PREDICTIVE CULTURAL DIMENSIONS OF OCCUPATIONAL RISK PERCEPTION AND BEHAVIOR IN MIGRANT MEXICAN CONSTRUCTION WORKERS

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1. Executive Summary

Construction work is one of the productive sectors with the highest risk of occupational accidents and mortality. According to the last report of the Department of Labor of the United States (2016), the incidence rate of accidents related to the construction and handling of heavy machinery is 9.1 per 100 employees. The annual cost associated with work-related accidents is up to $ 1.36 billions. Notably, 53% of these costs are related to accidents and injuries in Hispanic workers, less than 48% receive payment for medical expenses (Xiuwen, 2007). Hispanic-Latino workers tend to show a higher incidence (15%) of accidents and occupational-related deaths compared to the rest of the population. Goodrum (2005) and Dong & Platner (2004) have found association between this higher incidence with poor working conditions and lack of observance of safety measures by employees (Perez-De Alejo, 2009). In the state of Texas, according to the US Census Bureau (2010), the Hispanic-Latino population comprises 39.1% of the total population (US Census Bureau, 2010). Furthermore, the construction workforce of in this state is 27.3% migrant, predominantly of Hispanic-Latino origin. It is expected for these figures to continue on the rise, especially among migrant workers, who additionally must face new cultural challenges and the rigorous demands in this field of work.

Several risk factors have been associated with a higher incidence or work-related injuries and deaths in the Hispanic-Latino construction workforce. Among some of the risk factors, the following are of main concern: 1) lack of formal education, or little training to perform the work (Escamilla, 2017); 2) lack of safety and/or training in the use of safety equipment by employers; 3) language and literacy barriers (Roelofs, 2011); 4) negligence in relation to observing security measures; and, 5) the very need for a job, that may lead the worker to expose himself to certain risks out of fear of losing it. One must realize that immigrant workers are at a financial and educational disadvantage at work, in particular those from Hispanic-Latino descent. This population group faces greater risk situations, likely exacerbated by language and cultural barriers that may limit the efficacy of safety trainings (Parra-Cardona et. al, 2006). To address this, Dr. Gabriel Ibarra-Mejia from the University of Texas at El Paso (UTEP), and Dr. Aurora Máynez-Guaderrama, Karla Gomez Bull, and Marisela Vargas from Universidad

Autonoma de Ciudad Juarez (UACJ) are combining their expertise to study the potential effects of cultural barriers on the perception of occupational risk in migrant construction workers of Mexican descent in the Paso del Norte region.

In summary, our study's goal was to identify cultural barriers associated to occupational risk perception and behavior in Mexican migrant construction workers from three counties in the United-States-Mexico border region. We used Hofstede's (1980) concept of culture, and modified it to include four out of its six dimensions. Hofstede's conceptual theory on culture include the following six dimensions: 1) Distance of power; 2) Individualism; 3) Masculinity; 4) Evasion of uncertainty; 5) Long-term orientation, and 6) Indulgence. Four of these dimensions were used to study the cultural barriers that may have an impact on the behavior and perception of work-related risk among Hispanic construction workers in the U.S.-Mexico border. The dimensions long-term orientation, and indulgence were excluded. To accomplish our goal, we used a descriptive, cross-sectional, causal-correlational design. Participants were self-identified Mexican migrants, with at least a 12 month-history of construction work. Structural equation modelling (SEM) with partial least squares (PLS) was used to predict for risk behavior using SmartPLS®.

The collaborating team developed a survey based on a pool of accepted items from previous published literature complemented by findings during focus groups sessions. Collected data from a total of 117 participants was then analyzed, to build an SEM-PLS model based on four cultural dimensions: power distance (PD), individualism/collectivism (IC), uncertainty avoidance (UA), and masculinity/femininity (MF). After reviewing survey responses, only 66 (56%; 65 males, 1 female) were included in the analysis. Based on our findings, PD was sub-divided into leadership style (LS) and job structure (JS). Three out of the five structural paths showed predictive significance at p=0.05, and 95%CI. Both sub-dimensions of PD, LS (path estimation 0.337; t=2.185) and JS (path estimation -0.392; t=2.024), and MS (path estimation 0.243; t=2.277). Neither IC or UA were considered as predictive of risk behavior.

In conclusion, our findings support that the SEM-PLS model based on the culture-construct dimensions predicts, and may explain risk behavior in the studied population. Additionally, our findings suggest that further research should be conducted

on the roles of management in workplace safety at construction job sites that employ migrant workers of Mexican descent. The role of women holding supervisor level positions in the construction industry should be also investigated further.

2. Background

a. Funding source

Funding for this project was provided by PIMSA “Programa de Investigación de Migración y Salud (Migration and Health Research Program) through The University of California-Berkeley.

b. Collaboration description

To accomplish the aims of this project, a collaboration was established between Gabriel Ibarra-Mejia. M/D., Ph.D. from the University of Texas at El Paso (UTEP), and Dr. Aurora Máynez-Guaderrama, Karla Gomez Bull, and Dr. Marisela Vargas from Universidad Autonoma de Ciudad Juarez (UACJ). They combined their expertise to study the effect of cultural barriers in the perception of occupational risk in Mexican migrant workers.

1) Collaborators from both institutions actively participated in carrying out all phases of the project, based on the proposed research. In conjunction, they held several meetings to:
    a. Complete required training in human subjects’ research, and discuss potential manuscript authorships.
    b. Develop and submit the research protocol to the Internal Review Board.
    c. Develop and pilot the methodologies to conduct focus groups, and later the survey instrument used to collect data from participants.
2) Due to legal restrictions, Dr. Ibarra-Mejia, along with a Research Assistant carried out the focus groups. Dr. Maynez-Guaderrama, Dr. Vargas-Salgado, and Ms. Gomez-Bull, analyzed the content of videos and audio recordings from the focus groups, and developed a draft of the survey instrument, complementing it with previous items based on additional literature research. Later, both groups discussed until a consensus was reached on the design and content of the final instrument.
3) Again, due to legal restrictions, Dr. Ibarra-Mejia, along with a Research Assistant carried out the visits to several selected construction sites, according to the

established protocol. Collected data was then entered into a worksheet and prepared for analysis.

4) Dr. Maynez-Guaderrama, Dr. Vargas-Salgado, and Ms. Gomez-Bull, further reviewed and analyzed the data worksheet, and entered all data into a statistical software package to complete the planned statistical analyses, and develop the proposed predictive model. After completing, results where then shared and discussed.
5) Dr. Ibarra-Mejia, along with a Research Assistant took then the responsibilities of coordinating the development of the abstract and poster presented at the 13th Summer Institute on Migration and Global Health held on June 18 to 21 in Oakland, California at The California Endowment's Center for Healthy Communities.
6) The PI's from both collaborating universities attended the 13th Summer Institute on Migration and Global Health. Dr. Ibarra-Mejia was responsible for the poster presentation at the event.
7) Dr. Ibarra-Mejia, along with a Research Assistant took responsibility on the writing of the policy brief, and the final written and financial reports to be submitted to PIMSA, the Research Program on Migration and Health, administrated by the Health Initiative of the Americas (HIA).

3. Introduction

a. Motivation for research

In the United States, as previously mentioned, migrant workers specifically those from Hispanic-Latino origin, have a higher rate of work-related injuries and mortality when compared to other population groups. Among the determinants of such phenomena, the literature has identified differences linked to cultural aspects associated to an increase in the risk of injury. Moreover, the majority of the research on occupational-related injuries has focused on the agricultural sector, even though most of Hispanic-Latino workers are in services, transportation and warehousing, construction and manufacturing. Therefore, the purpose of this research project is to identify the relationship of cultural barriers and perceived occupational risk among Mexican migrant construction workers in the Paso Del Norte region, as a surrogate of the larger population of Hispanic-Latino in the country, and more specifically to the U.S.-Mexico Border. As part of the results, it was expected that components of culture may act as barriers, negatively impacting the perception of risk. As a result we will then aim to contribute in the design of culturally appropriate interventions, which can ultimately lead to a decreased likelihood of work-related accidents and injuries in this industry, and for this population group. Results from the research project is expected to generate useful, translational information for designing interventions that allow for a reduction of occupational risk behaviors, contributing in the development, or modification of public policies related to health and safety in construction-related work sites.

b. Mexican migration to the United States and construction work

Mexican migrants joining the construction workforce in the United States of America is not a recent issue. Nevertheless, the questions and problems associated with this phenomena remain relevant both in the economic and political arenas. According to a recent report, migrants of Mexican descent comprise the largest population group of immigrants (28%) in states such as New Mexico and Texas, representing nearly 60% of the population. Even though they are economic and cultural contributors to U.S. society, they still face social exclusion, and lack access to public health programs (Secretaría de

Gobernación/Consejo Nacional de Población, National Population Council and Migration Policy Unit, & University of California, 2013).

