

Developing a Tailored Fall Prevention Training Program for Latino Roofers

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Roofers are at an increased risk of falls due to the nature of their work. Inappropriate safety training is one of the leading causes behind the alarming number of workplace accidents suffered by Latinos. As the total number of Latino construction worker deaths continues to trend upwards, the need for effective and culturally appropriate training is also increasing. This paper examined the demographic profiles of 45 Latino roofers who work for a roofing company in Colorado. The most significant findings from the demographic survey indicate that 92 percent of the participants received more than five hours of safety training in the past year. However when asked if the training they received was in their main language, 95 percent responded that the training was not presented in their main language. The fact that training was not in the participants' main language and that only 13% of participants indicated that their ability to read English is good or better raises concern about the adequacy and effectiveness of the training. The goal of this research is to present the results of a demographic survey of Latino roofers. This paper contributes to the body of knowledge by increasing the understanding about Latino construction workers.

Key Words: Latino construction workers, roofers, safety training, fall prevention

Introduction

The construction industry continues to have a high percentage of fatal and non-fatal injuries experienced by Latino workers in the United States (Smith, Perry, & Moyer, 2006). Despite these alarming facts, only a small portion of health and safety research in the construction industry involves Latino workers (Brunette, 2004). The industry standard in the United States to train Latino workers is to provide training in English, or to take existing training manuals and translate them into Spanish (Canales, et al., 2009). It has been recognized that traditional translation methods may lead to inaccuracies (Brunette, 2005) that can prove to be misleading and even fatal (Robotham, 2001). Inappropriate safety training is one of the leading causes behind the alarming increase in workplace accidents for Latino construction workers. The construction industry lacks effective training tools to effectively educate Spanish speaking workers about fall protection (ASSE, 2004). This is an area of concern as Latinos experience work-related injuries at a higher rate compared to non-Latino U.S. workers Smith, Perry, & Moyer, 2006; Byler, 2013).The need for linguistically and culturally appropriate training for Latino construction workers is evident. A significant amount of research exists regarding theories as to why Latinos suffer from a higher percentage of work-related injuries than any other ethnic group. However, only limited research exists that evaluates successful training techniques in the prevention of work-related injuries to Latino construction workers (Brunette, 2004). The paper starts with a literature review that is organized into the following sub-sections; defining the Latino workforce, Latinos in construction, current Latino training programs, training techniques and tailored training programs. It also includes the methodology used to gather respondent demographics and presents the results of the survey administered to roofers. Finally, it presents the conclusions of the first phase of the study and the future steps. The researchers' goal is to tailor the intervention to program participants including participatory input from Latino construction workers and their supervisors, and facilitating a peer-led training program, the risk of falls among participants will be reduced. This paper contributes to the body of knowledge by increasing the understanding about Latino construction workers. The results of the demographic survey can be used by researchers/ trainers to develop effective safety training programs that are culturally, language and educational level appropriate for Latino construction workers at other jobsites that may have similar demographic characteristics. The results can be also used as a sample process framework for other companies.

Defining the Latino Workforce

Latinos are the fastest growing segment in the U.S. work force (Center for Disease Control and Prevention, 2008; Brunette, 2005); and accounted for 49.9 percent of the foreign-born workforce in 2010 (Bureau of Labor Statistics United States Department of Labor, 2011) with 38 percent employed as laborers (Olbina, Hinze, & Ruben, 2011). For the purpose of this paper Latino construction workers are defined as:

Individuals who work in the construction industry and identify with the Latino ethnic group (Padilla, 1984);
Are immigrants of South or Central America including, but not limited to: Ecuador, Argentina, Columbia, Cuba, Mexico, Peru and Puerto Rico (Canales, et al., 2009; Ennis, Rios-Vargas, & Albert, 2011);
Are linked by the Spanish language (Robinson, 1998).

