ExperienceLN				1	0.12	-0.09
Self-efficacy					1	0.19
Safety Climate						1

Note: **p<0.01,*p<0.05

There was a moderate positive correlation between locus of control and safety climate *(p=0.03)*.

Lastly, Pearson correlations were conducted to determine if it was appropriate to combine the narrative simulation scores with the confidences scores. The pre-narrative

simulation score was not significantly correlated with the pre-confidence score nor was the post-narrative simulation score significantly correlated with the post-confidence score. Therefore, the variables remained single entities and were not combined. **Table 14** displays the correlation value and significance level of the narrative simulation scores with their respective confidences.

Table 14. Pearson Correlations between Dependent Variables.

	Confidence Score	
	Pre-Confidence	Post-Confidence
Narrative Simulation Score		
Pre-Narrative Simulation	-0.09	-
Post-Narrative Simulation	-	0.20

3.14 Regression Analysis

Two regression models were run for each of the four dependent variables (Pre-NS, Pre-Confidence, Post-NS, and Post-Confidence). The regression models provided include a full regression model and a stepwise regression model. A summary of the significant findings from the regression models is shown in **Table 15**.

Table 15. Regression Models.

Regression Model	Dependent Variable	Predictor Variable(s) Included in Model	R Squared	Adjusted R Squared	F-Statistic	P-value
Full	Pre-NS Score	Acculturation, Risk, LOC, ExperienceLN, Self-efficacy, Safety Climate	0.40	0.28	3.25	< 0.05
	Pre-Confidence Score	Acculturation, Risk, LOC, ExperienceLN, Self-efficacy, Safety Climate	0.41	0.28	3.31	< 0.05
	Post-NS Score	Acculturation, Risk, LOC, ExperienceLN, Self-efficacy, Safety Climate	0.37	0.24	2.88	< 0.05
	Post-Confidence Score	Acculturation, Risk, LOC, ExperienceLN, Self-efficacy, Safety Climate	0.45	0.33	3.87	< 0.01
Stepwise	Pre-NS Score	Safety Climate, Risk	0.35	0.31	8.86	< 0.01
	Pre-Confidence Score	ExperienceLN, Self-efficacy	0.28	0.24	6.53	< 0.01
	Post-NS Score	Risk, Safety Climate	0.35	0.31	8.81	< 0.01
	Post-Confidence Score	ExperienceLN	0.19	0.17	8.00	< 0.01

The full regression models were significant for all four dependent variables. The full regression models were significant for the pre-narrative simulation score *(F(6,29) = 3.25, p<.05)*, pre-confidence score *(F(6,29) = 3.31, p<.05)*, post-narrative simulation score *(F(6,29) = 2.88, p<.05)*, and the post-confidence score *(F(6,29) = 3.87, p<.01)*.

The stepwise regression models were significant for all four dependent variables but did not include all of the independent variables. The pre-narrative simulation score stepwise regression model included risk perception and safety climate as the only independent variables *(F(2,33) = 8.86, p<.01)*. The pre-confidence score stepwise regression model included industry experience and self-efficacy as the only independent variables *(F(2,33) = 6.53, p<.01)*. The post-narrative simulation score stepwise regression model included risk perception and safety climate as the only independent

variables *(F(2,33) = 8.81, p<.01)*. The post-confidence score stepwise regression model included industry experience as the only independent variable *(F(1,34) = 8.00, p<.01)*. The regression equations for each of these models are shown in **Table 16**.

Table 16. Regression Equations.

Regression Model	Regression Equation
Full	**Pre-NS Score** = 4.16 + 0.09**Acculturation** + 0.05**Risk** - 0.06**LOC** + 0.19**ExperienceLN** - 0.08**Self-efficacy** + 0.35**Safety Climate**
	Pre-Confidence = -4.52 – 0.10**Acculturation** + 0.06**Risk** + 0.23**LOC** + 0.88**ExperienceLN** – 0.58**Self-efficacy** - 0.08**Safety Climate**
	Post-NS Score = 9.23 - 0.00**Acculturation** + 0.09**Risk** - 0.02**LOC** – 0.26**ExperienceLN** – 0.14**Self-efficacy** + 0.22**Safety Climate**
	Post-Confidence = -1.15 - 0.14**Acculturation** + 0.08**Risk** + 0.21**LOC** + 0.81**ExperienceLN** + 0.30**Self-efficacy** + 0.10**Safety Climate**
Stepwise	**Pre-NS Score** = 3.10 + 0.07**Risk** + 0.36**Safety Climate**
	Pre-Confidence = 2.72 + 1.41**ExperienceLN** + 0.54**Self-efficacy**
	Post-NS Score = 5.99 + 0.09**Risk** + 0.20**Safety Climate**
	Post-Confidence = 13.04 + 1.49**ExperienceLN**

3.15 T-tests and Two-way ANOVAs

A t-test was conducted on the acculturation of the two ethnic groups. The acculturation of the two ethnic groups were significantly different *(t(28) = -5.17, p < .01)*. The mean acculturation score for the Hispanics *(M = 42.33, SD = 22.94)* was significantly higher than the European-Americans *(M = 53.83, SD = 66.15)*. A Two-way ANOVA was conducted to determine statistical significance for the dependent variables. The Two-way ANOVA included factor A, ethnicity (European-American and Hispanic), and factor B, video (People-Based Safety video and the concrete construction video). The results of the Two-way ANOVA are presented in **Table 17**.

Table 17. Two-way ANOVA (NS Scores) – Ethnicity and Video Group.

	Criterion Variables			
Source	Pre-NS Score	Pre-Confidence	Post-NS Score	Post-Confidence
Ethnicity	F(1, 32) = 0.46 p = 0.51, p>0.05	F(1, 32) = 5.27 p = 0.03, p<0.05*	F(1, 32) = 0.81 p = 0.38, p>0.05	F(1, 32) = 6.43 p = 0.02, p<0.05*
Video			F(1, 32) = 10.96 p = 0.00, p<0.01**	F(1, 32) = 5.48 p = 0.03, p<0.05*
Ethnicity x Video			F(1, 32) = 1.77 p = 0.19, p>0.05	F(1, 32) = 2.14 p = 0.15, p>0.05

Note: **p<.05, *p<.05

Ethnicity was a significant main effect for pre-confidence and post-confidence score (**Figure 8**). The pre-confidence score for European Americans *(M = 16.44, SD = 2.71)* was significantly higher than the Hispanics *(M = 13.56, SD = 4.93)*. The post-confidence score for European Americans *(M = 16.39, SD = 2.57)* was significantly higher than the Hispanics *(M = 13.50, SD = 4.54)*.

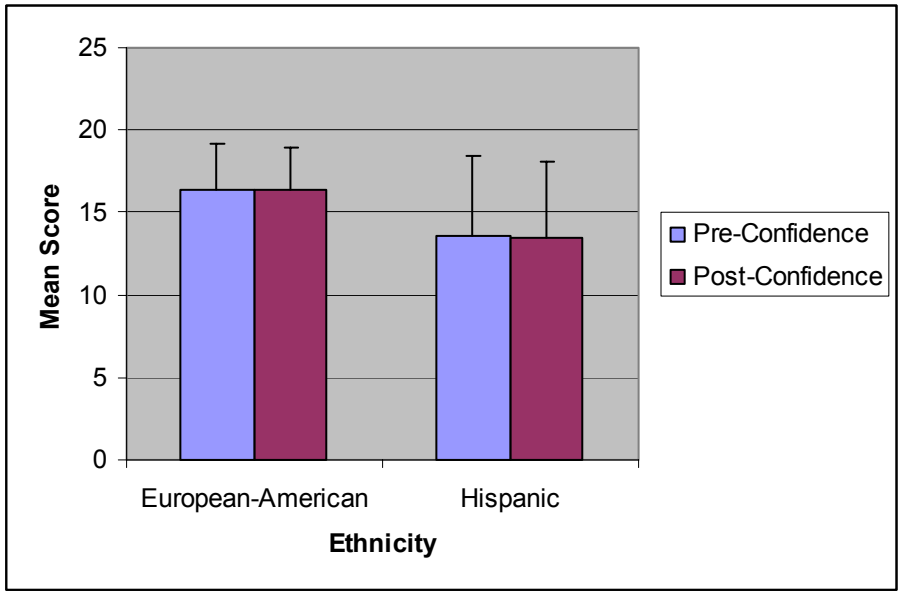

Figure 8. Pre-Confidence and Post-Confidence Score by Ethnicity.

Video group was a significant main effect for the post-narrative simulation score (**Figure 9)** and the post-confidence score (**Figure 10**). The post-narrative simulation score for the participants who viewed the People-based Safety video *(M = 17.08, SD = 1.80)* was significantly higher than the participants who viewed the generic concrete

construction video *(M = 14.11, SD = 3.39)*. The post-confidence score for the participants who viewed the People-based Safety video *(M = 16.27, SD = 2.420)* was significantly higher than the participants who viewed the concrete generic construction video *(M = 13.61, SD = 4.69)*.

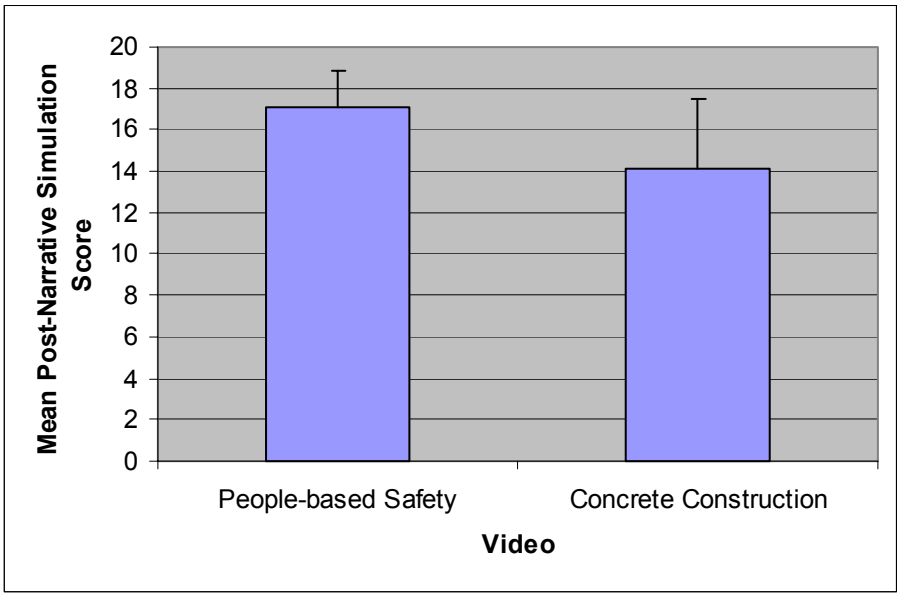

Figure 9. Post-Narrative Simulation Score by Video Group.

Figure 10. Post-Confidence Score by Video Group.

A second Two-way ANOVA on the difference scores between the pre and post-tests was conducted. The Two-way ANOVA included factor A, ethnicity (European-American and Hispanic), and factor B, video (People-Based Safety video and the concrete construction video). The results of the Two-way ANOVA are presented in **Table 18**.

Table 18. Two-way ANOVA (NS Difference Scores) – Ethnicity and Video Group.

	Difference Scores	
Source	Difference Score of the NS Score	Difference Score of the Confidence
Ethnicity	F(1, 32) = 0.00 p = 0.98, p>0.05	F(1, 32) = 0.00 p = 1.00, p>0.05
Video	F(1, 32) = 5.94 p = 0.02, p<0.05*	F(1, 32) = 1.97 p = 0.17, p>0.05
Ethnicity x Video	F(1, 32) = 0.01 p = 0.93, p>0.05	F(1, 32) = 1.45 p = 0.24, p>0.05

Note: **p<.05, *p<.05

Video group was a significant main effect for the difference scores of the narrative simulation score (**Figure 11**). The difference scores of the narrative simulation score for the participants who viewed the People-based Safety video *(M = 2.33, SD = 3.48)* was significantly higher than the participants who viewed the generic concrete construction video *(M = 0.05, SD = 0.42)*.

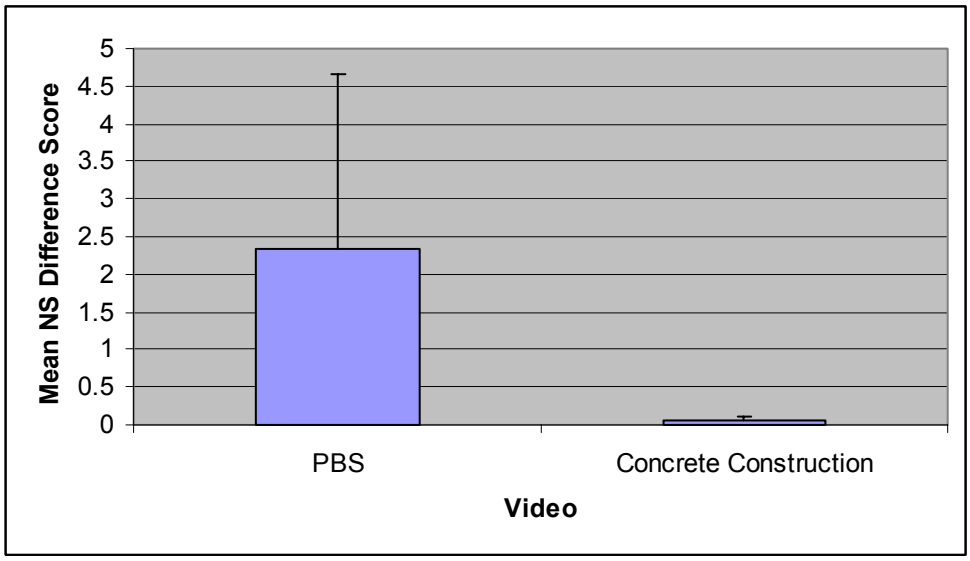

Figure 11. Narrative Simulation Difference Scores by Video Group.

3.16 Narrative Simulation Rating

The responses to the narrative simulation rating form questions were analyzed. These questions revealed information on participants' perceptions of the narrative simulations. Questions were asked concerning the realism, length, detail, and readability of the narrative simulations. Descriptive data of the responses for each of the questions are shown in **Table 19**. **Figure 12** through **Figure 19**are graphical representations of the frequency responses of each of the questions. Of the participants, 36 or 97%, at least somewhat agreed the narrative simulations were realistic. Fifty-five percent of the participants somewhat agreed or agreed the narrative simulations were too long. Ninety-one percent of the participants somewhat agreed or agreed the narrative simulations provided enough detail to solve the problems. Fifty-eight percent of the participants somewhat agreed or agreed the narrative simulations provided too much detail. Eighty-eight percent of the participants somewhat agreed or agreed the narrative simulations were easy to read. Eighty-six percent of the participants somewhat agreed or agreed the narrative simulations were easy to understand. Seventy-seven percent of the participants somewhat agreed or agreed the directions for solving the problems were easy to understand. Seventy-two percent of the participants somewhat agreed or agreed the narrative simulations were similar to problems they saw in the workplace.

Table 19. Narrative Simulation Rating Form Results.

Question	Response Frequency					Mean	Std. Dev.
	Strongly Disagree	Somewhat Disagree	Neither Disagree Nor Agree	Somewhat Agree	Strongly Agree		
1. The problems in the narrative simulation were realistic.	0	0	1	24	11	3.28	0.51
2. The problems in the narrative simulation were too long.	2	6	8	11	9	2.42	1.38
3. The problems provided enough detail to solve the problem.	0	0	3	24	9	3.17	0.56
4. The problem provided too much detail.	3	5	7	16	5	2.42	1.16
5. The problems were easy to read.	0	0	4	15	17	3.36	0.68
6. The problems were easy to understand.	0	2	3	13	18	3.31	0.86
7. The directions for solving the problems were easy to understand.	0	3	5	17	11	3.00	0.89
8. The problems in the narrative simulation were similar to problems I see in my workplace.	0	2	8	17	9	2.92	0.84

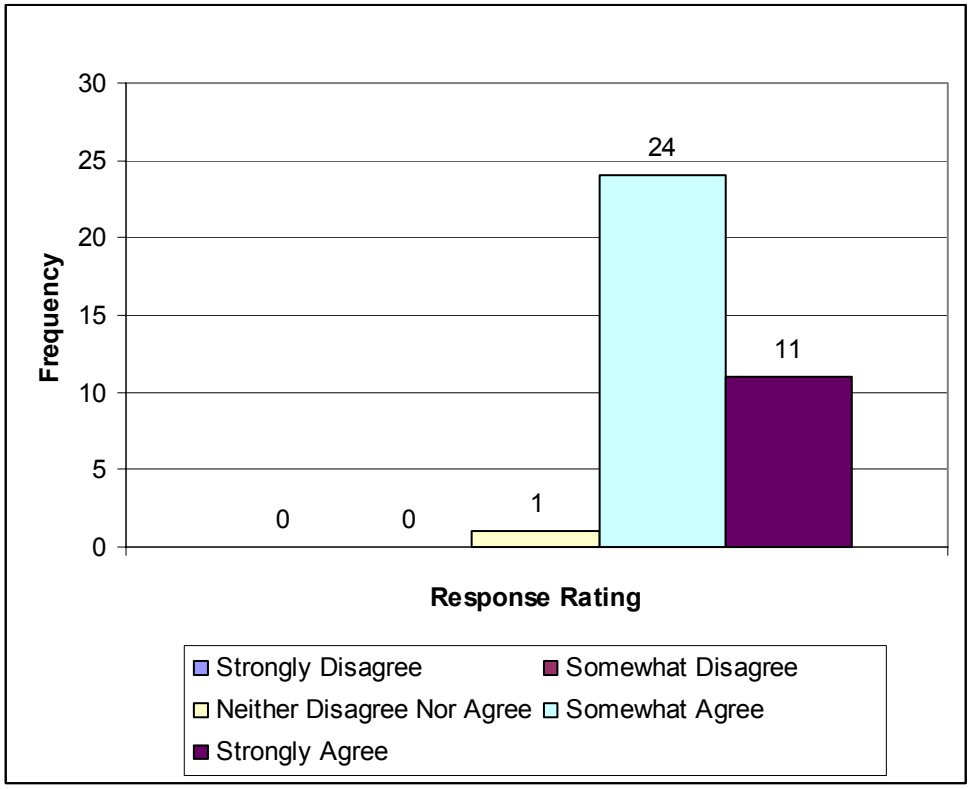

Figure 12. Question #1 (The problems in the narrative simulation were realistic.) Frequencies.