Approximately 2.2 million Hispanic employees were registered in the 2010 Census, and up to 75% were born outside the United States. Due to Mexico's advantageous geographical position, migrants of Mexican descent comprise the majority of U.S. immigrants (Lothar Weiss & López Chaltelt, 2011). Jobs performed by this population group are generally in the agricultural, warehousing, manufacturing and construction sectors (Flynn & Eggerth, 2014; Secretaría de Gobernación/Consejo Nacional de Población et al., 2013). Unfortunately, Mexican migrant workers are usually hired and assigned to perform the majority of low-skill, low-wage jobs other local population groups do not seem willing to perform (Rivermar, 2013). In the construction sector, Hispanic-Latino workers represent the population group with the highest work-related mortality rate, comparatively greater than other ethnic groups (Cigularov, Lancaster, Chen, Gittleman, & Haile, 2013; Roelofs, Sprague-Martinez, Brunette, & Azaroff, 2011).

c. Problem statement

Construction is one of the productive sectors. It also is the one with the highest risk for occupational-related accidents and injuries, and mortality. According to the last report of the Department of Labor of the United States (2016), the incidence rate of construction-related accidents, and handling of heavy machinery is 9.1 per 100 employees. In the United States, Texas is considered the state with the highest risk for construction workers due to poor working conditions and the lack of safety measures for employees (Perez-De Alejo, 2009). The annual cost associated with construction work accidents is up to $ 1.36 billion, of which 53% is in Hispanic workers and less than 48% receive payment for medical expenses (Dong, et. al., 2007). These figures continue to rise especially among migrant workers, who must face cultural challenges and the rigorous demands in this work sector.

Numerous risk factors associated to the increased risk of work among Hispanic-Latinos. Among to most prominent are: the lack of formal education or little training to develop the work (Escamilla, 2017); the lack of training or safety equipment provided by companies to their employees; language and literacy barriers (Roelofs,

2011); negligence in relation to security measures; and, the very need for a job that leads the worker to expose himself to certain risks for fear of losing it. All these factors are related to certain cultural aspects that place the Hispanic-Latino worker at a disadvantage, therefore to a higher risk of work-related accidents and injuries.

According to Hofstede, culture is a collective programming of the mind that distinguishes members of a group from others (Hofstede, 1980). It is a system of collectively shared values that influence the group's response to the environment. The six dimensions of Hofstede's theory include the following: 1) Distance of power, 2) Individualism, 3) Masculinity, 4) Evasion of uncertainty, 5) Long-term orientation, and 6) Indulgence. His theory of "cultural dimensions" shows how culture influences the values of people, and how they are known in human behavior. Although these dimensions do not allow predicting individual behaviors, they may offer a reflection on shared values within a group and how they respond to their environment. People are different in part because of the cultures in which they were born and raised, and they bring these influences along with them as they become members of a working community (Rodríguez Estrada & Ramírez Buendía, 2004). Therefore, it can be assumed that migration exposes individuals to face the challenge of adapting, not only to the natural environment, but also to the local culture. Moreover, being part of a group introduces cultural influences, which then may be a determinant for the individuals' behavior and response to a work environment.

Work-related injury statistical data, positions construction work as a high-risk industry, making evident the need to examine factors that influence accident occurrence with the goal of protecting workers (Abbe, Harvey, Ikuma, & Aghazadeh, 2011). Additionally, research on the psychosocial environment effects on injury rates in construction work has been limited (Brown et al., 2011; Roelofs et al., 2011), and individual perception regarding training practices has rarely been the focus of research interest (Demirkesen & Arditi, 2015). Recent work by Flynn & Egghert (2014), recommends inquiry into cultural aspects, in consideration of being recognized as a potential factors that may explain why immigrant workers have such high injury rates. Moreover, they indicate that even though efforts have been made to include culture and expand this area of research, emphasis is made on how limited the definition of the

cultural variable has been. Instead, Flynn & Egghert (2014) support a much broader approach. They suggest exploring within the target population, considering it shares beliefs, behaviors, and symbol comprehension. Furthermore, attention should be geared towards as how these factors may impact occupational safety and health.

d. Effects of migration on the problem

Despite the geographic proximity between the Unites States and Mexico, important and significant cultural differences exist between the countries (Hallowell & Yugar-Arias, 2016). Some authors state that Mexicans tend to be individualistic, do not believe in team work, and show disorganized and undisciplined behaviors that are reflected in all perspectives of life. They also self-modify to adapt to the environment (Rodríguez Estrada & Ramírez Buendía, 2004). Even though Mexicans have been shown to accept hierarchical order, which is considered a reflection of inherent differences, they tend to wait for the person in charge to show a behavior of authority and instruct them what to do, while simultaneously challenging that authority. Mexicans also have been shown to have a low tolerance toward different behaviors and ideas, stay occupied, and live to work, and desire quick results (Hallowell & Yugar-Arias, 2016). Such behavioral characteristics make them at higher risk of suffering injury, and even death, while performing job duties. In light of these inherent cultural characteristics affecting work behaviors and increasing potential health risks, this research project aims to explore and identify those influences related to cultural barriers on work-related risk perception in recently immigrated workers of Mexican origin who perform construction-type work in the binational border region of Paso del Norte, which includes the New Mexico counties of Doña Ana and Otero, El Paso county in Texas, as well as Ciudad Juarez in the state of Chihuahua, Mexico.

Construction work is inherently a hazardous occupation. Inappropriate, or lack of safety training may increase the injury and mortality rates in this sector, especially for those with a language barrier (Behm, et.al. 2005; Abbe, et al. 2011). Disparities in work related deaths and injuries between Hispanics and Non-Hispanic construction workers in the United States have been reported before. In 2008 there were about 501 injuries and illnesses per every 10,000 Hispanic iron workers, making it the highest rate of

injuries since 2001 (Dong, Wang & Daw, 2010). Furthermore, there are additional disparities between foreign-born and native Hispanic-Latino construction workers. Foreign-born Hispanic-Latinos have been found to be more vulnerable to work-related death and injuries, constituting 74% of deaths among Hispanic construction workers (Dong, 2005; Dong, Wang & Daw, 2010).

4. Goal

The main goal of this study was to identify the presence of cultural components that may present a barrier influencing the perception of work-related risks in Mexican migrant construction workers in the United States-Mexico border region. This perception may as well influence the behavior regarding compliance of safety measures, increasing potential risk of accidents and injury while performing daily construction work-related tasks. Considering the previous statement that construction work in the U.S. is one of the most hazardous and risky jobs, and that Mexican migrant workers represent a significant proportion within the sector, this proposed study aims to identify cultural components that may be negatively affecting risk perception in this population. Once these cultural components are identified, the research can lead to the design of intervention strategies, and hopefully ultimately decrease injury and mortality rates in Hispanic-Latino construction workers of Mexican descent who recently immigrated to the U.S.

5. Research Questions

Which specific cultural components are predictive of the perception of work-related risk and behavior in Mexican migrant construction workers in the United States-Mexico border region?

6. Methods

This was a descriptive, cross-sectional, causal-correlational study. Selection of sample population included volunteer participants identified in construction work sites that agreed to donate their time to participate. It consisted of two-phases involving first focus

groups interviews, and a second phase using a survey questionnaire, based on findings of the first.

Sample population

Participants involved in the study were either male or female construction workers. A list comprised of major construction companies in the Paso Del Norte border region was used as a source to identify potential participants. Direct contact was established by telephone or electronic mail with a company's project representative. Later, telephone or face-to-face conversation were held requesting access to the project's worker population. Once companies agree to allow access to their worker population, eligible participants were selected at convenience until the sample size quotas are met.

Eligible candidates for enrollment were self-reported Mexican migrant workers from construction contractors and companies, and non-governmental organizations (NGOs) associated to construction work in the Paso del Norte region. All participants were 18-years-of-age and older, self-reported Mexican origin, able-bodied, with at least a 12-month history of uninterrupted construction work history, and currently living in the Paso del Norte region. Workers who did not meet inclusion criteria, or with known self-reported history of musculoskeletal, neurological and metabolic chronic disease were not included in the study.

Instruments

The first phase consisted of assembling four focus groups of five to eight members each. An independent moderator conducted the interviews with one or both PI's as observers. A series of questions based on Hofstede's cultural dimension were constructed and served as the interview guide. Groups were scheduled for interviews lasting between one to two-hours duration. A translator was always available. Discussions were video and audio recorded, and later transcribed.

For the second phase, a self-administered, semi-structured questionnaire was developed using information collected from the first phase and developed from previous published literature on Hofstede's theory of cultural dimensions. The questionnaire included different items related to migration and construction work adapted from

Hofstede's model of cultural dimensions. The four cultural dimensions included in the survey and included in the SEM-PLS model: 1) power distance (PD); 2) individualism/collectivism (IC); 3) uncertainty avoidance (UA); and 4) masculinity/femininity (MF). PD was sub-divided into leadership style (LS) and job structure (JS). "Collectivism" was measured in a scale of 10 items, "power distance" was assessed with 13, "uncertainty avoidance" with 9, and "masculinity" with 7, from the scales proposed by (Dorfman & Howell, 1988; Wu, 2006; Yoo, Donthu, & Lenartowicz, 2011).

The questionnaire allowed also for collecting demographic information, and information regarding cultural factors that may impact risk perception. The questionnaire was developed in both English and Spanish languages and administered according to the participant's language of preference. Items in the questionnaire were measured through a Likert-type scale. A pilot survey was first applied to a sample of 30 participants to assess validity and reliability and modifications were then completed as deemed necessary.