Between 1990 and 2010, immigrants accounted for more than 50 percent of U.S. growth increasing foreign-born employment by 22 percent between 1996 and 2000 (Anderson, Hunting, & Welch, 2000; Ennis, Rios-Vargas, & Albert, 2011). During this time period, immigrants' share of fatal occupational injuries increased by 43 percent during a time when the overall number of fatal occupational injuries in the U.S. declined by five percent (Anderson, Hunting, & Welch, 2000). These trends have continued with fatalities of all ethnicities in construction decreasing from 20.3 percent, or 1,121of all occupational deaths in 2002, to 16.7 percent in 2010 (Bureau of Labor Statistics United States Department of Labor, 2011; Brunette, 2004). However, with the exception of 2002-2003, the total number of Latino construction worker deaths has trended up (Sanders-Smith, 2007) as the overall of number of Latino construction workers has substantially increased in the past decade (Olbina, Hinze, & Ruben, 2011). Two million of the 2.7 million Latino construction workers in the United States are foreign-born; 42 percent cannot speak English fluently and another 42 percent cannot speak English at all (Evia, 2011). Language barriers make communication among Spanish and English speaking workers about the importance of safety training nearly impossible since most training is only available in English (Olbina, Hinze, & Ruben, 2011). As the Latino population in the United States continues to trend upwards the need for effective training for Latino construction workers increases and becomes more critical.

Latinos in Construction

Opportunities exist to improve construction safety training. The construction industry consistently maintains a higher rate of injuries and fatalities than other industries. In 2012 there were 775 fatalities in the private construction sector (BLS, 2013). All workers in the construction industry are faced with the inherent risk of injury regardless of their ethnicity (Anderson, Hunting, & Welch, 2000); language barriers and ineffective training can hinder a worker's understanding of potential hazards on a work site as well as the skills needed to properly complete a job in a safe manner (Smith, Perry, & Moyer, 2006; Evia, 2011; Olbina, Hinze, & Ruben, 2011). Between 1992 and 1996, 11,303 Latino workers lost their lives due to work related injuries (Center for Disease Control and Prevention, 2008) with nearly 25 percent of the occupational deaths occurring in the construction industry (Loh & Richardson, 2004). According to the Occupational Safety and Health Administration (OSHA), falls are the number one cause of fatalities in construction (OSHA, 1996). Other than agriculture, the construction industry has the highest proportion of Latino workers in the U.S. (Olbina, Hinze, & Ruben, 2011) making the construction industry a high priority when it comes to safety research. Brunette (2005) reported that 21 percent of Latino construction workers are laborers accounting for more than 38 percent of all laborers in the industry (Olbina, Hinze, & Ruben, 2011). The five most common laborer positions for Latinos working in construction have consistently been carpenters, concrete workers, painters, drywall installers and roofers (Goodrum & Dai, 2005; Brunette, 2004). Latino culture revolves around strong family ties and workers often see other Latinos in their industry as an extended part of their own family. This leads Latino construction workers to express their concerns to their peers rather than their supervisors. Common concerns among Latino construction workers about keeping their jobs in the U.S. and avoiding potential conflicts also leads to fewer questions about safety procedures and underreporting of occupational injuries and hazardous conditions (Smith, Perry, & Moyer, 2006).

Current Latino Training Programs

While Latino construction workers continue to account for a disproportionate number of occupational injuries in the construction industry (Goodrum & Dai, 2005), research involving Latino workers is still lacking (Anger, Stupfel, Ammerman, Tamulinas, Bodner, & Rohlman, 2006; Brunette, 2004). The need for research is significant and increasing as the Latino population accounted for more than half of the total population growth in the United States between 1990 and 2010 (Ennis, Rios-Vargas, & Albert, 2011; Anderson, Hunting, & Welch, 2000). Research is needed to determine which safety practices are most effective (Olbina, Hinze, & Ruben, 2011). Entities who have training programs directed towards Latino workers include: Occupational Safety and Health Administration

(OSHA); Construction Accident Reduction Emphasis (CARE) based in Florida; the Georgia Tech Research Institute (GTRI); National Institute for Occupational Safety and Health (NIOSH); and Working Immigrant Safety and Health Coalition (WISH) (Canales, et al., 2009).

OSHA has allocated more than two million dollars of new funding to efforts dedicated to Spanish and other non-English speaking workers. A large portion of this budget has been allocated towards the translation of basic documents related to worker and employer rights and responsibilities, publications and fact sheets into Spanish, as well as a new website written in Spanish

Research shows a notable increase in safe work practices immediately after training (Anger, Stupfel, Ammerman, Tamulinas, Bodner, & Rohlman, 2006), which declines after the initial training, and only 10 to 15 percent of the content is retained after one year (Cekada, 2010). Selecting an appropriate teaching instrument determines effectiveness since a person's ability to retain information is directly related to the chosen training method (Thompson, 2000). Despite Latinos being the largest percentage of immigrant workers in the U.S. there is still a limited amount of research available on the effectiveness of training programs geared towards increasing safety awareness among Latinos (Anger, Stupfel, Ammerman, Tamulinas, Bodner, & Rohlman, 2006). Studies by the Pew Hispanic Center have found that just one in three Latino who do not speak English go online; only 56 percent of Latinos in the U.S. use the internet; and are less likely than non-Latinos to have internet access at home (Fox & Livingston, 2007). Latino construction workers face cultural and language differences on a daily basis (Evia, 2011). Materials developed by OSHA, CARE, GTRI, NIOSH and WISH may be out of reach due to its computer-based presentation (Fox & Livingston, 2007). Research shows trainees of all ethnicities only retain 10 percent of what they read one year after training compared to 20 percent of what they hear; 30 percent of what they see; 50 percent of what they see and hear; 70 percent of what they verbalize; and 90 percent of what they say and do (Thompson, 2000).