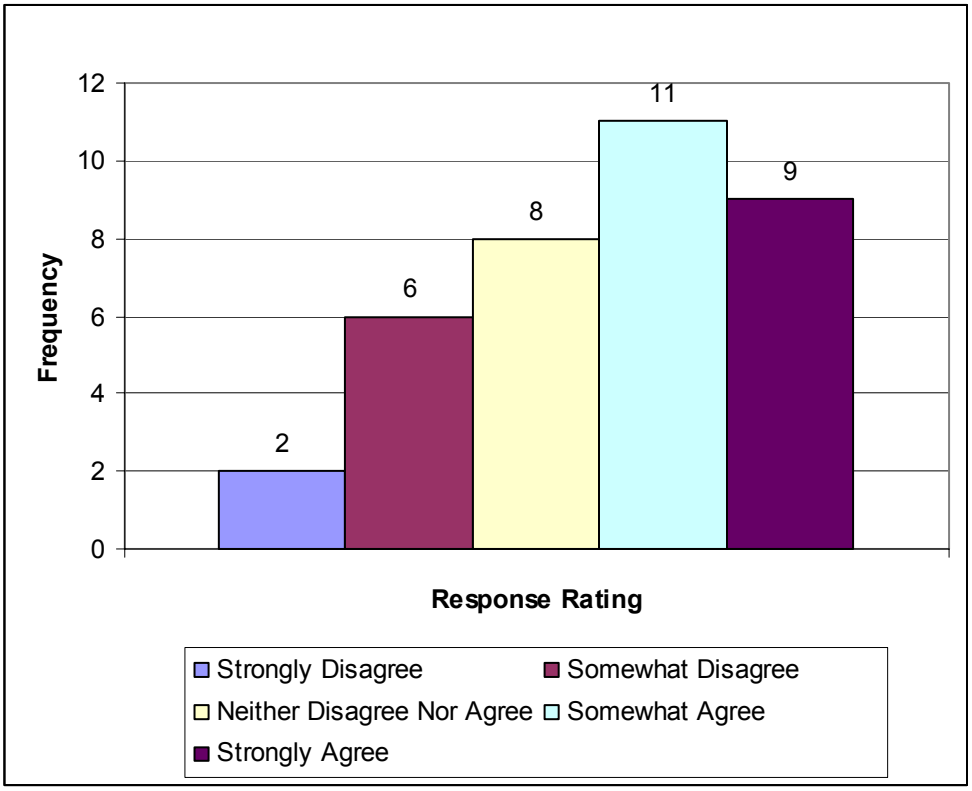

Figure 13. Question #2 (The problems in the narrative simulation were too long.) Frequencies.

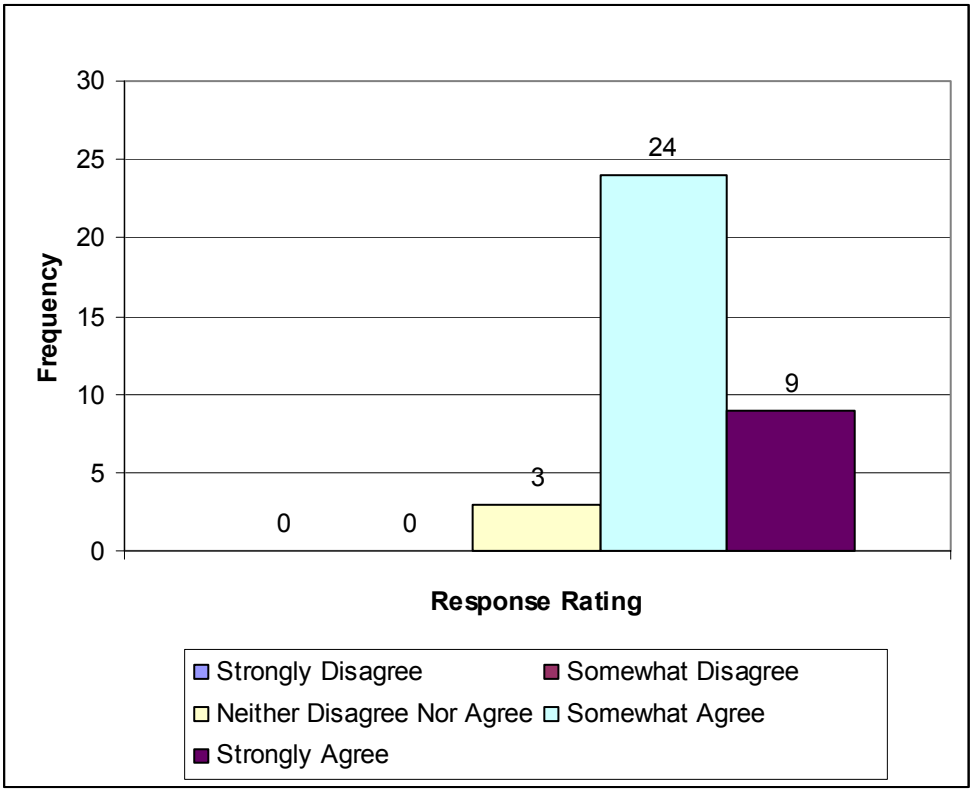

Figure 14. Question #3 (The problems provided enough detail to solve the problem.) Frequencies.

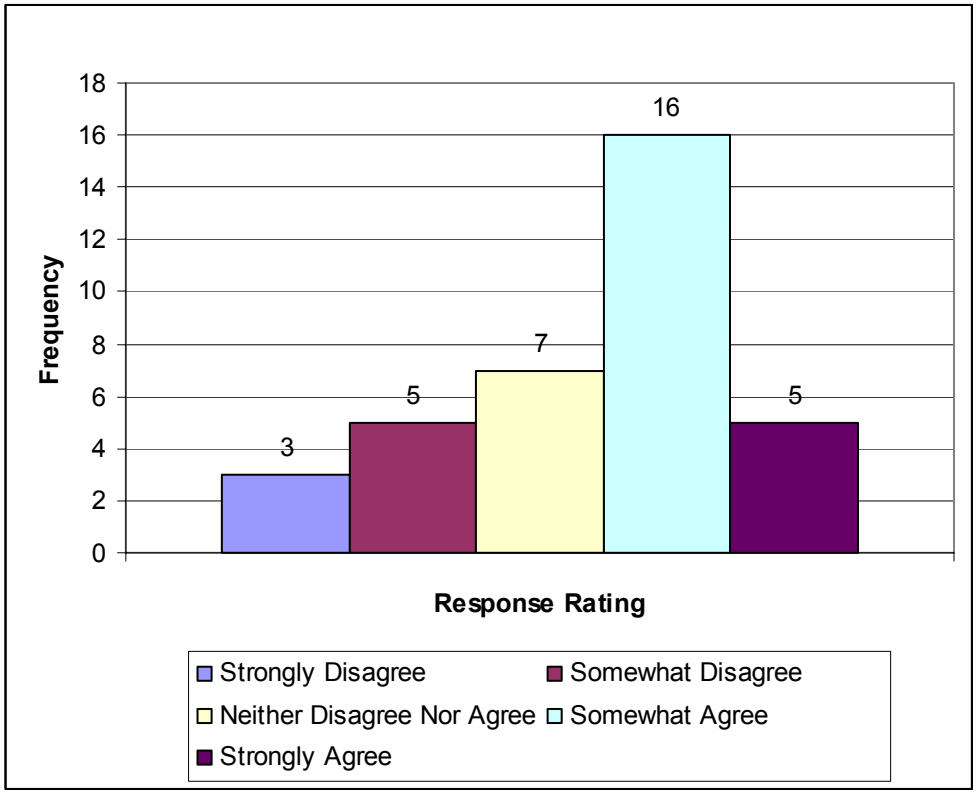

Figure 15. Question #4 (The problem provided too much detail.) Frequencies.

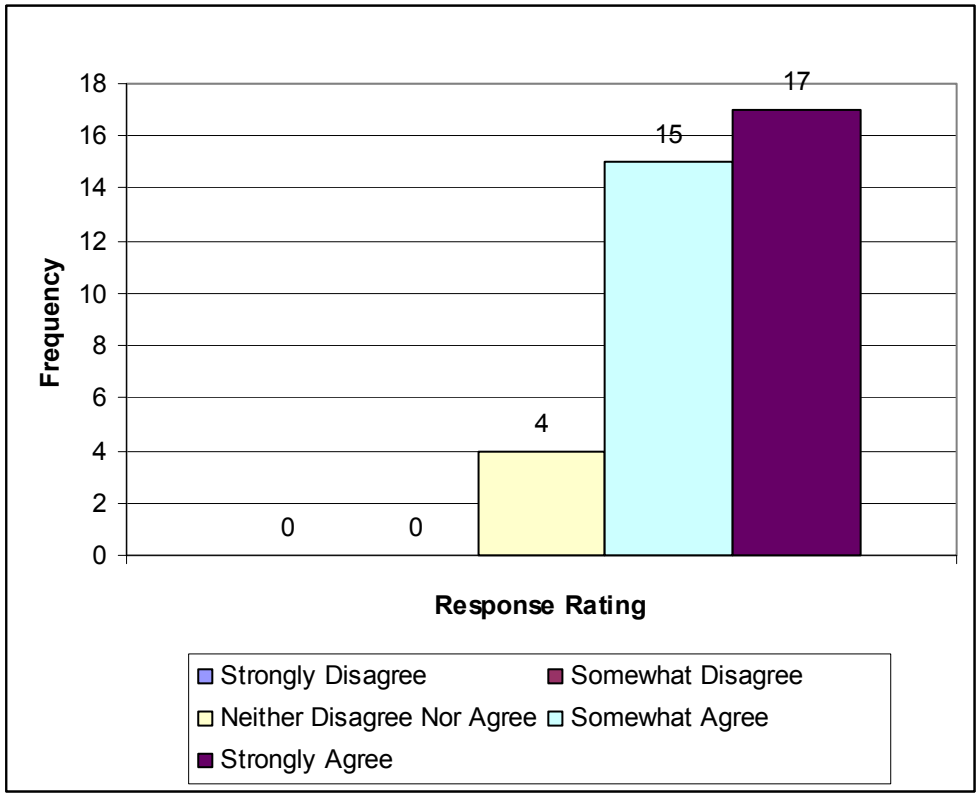

Figure 16. Question #5 (The problems were easy to read.) Frequencies.

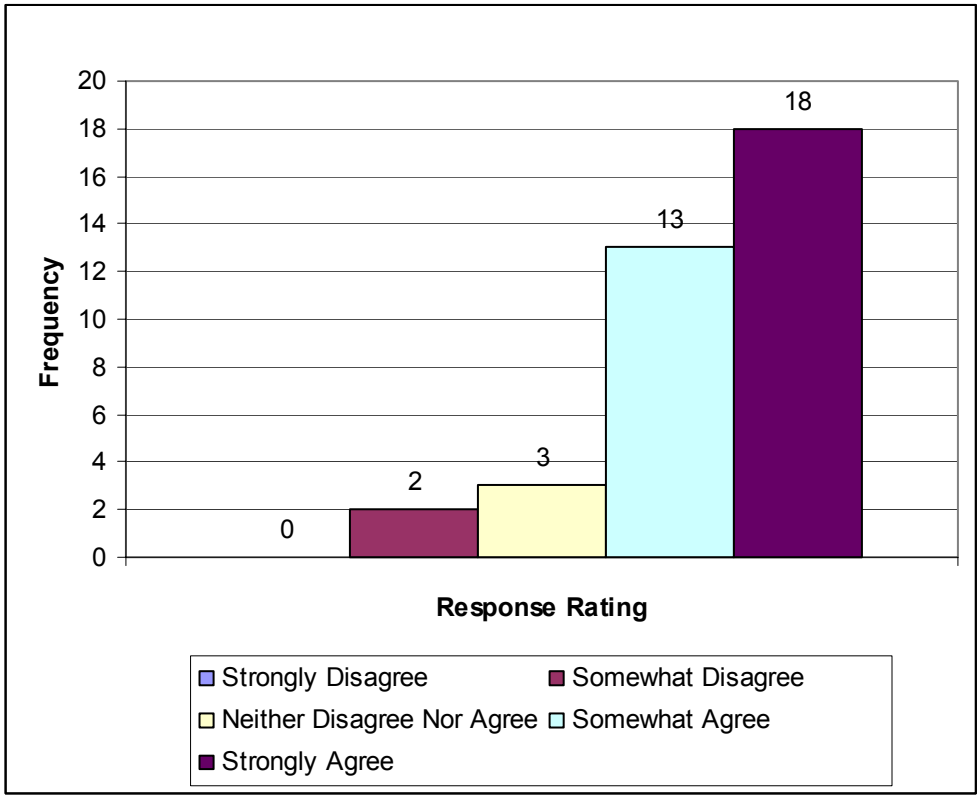

Figure 17. Question #6 (The problems were easy to understand.) Frequencies.

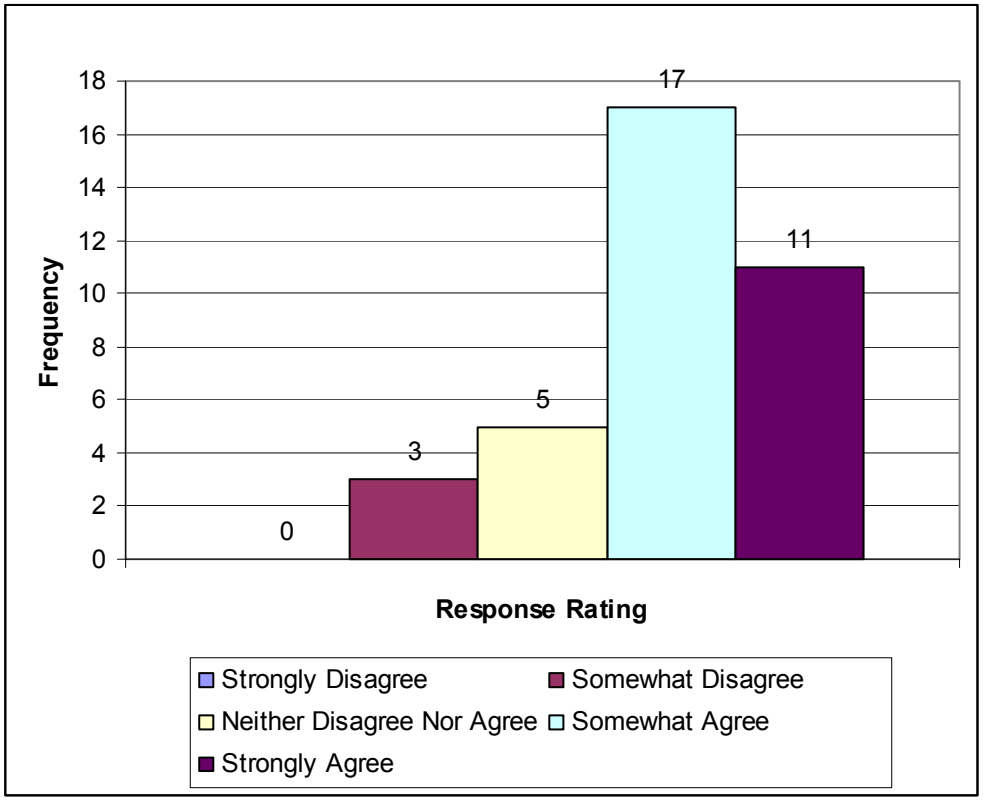

Figure 18. Question #7 (The directions for solving the problems were easy to understand.) Frequencies.