Risk behavior was assessed with 21 items (Arcury et al., 2015) for the valuation of the aforementioned constructs, using a Likert scale of five points of response allocation where: 1-Strongly disagree, 2-disagree, 3-neither agree nor disagree, 4-agree and 5-totally agree. Finally, the perception of risk was assessed, which is a cognitive construct that includes the subjective evaluation of the probability and the severity of the consequence if an event happens (Rundmo & Nordfjærn, 2017). Therefore, the instrument assessed the probability and severity of risk, each with 6 items. The first of these was answered with a scale of 5 points where 1-Impossible, 2-Little possible, 3-Possible, 4-Very possible and 5 highly possible; with respect to the second, the scale consisted of: 1-Nothing serious / superficial, 2-Mild, 3-Moderate, 4-Severe and 5-Very serious / could die.

Procedures

a) Phase 1- Focus groups: For recruitment of the participants, announcements were posted at identified construction workplaces. Potential participants were then approached individually and screened for inclusion criteria and invited to participate voluntarily. Upon successful screening and agreeing to participate, the project's purpose and procedure were explained in detail using their language of

preference, followed by signature of the informed consent. Only those workers that agreed and signed an informed consent were included. Afterwards, groups of five to eight members each, were scheduled for interviews which lasted approximately one to two hours. A translator was always available. Discussions were video and audio recorded, and later transcribed. Interviews were conducted at a location different from the worksite, and after working hours so as not to affect daily work routines. A $25 US Dollar gift card was given as an incentive to the participants.

b) Phase 2 - Questionnaire surveys: After identification and agreement of construction contractors, the principal investigator (PI) personally visited each site and explained the study to management. Upon acceptance, employees that met inclusion criteria were invited to participate in the survey. Only those workers that agreed and signed an informed consent were included. The PI and research assistant (RA) then explained the purpose and procedure of the study and asked the potential participant a signed informed consent. After the informed consent was signed, the researcher administered the questionnaire using the participant´s preferred language. Questionnaires were administered at the selected worksites, either during scheduled breaks and/or after working hours so as not to affect daily work routines. A $10 US Dollar incentive was given once the questionnaire was completed.

Data analysis

A database was constructed to enter the collected data. MS Excel was used for data cleaning and initial analysis. A combination of statistical methods was applied to analyze collected data. Content analysis of transcripts from the focus groups was searched for emerging themes concerning keyword markers used by workers-consumers to assess their perception of risk and cultural barriers. Descriptive analysis was then conducted on all measured variables. Frequencies and percentages were determined in nominal and categorical variables using cross tabulations; measure of central tendency and dispersion was also applied to scale variables under the assumption that data are normally distributed. Statistical analysis was performed using SPSS® v23 statistical package

software. An exploratory factorial analysis (EFA) was conducted to identify relationships between latent variables. Structural equation modeling (SEM) with partial least squares (PLS) was used to predict for risk behavior. The inferential statistical tests were carried out through using the statistical package software SmartPLS® by partial least squares, with a PLS algorithm that it was run with 500 iterations, data metric of mean 0 and variance of 1. With respect to the bootstrapping algorithm, the selected cases were used, and 500 subsamples of the original sample were obtained.

7. Results

Phase 1: Qualitative Study Results

Once the subjects who met inclusion criteria were identified and recruited, focus groups were carried out, following the script designed for that event. A total of 4 focus groups were held in different sites in the Paso del Norte area. One focus group was conducted outdoors, due to lack of proximity to an indoor facility (Figure 1a).

Figure 1a. Moderator explaining purpose of, and inviting to participate in focus group in an outdoor setting.

Figure 1b. General view of sample focus group in an indoor setting

Each group included 6 to 8 participants and interviews (Figure 1b). It should be noted that each of the sessions was video and audio taped. All participants consented, and signed the informed consent form. Only males attended focus groups. During the development of the event they were given refreshments in addition to a gift card of $25 US Dollars each. Also, translation services were provided when necessary for the participants. After information was collected, a transcription was made for each of the focus groups based on audio and video session recordings. Participants' answers' then were entered and classified into a construct matrix containing the culture dimension variables of interest, site location were testimonies were collected, and the number of recurrences of each.

In summary, groups found the topic interesting and relevant. Interviewed participants actively interacted with the moderator. Seldom there was a need to translate, although the moderator asked to clarify on construction worker's slang. The average focus group lasted 90 minutes, and the moderator was able to control each

group's discussion, and to be heavily involved in it. Summaries of the participants' answers content are omitted in this report to avoid excessive length. According to the information gathered from the four focus groups, participants showed aggrement on the folllowing explored cultural dimensions:

a) Power Distance

1. The supervisor sanctions workers who do not comply with safety rules.
2. Except in one of the focus groups, the remaining groups reported to have a good relationship and communication with the supervisor. Participants said his supervisor was usually open and feel confidence to talk to him, and/or listen to their suggestions. Also, in one of the groups, workers mentioned that they could reach out to him by his cell phone, since they had their number in case they need it. In the case of the only focus group with different results, the participants indicated that their communication with the supervisor was very superficial, that they're supervisors were strict and that they even scolded them.
3. People considered their supervisor as good persons, friendly, close, pleasant and a person who listens to them. Even in one of the groups it was pointed out that he worked with them and made jokes.
4. On the other hand, workers perceived that the supervisor seeks out to protect them, informs them and trains them on safety issues. Regarding the risks of work, they indicated that he is strict, retailer and perfectionist. It focuses on verifying compliance with security measures. In addition, they indicate that they are attentive to avoid accidents and try to ensure that employees have what is necessary to carry out their work. Finally, it was commented that most of the safety measure agreements are taken during scheduled safety meetings.

b) Collectivism

1. It was clear that there is a sense of group / team. The workers report that they take care of others, they protect themselves, they help each other and "shake hands". In addition, they indicate that they live together in work, meaning that they are like a family. Something that stood out in this sense, is that although

they call each other to pay attention [in case of having safety infractions], they did not report such situations to the supervisor in order to avoid problems, or because it could cause the reported worker to lose a job that was needed.

2. The influence of the family was relevant. For the people who participated in the focus groups, they mentioned that their family is their real motivation to work. They point out that they strive to return home safely, and take care of their family as they are the providers of resources in their home. In addition, the family collaborates so that workers take care of themselves, trying to provide them with the resources they require (e.g., water, medicine).

c) *Uncertainty Avoidance*

1. Employees indicated they do not perform unsafe work, or work in unsafe places, and do not carry out work for which they are not trained. They also specified that regarding the last condition, they were prevented from doing so.
2. Regarding training, they commented that it is important [above all safety measures], useful and necessary. Training it's usually theoretical-practical; they received it according to their needs [according to specifics of the work]. Furthermore, it helped them to be more responsible, by accepting and learning from their mistakes and acquire awareness. Unfortunately, in one of the groups it was pointed out that each project is different and not all of them have an interest in safety issues. They added that with experience they gave training greater importance, and prefer to receive it before performing a task. As areas of opportunity, they recommended including more practice, doing it more frequently, providing safety equipment and hiring competent people. Finally, they indicated that the managers [supervisors] are the ones who selected the right person for each job.

d) *Risk Behavior*

1. Hispanics do hard work, do not take precautions. Even, sometimes they do not respect the safety training measures, because they want to move forward.

2. Because of the need they have, Hispanics will do everything; they are not afraid, they are more fanned, and they work faster to earn more.
3. According to them, neither Non-Hispanic Whites, African-Americans, nor Asians are seen performing high-risk construction work.
4. “Hispanics are rough, they are designed to work”.

Phase 2: Quantitative survey questionnaire

A total of 121 surveys were completed at 14 different construction sites throughout the region (thirteen commercial; one residential). The sample was later reduced to 66, due to inconsistencies in responses regarding country of origin. Workers self-identified the type of construction work as construction equipment operators, masonry, electricians, roofers, general construction laborers, helpers, and other specialized workers (Table 1).

Table 1. Self-classification of construction work type by selected site.

	Construction site	n	Construction job type						
			Equipment operator	Masonry	Electrician	Roofer	General laborer	Helper	Other*
1	Joe Battle and Bill Mitchell	13	3	1	1	2	4	2	0
2	Pebble Hills	7	0	7	0	0	0	0	0
3	Montana / Ruth Erglen	17	3	3	4	4	3	0	0
4	Montana / Brunner	11	2	3	3	3	0	0	0
5	El Paso St / Missouri	21	4	4	4	5	2	2	0
6	Yarbrough / Montana	17	4	6	3	0	4	0	0
7	Sundance	2	0	0	1	1	0	0	0
8	George Dieter / E. Glen	12	0	4	3	5	0	0	0
9	Mesa / Redd	2	0	0	0	0	2	0	0
10	Doniphan / Midway	3	0	2	0	0	0	1	0
11	Montoya and Doniphan	1	0	1	0	0	0	0	0
12	N. Mesa and Crossroads	2	0	2	0	0	0	0	0
13	Mesa Hills	1	1	0	0	0	0	0	0
14	Schuster and El Paso St.	12	2	0	10	0	0	0	0

*Other types of construction job included specialized insulation and building equipment installers.

The location of each group where surveys were administered is shown in Figure 2.