Training Techniques

Training is fundamental to occupational safety. Primary reasons why training techniques developed for U.S. construction workers may not be effective for Latinos are: different cultural backgrounds (Anger, Stupfel, Ammerman, Tamulinas, Bodner, & Rohlman, 2006; Goodrum & Dai, 2005; Brunette, 2004; Evia, 2011); limited education (Anger, Stupfel, Ammerman, Tamulinas, Bodner, & Rohlman, 2006), communication barriers (ASSE, 2004; Olbina, Hinze, & Ruben, 2011; Evia, 2011) and the lack of work experience in a country with a strong governmental regulation of the workplace, which is limited in Latin speaking countries (Anger, Stupfel, Ammerman, Tamulinas, Bodner, & Rohlman, 2006).

The biggest challenges when developing training materials for Spanish-speaking construction workers in the United States are language and culture (Evia, 2011). Therefore, appropriate training needs to reflect the native language of the audience (Evia, 2011) and be culturally appropriate (Brunette, 2004). It is critical for safety and health training and on-the-job safety meetings to be conducted in Spanish by a Latino person (Smith, Perry, & Moyer, 2006) to ensure that the 42 percent of foreign-born workers who do not speak English are not at a greater disadvantage (Evia, 2011). Regarding educational attainment, there is a large disparity between foreign-born and native-born workers in the US. Only 72 percent of foreign-born workers have completed high school by the age of 25 as compared to 93 percent of the native-born workforce (Smith, Perry, & Moyer, 2006), contributing to lower literacy rates among Latinos (Nielsen, 2005). The use of English training videos with Spanish subtitles has been common practice in the industry. Such an approach has created another set of challenges for Latino workers because many are unable to read Spanish even if it is their native language (Evia, 2011). With the help of Latino construction workers, researchers have identified the deficiencies in current Latino training programs and developed a comprehensive set of guidelines for the development of new Latino training programs (Smith, Perry, & Moyer, 2006). Materials used to aid in Latino construction workers' education should: Be conducted in the audience's native language; demonstrate the proper use of equipment and explain why it is needed; develop videos in Spanish; supply graphics and statistics in Spanish; include hands-on training and demonstrations; utilize long training sessions with refresher trainings; employ Spanish speaking trainers; integrate culturally appropriate materials; avoid the use of direct English to Spanish translation and collaborate with a native speaking Spanish translator with in-depth knowledge of the subject (Brunette, 2005; Smith, Perry, & Moyer, 2006).

Latino workers are more responsive to group learning environments rather than individual training sessions (Smith, Perry, & Moyer, 2006). They prefer the use of Latino trainers who are native Spanish speakers, enjoy the use of Latino cartoon characters in videos (Brunette, 2005) and benefit from mentor programs that team them up with experienced, bi-lingual, well-trained coworkers (Olbina, Hinze, & Ruben, 2011).

Tailored Training Programs

Generic approaches can be appropriate under certain circumstances but cannot address the unique needs of different individuals. (Kreuter, Strecher, & Glassman, 1999). Tailoring a program means developing a specific program based on an assessment of the individual's characteristics. Tailoring includes individualizing content based on participant demographics such as race/ ethnicity and psychosocial variables (Campbell & Quintiliani, 2006). Williams et al. developed a participatory curriculum that was customized based on the needs of day laborers in residential construction. The program involved peer leaders to facilitate training and concluded that a peer led customized curriculum may be effective but requires employer engagement (Williams, Ochsner, Marshall, Kimmel, Martino, 2010)

Methodology

The methodology used for this study is a mixed methods research design using a concurrent triangulation strategy which is an approach to inquiry that utilizes both qualitative and quantitative forms of research concurrently (Creswell, 2009; Creswell & Plano-Clark, 2007). The use concurrent triangulation approach allows the researcher to collect both qualitative and quantitative data concurrently to determine if there is convergence, differences or a combination of both (Creswell, 2009). A mixed methods approach is appropriate in this study since it allows the collection and analysis of both quantitative and qualitative data in tandem strengthening the overall study (Creswell & Plano-Clark, 2007). The study protocol was submitted and approved by the university Human Research Board (IRB/HRB). The survey questions emerged from the literature as those that most researchers agreed were necessary to better understand a particular population response to intervention.