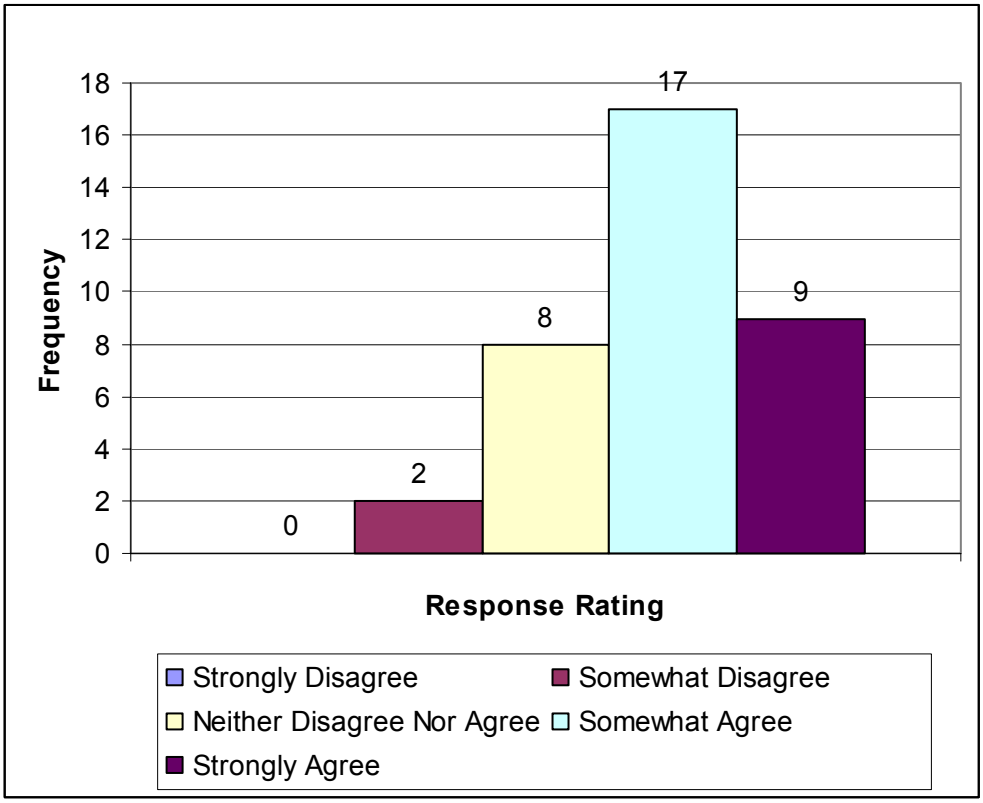

Figure 19. Question #8 (The problems in the narrative simulation were similar to problems I see in my workplace.) Frequencies.

3.17 Sample Size Calculation

A post hoc sample size calculation was conducted to determine the required number of participants, based on the data collected. The sample size equation and the values of the terms in the equation are listed below. The sample size required, based on the independent variable with the largest standard deviation (risk perception), was eight participants. The total participants required, was eight participants, doubled for each ethnic group and video condition. The values of the variables used to calculate the sample size are listed below.

$$n = \frac{(Z_\alpha + Z_\beta)^2 \sigma^2}{\Delta^2}$$

$Z_\alpha - Z_{0.10} = 1.282$
$Z_\beta - Z_{0.20} = 0.84$
σ – standard deviation of the sample mean of risk perception = 2.87
Δ – tolerance level = 2.14

n - sample size = 8.12

The tolerance level was obtained from the absolute value of the difference of the means of the pre-narrative simulation score and the post-narrative simulation score.

3.18 Focus Groups

Focus groups were conducted to (1) explain differences between European-American and Hispanic responses to the People-based Safety training intervention, (2) determine safety related topics of interest to construction laborers that have been neglected in construction laborer training, and (3) to determine preferences for form of safety training and instruction. The participants selected were a subset of the laborers that viewed the People-based Safety training intervention. Participant age ranged from 18 to 45 years old and were all male. A total of eleven participants were recruited: 5 European-Americans and 6 Hispanics.

The focus groups conducted offsite. Two focus groups, one for each ethnic group, were conducted prior to participants viewing the video. This participatory approach was used to determine differences in the ethnic responses to the safety intervention and to determine currently neglected safety related problems that employees felt needed to be addressed. Each focus group was comprised of five to six participants and a moderator. Five to six participants per focus group were used instead of eight to twelve because of the lack of accessibility of the target population. The role of the moderator was to (1) facilitate discussion with probing questions, (2) keep participants' discussion from digressing, (3) take notes and (4) monitor the time spent on each topic. The moderator was a bilingual female European-American student, majoring in Spanish. Participants were asked both open and closed ended questions. The questions, responses of the two ethnic groups, and their respective frequencies are summarized in **Table 20**.

Table 20. Focus Group Discussion.

Question	European-American Responses	Hispanic Responses
1. What topics would you like to see covered in safety training?	▪ Fall protection (4) ▪ Whatever is relevant to the job (1) ▪ Tools you are unfamiliar with (2) ▪ How to operate machinery (1)	▪ Safety equipment (5) ▪ Tools (2)
2. How often do you think employees should receive training? Why?	▪ On-going because the work varies from day to day (5) ▪ Continuous, some jobs are won because of safety records (1) ▪ Continuous training makes the workers think you care about safety (1)	▪ On-going because the work varies from day to day (5) ▪ Every six months (1)
3. Do you know the Personal Protective Equipment (PPE) available for your job?	▪ Yes, the boss goes over it (1) ▪ Yes, it gets repeated because people don't wear them (1) ▪ Yes, hard hats, gloves, work boots, harnesses, hearing protection (3)	▪ Yes, safety glasses, hard hats, boots, gloves (5)
4. Can you talk to your boss about getting PPE?	▪ Yes, because they are nice (1) ▪ Don't have to, you usually get it before you are onsite (1) ▪ PPE is available you just need to ask for it (1) ▪ I can ask for anything (1) ▪ He has an open door policy (1)	▪ Sometimes I ask for it, but I don't like to (3) ▪ PPE is available you just need to ask for it (1) ▪ Sometimes what we have is old and we need new stuff (1)
5. Would you correct someone that isn't using PPE? Would you correct someone using PPE in the wrong way?	▪ Depends on what my responsibility is…if I was working as a laborer no (1) ▪ Depends on the situation…if a guy was on the roof I wouldn't tell him to put on a hard hat (1) ▪ No, the supervisor will tell him (2) ▪ Yes, but in a joking way so that it doesn't appear that I am looking down on him (1) ▪ Yes, but only if there was a huge chance they could be hurt (1) ▪ Correct them in an informal way (1)	▪ No, the supervisor will tell him (2) ▪ Yes, I look out for my friends (4)

Note: ( ) indicates the frequency of responses out of n = 5 European-American participants and n = 6 Hispanic participants

6. What do you think is the best way to teach employees to use PPE?	▪ Zero tolerance (1) ▪ Continuously show them how to adjust equipment (1) ▪ Hands on, step by step (2) ▪ Practice using it (1)	▪ Give real life scenarios of incidents that have happened in the past when equipment wasn't used the right way (2) ▪ Show them how to use the equipment (4) ▪ Video (2)
7. Are you exposed to risks on the job? If yes, how do you know?	▪ Yes, all the time (5) ▪ You can feel it in your gut if something is going to go wrong (2) ▪ Everything is risky to some extent (1) ▪ The nature of the work (1)	▪ Yes, it is common sense (3) ▪ You can feel it in your gut if something is going to go wrong (1) ▪ Everything is risky to some extent (2)
8. In what form do you think safety training should be offered (i.e., computer, live lecture, video, etc.)?	▪ Verbal, some places don't have computers (2) ▪ Toolbox talks at luncheons (2) ▪ Presentations, signs, and pamphlets (3) ▪ Have tools or equipment present and use them during the training (2) ▪ Provide information on everyday safety examples like using a cell phone while driving and not wearing your seatbelt (1) ▪ Live and in person (2)	▪ Toolbox talks at luncheons (1) ▪ Signs and pamphlets (3) ▪ Video (3) ▪ Have tools or equipment present and use them during the training (3) ▪ In person (3)
9. What are your feelings on choice of instructor in safety training (i.e. gender, ethnicity, position, internal or external to the company)?	▪ Supervisor/superintendent (3) ▪ Someone that is present throughout the job (1) ▪ A good public speaker (1) ▪ Race and gender don't matter as long as the person knows what is going on (2) ▪ Whoever knows the most, as long as they know their stuff (1)	▪ Supervisor (1) ▪ Safety person (2) ▪ Someone who speaks Spanish (4) ▪ Someone that is present throughout the job (2) ▪ Pictures of someone from my race on handouts (1) ▪ Someone that can provide stories from previous sites (1)
10. What topics were not covered in your own safety training that should have been covered?	▪ None, I received new ones every week (1) ▪ I had the same ones every week (1)	

CHAPTER 4. DISCUSSION

4.1 Predictors of Risk Judgments

The purpose of the research was two-fold. First, identify an effective method for predicting the risk judgments of laborers employed by small construction firms. In order to achieve this goal, independent variables were selected for inclusion in a regression model based on the variables that would most strongly predict the risk judgments of construction laborers. The regression analyses were conducted on dependent variables, narrative simulation score and narrative simulation confidence. The second component of the research's purpose was to determine if differences in risk judgments existed between European-Americans and Hispanics.

4.1.1 Narrative Simulation Score

The stepwise regression model revealed that risk perception and safety climate, independent of all other variables, were the strongest predictors of risk judgments prior to and following exposure to the video intervention. This finding is consistent with safety climate having a significant Pearson correlation with risk judgments prior to the interventions. However, risk perception had a significant Pearson correlation prior to and following the interventions. The stepwise regression model was selected as the most appropriate of the full and stepwise models. It sequentially added each independent variable and evaluated the remaining variables contribution to the model before adding additional variables. Thus, removing any variables that did not contribute significantly.

4.1.2 Narrative Simulation Confidence

The stepwise regression model revealed industry experience and self-efficacy, independent of all other variables, were the strongest predictors of the confidence of individuals' risk judgments, prior to the video interventions. Experience was also the strongest predictor of the confidence following the video interventions. This finding is consistent with industry experience having the strongest and most significant Pearson correlation with the confidence of risk judgments prior to and following the intervention. Self-efficacy had a significant Pearson correlation prior to the video interventions.

4.2 Ethnicity

The current research failed to reject the first hypotheses. It was hypothesized that differences in the risk judgments of European-American and Hispanic construction

laborers would not exist. Significant differences in the risk judgments of the two ethnic groups were not detected when preference of language was provided. However, there were significant differences in the confidences of the risk judgments of European-Americans and Hispanics.

4.3 Experience, Exposure to Incidents, Individual Differences, and Acculturation

The current research failed to support hypothesis number two. It was hypothesized that the more experienced construction workers would have more difficulty making safe risk judgments. The expected negative relationship did not exist between experience and risk judgments.

The current research failed to support hypothesis number three. It was hypothesized that individuals with more exposure to safety related incidents would have greater difficulty making risk judgments. Analysis on safety related incident exposure were not conducted due to the non-normal distribution of the variable.

The current research failed to reject hypothesis number four. It was hypothesized that individuals with a lower level of risk perception would have more difficulty making safe risk judgments. The expected positive relationship did exist between risk perception and risk judgments.

The current research failed to support hypothesis number five. It was hypothesized that individuals with an internal locus of control would have more difficulty making safe risk judgments. The expected negative relationship did not exist between locus of control and risk judgments.

The current research failed to support hypothesis number six. It was hypothesized that the video interventions would have a positive affect on highly acculturated construction laborers. The expected positive relationship between acculturation and post-risk judgments did exist, but was not significant. Also, acculturation was not a good predictor of risk judgments as the acculturation of the two ethnic groups researched were significantly different.

4.4 Video

Significant differences in risk judgments based on the video intervention were detected. The risk judgments of participants viewing the People-based Safety intervention were more favorable, or safer, than the participants who received the generic

intervention. Both safe risk judgments and the confidence of the judgments increased following the viewing of the People-based Safety intervention.

4.5 Preferences in Safety Training Topics and Form of Instruction

Findings concerning the topics construction laborers desired more specific training on include (1) equipment, (2) the use of tools, (3) fall protection, (4) safety equipment, and (5) the correct use of machinery. When participants were asked if they were aware of the PPE available for their jobs, varying answers were given. Most participants mentioned hard hats, work boots, safety glasses, and gloves but several neglected to include fall protection.

The questions concerning approaching the employer for PPE resulted in different responses between European-Americans and Hispanics. The European-American laborers believed their employers had an open door policy and they could freely ask for new PPE. Some of the Hispanics said they could approach their employer for new PPE but they would rather not. Nash (2004) reported consistent findings concerning workers' apprehension for approaching their employers. When asked if they would correct a co-worker who neglected to use PPE or used it incorrectly, there were differences both between and within groups. Those who were willing to correct co-workers emphasized the need to correct them in an informal or joking manner to ensure they did not appear to be looking down on the other co-worker. Overall the participants were aware of the hazards they were exposed to on the job and believed it was the nature of the job.

The findings on the preferred form of training, found in the focus groups, were inconsistent with some of the older research found in **Table 3**. Contrary to the findings of Svinicki and Dixon (1987) and Sutliff and Baldwin (2001), European-American laborers preferred lecture-based training while Hispanic laborers preferred training built around discussion in addition to the use of videos. While European-Americans did not reveal ethnic preferences for the trainer or instructor, Hispanics preferred a native-Spanish speaking trainer. These findings are consistent with literature on the training of Hispanic workers (Nash, 2004; Ruttenberg & Lazo, 2004). Both ethnic groups wanted training delivered by an individual knowledgeable of the construction industry that could relate the material to prior experiences on other worksites. Both ethnic groups commented on the need for continuous training versus one time training at the time of

hiring. These findings support Nash (2004) where the author suggested weekly safety meetings to reinforce lessons and address new hazards employees are exposed to. One of the participants referred to this type of training as toolbox talks during luncheons. Ruttenberg and Lazo (2004) also support longer and more frequent training.

CHAPTER 5. CONCLUSIONS

5.1 Predictive Models

The hypothetical model in **Figure 1** was not supported by this research. **Figure 20** shows the relationships between the independent and dependent variables supported by this research.

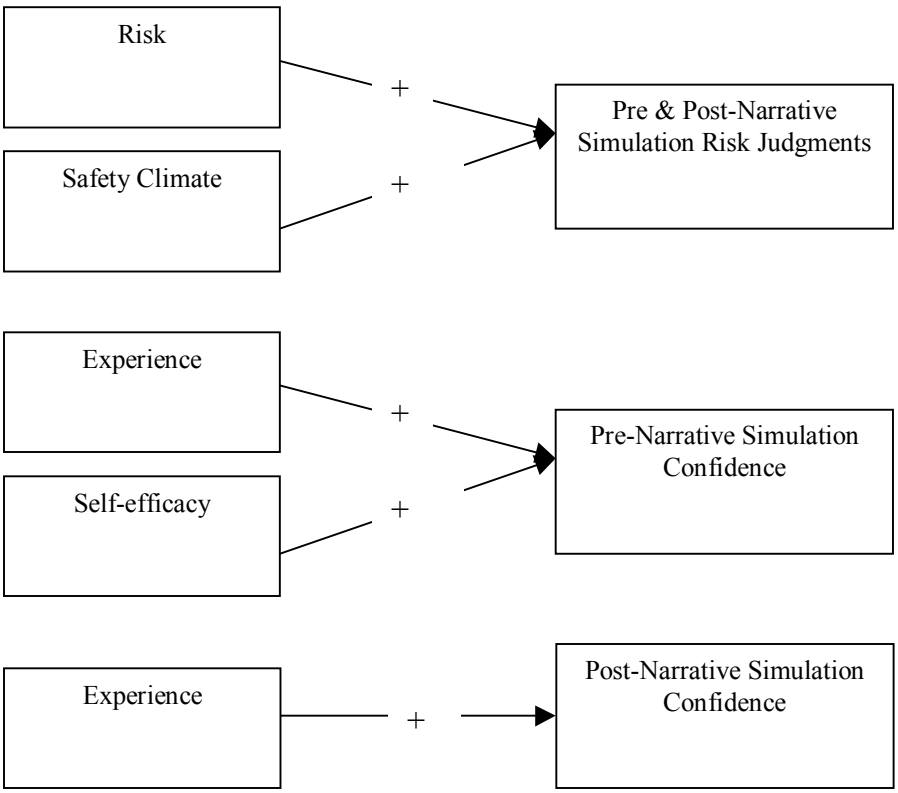

Figure 20. Conclusive Model.

Lee and Halpin (2003) attempted to develop a predictive tool for estimating incident risk in excavation and pipe-installation construction work. The authors began with a model that included workers' experience, skills and attitudes, training, weather conditions, soil conditions, supervision, and preplanning. In order to identify the most critical factors, the model was reduced to include training, supervision, and preplanning. These safety factors were analyzed to evaluate their contributions to the probability of incidents. The research findings indicated the risk level of incidents was more significantly affected by preplanning for excavation work and more significantly affected by supervision and training for pipe-installation work.

Goldenhar, Williams, and Swanson (2003) examined relationships between job stressors and injury or near miss outcomes among construction workers. The theoretical model for this research (Goldenhar et al., 2003), is shown in **Figure 21**.