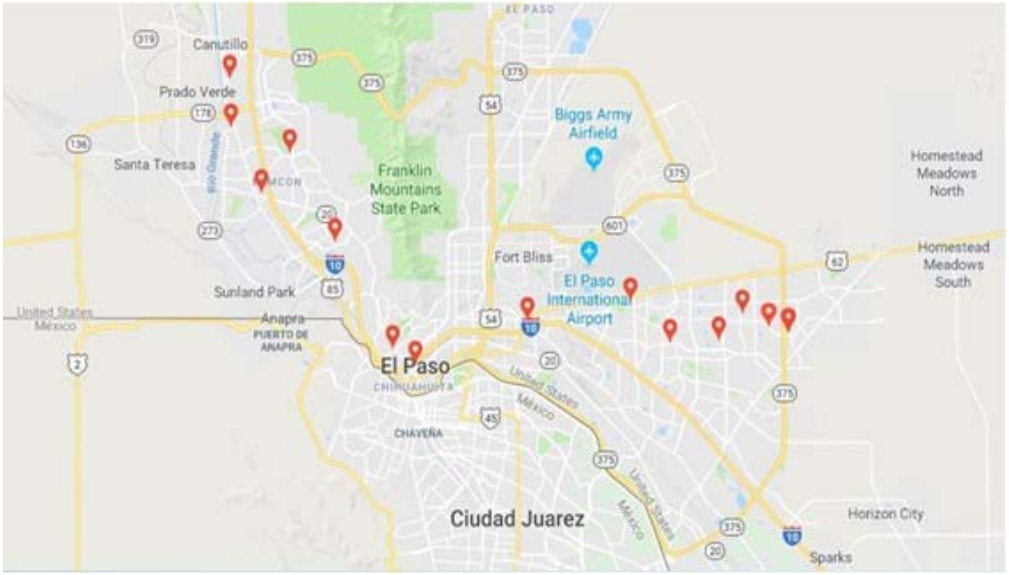

Figure 2. Geographical representation of all sites where surveys were administered in different construction work sites around El Paso, TX (2018).

Demographics

Table 2 shows the demographic data of the sample population studied which consisted of a total 66 participants. From these, 65 of the participants (98.5%) were men. Only one woman (1.5%) was identified in the study. Age was classified into three main groups: those between 18 and 30 years (21.2%), those between 31 and 45 years (36.4%) and those 45 years and above, which was the majority of the participants (42.4 %). In regards to seniority, participants were classified into the following groups: those who have worked in a construction-related work for 1 year or less (25.8%), those who have worked between 1 and 3 years (18.2%), those who have worked for a period of 4 to 6 years (15.2%), and those who have worked for more than 6 years and comprised the majority of the participants (40.9%). As many as 53 participants (80.3%) had more than 6 years of residence in the United States, while only 3 (4.5%) had less than 1 year living in that country.

Table 2. Demographic characteristics of sampled population (n=66)

		(n)	%
Gender	Male	65	98.5
	Female	1	1.5
Age range (years)	≤ 30	14	21.2
	31 - 45	24	36.4
	≥ 45	28	42.4
Seniority (years)	≤ 1	17	25.8
	1 – 3	12	18.2
	4 – 6	10	15.2
	≥ 6	27	40.9
Length of residency in U.S. (years)	≤ 1	3	4.5
	1 – 3	2	3.0

Source: Data analysis elaborated through SPSS (2018)

Analysis on targeted cultural dimensions

Collectivism

The first cultural dimension of Hofstede's model to be analyzed was "collectivism" and included 10 different questions to be answered by all the participants. Descriptive analysis is shown on Table 3. All the items answered have a minimum value of 1 and a maximum value of 5. The item with the lowest average value (2.70) was "if necessary I must sacrifice my own interests for the best of the group", which indicates that workers

are considered to be more individualistic of opinion in regards to protect self-interests more rather than the group. On the other hand, the question with the highest average (3.86) was "Performance is better when working in a group", which indicates that from the perception of employees, they agree that collaborative work in the company is has better results and benefits. In almost all cases the response averages are above the midpoint. In the question "Performance is better when working in a group" a mode of 5 was obtained, this means that the majority of workers considered to be totally in that when working in a team the results are better than individual. The answers on "It is more important to be loyal to the group, even if it prevents me from achieving my personal goals" and "If necessary I have to sacrifice my own interests for the welfare of the group" had a mode of 2, that is, the majority of the subjects were in disagreement with this, indicating their personal wellbeing is first that of the group. Lastly, the answer with more frequency was "I work to achieve the goals of my group, not necessarily for mine", meaning that workers were neither in agreement nor in disagreement with this. For the rest of the questions on collectivism, most agreed with what was asked.

Table 3. Descriptive statistics for "Collectivism" dimension

	N	Min.	Max	Mode	M	Std. Dev
1. It is more important to be loyal to the group, even if it prevents me from achieving my personal goals.	66	1	5	2	2.89	1.204
2. Group success is more important than personal success.	65	1	5	4	3.09	1.343
3. Work to achieve the goals of my group, not necessarily for mine.	66	1	5	3	3.21	1.271
4. My supervisor expects me to follow the procedures indicated by me to the letter.	66	1	5	4	3.80	1.231
5. The welfare of the group is more important than recognizing the work of each employee.	65	1	5	4	3.45	1.160
6. The welfare of the group is more important than the personal rewards of its members.	66	1	5	4	3.26	1.207
7. If necessary, I must sacrifice my own interests for the welfare of the group.	66	1	5	2	2.70	1.240
8. I must continue with the group at all times, even when there are difficulties.	66	1	5	4	3.36	1.308
9. Performance is better when working in a group.	65	1	5	5	3.86	1.310
10. The employees can only pursue the goals, once we have taken into account the welfare of the group.	66	1	5	4	3.35	1.102
(N)	63					

Source: Data analysis was elaborated through SPSS (2018)

Power Distance

The second dimension analyzed was “Power Distance”. Table 4 shows descriptive statistics of all the 13 questions used to evaluate this cultural dimension. All items have a minimum value of 1 and a maximum value of 5. The question with the lowest average value of (2.72) was "My supervisor does not ask for my opinion", which indicates that the workers consider that their superior does not take into account the opinion of all the collaborators. On the other hand, the item with the highest average (3.90) was "My supervisor uses his authority to make sure that we do the job", which indicates that from the perception of the employees they agreed that the superior exercises the authority for a better performance and compliance in regards to all activities at work. In all cases the response averages are above the midpoint of the scale. While for the mode of all the items, the values obtained were 4, indicating that they were in agreement with them, except for the item "My supervisor does not ask for my opinion" which had a fad of 2, is say that most study subjects perceive that their supervisor does take their opinions into account.

Table 4. Descriptive statistics of “Power Distance” dimension.

	N	Min	Max	Mode	M	Std. Dev
1. My supervisor uses his authority to make sure we do the job right.	60	1	5	4	3.90	1.069
2. My supervisor has the authority in the working group.	62	1	5	4	3.47	1.277
3. There is favoritism towards co-workers who have friendship with the supervisor.	61	1	5	4	3.03	1.354
4. My supervisor makes most of his decisions without consulting us.	58	1	5	4	3.21	1.239
5. My supervisor does not ask for my opinion.	58	1	5	2	2.72	1.281
6. I must agree with the supervisor's decisions	59	1	5	4	3.49	1.089
7. My co-workers must agree with the supervisor's decisions.	61	1	5	4	3.54	1.058
8. Supervisors must make important decisions.	62	1	5	4	3.84	1.176
9. I follow the rules established in the work, because I do not want to be punished if I do not.	62	1	5	4	3.81	1.099
10. Work productivity is achieved thanks to the strict supervision of the supervisor.	62	1	5	4	3.55	1.169
11. Work productivity is achieved thanks to the continuous monitoring of the supervisor.	62	1	5	4	3.55	1.155

Table 4. Descriptive statistics of "Power Distance" dimension.

	N	Min	Max	Mode	M	Std. Dev
12. I expect my supervisor to tell me what I should do at work.	62	1	5	4	2.90	1.277
13. My supervisor has privileges.	61	1	5	4	3.31	1.191
(N)	50					

Source: Data analysis was elaborated through SPSS (2018)

Uncertainty Avoidance

The third cultural dimension to be analyzed was "Uncertainty Avoidance". Table 5 includes descriptive statistics of all the 9 items through which uncertainty was assessed. All items have a minimum value of 1 and a maximum value of 5. The item with the lowest average value is (3.67) was "In the company, the work problems are solved logically", which indicates that the workers consider to be in agreement, in the form in which they face the daily situations in the labor context. On the other side, the item with the highest average (4.17) was ¨It is important to follow the work instructions at the bottom of the letter¨, which indicates that from the perception of employees it is important to receive clear and precise instructions. In all cases, the response averages are above the midpoint of the scale.

All the items obtained a mode of 4, showing agreement with them, with the exception of the item "It is important to follow the work instructions to the letter" and "The work rules should not be broken, although it could be good for the company ", which had a mode of 5, indicating that most workers give great importance to receive work instructions and follow them, without breaking any of them.