The methodological approach was divided in three phases. The first phase consisted of a survey which included participant's demographic information. Participation in the survey was voluntary. Participants were recruited through convenience sampling and were employees of a roofing company in Northern Colorado who agreed to participate in this study. A limitation of convenience sampling is that subject are not selected randomly and their responses may not be generalized (Gay, Mills and Airasian, 2006). The second phase of the study will consist of developing the peer-led training program with participatory input from workers and their supervisors. The third phase of the study will be the administration and assessment of the training program. This paper focused on the first phase of the study. Each participant who completed the survey received a $5 cash incentive. In order to account for the cash transaction each recipient of the incentive was required to fill out a verification form, which consisted of his or her name, signature and the date. The form was kept separate from the surveys to limit the risk of the participants' identities from being revealed. The survey consisted of 19 questions pertaining to the participants' demographics. Demographic questions included age, main language, trade, birth country, number of years in the industry, amount of fall protection training at work and if the training was in the participant's main language. Seventeen of the 19 demographic questions were multiple-choice and two were open-ended.

Results and Discussion of Phase I

After the surveys had been completed, the results were manually entered into a Microsoft Excel spreadsheet. The raw data was then sorted and coded in preparation for analysis using StatPlus:mac. When an open-ended question was used, individual responses were grouped and assigned a coded number. For example, if the survey question, "In what country were you born?" was answered with "Mexico" this response will be coded as "1". If any other participant provided "Mexico" on their survey, the same number was assigned to that response. This process was repeated until every response was assigned a code number.

The survey was completed by 45 participants. One hundred percent of the participants of the study were male. This data is consistent with demographic data in the construction industry. Females make up less than five percent of laborers and less than 10 percent of all workers in the construction industry (United States Department of Labor, 1999). When asked to provide their age, the participants were given four possible answers: 30 or younger, between 31 and 40, between 41 and 50 and older than 50 years of age. Out of the 40 participants who responded, 78 percent reported that they were younger than 40 years old. This finding is consistent with published literature which reports that 63 percent of the Latino workforce in the United States is between 18 and 41 years of age (Fox & Livingston, 2007).

Table 1: Respondents' Age

Age	**N**	**(%)**

30 or younger	12	30%
Between 31 and 40	19	48%
Between 41 and 50	7	17%
Older than 50	2	5%

When asked to provide their primary language, 98 percent of the responding participants reported that their primary language was Spanish. Only two percent of the study population identified English as their primary language. Out of the 40 participants who responded when asked to identify their birth country, 93 percent reported that they were born in Mexico; five percent reported they were born in the United States (US) and two percent were born in Bolivia. This finding is consistent with other investigator's findings, which identified that 60 percent of Latinos were born outside the US (Fox & Livingston, 2007; Loh & Richardson, 2004).

In addition to providing their birth country the participants provided the number of years they had lived in the US if they were born in another country. Possible responses were: less than a year, 1-3 years, 4-6 years and more than 7 years, see Table 2. Out of the 37 responding participants, 92 percent reported they had lived in the US for more than seven years and the remaining eight percent had lived in the US between four and six years. Out of the 37 participants who responded to how many years they worked in construction in their birth country, 46 percent reported that they had less than one year or no construction experience in their country of origin. These results were in line with the published work, which reports that 51 percent of Latino workers had less than one year of experience in construction prior to moving to the US (Canales, et al., 2009).

Table 2 - Years in construction in country of origin

Years in construction in country of origin	**N**	**(%)**
I didn't work in construction	15	40%
Less than a year	2	6%
1-3 years	3	8%
4-6 years	4	11%
More than 7 years	13	35%

Ninety-eight percent of the 40 participants who provided a response when asked how many years they had worked in construction while living in the US responded with between four and six years or more than seven years of experience. Out of the 39 participants who provided their highest academic degree, 83 percent reported that they did not complete high school, see Table 3. The published work reports a significantly lower number of Latinos who have not finished high school at 41 percent (Fox & Livingston, 2007). The average education degree earned by the participants who responded was the completion of middle school.