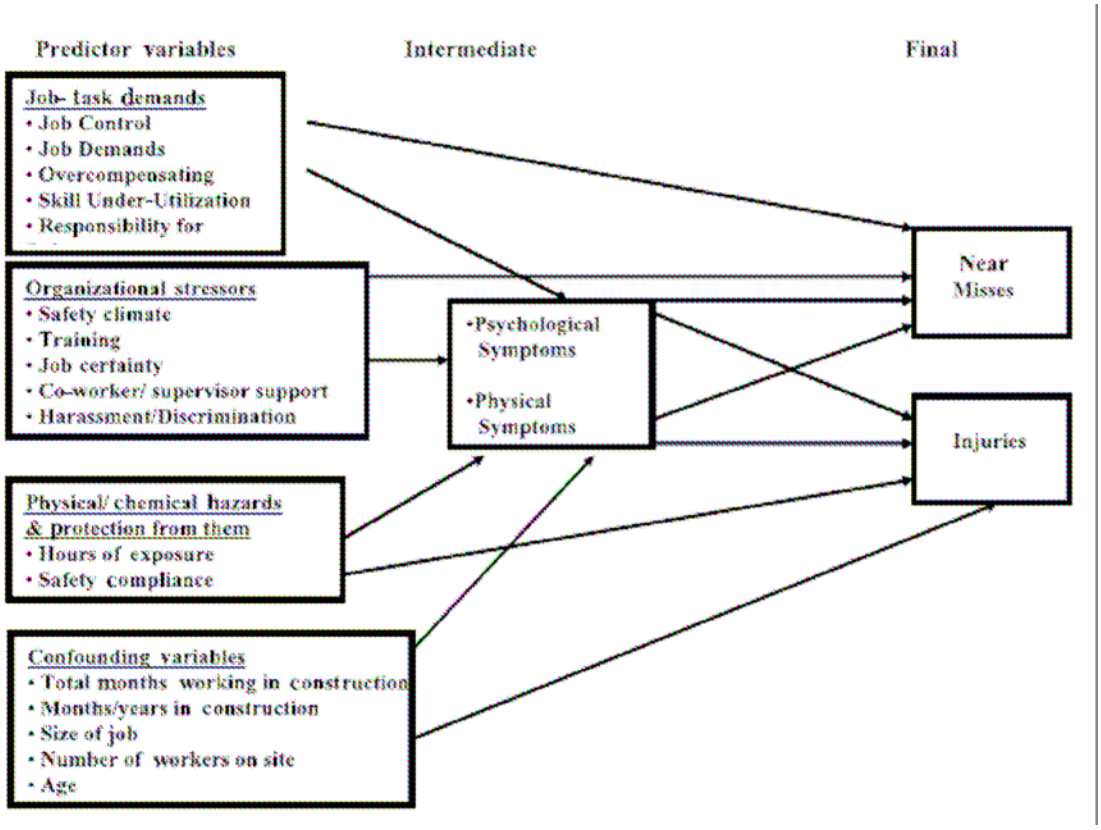

Figure 21. Partially Mediated Stressor-Injury/Near Miss Theoretical Model (Goldenhar et al., 2003).

Ten of the 12 work-related stressors in the study were found to be directly related to injury or near misses. The ten stressors include: job demands, job control, job certainty, training, safety climate, skill under utilization, responsibility for the safety of others, safety compliance, exposure hours, and job tenure.

Knowledge of the direction of influence of risk perception and safety climate on risk judgments may be used to influence employees' actions. Individuals with a higher safety climate as well as those with higher levels of risk perception chose more safe actions in the narrative simulations. Employers cannot screen potential candidates and hire those fitting these desired traits, but they can influence employees' risk perception once hired.

If employees are not satisfied with the current work environment the safety climate of the company can be changed internally.

The safety climate measure depicted employees' perceptions of their supervisors. If employees are not comfortable approaching their supervisors, or do not believe their superior is genuinely concerned about safety; their risk judgments are negatively influenced. In order to increase the company safety climate communication between laborers and supervisors should be bi-directional, with each group communicating to the other their thoughts and concerns about workplace safety. One-way communication where supervisors only reference to safety is when they are reprimanding laborers, should be avoided. Employees should not be immediately intimidated when supervisors approach them about safety. It should be desired and not feared.

The acculturation of the two ethnic groups researched were significantly different. The goal should not be to employ all highly acculturated individuals, but rather employers can take action by addressing the needs of various cultural groups in the workplace. Instead of persuading a particular culture or ethnic group to identify with the dominant culture employers can promote activities and training that recognize the needs of both groups. These activities should encourage employees to interact with one another to help them recognize and understand each others' needs. One such activity is a safety Kaizen. Kaizens allow individuals with varying roles and expertise within a company to come together to identify a solution to the problem. Individuals discuss what they believe to be the source of the problem, other areas the problem affects, potential solutions, and a plan for implementing the solutions. Events such as these allow employees with a vested interest to come together as a single entity to solve problems. There is no us against them belief. The group acts together to find a solution that will benefit all. An additional technique to increase employees' awareness of other cultures is to incorporate pictorial depictions of culture on safety posters, pamphlets, and overall training material. These pictures should represent various ethnic groups and not make the primary focus on the dominant culture.

Kaizens can be used to identify both advocates and resistors of occupational safety and health within a company as well employees' perceptions of the current work environment. Individuals that are eager and enthusiastic about participating in safety

related meetings and talks, are the individuals that can be used to lead and encourage other employees to act responsibly and safely. Employees that have had a history of neglecting safety protocol may be more susceptible to following the example of a co-worker that buys-in to safety, than to a superior that mandates and enforces safety procedures.

Employees' perception of risk can be increased by making employees aware of negative outcomes that are the result of unsafe actions. Emphasis should be placed on common hazards that are frequently overlooked (i.e. neglecting to use a hard hat or not attaching a body belt). Trainers should instruct employees that infrequent occurrences do not diminish the severity of the outcome if it does occur. If employers and trainers provide frequent toolbox discussions, short narratives of past incidents may be communicated to the employees during these sessions. In addition to the outcome of the incident, trainers and employers should emphasize how and who the negative outcomes affect. Individuals will become aware that an injury to one employee affects the reputation of the company, and the lives of co-workers, and family members of the injured employee. Visualizing how incidents affect co-workers and family members may encourage employees to feel ownership over one another's safety and well-being.

By increasing employees' perception of the hazards surrounding them in the workplace, the number of unsafe risk judgments may be decreased. As employees become more aware of hazards and their affects, as well as their personal responsibility in removing or avoiding hazards their risk judgments are more likely to decrease. More appropriate training is where employees become aware of these hazards and their potential outcomes.

5.2 People-based Safety Approach

The risk judgments of participants were significantly different by video group. Participants that received the intervention developed on the concept of People-based Safety made safer risk judgments than individuals who received the generic video. The difference scores between the pre and post-tests were also significantly higher for the individuals who viewed the People-based Safety intervention. The People-based Safety intervention may have made participants more aware of their own actions as well as the potential consequences of these actions.

The focus groups indicated Hispanic participants preferred to see self-cultural representation in safety training provided. The People-based Safety intervention did not reflect this preference. There were no significant differences in the ethnic responses to the video intervention. Despite the Hispanic's desire for cultural representation in the video, the Hispanic population was as likely to make safe risk judgments as the European-Americans without cultural representation. However, Spanish translations were provided which was also a preference indicated in the focus groups.

5.3 Narrative Simulation Use

Results of the narrative simulation rating form indicate overall participants were satisfied with the narrative simulations. The majority of the participants reported the simulations were easy to read, understand, and provided enough detail to make decisions concerning the problems. Negative criticisms were related to the length of the narrative simulations. Over half of the participants believed the narrative simulations were too long and/or provided too much detail. A fourth of the participants thought the directions were not easy to understand. Future use of narrative simulations should focus on ways to (1) shorten the simulations without losing important information and (2) make the directions more clear. Employers and trainers should provide at least one sample simulation for the employees and trainer to work through together. Doing so will give employees the opportunity to see the correct method of reporting the chosen course of action and the respective confidence.

Employees are not the only individuals that have the potential to benefit from narrative simulation use. From an organizational standpoint the narrative simulation is an assessment tool that allows trainers to visualize how employees react to hazardous environments. If employees do not respond to the simulations in the anticipated safe manner, the trainer can go back to the employees to learn why they responded inappropriately. Instead of reprimanding unsafe risk judgments, employers and trainers can attempt to learn why employees acted unsafely and then examine what they can do to change this behavior. Reductions in unsafe behaviors are less costly to the company because they reduce misuse of equipment, injuries, and fatalities.

5.4 Cultural Differences and Training Recommendations

The finding that there were no significant differences in the risk judgments of European-American and Hispanic construction workers, when given their language preference, does not undermine the fact that differences in the injury, illness, and fatality rates do exist. Rather, it makes one examine further the cause for differences in these rates. Is the disparity primarily attributed to language barriers? Perhaps the problem is not as simple as it appears.

Goodrum and Dai (2005) suggest one possible reason for the disparity between Hispanics and non-Hispanics is the disproportionate rate of Hispanic employment in the more hazardous construction occupations. The five most common occupations of Hispanic construction workers are carpenters, laborers, painters, drywall installers, and electricians. They also note that the increase in injuries, illnesses, and fatalities came with an increase in employment levels of Hispanic construction workers.

Cultural considerations should be made to account for differences in disparities between ethnic groups. It is critical the cultural backgrounds of the Hispanic workforce be considered relative to their current work environment. Consideration of socioeconomic factors will ensure development of materials that adequately educate Hispanics (Brunette, 2005). Brunette suggests the notion Hispanics come to the US with little to no understanding of the topics surrounding occupational health and safety, including government enforcement. Part of their lack of understanding is attributed to the working conditions in their respective countries of origin. These conditions include working in unsafe physical environments, abusive supervisors, and lack of PPE.

Also, immigration status may have an affect on workers' willingness to approach their employers. If workers are in the US illegally they may not feel comfortable approaching their employer to request PPE or training material in Spanish, out of fear of being deported or fired (Brunette, 2005). Their unwillingness to approach employers may unintentionally imply they are willing to make sacrifices in the area of safety. This reluctance may indicate they are more likely to work in unsafe conditions and less likely to report unsafe acts of their co-workers. Therefore, culturally sensitive training should emphasize workers will not be reprimanded for reporting unsafe acts and conditions (Nash, 2004).

All Spanish occupational health and safety materials are not equal. Neither English produced videos with Spanish voice-overs nor back translated documents are the solution to addressing differences in language. Nash (2004) recommends all workers be aware of basic construction terms in the second language. Knowing key terms will allow co-workers to communicate vital information with one another under dire circumstances. In the development of a safety training program for use in the Dallas/Fort Worth Airport expansion project, Nash (2004) found that speaking the workers' language encompasses several factors. For example, differences in education and culture can be reflected in one's spoken language. Both instructors and curriculum developers should be bilingual to ensure these cultural and educational differences are reflected in translations. Brunette (2004) prefers the use of decentering translation techniques over back translation. She suggests back translation does not guarantee translations are linguistically appropriate. The decentering translation method requires several iterations of change for both the Spanish and English documents. Both languages are equally important; therefore changes can be made to both versions. The goal of decentering is both conceptual clarity and conceptual equivalence.

Hispanic construction workers prefer images of Hispanics in brochures and on posters, as well as Hispanic instructors or trainers familiar with construction work (Brunette, 2005; Nash, 2004; Ruttenberg & Lazo, 2004). These preferences were supported by the focus groups. In order to implement these preferences, researchers and trainers must take a participatory approach by getting Hispanics involved in the development stage of training and training material. In the training developed for the OSHA 10-hour construction safety training program, two Hispanic workers were selected to become trainers after successfully completing the 30-hour OSHA course (Brunette, 2005). It was believed by the author Hispanic workers would feel more comfortable receiving training from an individual with the same ethnic background and native language. Specific to training materials, the Hispanic workers involved in the development phase suggested a cartoon character, representing a Hispanic, be included on pamphlets and posters. They also had a preference for bright colors on these pamphlets and posters.

Until recently, Hispanics have not been thoroughly represented in research on training in occupational safety and health. The focus groups indicate both European-American and Hispanic construction workers do have preferences in the form of training, choice of instructor, and frequency of training. Implementing training that considers the preferences indicated in the focus groups may send the message that employers have a vested interest in the safety of their employees. Asking employees about their concerns and consequently addressing these concerns, emphasizes management's dedication to safety and the well-being of their employees.

In an article on the development of occupational safety and health information, the author compiled a list of general guidelines for the design and development of such material (Brunette, 2005). These guidelines were compiled from current literature and specifically targeted Hispanics. The results of the focus groups support some of the guidelines. The guidelines include the following:

1. Design materials that are linguistically and culturally appropriate
2. Use a language that is familiar to the workers
3. Avoid straight translation from English materials
4. Use a native-speaking Spanish translator who has in-depth knowledge of the topic
5. Keep materials at a limited literacy level
6. Use plenty of clear and realistic illustrations, graphics, or photographs
7. Use generic standard Spanish to provide equivalent Spanish versions of a given word or term, when appropriate
8. Conduct pilot tests with a subset of Hispanic workers
9. Have Hispanic trainers who are native speakers and provide the Spanish language training
10. Include basic education on OSHA laws and workers' rights to safe and healthy conditions of workers in the training program
11. Deliver education and training program in a learner-centered environment
12. Provide an educational and training program in a learner-centered environment
13. Provide an educational and training program that is culturally sensitive and is accompanied by an employer's true commitment to safety
14. Establish a continuous evaluation process

Once training programs have been designed and deemed culturally sensitive, based on these guidelines and preferences specified in the focus groups, employers and trainers must evaluate the effectiveness of these programs. The focus is not to ensure construction workers can regurgitate facts but rather that they can demonstrate

competence. Nash (2004) suggests the use of a Montessori approach; learn by doing, instead of the use of written tests. Written tests may be problematic when literacy levels of employees are low. However, narrative simulations may be used to compliment the Montessori approach. Examples of how the Montessori approach can demonstrate knowledge, are the identification of the correct method to use and inspect PPE and tools, and knowledge of when PPE is applicable to a given task. The Montessori approach cannot be directly applied to a hazardous environment. On the other hand, narrative simulations may convey how employees react in a hazardous environment. Employees' response to narrative simulations demonstrates how they intend to react to a risk or hazardous environment. For the training to be considered effective, workers should be able to demonstrate such tasks as these. Training that is considered adequate should not be assumed to be perfect or resistant to change. Training should be revamped to stay current with industry and government regulations as well as new hazards (Goldenhar et al., 2001). Individuals that do not follow safety rules and guidelines should be reprimanded.

5.5 Limitations and Assumptions of Study

Several limitations of the study have been identified in terms of the sample population, participant reporting methods, and generalizability of the focus group data. The participants of the research were recruited from three cities in the state of Virginia; Blacksburg, Christiansburg, and Richmond. These three cities may not be representative of the European-Americans and Hispanics in the construction workforce throughout the US. Random sampling was desired but infeasible for the purpose of the study.

Participant data on involvement in safety related incidents was self-reported. Participants were questioned about safety incidents in the following manner:

1. Have you ever been involved in a safety accident on the job? (choose one)
   Yes _____
   No _____
   If yes, how many _____
   If yes, describe the incident(s).
2. Have you ever witnessed someone else in a safety accident on the job? (choose one)
   Yes _____
   No _____
   If yes, describe the incident(s).

This line of questioning left the interpretation of what an incident is, subject to the participants' thinking. Guidance was not given in how to define an incident. This method may have allowed for underreporting of incident involvement. Frequent occurrences, such as an injury as the result of improper nail gun use may have been unreported. Participants may have believed this type of incident was not worth reporting because of the mild severity of the outcome. In a study where injury and near miss data was collected (Goldenhar et al., 2003), the researchers provided a list of the major body parts and asked the participants if they had been injured in those respective areas in the past year. This form of questioning may provide more accurate information on incidents and injuries, as it is more structured and causes participants to think about each of the respective body parts. However, if participant unwillingness to report injuries and incidents is attributed to other factors, substantial differences between the two lines of questioning are not likely to exist.

An additional limitation attributed to reporting was the reported risk judgments of the construction workers. The participants reported the choice of action they would take given the situation. Participants may have reported the actions they knew were correct instead of the action they would take if they were in a similar situation. There was no validity check on what participants would actually do relative to what they said they would do. In order to address this issue, the researcher and translator strongly emphasized the importance of answering how participants would act in the situation and not what they thought was the correct action or the action their employer would want them to take.

Lack of reported information on the trades of the construction laborers is a limitation of the study. The laborers included in this study were not asked to specify the trade they worked in. Research has shown (Huang & Hinze, 2003) the nature of trades is associated with high incidence of injuries.

The population representativeness of the qualitative data obtained from the focus groups is a limitation to the research. Due to the small sample size of the focus groups, the information obtained has limited use. It was desired to have more participants in each of the respective focus groups because of the data that can be obtained as a result of the

interaction between the participants. The intent of the focus groups was not to collect and report quantifiable data, but to record construction workers perceptions and views on safety training. The findings of the focus groups did validate the more recent research on construction workers.