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Table 5. Descriptive Statistics of "Uncertainty Avoidance" dimension

	N	Min	Max	Mode	M	Std. Dev
1. It is important that the work instructions are detailed, to know what we are expected to do.	65	1	5	4	4.02	1.038
2. It is important to follow the work instructions to the letter.	65	1	5	5	4.17	1.039
3. Work rules are important because they inform us what is expected of us.	65	1	5	4	4.08	1.080
4. It is useful to have procedures to perform the work.	60	1	5	4	4.10	1.020
5. The work rules should not be broken, although it could be good for the company.	61	1	5	5	3.74	1.196

Table 5. Descriptive Statistics of "Uncertainty Avoidance" dimension

	N	Min	Max	Mode	M	Std. Dev
6. In the company we accept the recommendations of the different experts in the field (construction, security, health)	61	1	5	4	3.95	1.007
7. In the company we follow the recommendations of the different experts in the field (construction, security, health)	61	1	5	4	4.02	.975
8. In the company, work problems are solved logically.	61	1	5	4	3.67	1.165
9. The company relies on the recommendations of more experienced workers.	61	1	5	4	3.93	.946
(N)	59					

Source: Data analysis was elaborated through SPSS (2018)

Masculinity

The last cultural dimension to be analyzed was "Masculinity". Table 6 includes the descriptive statistics of all the 7 items with which masculinity was measured. All items have a minimum value of 1 and 5 of the 7 have a maximum value of 5, the exception is found in the question ¨It is better for a man to conduct work meetings¨ and ¨To solve the company's problems it is required the strength and mentality of men¨, where the maximum value was 4. The question with the lowest average value (2.11) was ¨Women are more concerned about making friends, than about doing their job¨, which indicates that the workers consider that they disagree given that they think that women can do a good job in the construction field. Like men, this is confirmed by the value obtained in mode of 1, where the majority responded totally disagree with the previous. On the other hand, the item with the highest average (2.72) was "Men do some jobs better than women", which indicates that from the perception of employees it is better to have a male supervisor than a female one. In almost all cases the response averages are below the midpoint of the scale. With regard to mode, in the question "Men solve problems with the head, while women do it with their hearts" and "To solve the company's problems requires the strength and mentality typical of men", there was a fad of 2, indicating that most of the sample answered that they did not agree with the above, this means that they perceive that both men and women are capable of solving the problems that arise.

Table 6. Descriptive Statistics of "Masculinity" dimensión.

	N	Min	Max	Mode	M	Std. Dev
1. I prefer that the supervisor be a man and not a woman.	64	1	5	3	2.50	1.127
2. Women worry more about making friends, than about doing their job.	64	1	5	1	2.11	.961
3. Men worry more than women about their work.	64	1	5	3	2.27	.996
4. It is better for a man to conduct business meetings.	63	1	4	3	2.27	.971
5. Men solve problems with their heads, while women resolve problems with their hearts.	63	1	5	2	2.24	1.058
6. To solve the problems of the company requires the strength and mentality typical of men.	64	1	4	2	2.30	1.019
7. Men do some jobs better than women.	64	1	5	3	2.72	1.061
(N)	62					

Source: Data analysis was elaborated through SPSS (2018)

Risk Behavior

Risk behavior among the participants was also included in the study. Table 7 shows the descriptive statistics of the 21 items with which risk behavior was assessed. All items have a minimum value of 1 and a maximum value of 5. The item with the lowest average value was (1.91) "Use damaged tools", which indicates that the workers consider that they disagree, since they have access to tools in good conditions to perform their work. On the other hand, the item with the highest average (3.77) was "Climb stairs over 2 meters high", this agrees with the mode obtained for this question, which was 4, indicating that from the perception of the employees they agree that they regularly perform work at high heights. In 15 of the questions the response averages are below the midpoint of the scale. Most of the items obtained a mode value of 1 and 2, indicating that they were totally in disagreement and in disagreement with a large part of the risk behaviors, except for work at heights, which is therefore considered the highest risk behavior in the sample population studied.

Table 7. Descriptive statistics of risk behavior

	N	Min	Max	Mode	M	Std. Dev
1. Climb stairs that are more than 2 meters high.	65	1	5	4	3.77	1.115
2. Climb stairs that are not secured to the structure.	66	1	5	2	2.50	1.339

Table 7. Descriptive statistics of risk behavior

	N	Min	Max	Mode	M	Std. Dev
3. Climb stairs of more than 2 meters without securing with a seatbelt.	64	1	5	2	2.34	1.237
4. Holds only with one hand when climbing stairs over two meters high.	65	1	5	2	2.11	1.077
5. Climb stairs carrying tools or equipment in your hand.	64	1	5	2	2.66	1.348
6. Climb stairs carrying material in your hands.	65	1	5	2	2.69	1.298
7. Works on scaffolding.	64	1	5	1	3.06	1.355
8. Climb the scaffold without checking it before.	64	1	5	1	2.08	1.212
9. Avoid tethering to a fixed point when climbing the scaffold	65	1	5	2	2.09	1.155
10. Load heavy objects more than two meters away.	65	1	5	1	2.68	1.336
11. It does not help your partners to lift heavy objects.	65	1	5	1	2.08	1.241
12. Avoid putting on protective gloves	65	1	5	1	1.98	1.139
13. Do certain jobs, although you know they are insecure.	65	1	5	1	2.22	1.205
14. Missing security meetings.	64	1	5	1	2.02	1.161
15. Work in a place with unsafe conditions.	65	1	5	1	1.94	1.059
16. Work in a messy place.	65	1	5	1	2.12	1.125
17. You lack the safety equipment you need.	65	1	5	1	2.17	1.193
18. Use damaged tools.	65	1	5	1	1.91	1.011
19. Use damaged machinery.	63	1	5	1	1.95	1.084
20. Uses damaged personal protective equipment (safety).	65	1	5	1	1.94	1.074
21. He sees his partners perform unsafe actions	65	1	5	1	2.28	1.244
(N)	60					

Source: Data analysis was elaborated through SPSS (2018)

Risk Probability

The results corresponding to the probability of risk are shown in Table 8, in which descriptive statistics of the 6 items assessed can be observed. The highest average obtained (4.02) was in the item "Help your colleagues", reflecting that most workers consider that when they are helping one of their co-workers. It is very likely that they will present the possibility of a risk, this coincides with the results for the same question where the most frequent response was 5 of highly probable risk. The next question with the highest mean (3.46) was "Clean or prepare your place of work", an activity in which

most believe that the risk may be present, this coincides with the mode of the item, which was of 5 also, perceiving such activity as highly probability of an injury. On the other hand, the item with the lowest average (2.55) was the one of "Mount / disassemble structures and scaffolds", the mode for this one was 1, that is, the most frequent answer was "impossible", which means that the workers consider that during this activity it is very unlikely that they will have an injury. Another of the questions with a low value (2.68) was "Digs trenches or prepares the ground to work", this had a mode of 1 as well, indicating that the majority of the study sample considered it unlikely that an injury would occur during the accomplishment of this task.

Table 8. Descriptive statistics on "Risk probability" dimension.

	N	Min	Max	Mode	M	Std. Dev
1. Clean or prepare your workplace	65	1	5	5	3.46	1.437
2. Loading or unloading construction materials	65	1	5	3	3.35	1.304
3. Assemble / disassemble structures and scaffolding	65	1	5	1	2.55	1.370
4. Dig trenches or prepare the ground to work.	65	1	5	1	2.68	1.348
5. Uses work tools	64	1	5	5	3.89	1.197
6. Help your colleagues.	65	1	5	5	4.02	1.139
(N)	64					

Source: Data analysis was elaborated through SPSS (2018)

Severity of risk

Table 9 contains the results corresponding to the severity of risk, in which the descriptive statistics can be observed for the 6 items assessed. The highest average obtained (3.70) was in the items "Use work tools" and "Help their peers", which had a mode of 4 (serious) and 5 (very serious / could die) respectively. This indicates that workers perceive that if an injury developed in activities involving tools or by helping their colleagues at work, it would be a serious injury that could put their lives at risk. Another of the items with the highest average (3.42) was "Clean or prepare your workplace", indicating that the participants consider that if an injury developed as a result of this activity, it could also be serious. The mode for this same question was high (5), meaning that most workers perceive that the resulted injury can be very serious or

even fatal. On the other hand, the item with the lowest average (2.41) was "Assemble / disassemble structures and scaffolds", that is to say that the workers consider that, if an injury occurs during the aforementioned activity, it would probably not be serious or considered as a superficial injury.

Table 9. Descriptive statistics on "Severity of risk" dimension.

	N	Min	Max	Mode	M	Std. Dev
Clean or prepare your workplace	63	1	5	5	3.43	1.510
Loading or unloading construction materials	64	1	5	4	3.14	1.355
Assemble / disassemble structures and scaffolds	64	1	5	1	2.41	1.342
Dig ditches or prepare the ground to work.	63	1	5	1	2.62	1.385
Use work tools	64	1	5	4	3.70	1.318
Help your colleagues.	64	1	5	5	3.70	1.466
(N)	62					

Source: Data analysis was elaborated through SPSS (2018)

8. Discussion

Numerous previous studies have shown that Hispanic-Latino construction workers suffer a higher significant risk of occupational injuries and mortality in the U.S. due to poor work conditions, lack of safety training and language barriers. According to federal law and regulations, employers must provide adequate safety protective measures, equipment, and an overall safe work environment. Employers are also obligated to provide safety training in the language of preference, as a preventative measure to reduce the risk of accidents and fatalities during work. Still, Hispanic-Latinos have a workplace fatality rate of 5.9 per 100,000, which is almost 50% higher than the rate of all the construction worker population (Center for Disease Control and Prevention, 2014). This problem it is expect to continue to increase in Texas, as many cities are considered top for construction jobs due to the increase of population and infrastructure.