Table 3 - Highest academic degree

Highest academic degree	**N**	**(%)**
Attended elementary school, did not graduate	3	8%
Graduated elementary school	5	13%
Attended middle school, did not graduate	2	5%
Graduated middle school	13	33%
Attended high school, did not graduate	9	24%
Graduated high school	3	8%
Vocational or technical school	1	2%
Attended a University, did not graduate	2	5%
Graduated from a University	1	2%

One hundred percent of the responsive participants had received safety training in the past year. Ninety-two percent had received more than five hours of safety training. When asked if the training they received was in their primary language, 95 percent responded that the training was not presented in their main language. The published literature reports a significantly higher level of safety trainings delivered in the worker's native language at 20 percent (Olbina, Hinze, & Ruben, 2011). When asked to self-report their ability to speak and read English the participants were given a scale of: Excellent, Very Good, Good, Regular and Bad. Eighty- five percent of the participants who provided their ability to speak English reported their ability as regular or bad, see Table 4. These results are consistent with the findings of other investigators that identified over one-third of Latino construction workers only spoke Spanish (Olbina, Hinze, & Ruben, 2011; Evia, 2011). Of the 42 participants who responded to their ability to read English, 48 percent reported their ability as regular and 40 percent reported their ability to read English was bad. This finding is consistent with published literature reports that 42 percent of foreign-born Latino worker cannot read English at all (Evia, 2011). In response to their ability to read Spanish 37 percent responded that their ability to read Spanish was excellent. The remaining participant's responses varied equally from regular to very good. It is important to note that published investigations report that a small, but significant number of Latino workers are illiterate in their own language (Brunette, 2004) and that individuals with lower literacy rates can read, but have difficulty in doing so (Nielsen, 2005).

Table 4 – Self-reported Language Abilities

Rating	**Ability to speak English**		**Ability to read English**		**Ability to read Spanish**	
	N	(%)	N	(%)	N	(%)
Excellent	1	3%	1	2%	15	37%
Very Good	1	3%	2	5%	9	21%
Good	3	7%	2	5%	9	21%
Regular	26	63%	20	48%	9	21%
Bad	10	24%	17	40%	-	-

Conclusions

The most significant findings from the demographic survey indicate 92 percent of the participants received more than five hours of safety training in the past year. However when asked if the training they received was in their main language, 95 percent responded that the training was not presented in their primary language. The fact that training was not in the participants' main language and that only 13% of participants indicated that their ability to read English is good or better raises concern about the adequacy and effectiveness of the training. The researchers are in the process of gathering and reviewing the content that was presented to participants in prior safety trainings at the roofing company. Knowing the content that has been presented to the Latino roofers is important to develop a tailored training program that will review and build upon the information that participants are expected by management to know but may not know due to the manner and/ or language that in which it was presented. When developing the draft of the tailored training program, researchers will take into consideration the information found from a review of prior trainings and the results of the surveys. Published literature involving the study of literacy rates reports that an individual's reading level is on average four grades below their completed year of schooling (Baker, Parker, Williams, Clark, & Nurss, 1997). The average education of the participants in this study was the completion of middle school, effectively estimating an associated literacy rate equal to the second or third grade level. Individuals with lower literacy rates can read, but often have difficulty doing so and cannot understand text simply by glancing at it; they must read it word for word (Nielsen, 2005). These findings informs the researchers about characteristics of training programs that are necessary to increase the likelihood of success. The peer-led tailored training program will be conducted in Spanish and will limit the use of text. It will be culturally appropriate and use primarily pictures and graphics and short videos to convey the main ideas and will have a strong spoken component. Prior studies have indicated that participants learn better by doing (Thompson, 2000), therefore the training program will also have a strong active learning component. A draft version of the training program will be presented to a selected group of Latino roofers and their supervisors and will be revised based on their feedback. The third phase of this research will involve the administration and assessment of the fall prevention training program to employees of the roofing company. The researchers hope that by tailoring the fall prevention training

program to participants and having peers as facilitators, cultural sensibilities with be incorporated the training will be more effective in reducing the risk of falls among workers of the roofing company participating in the study.

Limitations

This study had numerous limitations. The study was conducted at a single company in northern Colorado and may not represent Latino construction workers at a different company or in other regions of the country. In addition, the study was limited to the maximum value of N = 45. The sample was collected through convenience sampling using a company who had an existing relationship with the university rather than by random selection, which might have represented a broader array of participants. Due to the limitations of the convenience sample and small sample size generalizations the results of this study may not be accurately applied to other working populations.

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