5.6 Future Research and Lessons Learned

Future research should examine long term affects of a training intervention by conducting a pre-test at the time the construction worker is hired and conduct the post-test at a future predetermined time (i.e. 6 months later). Researchers can develop a new predictive model of risk judgments that includes acculturation, risk perception, experience, safety climate, self-efficacy, in addition to the significant predictors found in Goldenhar et al. (2003), and Lee and Halpin (2003). This research should aim to develop a predictive model that is more significant than the stepwise regression models that are a product of the research. This may require introduction of factors related to socioeconomic status. If self-efficacy is included, a self-efficacy scale with a higher reliability coefficient should be explored. Additionally, researchers could examine the preferences and recommendations specified in the focus group discussions to develop a new training intervention. This training intervention should incorporate the suggestions of the construction laborers, current literature on training systems and adult learning, in addition to cultural considerations of the Hispanic workforce.

The greatest challenge of the research conducted was the recruitment of Hispanic construction laborers. Accessibility of the target population should be considered in any research endeavor. However, recruitment of Hispanic construction laborers may have presented challenges that may not be specific to all ethnic groups. The most frequently mentioned obstacle in conducting research on Hispanics is the language barrier. Differences in first language require the use of one or more translators. However, an individual fluent in Spanish is needed for reasons other than direct translation. This individual should serve in the capacity of a research assistant to support in recruitment, document translation, face-to-face contact with participants, transcription, in addition to other duties. While differences in languages spoken may provide a challenge, it is not the only obstacle encountered in research on the Hispanic workforce. Trust issues frequently arise. The target population may include individuals that do not have US citizenship.

Therefore, they may not want to participate out of fear of being deported. Other trust considerations are related to government monitoring of construction worksites, which are not specific to any ethnic group.

Researchers may be mistaken for employees of government agencies; those responsible for citing hazardous work environments. Construction laborers may be less inclined to speak to researchers out of fear that they are representing such agencies as these. Further, the research was conducted during a period of time when Immigration was a loaded and controversial subject in the media. As a result of these barriers related to trust, it is critical to identify community individuals and non-official public leaders within the community of the target population. Goldenhar et al. (2001), recommended the inclusion of a recruitment letter and information sheet, when contacting contractors, designed to address the following questions:

1. What is the purpose of this study?
2. What types of contractors are going to be studied?
3. How will the study be conducted?
4. Will responses be confidential?
5. Will the results be shared with other contractors who participate?
6. What is the role of NIOSH (or other government agencies) in this study?

These questions should be answered without exposing participants to information that may cause bias. Lastly, the difficulty encountered in recruiting participants may have been attributed to the compensation advertised for the participants. Participants were compensated ten dollars for an hour and a half of their time. Incentives such as gift certificates to Home Depot have been used by other researchers (Brunette, 2005). The author suggests this compensation is more appropriate. Additional, non-monetary forms of compensation should be explored.

5.7 Overall Conclusion

The major findings of the research are (1) there were no differences in the risk judgments of European-American and Hispanic construction laborers, (2) risk perception and safety climate were significant predictors of construction laborer risk judgments, and (3) the risk judgments of participants were significantly higher for individuals viewing a People-based Safety intervention. There are several advantages of having this

information. First, the lack of differences between the two ethnic groups demonstrates that both groups are able to make safe risk judgments when given the appropriate information in the correct form and language. Secondly, regression analysis using independent variables risk perception and safety climate, may be used to predict narrative simulation risk judgments. The positive relationship between risk perception and safety climate on safe risk judgments should encourage employers and trainers to increase employees' awareness of hazards on the job and increase employees' perception of the company safety climate. Hazards should be identified in addition to their consequences. Often hazards are not depicted as dangerous by employees, because the probability of negative outcomes is very low. Trainers should aim to increase workers' perception of risk by relying on past negative outcomes that have a personal nature even if they are infrequent events. A fact sheet on fatality rates may have less of an impact than a personal story about a co-worker who died on the job. Third, experience was positively correlated to participants' confidence in their risk judgments on the narrative simulations. Trainers should not exclude the more experienced employees during training. Continuous training will allow more experienced employees to re-familiarize themselves with old hazards and become aware of new hazards. It is just as important for more experienced employees to be updated on risks because they are more confident in how they react to hazardous situations. It is in the best interest of the company for the confident employees to be confident in safe risk judgments.

From an organizational viewpoint employers should aim to get employees of various ethnic backgrounds involved in the planning, development, and implementation of company safety programs. If updates on the company's health vision, mission, or objectives are warranted, employees should have representation in making these changes. Getting employees involved increases workers vested interest in safety, and re-assures them of management's commitment to safety. Employees should have a voice in the development of safety materials, as they are the individuals that immediately stand to benefit from training. Lastly, employers should remember training, just like learning, should be a continuous process that is ever changing. "Learning about construction work is not a matter of mastering a number of succeeding punctual instants, but of being able

to construct a flow of events and occurrences within which the work roles and objectives are understood and made intelligible" (Styhre, 2006, p. 101).

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APPENDIX A: IRB

Virginia Tech
VIRGINIA POLYTECHNIC INSTITUTE
AND STATE UNIVERSITY

Institutional Review Board

Dr. David M. Moore
IRB (Human Subjects)Chair
Assistant Vice President for Research Compliance
CVM Phase II- Duckpond Dr., Blacksburg, VA 24061-0442
Office: 540/231-4991; FAX: 540/231-6033
email: moored@vt.edu

DATE: June 16, 2005

MEMORANDUM

TO: Tonya L. Smith-Jackson ISE 0118
Chanel Thomas

FROM: David Moore

SUBJECT: **IRB Expedited Approval:** "The Effect of Culture and Individual Differences on Construction Safety Training Comprehension" IRB # 05-389

This memo is regarding the above-mentioned protocol. The proposed research is eligible for expedited review according to the specifications authorized by 45 CFR 46.110 and 21 CFR 56.110. As Chair of the Virginia Tech Institutional Review Board, I have granted approval to the study for a period of 12 months, effective June 16, 2005.

Virginia Tech has an approved Federal Wide Assurance (FWA00000572, exp. 7/20/07) on file with OHRP, and its IRB Registration Number is IRB00000667.

cc: File
Department Reviewer: Thurmon E. Lockhart
T. Coalson 0118

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

IRB Protocol for
"The Effect of Culture and Individual Differences on Construction Safety Training Comprehension"

Investigator: Chanel T. Thomas. (Dr. Tonya Smith-Jackson, Advisor)

1. Justification

In 2002 the number of reported nonfatal injury and illness cases in the construction industry involving days away from work was over 98,000 for European-Americans (non Hispanic) and 26,000 for Hispanics. Disproportionate to the number of injury and illness cases, the construction industry is comprised of 68% European-Americans, 7% African-Americans and 23% Hispanics (BLS, 2004a). Based on the expected increase in employment of construction workers and the increase in the number of injuries and fatalities amongst specific groups, a need exists to study disparities across cultural groups to determine the basis for injury and fatality differences between these ethnic groups. European-American and Hispanic construction laborers will receive identical construction safety training followed by narrative simulations, to assess their ability to make risk judgments based on the information presented in training.

2. Procedures

A total of 60 participants, 24 for focus groups, 36 for safety training, will be recruited for this study. Recruitment will be conducted using newspaper advertisements and word of mouth. In addition the primary investigator will set up a recruitment booth at various festivals and events to attract additional potential participants. The efforts to recruit are primarily community-based and informal and will not involve random sampling. Initially, participants will be given a verbal description of the study and its objectives, and they will be asked to read and complete the informed consent document (Form A) approved through the Institutional Review Board for research involving human participants. Participants that are not in management positions will then be asked to complete an employee demographic questionnaire (Form C(a)), which includes items on age, gender, years of experience, formal training, exposure to accidents, and level of education. Participants that are in management positions will then be asked to complete a employer demographic questionnaire (Form C(b)), which includes items on employee demographics as well as the company's current safety program. The following scales will be completed by the participants: Phinney's (1992) Multigroup Ethnic Identity Measure (Form D), Leonard et al.'s (1989) Risk Perception Scale (Form E), Janicak's (1996) Accident Locus of Control Scale (Form F) Hacket and Betz's (1981) Self-efficacy Scale (Form G), and Zohar's (1980) Safety Climate Scale (Form H). The Risk Perception Scale will be modified to include construction-related hazards common to small construction environments. The Multigroup Ethnic Identity Measure will be designed to support a 0-4 Likert-type rating format with opposing anchors. The Risk Perception scale will be designed to support a 0 - 6 Likert-type rating format with

opposing anchors. The questionnaires are designed to be completed in no more than 30 minutes, although no time limits will be imposed. The questionnaires will further be modified to be conducive to literacy levels of 8th grade.

Study 1: Safety Training & Narrative Simulation
Participants will receive safety training in the area of construction by means of a video. A lecture-based training video will be disbursed to employers volunteering to participate in the study. The employer will choose a convenient time to allow employees to watch the video as a group. Upon viewing the safety training video, the employees will complete a series of narrative simulations. Following the simulations, the participants will complete the narrative simulation rating form. The rating form will be designed to support a 0 - 4 Likert-type rating format with opposing anchors.

Study 2: Focus Groups
I will conduct 4 construction safety focus groups, 2 per ethnic group, with selected construction workers who volunteer to participate in discussions of safety and health issues in small construction firms. A maximum of 8 people will be allowed for each focus group. A script will be developed to be used by the moderator of the focus groups. The discussion will focus on topics traditionally neglected or underemphasized in safety training, language barriers, and employee access to personal protective equipment (PPE). The forum will be designed not to exceed two hours of discussion.

3. Risks and Benefits
By participating in this study, participants will be assisting the investigators in possibly identifying factors that may contribute to disparities among ethnic groups receiving safety training in small construction businesses. Participants will be compensated as follows:

Study 1: Safety Training & Narrative Simulation
- $7.50/hr for safety training & narrative simulation
- $7.50/hr x 2 hrs x 36 participants = $540

Study 2: Focus Groups
- $7.50/hr for participation in the discussion forum
- $7.50/hr x 2hrs x 24 participants = $360

4. Confidentiality/Anonymity
A participant's anonymity will be kept in the strictest of confidence. No names will appear on questionnaires or surveys, and a coding system will be used to associate a participant's identity with questionnaire answers and data. All information will be stores in a locked room when not in use.

5. Informed Consent

All participants will receive two informed consent forms to be signed before beginning the experiment; one copy will be for the participant's records and the other copy will be retained for the investigators' records. The consent form for the study can be found in Form A of the Appendix.

Biographical Sketches

Thomas, C. T.

Chanel Thomas is a second-year Master's student in the Safety concentration of the Human Factors Option of the ISE department. She received her undergraduate (B.S., 2003: Industrial Engineering) education from Virginia Polytechnic Institute and State University. She plans to complete her Master's degree in 2005.

Smith-Jackson, T. L.

Dr. Smith-Jackson is an assistant professor of Human Factors Engineering in the Industrial and Systems Engineering Department and is director of the Assessment and Cognitive Ergonomics Laboratory. For the past 11 years, she has conducted research using human subjects in the areas of warning and compliance, safety information design, focused attention, and cognitive ergonomics. Most of her research was conducted within Departments of Psychology. She has also conducted usability testing at various corporations such as Ericsson, IBM, and PC&InfoSystems Consulting.

INSTITUTO POLITECTENICO Y UNIVERSIDAD ESTATAL DE VIRGINIA

IRB Protocolo para

"El Efecto de la cultura y de las diferencias individuales en la comprensión del entrenamiento de seguridad de la construcción"

Investigadora: Chanel T. Thomas. (Dr. Tonya Smith-Jackson, Consejera)

1. Justificación

En el año 2002, el número de los casos no fatales divulgados de lesión y de la enfermedad en la industria de construcción que implicaba días lejos del trabajo estaba sobre98.000 para los Europeo-Americanos (no Hispánicos) y 26.000 para los Hispanos. Desproporcionado al número de los casos de lesión y de enfermedad, la industria de construcción es compuesta de Europeo-Americanos con el 68%, Africano-Americanos con el 7% e hispanos con el 23% (BLS, 2004a). De acuerdo con el aumento previsto en el empleo de los trabajadores de la construcción y el aumento en el número de lesiones y las fatalidades entre grupos específicos, una necesidad existe para estudiar disparidades a través de grupos culturales para determinar la base para las diferencias de lesión y de la fatalidad entre estos grupos étnicos. Los trabajadores Europeo-Americanos e Hispánicos de la construcción recibirán el entrenamiento idéntico de seguridad en la construcción seguido por simulaciones narrativas, para determinar su capacidad de hacer los juicios del riesgo basados en la información presentada en el entrenamiento

2. Procedimientos

Un total de 60 participantes, 24 para los grupos principales, 36 para el entrenamiento de seguridad, serán reclutados para este estudio. El reclutamiento será conducido usando anuncios de periódico y la palabra de la boca. Además, el investigador primario instalará una cabina de reclutamiento en los varios festivales y acontecimientos para atraer adicionalmente participantes potenciales. Los esfuerzos de reclutar son basados en comunidad sobre todo, e informales y no implicarán el muestreo al azar. Inicialmente, se les dará a los participantes una descripción verbal del estudio y de sus objetivos, y se les pedirá leer y terminar el documento informado del consentimiento (la Forma A) aprobado a través del Comité Examinador Institucional para la Investigación que implica a participantes humanos. Entonces se les pedirá los participantes que no están en posiciones de gerencia terminar un cuestionario demográfico del empleado (Forma C(a)), la cuál incluye artículos en edad, género, años de la experiencia, entrenamiento formal, exposición a los accidentes, y nivel de la educación. Los participantes que están en posiciones de gerencia terminaran un cuestionario demográfico del patrón (Forma C (b)), cuál incluye artículos en demográficos del empleado así como el programa actual de la seguridad de la compañía. Las escalas siguientes serán terminadas por los participantes: Phinney's (1992) Medidas Étnicas De la Identidad de Grupos Múltiples (Forma D), Leonard et al.'s (1989) Escala de Percepción de Riesgos (Forma E), Janicak's (1996) Escala de Control Accidentes Locus (Forma F) Hacket and Betz's (1981) Escala de Eficacia Individual (Forma G) y Zohar's (1980) Escalas de Seguridad Del Clima (Forma H). La Escala de la Opinión de Riesgos será modificada para incluir los peligros comunes a la construcción en ambientes pequeños. La medida étnica de la identidad de Grupos Múltiples será diseñada para apoyar un grado de 0-4 formato tipo-Likert con

igual anclas de oposición. La escala de la opinión de riesgo será diseñada para apoyar un grado de 0-6 formato tipo-Likert con igual anclas de oposición. Los cuestionarios están diseñados para ser terminados en no más de 30minutos, aunque no se impondrá ningún límite de tiempo. Los cuestionarios serán modificados para ser conformes a los niveles de la instrucción del 8vo grado.

Estudio 1: Simulación de Entrenamiento en Seguridad y Narrativa
Los participantes recibirán el entrenamiento de seguridad en el área de la construcción por medio de un vídeo. Un vídeo de entrenamiento conferencia-basado será desembolsado a los patrones que se ofrecen voluntariamente a participar en el estudio. El patrón elegirá un momento conveniente para permitir que los empleados miren el vídeo como grupo. Después de ver el vídeo de entrenamiento de seguridad, los empleados terminarán una serie de simulaciones narrativas Después de las simulaciones, los participantes llenarán el formulario narrativo para evaluar la simulación. La forma del grado será diseñada para apoyar un grado de 0-4 formato tipo-Likert con igual anclas de oposición.

Estudio 2: Grupos de Enfoque
Conduciré 4 grupos principales sobre la seguridad de la construcción, 2 por grupo étnico, con los trabajadores seleccionados de la construcción que se ofrecen voluntariamente a participar en discusiones de las ediciones de seguridad y de la salud en pequeñas firmas de construcción. Un máximo de 8 personas será permitido para cada grupo principal Una escritura será desarrollada para ser utilizada por el asesor de los grupos principales. . La discusión se concentrara en los asuntos descuidados o menospreciados tradicionalmente, como en el entrenamiento de seguridad, barreras lingüísticas, y acceso del empleado al equipo protector personal (PPE). El foro será diseñado para no exceder dos horas de discusión

3. Riesgos y Beneficios
Por la participación en este estudio, los participantes asistirán a los investigadores en posiblemente identificar los factores que pueden contribuir a las disparidades entre los grupos étnicos que reciben el entrenamiento de seguridad en negocios pequeños de la construcción. Se compensara a los participantes de la siguiente manera:

Estudio 1: Simulación de Entrenamiento en Seguridad y Narrativa
- $7.50/hr por el entrenamiento en seguridad y narrativa
- $7.50/hr x 2 hrs x 36 participantes = $540

Estudio 2: Grupos de Enfoque
- $7.50/hr por la participación en el foro de discusión
- $7.50/hr x 2hrs x 24 participantes = $360

4. Anonimato/Confidencialidad
El anonimato del participante será mantenido en estricta confianza. Ningún nombre aparecerá en los cuestionarios o los exámenes, y un sistema de codificación será utilizado

para asociar la identidad de un participante a sus respuestas y a datos del cuestionario. Toda la información será almacenes en un cuarto bloqueado cuando no este en uso.