The participants of this study consisted primarily of male workers with an age of 45 and above, who have worked in the construction sector for over 6 years and have migrated to the U.S. also over 6 years ago. Most of them had previous work experience in Mexico and the only type of job they had always performed over their life time. Although they agreed that the activities they performed in both countries were the same,

what made the difference from both places were: the level of safety measures, a superior organization of work and the access to better equipment which allowed them to complete their tasks easier and faster. The question would be, if workers have better equipment and safety gear then why the continued increase in injuries and mortality rates? When communicating with participants during focus groups and the application of surveys, the language of preference continued to be Spanish, while safety meetings and communication with supervisor was English. Although this study was focused on Hofstede's cultural dimensions, the language barrier was an obvious factor that will continue to represent an important challenge to supervisors in the implementation of safety training and communication with their workers.

Following Hofstede's model, "collectivism", "power distance" and "uncertainty avoidance" had a higher impact on the interviewed participants, while "masculinity" was lower. "Collectivism" is the degree to which people in a society are integrated into groups (Hofstede, 2011). In Hofstede's model, Mexico is considered as a collectivistic society while USA is highly individualist. Thus it can be interpreted that people of Mexico tend to build strong relationships with other members of their group as family is one of the most important elements in Mexican society. Loyalty is also an important trait of collectivistic societies, which makes them to protect group members or make decisions that would benefit all their members. The results in this study were in almost all cases with means above the midpoint. The majority of workers considered to be in agreement that when working as a team the results are better than individual.

The "power distance" dimension deals with the fact that all individuals in societies are not equal and express the attitude of the culture towards these inequalities (Hofstede, 2011), representing some form of inequality. Mexico is considered a hierarchical society under Hofstede's model. Therefore, subordinates are expected to be told what to do and how to do it; also having a boss who, ideally, will consider opinions of the group at some extent. Results of this study reflect this power distance. The overall perception of the employees is that the superior exercises the authority for a better performance and compliance at work without considering their opinions into account.

"Uncertainty avoidance" deals with a society's tolerance for ambiguity indicating to what extent a culture programs its members to feel either uncomfortable or comfortable in unstructured situations. In this study, this dimension tested high indicating that from the perception of employees it is important to receive clear and precise instructions. Considering this, core elements under the updated OSHA guidelines (OSHA, 2016) including hazard identification and assessment, hazard prevention and education should consider these dimensions under their program evaluation and improvement of safety strategies for migrants.

The dimension of "masculinity" is related to the emotional roles between men and women within a society, not at an individual level. The majority of answers among the participants reflect a general perception that both men and women are capable of solving the problems at work. Women are well accepted in their group with no difference.

On terms of risk probability and severity, these were considered higher only when working with specific machinery or tools, or helping a coworker on a different task than the one they were performing. During focus groups, some workers agreed that having weekly, and even daily, brief meetings about safety were ideal to reinforce information on procedures and work practices.

Current established guidelines are already considering the importance of removing some barriers, and encourage workers to become more active participants without the fear of retaliation. Development of health and safety training strategies should also consider the importance "collectivism", "power distance" and "uncertainty avoidance" as key elements in their recommended strategies when communicating with migrant workers.

9. Additional Accomplishments

Final study results were presented as a poster at the 13th Summer Institute on Migration & Global Health Conference in Oakland, CA. held in June, 2018 (Appendix 1)

10. Conclusions and/or Recommendations

The need to overcome training barriers has been recognized in previous research, and acknowledge by government labor institutions. Research is needed to determine additional causes for the higher rate of accidents and injuries among Hispanic and foreign-born workers (Dong, et.al. 2013). As populations and infrastructure continue to grow, migrant workers will continue to play an essential role in the construction industry as they occupy the primary workforce in US. Therefore, developing strategies that satisfy cultural differences are strongly needed and should be constantly reviewed with the aim to decrease the occupational injuries and mortality rates. Based on or findings, a policy brief has been developed and is shown in Appendix 2a and 2b.

Implementing worker safety training has been already been identified as a problematic issue before. The efficiency of passive versus active methods was evaluated by Burke, et.al. (2006), concluding that the design of safety training must involve "…behavioral modeling, a substantial amount of practice, and dialogue…" since it has proven to be more effective than other methods. They also discussed the challenges posed by the then current emphasis on more passive computer-based and distance training methods within the public health workforce.

Safety trainings design based on behavior modeling have been implemented before. However, as pointed out by Nieto-Montenegro, et.al. (2008), seldom they are applied to industrial settings. In the same study, the Health Action Model (HAM) was used to design a safety training targeting Hispanic-Mexican workers in the mushroom industry. Interestingly, one particular safety behavior "handwashing after using restroom" was significantly improve after training. However, according to authors, the positive result may have been greatly influenced by previous health-culture practices in Mexico that promote handwashing, which eased the transition from intention to action. They also noted that the training lessons by themselves cannot necessarily lead to modifications in behaviors, unless they are deeply rooted and familiar to workers. Hence the importance on considering the different component of culture when designing safety training methods in this particular population groups.

Regarding safety training in Hispanic migrant populations in the United States, a participatory approach has been reported as a successful practice, taking advantage of

group and peer leadership behavior common to the culture. It has been identified that safety training tailored to the needs of construction day laborers may have a positive effect on Latino immigrant workers' attitudes and work practices (Williams, et.al. 2010). The success of this approach has been supported by the literature as one that may indeed aid in reducing the number of traumatic injuries among the immigrant construction workforce. However, a widespread implementation of this type of training will require more than support and cooperation from contractors. It will require active and committed employer engagement. Hence the need for development of policy.

All future research should embrace the overarching goal of reducing traumatic fatalities and injuries, which remain high among the growing Hispanic construction workforce, particularly among foreign born Hispanic-Latinos. Still, safety training educational interventions have been shown to promote participation, build skills and leadership, its application in construction work have been limited. Moreover, the influence of specific dimension components of culture needs to be considered when designing these interventions. The need for policy development in this area cannot be overlooked.

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Appendix 1a

TIME TO BRING CULTURAL FACTORS INTO SAFETY TRAINING

Gabriel Ibarra-Mejia[1], Aurora I. Maynez-Guaderrama[2], Maria M. Vargas-Salgado[2], Karla G. Gomez-Bull[2]

Background

Construction is the third most dangerous industry in the United States. In 2016, the Hispanic-Latino work force numbered 26.8 million, a nearly triple figure from the 9 million reported in 1988, with an overwhelming majority represented by individuals on Mexican descent. Furthermore, out of this work force figures, as many as 27.3% of them work in construction-related jobs. However, this population group suffers disproportionately high rates of injuries and fatalities related to occupational injuries than the rest of the population in the country, and in the different construction fields. The annual cost associated with construction-related accident is up to $1.36 billion, of which 53% derives from the Hispanic-Latino worker population. Notably, less than 48% of injured Hispanic-Latino workers receive payment for medical expenses, and a similar percentage lacks the health insurance needed to cover these expenses.

While many factors contribute to accident occurrences, among the most prominent risk factors in this population are those associated with the lack of previous formal education, or the lack of training or safety equipment provided by companies to their employees. Other risk factors known to represent an increased risk are language and literacy barriers, and the very need for a job that leads the worker to expose himself to certain risks for fear of losing his job. It is also known that Hispanic-Latino migrant workers are at a financial and educational disadvantage at work, and particularly, face

situations of greater risk, likely exacerbated by language and cultural barriers which limit the efficacy of safety trainings. Recent research recommends considering cultural aspects to understand behavior and cultural factors of Hispanic-Latino construction workers as potential factors that may explain why these migrant workers have such high injury rates. Moreover, researches also indicate that even though efforts have been made to include culture and expand this area of research, emphasis is made on how limited the definition of the cultural variable has been.

Research Findings

According to this study, the following are key findings that require special attention from supervisors and contractors in construction companies.

- **Hispanic-Latino construction workers suffer a higher significant risk of occupational injuries and mortality in the U.S. due to poor work conditions, lack of safety training and language barriers**. Perhaps, not only language should be considered as the only barrier needed to fully understand possible hazards and control measures in their work environment as part of their guidelines. Findings in this research strongly suggest the need to consider cultural characteristics and adapt them to current strategies in all their education course and safety training material.
- **Language barriers are still an important factor for work-related injuries in migrant workers.** According to this study, many of the interviewed workers have had a lifetime experience in construction and performed the same tasks when working in Mexico before migrating. The all agree that the level of safety

measures, a superior organization of work and the access to better equipment allow them to complete their tasks easier and faster. Still, safety meetings continue to be in a language they do not dominate missing key points when avoiding hazards and exposing them at riskier activities. Fear of retaliation and of losing their job for not following instructions as they do not understand instructions are an important factor.

- **Employed Latinos are less likely to hold formal education.** As Latinos continue to enter the workforce in greater number as the population growth, it is imperative to offer access to education, or language training to decrease accidents related to language barriers. Many of the participants never had access to finish high school. Therefore, when it comes to receiving instructions this could have an impact in have a higher risk of injury.
- **Cultural barriers are considered essential in migrant workers.** Results in this study identified essential cultural factors among the majority of Hispanic construction workers which provides an insight of how they probably also interact at work. Participants were identified acting as a collectivistic society, in which all members of the group are more integrated as a group. But when it comes to risk behaviors, they agreed they find themselves at a higher risk when helping other workers in an activity not related to them. Hispanics workers appear to like to have an authority who guides their performance and work duties, they also like to have their opinions into account when it comes to decisions that benefit the group as a whole entity.

Current State/Federal Policy

OSHA is the enforcing government agency that oversees workplace safety, and regarding safety training and education, and it establishes workers are entitled to the following:

- Being trained in a language workers understand and be provided with safety gear is a right to all construction workers.
- Safety trainings should be able to adapt strategies in which the Hispanic population may be able to understand better and have an impact on the reduction of rates associated with work related injuries and mortality.

In 2008, the Construction Sector Council of the National Occupational Research Agenda (NORA), sponsored by NIOSH, developed “Construction Culture.” It specified the need to better understand safety culture in construction and how it impacts construction safety and health. The construction-focused workshop was part of a larger Safety Climate and Safety Culture workshop co-hosted by the National Institute of Environmental Health Sciences (NIEHS) and CPWR. Cultural differences in the working population are now beginning to be considered and incorporated in different research projects and organizations.

As can be seen, regulations mainly enforced by OSHA require mandatory safety education and training, which to some extent has been proven effective in reducing rates of accidents and injuries. However, the focus is more on the training itself that on the methods and efficiency in promoting a safety culture. There are no regulations or policies that promote the design and implementation of safety education and training methods tailored to the specific need of different worker population groups. Thus, there

is a need to include cultural factors to appropriately design these. We must not limit the design of these intervention to the provision of multilingual information and materials.

Recommendations

- **Incorporate safety trainings designed on the basis of behavior modification modeling and cultural factors.** Knowing that training lessons by themselves cannot necessarily lead to modifications in behaviors, unless they are deeply rooted and familiar to workers. Hence the importance on considering the different component of culture when designing safety training methods in this particular population groups.
- **Create safety training programs that incorporate cultural differences to engage Hispanic workers**. By providing training to all managers, supervisors and workers in a cultural environment well accepted by construction workers will be able to give a sense of collectivistic society, which makes them more active in protecting other group members or making decisions that would benefit all their members, as well decrease the overall perception that the superior exercises the authority without considering their opinions into account.
- **Provide specific training, continued review of hazards for roofers or limit activities according to age as young construction workers are among the most vulnerable population in fatal injuries.** It is suggested that work duties are specific, or limited when there has been a lack of training under a specific activity, or in the language of preference to protect vulnerable populations from fatal injuries related to job performance.

- **Continue providing monthly/weekly safety training in a language of preference.** Provides information on safety measures in workplace with specific instruction on a language the worker understands, reducing injuries related to language barriers through the identification of potential hazards on different procedures during work performance. Also, resolves ethical issue of discrimination under United States Department of Labor.

Policy Impact

Migrant workers play an essential role in the construction industry as they occupy the primary working force. Therefore, developing strategies that meet cultural and language barriers to decrease mortality rates and work-related injuries should be a priority by the employers of the construction sector. Many of these strategies should be created to meet the cultural differences and language barriers of the Latino population as they migrate and adapt to a new work environment and lifestyle.

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Appendix 1b

ES TIEMPO DE INCLUIR LOS FACTORES CULTURALES EN EL ENTRENAMIENTO EN SEGURIDAD LABORAL

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Antecedentes

La construcción es la tercera industria más de mayor riesgo en los Estados Unidos. En 2016, la fuerza de trabajo hispano-latina ascendió a 26.8 millones, una cifra casi triple de los 9 millones reportados en 1988, con una abrumadora mayoría representada por individuos en ascendencia mexicana. Además, de estas cifras de fuerza laboral, hasta el 27.3% de ellas trabaja en trabajos relacionados con la construcción. Sin embargo, este grupo de población sufre tasas desproporcionadamente altas de lesiones y muertes relacionadas con lesiones laborales que el resto de la población en el país y en los diferentes campos de la construcción. El costo anual asociado con accidentes relacionados con la construcción es de hasta $ 1,36 mil millones, de los cuales el 53% proviene de la población trabajadora Hispano-Latina. Notablemente, menos del 48% de los trabajadores Hispano-Latinos lesionados reciben pagos por gastos médicos, y un porcentaje similar carece del seguro de salud necesario para cubrir estos gastos.

Si bien muchos factores contribuyen a la ocurrencia de accidentes, uno de los factores de riesgo más prominentes en esta población son los asociados con la falta de educación formal previa, o la falta de capacitación o equipo de seguridad proporcionado por las empresas a sus empleados. Otros factores de riesgo que se sabe que representan un mayor riesgo son las barreras del idioma y la alfabetización, y la necesidad misma de un trabajo que lleve al trabajador a exponerse a ciertos riesgos

por temor a perder su trabajo. También se sabe que los trabajadores migrantes hispano-latinos tienen desventajas financieras y educativas en el trabajo y, en particular, enfrentan situaciones de mayor riesgo, probablemente exacerbadas por barreras idiomáticas y culturales que limitan la eficacia de los entrenamientos de seguridad. Las investigaciones recientes recomiendan considerar los aspectos culturales para comprender el comportamiento y los factores culturales de los trabajadores de la construcción hispano-latinos como posibles factores que pueden explicar por qué estos trabajadores migrantes tienen tasas de lesiones tan altas. Además, las investigaciones también indican que, aunque se han realizado esfuerzos para incluir la cultura y ampliar esta área de investigación, se hace hincapié en cuán limitada ha sido la definición de la variable cultural.

Resultados de la investigación

De acuerdo a los resultados de este estudio, los siguientes hallazgos son esenciales y requieren especial atención de los supervisores y contratistas en las empresas de construcción.

- **Los trabajadores de la construcción hispano-latinos sufren un mayor riesgo significativo de lesiones y mortalidad ocupacional en los EE. UU. debido a las malas condiciones de trabajo, la falta de capacitación en seguridad y las barreras del idioma.** Quizá no solo el lenguaje debe considerarse como la única barrera necesaria para comprender completamente los posibles peligros y las medidas de control en su entorno de trabajo como parte de sus directrices. Los hallazgos en esta investigación sugieren

fuertemente la necesidad de considerar las características culturales y adaptarlas a las estrategias actuales en todos sus cursos de educación y material de capacitación de seguridad.

- **Las barreras del idioma siguen siendo un factor importante para las lesiones relacionadas con el trabajo en los trabajadores migrantes.** Según este estudio, muchos de los trabajadores entrevistados han tenido una experiencia vitalicia en la construcción y han realizado las mismas tareas cuando trabajaban en México antes de migrar. Todos coinciden en que el nivel de medidas de seguridad, una organización superior de trabajo y el acceso a mejores equipos les permiten completar sus tareas de manera más fácil y rápida. Aun así, los entrenamientos en seguridad continúan en un idioma en el que no dominan los puntos clave que faltan cuando se evitan los peligros y se los expone a actividades de mayor riesgo. El miedo a las represalias y a perder su trabajo por no seguir las instrucciones ya que no entienden las instrucciones son un factor importante. Por lo tanto, los trabajadores se ponen en mayor riesgo de realizar actividades que no son muy claras para ellos.
- **Los Latinos empleados son menos propensos a tener educación formal.** A medida que los Latinos continúan ingresando a la fuerza de trabajo en mayor número a medida que crece la población, es imperativo ofrecer acceso a la educación o capacitación en idiomas para disminuir los accidentes relacionados con las barreras del idioma. Muchos de los participantes nunca tuvieron acceso para terminar la escuela secundaria.

- **Las barreras culturales se consideran esenciales en los trabajadores migrantes.** Los resultados de este estudio identificaron factores culturales esenciales entre la mayoría de los trabajadores de la construcción hispanos, lo que proporciona una idea de cómo probablemente también interactúen en el trabajo. Se identificó a los participantes actuando como una sociedad colectivista, en la que todos los miembros del grupo están más integrados como grupo. Pero cuando se trata de comportamientos de riesgo, acordaron que se encuentran en un riesgo mayor al ayudar a otros trabajadores en una actividad que no está relacionada con ellos. Parece que a los trabajadores hispanos les gusta tener una autoridad que guía su desempeño y deberes laborales, también les gusta tener sus opiniones en cuenta cuando se trata de decisiones que benefician al grupo como una entidad completa.

Política estatal / federal actual

La OSHA es la agencia gubernamental que rige la educación y entrenamiento en seguridad en los sitios de trabajo, y establece que los trabajadores tienen el derecho a lo siguiente:

- Ser capacitado en un idioma en el que los trabajadores entienden y recibir equipo de seguridad es un derecho de todos los trabajadores de la construcción.
- Que los entrenamientos básicos de seguridad deberían ser capaces de adaptar estrategias en las que la población hispana pueda comprender mejor y tener un impacto en la disminución de las tasas relacionadas con las lesiones y la mortalidad laboral.