5. Consentimiento Informado

Todos los participantes recibirán dos formas informadas del consentimiento que se firmarán antes de comenzar el experimento; una copia estará para los expedientes del participante y la otra copia será conservada para los expedientes de los investigadores. La forma del consentimiento para el estudio se puede encontrar en la forma A del Apéndice.

Bosquejos Biográficos

Thomas, C. T.

Chanel Thomas es estudiante de segundo-año de maestría en la concentración de seguridad de la opción de los Factores Humanos del Departamento de ISE. Ella recibió su titulo (B.S., 2003: Educación de la ingeniería industrial) del Instituto Politécnico y Universidad Estatal de Virginia. Ella planea terminar su maestría en 2005.

Smith-Jackson, T. L.

Dr. Smith-Jackson es profesora auxiliar de Ingeniería de Factores Humanos en el departamento de Ingeniería Industrial y Sistemas y es directora del Laboratorio Ergonomía Cognitivo. Por los últimos 11 años, ella ha conducido la investigación usando temas humanos en las áreas de la advertencia y de la conformidad, diseño de la información de seguridad, atención enfocada, y ergonómica cognitiva. La mayoría de su investigación fue conducida dentro de departamentos de la psicología. Ella también ha conducido evaluaciones de utilidad en varias corporaciones tales como Ericsson, IBM, y PC&InfoSystems Consultadores.

APPENDIX B: Informed Consent Form

Virginia Polytechnic Institute and State University

Title of Project: The Effect of Culture and Individual Differences on Construction Safety Training Comprehension

Principal Investigator: Chanel T. Thomas (Advisor: Dr. Tonya Smith-Jackson)

THE PURPOSE OF THIS PROJECT

You are invited to participate in a study on construction safety training for workers in small construction firms. This project will examine your ability to judge risks in case studies.

PROCEDURES

You will be asked to participate in one of two tasks; a focus group or safety training session. If selected for the focus group, you along with 5-7 other construction workers will be asked to share information on topics you believe are important and need to be covered in safety training sessions. If selected for the training session you will complete, to the best of your ability, a set of questionnaires. After completing the questionnaires, you will view a construction safety training video, answer questions on construction related case studies, and rate the case studies.

RISKS

Participation in this project does not place you at more than minimal risk of harm.

I. BENEFITS OF THIS PROJECT

You will be compensated for your participation, and you will be given information to contact the principal investigator to get information about the outcomes of the study. You will also benefit from knowing that you have participated in worthwhile research that has immediate and positive applications.

II. EXTENT OF ANONYMITY AND CONFIDENTIALITY

The results of this study will be kept strictly confidential. No one outside the research team will be able to connect any data with your name. The information you provide will have your name removed and only a three digit participant number will identify you during analyses and any written reports of the research. No reference will be made in oral or written reports that could link you to the data nor will you ever be identified as a participant in the project.

III. COMPENSATION

You will be paid $7.50 per hour for participation in this research.

IV. FREEDOM TO WITHDRAW

You are free to withdraw from this study at any time for any reason.

V. APPROVAL OF RESEARCH

This research project has been approved, as required, by the Institutional Review Board for Research Involving Human Subjects at Virginia Polytechnic Institute and State University and by the Department of Industrial and Systems Engineering.

VI. PARTICIPANT'S RESPONSIBILITIES

It is very important that you keep the activities and information discussed confidential, since others will be participating in this research.

VII. QUESTIONS

If you have questions, or do not understand information on this form, please feel free to ask them now.

VIII. PARTICIPANT'S PERMISSION

I voluntarily agree to participate in this study, and I know of no reason I cannot participate. I have read and understand the informed consent and conditions of this project. I have had all my questions answered. I hereby acknowledge the above and give my voluntary consent for participation in this project. If I participate, I may withdraw at any time without penalty. I agree to abide by the rules of this project

_____ _____

Signature Date

_____ _____

Name (please print) Contact: phone

IX. CONTACT

If you have questions at any time about the project or the procedures, you may contact the principal investigator, Chanel Thomas at chthoma6@vt.edu (519-D Whittemore).

If you feel you have not been treated according to the descriptions in this form, or your rights as a participant have been violated during the course of this project, you may contact Dr. David Moore, Chair of the Institutional Review Board Research Division at (540)231-4991.

Forma Informada del Consentimiento
Instituto Politécnico y Universidad Estatal de Virginia

Título del Proyecto: El Efecto de la Cultura y de las Diferencias Individuales de la Comprensión en el Entrenamiento de Seguridad de la Construcción

Investigador Principal: Chanel T. Thomas (Consejero: Dr. Tonya Smith-Jackson)

EL PROPÓSITO DE ESTE PROYECTO

Se le invita que participe en un estudio en el entrenamiento de seguridad de la construcción para los trabajadores en firmas pequeñas de la construcción. Este proyecto examinará su capacidad de juzgar riesgos en caso estudiado.

PROCEDIMIENTOS

Se le pedirá participar en una de dos tareas; una sesión del grupo principal o del entrenamiento de seguridad. Si es seleccionado para el grupo principal, se juntará con 5-7 otros trabajadores de la construcción y se pedirá compartir la información sobre asuntos que usted cree que es importante y necesidad ser cubierto en sesiones del entrenamiento de seguridad. Si es seleccionado para la sesión del entrenamiento usted terminará, a su mejor capacidad, un sistema de cuestionarios. Después de terminar los cuestionarios, usted dará su opinión sobre un vídeo de entrenamiento de seguridad de la construcción, contestará a las preguntas sobre estudios de caso relacionados con la construcción, y clasificará los estudios de caso.

RIESGOS

La participación este proyecto no le coloca en ningún riesgo ni le provocara el más mínimo del daño.

X. VENTAJAS DE ESTE PROYECTO

Se le compensará por su participación, y le se dará información para entrar en contacto con el investigador principal para conseguir la información sobre los resultados del estudio. Usted también se beneficiará de saber que usted ha participado en la investigación de mérito que tiene usos inmediatos y positivos.

XI. El GRADO DEL ANONIMATO Y CONFIDENCIALIDAD

Los resultados de este estudio serán mantenidos terminantemente confidenciales. Nadie fuera del equipo de investigación podrá relacionar cualquier dato con su nombre. La información que usted proporciona tendrá su nombre removido y solamente un número de tres cifras del participante le identificará durante análisis y cualquier informe escrito de la investigación. No se hará ninguna referencia en los informes orales o escritos que podrían ligarle a los datos ni a la voluntad que le identifiquen siempre como participante en el proyecto.

XII. REMUNERACIÓN

Usted será remunerado $7.50 por hora por su participación en esta investigación.

XIII. LIBERTAD PARA RETIRARSE

Usted está libre de retirarse de este estudio en cualquier momento por cualquier razón.

XIV. APROBACIÓN DE LA INVESTIGACIÓN

Este proyecto de investigación se ha aprobado, según lo requerido, por el comité examinador institucional para la investigación que implica temas humanos en el Instituto Politécnico y Universidad Estatal de Virginia y por el departamento de la Ingeniería Industrial y de Sistemas.

XV. RESPONSABILIDADES DEL PARTICIPANTE

Es muy importante que usted guarde las actividades y la información discutida confidencial, puesto que otros participarán en esta investigación.

XVI. PREGUNTAS

Si usted tiene preguntas, o no entiende la información sobre esta forma, por favor siéntase libre de aclarar sus dudas ahora.

XVII. PERMISO DEL PARTICIPANTE

Yo estoy de acuerdo para voluntariamente participar en este estudio, y no tengo alguna razón para no participar en él. He leído y entiendo el consentimiento y las condiciones informados de este proyecto. He tenido todas mis preguntas respondidas. Reconozco por este medio el antedicho y doy mi consentimiento voluntario para la participación en este proyecto. Si participo, Puedo retirarme en cualquier momento sin pena. Acuerdo seguir las reglas de este proyecto.

_____ _____

Firma Día

_____ _____

Nombre (por favor imprima) Teléfono del Contacto

XVIII. CONTACT

Si usted tiene preguntas en cualquier momento sobre el proyecto o los procedimientos, usted puede entrar en contacto con la investigador principal, Chanel Thomas al chthoma6@vt.edu (519-D Whittemore).

Si usted le siente haber sido tratado según las descripciones en esta forma, o las sus derechas como participante se han violado durante el curso de este proyecto, usted puede entrar en contacto con el Dr. David Moore, Silla de la División Institucional de la Investigación del Comité Examinador al (540)231-4991.

APPENDIX C: Employee Screening

Job Title _____

1. Age _____

2. Gender (choose one)
   - Male _____
   - Female _____

3. Ethnicity/Race _____

4. Safety Training (check all that apply)
   - Vocational safety training _____
   - On the job instructions _____
   - Pamphlets _____
   - Posters or written rules _____
   - From trade association _____
   - From a union _____
   - Apprentice program _____
   - Other _____

5. Experience in Construction (years) _____

6. How long have you been with your current employer? (choose one)
   - Less than a year _____
   - 1 to 5 years _____
   - 6 to 10 years _____
   - Greater than 10 years _____

7. Have you ever been involved in a safety accident on the job? (choose one)
   - Yes _____
   - No _____
   - If yes, how many _____
   - If yes, describe the incident(s).

8. Have you ever witnessed someone else in a safety accident on the job? (choose one)
   Yes _____
   No _____
   If yes, describe the incident(s).

9. Employment status (choose one)
   Full-time _____
   Part-time _____

10. Highest level of education completed (please state the highest grade level or degree obtained)

    _____

11. How often do you work overtime? (choose one)
    Rarely _____
    Once a month _____
    Once a week _____
    More than once a week _____

12. First Language (choose one)
    English _____
    Spanish _____
    Other _____

13. What construction topics have you received training in? (check all that apply)
    PPE _____
    Scaffolding _____
    Personal fall arrest systems _____
    Equipment inspection _____
    Workplace hazards _____

14. Which range best describes your TOTAL household income? (choose one)
    Take your time thinking about these.

$20K – $29,999	_____
$30K - $39,999	_____
$40K - $49,999	_____
$50K - $74,999	_____
> $75,000	_____

INVESTIGACIÓN DEL EMPLEADO

Título de Trabajo _____

1. Edad _____

2. Género (elija uno)
   - Masculino _____
   - Femenino _____

3. Raza / Étnica_____

4. Entrenamiento de seguridad (marque todo lo que aplique)
   - Entrenamiento de Seguridad Vocacional_____
   - Instrucciones en el Trabajo _____
   - Folletos _____
   - Carteles o instrucciones escritas _____
   - De la Asociación de Comercio _____
   - De la Unión _____
   - Aprendiz del programa _____
   - Otro _____

5. Experiencia en la construcción (años) _____

6. ¿Cuánto tiempo ha estado con su patrón actual? (elija uno)
   - Menos de un año _____
   - 1 a 5 años _____
   - 6 a 10 años _____
   - Más de 10 años _____

7. ¿Ha estado usted implicado en un accidente de seguridad en el trabajo? (elija uno)
   - Sí _____
   - No _____
   - Si sí, cuánto _____
   - Si es sí, describa el accidente (s).

8. ¿Usted ha atestiguado a alguien en un accidente de seguridad en el trabajo? (elija uno)
   Sí _____
   No _____
   Si sí, describa el accidente (s).

9. Estatus del Empleado (elija uno)
   Tiempo Completo _____
   Medio Tiempo _____

10. El nivel de la educación más alto terminado (indique por favor el nivel o el grado más alto del grado obtenido)

    _____

11. ¿Usted trabaja a menudo horas extras? (elija uno)
    Rara vez _____
    Una vez por mes _____
    Una vez por semana _____
    Más de una vez por semana _____

12. Primera lengua (elija uno)
    Ingles _____
    Español _____
    Otro _____

13. ¿Qué entrenamiento de construcción ha recibido en? (marque todos los que apliquen)
    PPE _____
    Andamios _____

Sistema de detención de caídas personales _____
Inspección de Equipo _____
Peligros en el Trabajo _____

14. ¿Qué escala describe lo mejor posible sus ingresos totales de su hogar? (elija uno) Tómese su tiempo para pensarlo.

$20K – $29,999 _____
$30K - $39,999 _____
$40K - $49,999 _____
$50K - $74,999 _____
> $75,000 _____

APPENDIX D: Multi-group Ethnic Identity Measure

In terms of ethnic group, I consider myself to be (CIRCLE ONE) **European-American Latino African American Other**

Use the numbers given below to indicate how much you agree or disagree with each statement.

Statement	Response (Place an X in the box that matches your answer).				
	STRONGLY DISAGREE 0	SOMEWHAT DISAGREE 1	NEITHER DISAGREE NOR AGREE 2	SOMEWHAT AGREE 3	STRONGLY AGREE 4
1. I have spent time trying to find out more about my own ethnic group, such as its history, traditions, and customs.					
2. I am active in organizations or social groups that include mostly members of my own ethnic group.					
3. I have a clear sense of my ethnic background and what it means for me.					
4. I like meeting and getting to know people from ethnic groups other than my own.					
5. I think a lot about how my life will be affected by my ethnic group membership.					
6. I sometimes feel it would be better if different ethnic groups didn't try to mix together.					
7. I am not very clear about the role of my ethnicity in my life.					
8. I often spend time with people from ethnic groups other than my own.					
9. I really have not spent much time trying to learn more about the culture and history of my ethnic group.					
10. I have a strong sense of belonging to my own ethnic group.					
11. I understand pretty well what my ethnic group membership means to me, in terms of how to relate to my own group and other groups.					
12. In order to learn more about my ethnic background, I have often talked to other people about my ethnic group.					
13. I have a lot of pride in my ethnic group and its accomplishments.					
14. I don't try to become friends with people from other ethnic groups.					

15. I participate in cultural practices of my own group, such as special food, music, or customs.					
16. I am involved in activities with people from other ethnic groups.					
17. I feel a strong attachment towards my own ethnic group.					
18. I enjoy being around people from ethnic groups other than my own.					
19. I feel good about my cultural or ethnic background.					

En términos de grupo étnico, me considero (CIRCULE UNO) Europeo Americano Latino Africano Americano Otro

Use los números provistos para indicar cuán de acuerdo o no esta usted con cada situación.

Situación	Respuesta (Coloque una X en la casilla correspondiente a su respuesta).				
	TOTALMENTE EN DESACUERDO 0	ALGO EN DESACUERDO 1	NI DE ACUERDO NI EN DESACUERDO 2	ALGO DE ACUERDO 3	TOTALMENTE DE ACUERDO 4
1. He tratado de buscar más información acerca de mi grupo étnico, como por ejemplo su historia, tradiciones y costumbres.					
2. Estoy activo en una organización o grupo cívico donde la mayoría de sus miembros son de mi mismo grupo étnico.					
3. Estoy bien claro de cuales son mis raíces culturales y lo que significan para mí.					
4. Disfruto compartir con personas de otros grupos étnicos diferentes de mi propio grupo étnico.					
5. A menudo pienso acerca de como mi vida sería afectada por pertenecer a mi grupo étnico.					
6. Algunas veces siento que sería mejor sino se mezclaran diferentes grupos étnicos.					
7. No estoy muy claro acerca del rol que mis raíces culturales tienen en mi vida.					
8. A menudo comparto con personas de otros grupos étnicos diferentes de mi propio grupo étnico.					
9. No he tratado de buscar más información acerca de mi cultura e historia de mi grupo étnico.					
10. Yo me siento que pertenezco a mi grupo étnico.					
11. Yo entiendo completamente lo que significa pertenecer a mi grupo étnico, en términos de como relacionarme con ellos y con otros grupos.					
12. Para aprender más acerca de mis raíces culturales, he tenido que hablar con otras personas acerca de mi grupo étnico.					
13. Me siento bien orgulloso de mi grupo étnico y sus logros.					
14. No trato de hacer amigos con personas de otros grupos étnicos.					
15. Participo en actividades culturales de mi grupo étnico, tales como cenas, eventos musicales o tradiciones.					

16. Estoy involucrado en actividades con personas de otros grupos étnicos.					
17. Me siento totalmente identificado con mi grupo étnico.					
18. Disfruto compartir con personas de diferentes grupos étnicos.					
19. Me siento cómodo acerca de mis raíces culturales.					

APPENDIX E: Risk Perception Scale

Use the numbers given below to indicate how much you agree or disagree with each statement.

Statement	Response (Place an X in the box that matches your answer).								
	NOT AT ALL RISKY 0	1	SLIGHTLY RISKY 2	3	RISKY 4	5	VERY RISKY 6	7	EXTREMELY RISKY 8
1. Not wearing ear plugs in a high intensity noise environment.									
2. Not wearing steel toe safety shoes in high risk environments where objects are known to fall.									
3. Not wearing a hard hat in construction areas where posted signs state that they are required.									
4.Climbing from one ladder to another ladder at an elevated height.									
5. Holding on to a ladder with only one hand.									
6. Wearing fall protection that does not fit properly.									
7. Erecting or dismantling a scaffold.									
8. Working with individuals that do not speak the same language as you.									
9. Walking on slippery surfaces at elevated heights.									
10. Wearing fall protection that you have not inspected for damage.									

Statement	Response (Place an X in the box that matches your answer).								
	NOT AT ALL RISKY 0	1	SLIGHTLY RISKY 2	3	RISKY 4	5	VERY RISKY 6	7	EXTREMELY RISKY 8
11. Not wearing fall protection when working at elevated heights.									
12. Wearing fall protection but not attaching it.									
13. Wearing damaged fall protection.									

Use los números provistos para indicar cuán de acuerdo o no esta usted con cada situación.

Situación	Respuesta (Coloque una X en la casilla correspondiente a su respuesta).								
	NADA PELIGROSO 0	1	ALGO PELIGROSO 2	3	PELIGROSO 4	5	MUY PELIGROSO 6	7	EXTREMADAMENTE PELIGROSO 8
1. No usar el equipo de protección para los oídos en un ambiente donde existe ruido a una alta intensidad.									
2. No usar zapatos de seguridad con punta de acero en un ambiente donde típicamente objetos caen.									
3. No usar el casco de seguridad en el área de construcción donde la rotulación advierte que son requeridos.									
4.Subirse de una escalera a otra en una altura elevada									
5. Agarrarse en una escalera con una sola mano.									
6. Usar el equipo de protección contra caídas el cual no se ajusta adecuadamente.									
7. Montar y desmontar un andamio.									
8. Trabajar con individuos que no hablan tu mismo idioma.									

Situación	Respuesta (Coloque una X en la casilla correspondiente a su respuesta).								
	NADA PELIGROSO 0	1	ALGO PELIGROSO 2	3	PELIGROSO 4	5	MUY PELIGROSO 6	7	EXTREMADAMENTE PELIGROSO 8
9. Caminar en superficies resbalozas en una altura elevada.									
10. Usar el equipo de protección contra caídas el cual no ha sido inspeccionado por defectos.									
11. Usar el equipo de protección contra caídas cuando trabajas en alturas elevadas.									
12. Usar el equipo de protección contra caídas pero sin atarlo.									
13. Usar un equipo de protección contra caídas defectuoso.									

APPENDIX F: Accident Locus of Control

For each question choose the statement that you agree with the most.

1. A. In the long run, the accidents that happen to us are due to chance.
   B. Most accidents are the result of unsafe actions, unsafe conditions, or both.

2. A. When I am evaluated, sometimes I cannot understand how my supervisors arrive at their conclusions.
   B. There is usually a direct connection between my job performance and the feedback that I receive from my supervisor.

3. A. People earn the respect they deserve.
   B. No matter how hard a person tries, their worth generally goes unrecognized.

4. A. Without the right breaks one cannot prevent accidents.
   B. Capable people who fail to prevent accidents have not taken the proper precautions.

5. A. I have often found that if an accident is going to happen, it will happen.
   B. Trusting to fate has never turned out as well for me as making a decision about following safe job procedures.

6. A. The person that is selected to be the boss usually happens to be in the right place at the right time.
   B. It takes ability, not luck, to be able to get people to do the correct things.

7. A. In the case of the well trained worker there is rarely if ever such a thing as a freak accident.
   B. Many times safety requirements tend to be so unrelated to the job that following them is really useless.

8. A. A person that prepares well will rarely encounter an unfair test.
   B. It is useless to prepare for a test since most times questions are unrelated to the coursework.

9. A. Bad luck is partly the cause for many unhappy things in people's lives.
   B. When people experience misfortunes, they are due to the mistakes they make.

10. A. Most people don't understand the extent to which work injuries are controlled by accidental happenings.
    B. There really is no such thing as "bad luck."

11. A. One cannot be an effective leader without the right breaks.
    B. A person that is capable of being a leader but fails has not taken advantage of their opportunities.

12. A. The average worker can have an influence in preventing accidents.

B. Accident prevention is the responsibility of supervisors and other people and there is not much the little guy can do about it.

13. A. I believe luck and chance play a important role in my life events.
B. I have the ability to control many of the events that occur in my life.

14. A. In my case, being in an accident has little or nothing to do with luck.
B. Many times we might just as well decide who will be involved in an accident by flipping a coin.

15. A. I have control over the events in my life.
B. Sometimes I feel that I do not have much control over the events in my life.

16. A. If accidents occur to me, it is my own doing.
B. Sometimes I feel that I do not have enough control over preventing injuries.

17. A. It is hard to know what can cause an injury.
B. Following the proper job procedures will determine if you will be involved in an accident.

18. A. Accidental happenings control many areas of people's lives.
B. There really is no such thing as "luck."

19. A. One of the major reasons why we have accidents is because people don't take enough interest in safety.
B. There will always be accidents no matter how hard people try to prevent.

20. A. Preventing an accident is a matter of following safe job procedures, luck has little or nothing to do with it.
B. Being in an accident depends mainly on being in the right place at the right time.

21. A. When dealing with supervisor and employee relations, unfairness does not exist.
B. Workers do not realize how much their jobs are influenced by accidental happenings.

22. A. With enough effort, I can prevent work-related injuries.
B. It is difficult to have much control over the things that cause accidents.

23. A. Wars generally occur because people do not take enough interest in politics.
B. Wars will always occur no matter what people do to try to prevent them.

24. A. It is hard to affect a person's opinion about me.
B. How a person thinks of me depends upon how I act.

Accidente Locus de Control

Para las siguientes preguntas, escoja la respuesta con la cual usted este mas en acuerdo.

1. A. A la larga, los accidentes que nos pasan son a causa de la probabilidad.
   B. La mayoría de los accidentes son el resultado de acciones inseguras, condiciones inseguras o ambas.

2. A. Cuando soy evaluado, algunas veces no entiendo de donde mis supervisores llegan a sacar sus conclusiones.
   B. Usualmente hay una conexión directa entre mi desempeño de trabajo y las críticas que recibo de mis supervisores.

3. A. La gente se gana el respeto que ellos se merecen.
   B. No importa cuanto una persona trate, generalmente su esfuerzo pasa desapercibido.

4. A. Sin los descansos adecuados uno no puede evitar accidentes.
   B. Personas que son capaces pero que han fallado en prevenir accidentes son por que han fallado en tomar las precauciones adecuadas.

5. A. Yo frecuentemente me he encontrado con la situación en la cual si un accidente va a pasar, generalmente pasa.
   B. Confiar en el destino nunca ha salido tan bien para mí como tomar decisiones para hacer mi futuro trabajo mas seguro.

6. A. La persona que es escogida para ser el jefe generalmente esta en el momento y lugar adecuado.
   B. Toma habilidad y no suerte el poder hacer que la gente haga las cosas correctas.

7. A. A un trabajador que ha sido bien entrenado rara vez le ocurren accidentes a causa emergencias no previstas.
   B. Muchas veces los requerimientos de seguridad suelen ser tan incoherente al trabajo que el seguirlos es realmente inútil.

8. A. Una persona que se prepara bien raramente se encontrara con un examen que sea injusto o difícil.
   B. No tiene punto prepararse para un examen por que las mayorías de las preguntas no tienen relación con la materia.

9. A. Mala suerte es parcialmente la culpa para la infelicidad en la vida de la gente.
   B. Cuando la gente experimenta malos percances, generalmente son a causa de errores que ellos han cometido.

10. A. La mayoría de la gente no entiende a que punto los accidentes de trabajo causan las lesiones personales causadas en el trabajo.
    B. En verdad no existe tal cosa como la “mala suerte”.

11. A. Uno no puede ser un líder efectivo sin los descansos necesarios.
B. Una persona que es capas de ser un líder pero fracasa al no tomar esa posición, no ha aprovechado las oportunidades que tiene.

12. A. Un trabajador promedio puede influenciar en evitar accidentes.
B. La prevención de accidentes es la responsabilidad de los supervisores y otra gente y no hay mucho que un trabajador común pueda hacer.

13. A. Yo creo que la suerte y la probabilidad toman un papel importante en el curso de mi vida.
B. Tengo la habilidad de controlar muchos de los eventos que ocurren de mi vida.

14. A. En mi caso, el haber estado involucrado en un accidente tiene poco o nada que ver con la suerte.
B. Muchas veces podemos decidir quien estará involucrado en un accidente simplemente tirando una moneda al aire.

15. A. Tengo el control sobre los hechos en mi vida.
B. Algunas veces siento que no tengo mucho control sobre los hechos en mi vida.

16. A. Si algún accidente suele ocurrir, es por mis propias acciones.
B. Algunas veces siento que no tengo suficiente control sobre la prevención de lesiones.

17. A. Es difícil saber que puede causar una lesión.
B. Siguiendo los procedimientos apropiados determinara si tú estarás involucrado en un accidente.

18. A. La ocurrencia de accidentes tiene control sobre muchas áreas de la vida de una persona.
B. En realidad no hay tal cosa llamada “suerte”.

19. A. Una de las mayores razones por las cuales tenemos accidentes es porque la gente no tiene suficiente interés en la seguridad.
B. Siempre habrá accidentes no importa cuanto la gente los trate de prevenir.

20. A. La prevención de un accidente es cuestión de seguir los procedimientos seguros de trabajo, la suerte tiene poco o nada que ver.
B. El estar en un accidente depende mayormente en estar en el lugar correcto a la hora correcta.

21. A. Cuando tratando con supervisores y relaciones de empleados, la injusticia no existe.
B. Los trabajadores no realizan que tanto están influenciados sus trabajos con la ocurrencia de accidentes.

22. A. Con suficiente esfuerzo yo puedo prevenir las lesiones relacionadas con el trabajo.

B. Es difícil tener suficiente control sobre las cosas que causan los accidentes.

23. A. Las guerras generalmente ocurren porque la gente no toma suficiente interés en la política.
B. Las guerras siempre van a ocurrir, no importa que tanto las personas lo traten de prevenir.

24. A. Es difícil afectar la opinión de una persona sobre mí.
B. Como una persona piensa de mi depende de como yo actué.

APPENDIX G: Self-efficacy

Please use the following scale to indicate how well each statement fits you. There are no right or wrong answers.

Question	Response (Place an X in the box that matches your answer).				
	STRONGLY DISAGREE 0	DISAGREE 1	Neither AGREE nor DISAGREE 2	AGREE 3	STRONGLY AGREE 4
1. I am confident that I can read and interpret panel board meters, dials and gauges.					
2. I am confident that I can skillfully use equipment and safety devices.					
3. I am confident that I can use an assortment of tools and equipment for various jobs.					
4. I am confident that I can deal with all types of people.					
5. I am confident that I can speak accurately.					
6. I am confident that I can have physical stamina needed to engage in manual work.					

Propia Eficacia

Por favor, use las siguientes escalas para indicar su opinión sobre las siguientes declaraciones. No hay respuestas malas ni buenas.

Declaraciones	Responde (Poniendo una X en cada cuadro que corresponda a tu respuesta).				
	BIEN EN DESACEURDO 0	EN DESACEURDO 1	NI EN DESACUERDO O ACUERDO 2	EN ACUERDO 3	BIEN EN ACEURDO 4
1. Confió que yo puedo leer e interpretar los paneles de medidas.					
2. Yo confió en que puedo utilizar el equipo y los instrumentos de seguridad.					
3. Yo confió en que puedo utilizar el equipo y los instrumentos de seguridad.					
4. Yo confió en que puedo utilizar una variedad de instrumentos y equipo para una variedad de trabajos.					
5. Yo confió en que puedo tratar con todo tipo de personas.					
6. Yo confió en que estoy físicamente apto para manejar cualquier tipo de trabajo manual.					

APPENDIX H: Safety Climate

Please use the following scale to indicate how well each statement fits you. There are no right or wrong answers.

Question	Response (Place an X in the box that matches your answer).				
	STRONGLY DISAGREE 0	DISAGREE 1	Neither AGREE nor DISAGREE 2	AGREE 3	STRONGLY AGREE 4
1. My supervisor says a good word whenever he sees a job done according to the safety rules.					
2. My supervisor seriously considers any worker's suggestions for improving safety.					
3. As long as there is no accident, my supervisor doesn't care how the work is done.					
4. My supervisor pays less attention to safety problems than most other supervisors in this company.					
5. In general, I have much say about what happens with my job.					
6. I am empowered to make improvements related to my job.					
7. I feel I can influence the decisions of my immediate supervisor on things that I am concerned about on my job.					

Seguridad de Ambiente

Por favor, use las siguientes escalas para indicar su opinión sobre las siguientes declaraciones. No hay respuestas malas ni buenas.

Declaraciones	Responde (Poniendo una X en cada cuadro que corresponda a tu respuesta).				
	BIEN EN DESACEURDO 0	EN DESACEURDO 1	NI EN DESACUERDO O ACUERDO 2	EN ACUERDO 3	BIEN EN ACEURDO 4
1. Mi supervisor dice una buena palabra cada vez que ve un trabajo hecho con las reglas de seguridad.					
2. Mi supervisor seriamente considera cualquier sugerencia para mejorar la seguridad.					
3. Mientras no haya un accidente, a mi supervisor no le importa como el trabajo este hecho.					
4. Mi supervisor pone poca atención a los problemas de seguridad que otros supervisores en esta compañía.					
5. En general, tengo mucho que decir sobre lo que pasa en mi trabajo.					
6. Tengo el poder de mejorar cosas relacionadas con mi trabajo.					
7. Siento que puedo influenciar las decisiones que hace mi supervisor con cosas que me interesan en mi trabajo.					

APPENDIX I: Narrative Simulations

Narrative Simulation #1

You are a spray painter that has been working for a painting contractor for 2 months. You are currently on the jobsite working with three coworkers. The worksite is a condominium complex with multiple levels of roof. You plan to finish painting a section of the west wall before you leave to attend to some serious personal problems. You notice the ladder you are using will not reach the area of the wall that you need to paint. You notice the ladder will reach if you place it on the small roof of a protruding shed. What would you do? Circle the response that most closely resembles what you would do?

A. Place the ladder on the small roof. I've done it before and the job will only take 5 minutes to complete. (2 points)
B. Place the ladder on the small roof after putting on my fall protection equipment. (3 points)
C. Notify my supervisor of the situation. (5 points)
D. Ask a more experienced co-worker what to do. (4 points)
E. Leave the job for someone else. (1 point)
F. Other _____ (points assigned by the researcher based on the response)

How strongly do you feel about your answer? Use the numbers given below to indicate how strongly you feel about your answer.

Not Very Strongly				Very Strongly
1	2	2	4	5

Narrative Simulation #2

You are a construction worker completing a drywall installation for a commercial remodeling company. You have been working for the same company for 15 years. The day's temperature is approaching 100 degrees and you are having dizzy spells. In order to complete the installation you must use a Baker scaffold. The Baker scaffold is 6 feet high and the guardrails have not been installed. What would you do? Circle the response that most closely resembles what you would do?

A. Look for another scaffold with guardrails. (4 points)
B. Find a buddy to watch me while I complete the task. (3 points)
C. Use the Baker scaffold, the job is only 6 feet high. (2 points)
D. Notify my supervisor of the situation. (5 points)
E. Install the guardrails and then finish the job. (5 points)
F. Other _____ (points assigned by the researcher based on the response)

How strongly do you feel about your answer? Use the numbers given below to indicate how strongly you feel about your answer.

Not Very Strongly				Very Strongly
1	2	2	4	5

Narrative Simulation #3

You are a carpenter new to the job and your boss suddenly asks you to stop what you are doing and take over a task that your co-worker was performing in the morning. Your co-worker was sent home because of illness. You are asked to install sheathing and plywood to the buildings being constructed. In order to perform the task you must work on a wooden portable scaffold. The scaffold was placed on the forks of a hydraulic lift for easier use. You are unsure of the weight the scaffold is able to hold but you do know the co-worker that was sent home was using the same scaffold with the same load. What would you do? Circle the response that most closely resembles what you would do?

A. Use the scaffold. It must be safe; my co-worker was using it earlier the same day. (2 points)
B. Ask a co-worker what load the scaffold is able to hold. (3 points)
C. Notify my supervisor that I am unsure if the task is safe. (5 points)
D. Find a safer scaffold that I am more familiar with. (4 points)
E. Other _____ (points assigned by the researcher based on the response)

How strongly do you feel about your answer? Use the numbers given below to indicate how strongly you feel about your answer.

Not Very Strongly				Very Strongly
1	2	2	4	5

Narrative Simulation #4

You have been a home builder for 10 years. You usually perform interior work in the developing homes, requiring you to wear a hard hat. Today you are working on a roofing assignment where there is little overhead work. Every once in a while you have to travel up and down a ladder to get supplies from inside the developing home. It is really hot outside so your co-workers working on the roof have taken off their hard hats. What would you do? Circle the response that most closely resembles what you would do?