En 2008, el Consejo del Sector de la Construcción de la Agenda Nacional de Investigación Ocupacional (NORA), patrocinado por NIOSH, desarrolló "Cultura de la Construcción". Especificó la necesidad de comprender mejor la cultura de seguridad en la construcción y cómo afecta la seguridad y la salud de la construcción. El taller centrado en la construcción fue parte de un taller más amplio de Cultura de Clima de Seguridad y Seguridad coorganizado por el Instituto Nacional de Ciencias de Salud Ambiental (NIEHS) y CPWR. Las diferencias culturales en la población trabajadora ahora comienzan a ser consideradas e incorporadas en diferentes proyectos de investigación y organizaciones.

Como se puede ver, las regulaciones aplicadas principalmente por OSHA requieren educación y capacitación de seguridad obligatoria, que hasta cierto punto se ha demostrado que es efectiva para reducir las tasas de accidentes y lesiones. Sin embargo, la atención se centra más en la capacitación que en los métodos y la eficiencia en la promoción de una cultura de seguridad. No existen regulaciones o políticas que promuevan el diseño y la implementación de métodos de educación y capacitación en seguridad diseñados a la medida de las necesidades específicas de los diferentes grupos de población de trabajadores. Por lo tanto, es necesario incluir factores culturales para diseñarlos adecuadamente. No debemos limitar el diseño de estas intervenciones al suministro de información y materiales multilingües.

Recomendaciones

- **Incorporar entrenamientos de seguridad diseñados sobre la base de modelos de modificación de conducta y factores culturales.** Saber que las lecciones de capacitación por sí mismas no pueden conducir necesariamente a modificaciones en los comportamientos, a menos que estén profundamente enraizadas y sean familiares para los trabajadores. De ahí la importancia de considerar los diferentes componentes de la cultura cuando se diseñan métodos de entrenamiento de seguridad en estos grupos de población particulares.
- **Crear programas de capacitación de seguridad que incorporen las diferencias culturales para involucrar a los trabajadores hispanos.** Al proporcionar capacitación a todos los gerentes, supervisores y trabajadores en un ambiente cultural bien aceptado por los trabajadores de la construcción podrán dar un sentido de sociedad colectivista, lo que los hace más activos para proteger a otros miembros del grupo o tomar decisiones que beneficiarían a todos sus miembros. también disminuye la percepción general de que el superior ejerce la autoridad sin tener en cuenta sus opiniones.
- **Proporcionar capacitación específica, revisión continua de los peligros para los techadores o limitar las actividades según la edad, ya que los jóvenes trabajadores de la construcción se encuentran entre la población más vulnerable en lesiones fatales.** Se sugiere que las tareas laborales sean específicas o limitadas cuando no se haya capacitado en una actividad específica o en el idioma de preferencia para proteger a las poblaciones vulnerables de las lesiones fatales relacionadas con el desempeño laboral.

- **Continuar proporcionando entrenamiento de seguridad mensual / semanal en un idioma de preferencia.** Proporcionar información sobre medidas de seguridad en el lugar de trabajo con instrucciones específicas sobre un idioma que el trabajador entienda, reduciendo las lesiones relacionadas con las barreras del idioma a través de la identificación de riesgos potenciales en diferentes procedimientos durante el desempeño laboral. Además, resuelve el problema ético de la discriminación bajo el Departamento de Trabajo de los Estados Unidos.

Impacto de la política

Los trabajadores migrantes desempeñan un papel esencial en la industria de la construcción, ya que ocupan la fuerza de trabajo primaria. Por lo tanto, el desarrollo de estrategias que cubran las barreras culturales y del idioma para disminuir las tasas de mortalidad y las lesiones relacionadas con el trabajo debería ser una prioridad para los empleadores del sector de la construcción. Muchas de estas estrategias deben ser creadas para cumplir con las diferencias culturales y las barreras del idioma de la población latina a medida que migran y se adaptan a un nuevo ambiente de trabajo y estilo de vida.

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Appendix 2: Image copy of poster presented at the 13th Summer Institute on Migration & Global Health Conference

PREDICTIVE CULTURAL DIMENSIONS OF OCCUPATIONAL RISK PERCEPTION AND BEHAVIOR IN MIGRANT MEXICAN CONSTRUCTION WORKERS

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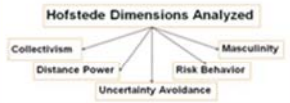
Introduction

In the United States, Texas is considered the state with the highest risk for of occupational accidents among construction workers due to poor working conditions and the lack of safety measures for employees (Perez-De Alejo, 2009).

- The Latino population in Texas is 39.1% (US Census Bureau, 2010). Construction work is occupied by up to 27.3% by Latinos migrants.
- Hispanic-Latinos suffer a higher incidence (15%) of accidents and occupational deaths compared to the rest of the population (Goodrum, 2005) (Dong & Platner, 2004).
- Risk factors associated with higher accident risk in Hispanics are:
  - Lack of formal education or little training to develop the work (Escamilla, 2017).
  - Lack lack of training or safety equipment provided by companies to their employees.
  - Inability to understand proper working procedures due to language and literacy barriers could lead to serious injuries (CPWR, 2008; Roelofs, 2011).
  - Negligence in relation to security measures
  - The very need for a job that leads the worker to expose himself to certain risks for fear of losing his job.
  - Past research has identified the need to identify additional causes – such as cultural factors - for the higher rate (50%) of fatal falls among Hispanic and foreign-born workers.

All these factors are related to certain cultural aspects that put the Hispanic employee at a disadvantage and therefore to a higher risk of accidents at work. Although all people are different according to the culture in which they were born and developed, being part of a group these cultural influences determine the behavior and response to a work environment.

Figure 1. Hofstede Culture Dimensions



Goals and objectives

- The overarching goal of this project is to identify cultural barriers associated to occupational risk perception and behavior in Mexican migrant construction workers from three counties in the United-States-Mexico border region.

- The objective of this study was to determine the analyzing the cause-effect relations between latent constructs using PLS-SEM path modeling.

Study Location-Paso del Norte Region (El Paso, TX)

Figure 2. Topographic map of Paso del Norte Region.
This map illustrates the Paso del Norte region from which sampled population was selected (Hispanic, Mexican-American construction workers). Locations include areas from East and West El Paso, TX.

Methodology

1 Study Design
An observational, descriptive, cross-sectional, causal-correlational, and analytical study design was used. Sample selection criteria:
- *Construction Workers.*
- *Hispanic*
- *12-month history of construction work history*
- *Living in the Paso del Norte region*

2 Focus Groups
Phase 1: Identify cultural aspects that may influence their perception of occupational risk, with emphasis on their views on health and safety.
- *Groups of 5-8 participants*
- *2-hour interviews*
- *Interviews held at work site and after work hours*

3 Data Collection (Surveys)
Phase 2:
- A self-administered, semi-structured, bilingual questionnaire was developed.
- A survey measuring using a Likert-type scale was developed based on a pool of accepted items from previous published literature, and focus group results from Phase 1.
- The questionnaire allowed collecting demographic information, and information regarding cultural factors that may impact risk perception.

4 Data Analysis
- Descriptive analysis were conducted on all variables using SPSS. Frequencies and percentages will be determined in nominal and categorical variables using cross tabulations. IBM© SPSS© Statistics 23 package was used for these analyses.
- A structural equation model based on previous identified cultural dimensions was developed using was using Smart PLS-SEM software.

Figure 3 (A-F). Focus groups and data collection of the sample population, among different construction sites along El Paso, TX.

Acknowledgements

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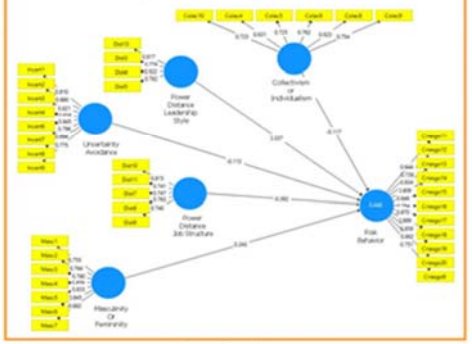
Special Thanks to: Maria Fuentes for the help received throughout this study.

Results

- Four cultural dimensions were included in the SEM-PLS model:
  1) Power distance (PD) (subdivided into leadership style (LS) and job structure (JS).
  2) Individualism/Collectivism (IC).
  3) Uncertainty Avoidance (UA), and
  4) Masculinity/Femininity (MF).
- A total of 117 participants were recruited to participate.
- Only 66 (56%: 65 males, 1 female) were included in the analysis.
- Three out of the five structural paths showed predictive significance at p=0.05, and 95%CI.
- Both sub-dimensions of PD, LS (path estimation 0.337; t=2.185) and JS (path estimation -0.392; t=2.024), and MS (path estimation 0.243; t=2.277).
- Neither IC or UA were considered as predictive of risk behavior.

Figure 4. Structural Equation Model



Conclusions

Conclusions: The SEM-PLS model based on the culture construct dimensions, predicted, and may explain risk behavior in the studied population.

Implications: Further research should be conducted on the management of work place safety at construction job sites, addressing also the role of women holding supervisory positions in the construction industry.

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