A. Take off my hard hat too. We are on the roof so chances are nothing will fall on our heads. (3 points)
B. Put on my hard hat when I am in an area where objects may fall on my head. (4 points)
C. Keep my hard hat on at all time while on the jobsite. (5 points)
D. I don't wear a hard hat. I find them uncomfortable and unnecessary. (2 points)

E. Other _____ (points assigned by the researcher based on the response)

How strongly do you feel about your answer? Use the numbers given below to indicate how strongly you feel about your answer.

Not Very Strongly				Very Strongly
1	2	2	4	5

Simulación Narrativa #1
Usted es pintor que ha trabajado para una compañía de pintura por 2 meses. Ahora usted está en el lugar de trabajo con tres colaboradores. El lugar es una unidad de condominios que tiene niveles diferentes. Va a terminar pintando una sección de la pared oeste antes de que salga para arreglar unos problemas personales muy graves. Se da cuenta que la escalera de mano que está usando no alcanza la sección de la pared que tiene que pintar. Despues, se da cuenta que la escalera de mano puede alcanzar si la pone arriba del techo de un cobertizo. ¿ Qué haría? Encierre la respuesta.

A. Poner la escalera de mano arriba del cobertizo. Yo lo he hecho antes y el trabajo solo ha durado 5 minutos.
B. Poner la escalera de mano arriba del cobertizo despues de me pongo el equipo protectivo personal.
C. Avisar al jefe de la situación.
D. Pedir la ayuda de un colaborador con más experiencia.
E. Dejar el trabajo para otra persona.
F. Otra respuesta:_____

¿Usted tiene sentimientos fuertes sobre la respuesta? Use los números abajo para indicarlos

No muy fuertes				Muy fuertes
1	2	3	4	5

Simulación Narrativa #2
Usted es trabajador de la construcción que está instalando las paredes para una compania. Ha trabajado para la misma compañía por 15 anos. Hace mucho calor (casi 100 grados) y se siente mareado. Para acabar la instalación tiene que usar una plataforma de seis pies y no hay pretiles. ¿Qué haría? Encierre la respuesta.

A. Buscar otra plataforma con pretiles.
B. Buscar otra persona para que me vea durante el trabajo.
C. Usar la plataforma porque no es muy alta.
D. Avisar al jefe de la situación.
E. Instalar los pretiles y acabar el trabajo.
F. Otra _____

¿Usted tiene sentimientos fuertes sobre la respuesta? Use los números abajo para indicarlos

No muy fuertes				Muy fuertes
1	2	3	4	5

Simulación Narrativa #3
Usted es carpintero nuevo y su jefe le pide hacer un trabajo de un colaborador suyo (el estaba haciendolo durante la manana, pero se fue porque está enfermo). Le pide instalar madera contrachapada en los edificios que está construyendo. Para hacer la instalación tiene que usar una plataforma. La plataforma está arriba de una máquina con hidraúlicas porque es más facil usarla asi. Piensa que la plataforma no puede soportarle pero sabe que el colaborador enfermo la uso y todo estaba bien. ¿Qué haria? Encierre la respuesta.

A. Usar la plataforma; nada malo paso con el colaborador enfermo.
B. Preguntar a otro colaborador cuanto peso soporta la plataforma.
C. Avisar al jefe que creo que el trabajo es peligroso,
D. Encontrar otra plataforma con que tengo mas experiencia.
E. Otra_____

¿Usted tiene sentimientos fuertes sobre la respuesta? Use los números abajo para indicarlos

No muy fuertes				Muy fuertes
1	2	3	4	5

Simulación Narrativa #4
Usted ha sido un constructor de casas por 10 anos. Normalmente hace trabajo interior en las casas que está construyendo (y tiene que ponerse casco protector). Hoy, está trabajando en el techo donde no hay mucho riesgo de que algo pueda caerse. De vez en cuando tiene que usar una escalera de mano. Hace mucho calor y por eso los otros trabajadores que están trabajando en el techo se han quitado los cascos protectors. ¿Qué haría? Encierre la respuesta suya.

A. Quitarme el casco protector, también. Nada va a golpearme.
B. Ponerme el casco protector cuando estoy en la área donde hay riesgo.
C. Voy a ponerme el casco protector por todo el dia (cuando estoy trabajando)
D. Nunca me pongo casco protector. Son incómodos y no son necesarios.
E. Otra_____

¿Usted tiene sentimientos fuertes sobre la respuesta? Use los números abajo para indicarlos

No muy fuertes				Muy fuertes
1	2	3	4	5

Narrative Simulations Alternate Form

Narrative Simulation #1

You are a carpenter new to the job and your boss suddenly asks you to stop what you are doing and take over a task that your co-worker was performing in the morning. Your co-worker was sent home because of illness. You are asked to install sheathing and plywood to the buildings being constructed. In order to perform the task you must work on a wooden portable scaffold. The scaffold was placed on the forks of a hydraulic lift for easier use. You are unsure of the weight the scaffold is able to hold but you do know the co-worker that was sent home was using the same scaffold with the same load. What would you do? Circle the response that most closely resembles what you would do?

A. Use the scaffold. It must be safe; my co-worker was using it earlier the same day.
B. Ask a co-worker what load the scaffold is able to hold.
C. Notify my supervisor that I am unsure if the task is safe.
D. Find a safer scaffold that I am more familiar with.
E. Other

_____

How strongly do you feel about your answer? Use the numbers given below to indicate how strongly you feel about your answer.

Not Very Strongly				Very Strongly
1	2	2	4	5

Narrative Simulation #2

You are a spray painter that has been working for a painting contractor for 2 months. You are currently on the jobsite working with three coworkers. The worksite is a condominium complex with multiple levels of roof. You plan to finish painting a section of the west wall before you leave to attend to some serious personal problems. You notice the ladder you are using will not reach the area of the wall that you need to paint. You notice the ladder will reach if you place it on the small roof of a protruding shed. What would you do? Circle the response that most closely resembles what you would do?

A. Place the ladder on the small roof. I've done it before and the job will only take 5 minutes to complete.
B. Place the ladder on the small roof after putting on my fall protection equipment.
C. Notify my supervisor of the situation.
D. Ask a more experienced co-worker what to do.
E. Leave the job for someone else.
F. Other

_____

How strongly do you feel about your answer? Use the numbers given below to indicate how strongly you feel about your answer.

Not Very Strongly				Very Strongly
1	2	3	4	5

Narrative Simulation #3

You have been a home builder for 10 years. You usually perform interior work in the developing homes, requiring you to wear a hard hat. Today you are working on a roofing assignment where there is little overhead work. Every once in a while you have to travel up and down a ladder to get supplies from inside the developing home. It is really hot outside so your co-workers working on the roof have taken off their hard hats. What would you do? Circle the response that most closely resembles what you would do?

A. Take off my hard hat too. We are on the roof so chances are nothing will fall on our heads.
B. Put on my hard hat when I am in an area where objects may fall on my head.
C. Keep my hard hat on at all time while on the jobsite.
D. I don't wear a hard hat. I find them uncomfortable and unnecessary.
E. Other

_____

How strongly do you feel about your answer? Use the numbers given below to indicate how strongly you feel about your answer.

Not Very Strongly				Very Strongly
1	2	3	4	5

Narrative Simulation #4

You are a construction worker completing a drywall installation for a commercial remodeling company. You have been working for the same company for 15 years. The day's temperature is approaching 100 degrees and you are having dizzy spells. In order to complete the installation you must use a Baker scaffold. The Baker scaffold is 6 feet high and the guardrails have not been installed. What would you do? Circle the response that most closely resembles what you would do?

A. Look for another scaffold with guardrails.
B. Find a buddy to watch me while I complete the task.
C. Use the Baker scaffold, the job is only 6 feet high.
D. Notify my supervisor of the situation.

E. Install the guardrails and then finish the job.
F. Other

_____

How strongly do you feel about your answer? Use the numbers given below to indicate how strongly you feel about your answer.

Not Very Strongly				Very Strongly
1	2	3	4	5

Simulación Narrativa #1

Usted es carpintero nuevo y su jefe le pide hacer un trabajo de un colaborador suyo (el estaba haciendolo durante la manana, pero se fue porque está enfermo). Le pide instalar madera contrachapada en los edificios que está construyendo. Para hacer la instalación tiene que usar una plataforma. La plataforma está arriba de una máquina con hidraúlicas porque es más facil usarla asi. Piensa que la plataforma no puede soportarle pero sabe que el colaborador enfermo la uso y todo estaba bien. ¿Qué haria? Encierre la respuesta.

A. Usar la plataforma; nada malo paso con el colaborador enfermo.
B. Preguntar a otro colaborador cuanto peso soporta la plataforma.
C. Avisar al jefe que creo que el trabajo es peligroso,
D. Encontrar otra plataforma con que tengo mas experiencia.
E. Otra_____

¿Usted tiene sentimientos fuertes sobre la respuesta? Use los números abajo para indicarlos.

No muy fuertes				Muy fuertes
1	2	3	4	5

Simulación Narrativa #2

Usted es pintor que ha trabajado para una compañía de pintura por 2 meses. Ahora usted está en el lugar de trabajo con tres colaboradores. El lugar es una unidad de condominios que tiene niveles diferentes. Va a terminar pintando una sección de la pared oeste antes de que salga para arreglar unos problemas personales muy graves. Se da cuenta que la escalera de mano que está usando no alcanza la sección de la pared que tiene que pintar. Despues, se da cuenta que la escalera de mano puede alcanzar si la pone arriba del techo de un cobertizo. ¿ Qué haría? Encierre la respuesta.

A. Poner la escalera de mano arriba del cobertizo. Yo lo he hecho antes y el trabajo solo ha durado 5 minutos.
B. B.Poner la escalera de mano arriba del cobertizo despues de me pongo el equipo protectivo personal.
C. Avisar al jefe de la situación.
D. D.Pedir la ayuda de un colaborador con más experiencia.
E. E.Dejar el trabajo para otra persona.
F. Otra respuesta:_____

¿Usted tiene sentimientos fuertes sobre la respuesta? Use los números abajo para indicarlos.

No muy fuertes				Muy fuertes
1	2	3	4	5

Simulación Narrativa #3
Usted ha sido un constructor de casas por 10 anos. Normalmente hace trabajo interior en las casas que está construyendo (y tiene que ponerse casco protector). Hoy, está trabajando en el techo donde no hay mucho riesgo de que algo pueda caerse. De vez en cuando tiene que usar una escalera de mano. Hace mucho calor y por eso los otros trabajadores que están trabajando en el techo se han quitado los cascos protectors. ¿Qué haría? Encierre la respuesta suya.

A. Quitarme el casco protector, también. Nada va a golpearme.
B. Ponerme el casco protector cuando estoy en la área donde hay riesgo.
C. Voy a ponerme el casco protector por todo el dia (cuando estoy trabajando)
D. Nunca me pongo casco protector. Son incómodos y no son necesarios.
E. Otra_____

¿Usted tiene sentimientos fuertes sobre la respuesta? Use los números abajo para indicarlos.

No muy fuertes				Muy fuertes
0	1	2	3	4

Simulación Narrativa #4
Usted es plomero y está instalando un aspersor para el césped para una compañía. Ha trabajado para la compañía por 15 anos. Hoy hace mucho calor y se siente mareado. Para acabar la instalacion tiene que usar una plataforma de seis pies y no hay pretiles. ¿Qué haría? Encierre la respuesta.

A. Buscar otra plataforma con pretiles.
B. Buscar otra persona para que me vea durante el trabajo.
C. Usar la plataforma porque no es muy alta.
D. Avisar al jefe de la situación.
E. Instalar los pretiles y acabar el trabajo.
F. Otra _____

¿Usted tiene sentimientos fuertes sobre la respuesta? Use los números abajo para indicarlos.

No muy fuertes				Muy fuertes
1	2	3	4	5

APPENDIX J: Narrative Simulation Rating Form

Statement	Response (Place an X in the box that matches your answer).				
	STRONGLY DISAGREE 0	SOMEWHAT DISAGREE 1	NEITHER DISAGREE NOR AGREE 2	SOMEWHAT AGREE 3	STRONGLY AGREE 4
1. The problems in the narrative simulation were realistic.					
2. The problems in the narrative simulation were too long.					
3. The problems provided enough detail to solve the problem.					
4. The problem provided too much detail.					
5. The problems were easy to read.					
6. The problems were easy to understand.					
7. The directions for solving the problems were easy to understand.					
8. The problems in the narrative simulation were similar to problems I see in my workplace.					

Declaración	Responde (Poniendo una X en cada cuadro que corresponda a tu respuesta).				
	BIEN EN DESACEURDO 0	EN DESACEURDO 1	NI EN DESACUERDO O ACUERDO 2	EN ACUERDO 3	BIEN EN ACEURDO 4
1. Los problemas en la simulación narrativa eran realistas.					
2. Los problemas en la simulación narrativa eran demasiado largos.					
3. Los problemas proporcionaron bastante detalle para solucionar el problema.					
4. El problema proporcionó demasiados detalles.					
5. Los problemas eran fáciles de leer.					
6. Los problemas eran fáciles de entender.					
7. Las direcciones para solucionar los problemas eran fáciles de entender.					
8. Los problemas en la simulación narrativa eran similares a los problemas que veo en mi lugar de trabajo.					

Chanel Thomas

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EDUCATION

Master of Science, Industrial & Systems Engineering (Human Factors), July 2006
Virginia Polytechnic Institute and State University (Virginia Tech), Blacksburg, VA
Advisor: Tonya L. Smith-Jackson, Ph.D.

Bachelor of Science, Industrial & Systems Engineering, May 2003
Virginia Polytechnic Institute and State University, Blacksburg, VA

HONORS/AFFILIATIONS

Alpha Epsilon Lambda (Graduate and Professional Student Honor Society)
Alpha Pi Mu (Industrial Engineering Honor Society)
American Society of Safety Engineers (president, secretary)
Human Factors and Ergonomics Society (secretary)
Institute of Industrial Engineers
McNair Scholar

RESEARCH INTERESTS

- Construction safety training
- Cultural ergonomics
- Risk perception

RESEARCH EXPERIENCE

NIOSH Fellow, Department of Industrial & Systems Engineering, Virginia Tech, Blacksburg, VA
August 2004 – May 2006

- Conducted independent research on acculturation and individual differences of construction laborers
- Research included the following: written proposal, participant recruitment, data collection, data analysis, and reporting of results & conclusions

Graduate Research Assistant, Department of Industrial & Systems Engineering, Virginia Tech, Blacksburg, VA
January 2004 – Present

- Formulated additional research question concerning cultural differences in risk perception in the workplace
- Developed quantitative measurement instruments
- Recruited participants

Graduate Research from Coursework, Department of Computer Science, Virginia Tech, Blacksburg, VA
January – May 2004
- Located a client
- Determined the need for a new database system based on user specifications and requirements
- Performed a usability study
- Analyzed data
- Presented the proposed new system

Graduate Research Assistant, Department of Industrial & Systems Engineering, Virginia Tech, Blacksburg, VA
August – December 2003
- Developed educational Web tutorials for GPS studies in Electrical Engineering

Undergraduate Researcher, Department of Industrial & Systems Engineering, Virginia Tech, Blacksburg, VA
May – July 2002
- Formulated additional research question concerning behavior type and academic success of undergraduate students
- Recruited participants
- Analyzed data
- Produced a written document
- Presented findings

PUBLICATIONS

Thomas, C.T., Nam, C.S., & Smith-Jackson, T.L. (2003). The Significance of Behavior Type on Web Information Retrieval and Academic Success. *Proceedings of the 2003 American Society for Engineering Education Annual Conference& Exposition.*

Nam, C.S., Smith-Jackson, T. L., and Thomas, C. (2004). Effects of Individual Differences and Task Environments on Users' Interactions with Web Resources. *Computers in Education Journal,* XV(2), 79-92.

Smith-Jackson, T.L., Headen, E., Thomas, C.T., & Faulkner, B. (2005). Cultural Critical Incidents in Hazardous Occupations: A Preliminary Exploration. *Proceedings of the Eighth International Symposium on Human Factors in Organizational Design and Management.*

WORK EXPERIENCE

Co-op, US Airways, Arlington, Blacksburg, VA
August – December 2001

- Worked on monthly equipment levels based on GSE Plan software
- Analyzed current human resources database and initiated the developmental stages of restructuring the system
- Assessed monthly staffing levels through time studies

Intern, Howmet Castings, Hampton, VA
May – August 2001

- Designed a material handling unit that would not interfere with product specifications
- Developed process flow charts of the Burr Bench operation
- Advised manufacturing engineers of decisions to purchase new equipment or to make adjustments within the existing operation

EDUCATIONAL OUTREACH

- College of Engineering Dean's Team (undergraduate recruitment), 2001 - Present
- Engineering Support Team (mentor), 2002
- Physics Outreach Program, 1999 - 2000

COMMUNITY SERVICE

- Alpha Kappa Alpha Sorority, Inc. (service organization), 2004 - Present
- Vacation Bible School, 2004
- The Big Event (cleanup project), 2004
- Girl Scouts, 2003 - 2005
- Heritage Hall Nursing Home, 2003 - present
- Christmas Store, 2003
- First Lego League, 2003
- YMCA Thrift Store, 2003
- YMCA Crafts Fair, 2003
- Operation Blessing, 2000