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Pilot-testing the Safety Climate Assessment Tool (S-CAT^{sc}) for Small Hispanic Construction Firms

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Pilot-testing the Safety Climate Assessment Tool (S-CAT^{SC}) for Small Hispanic Construction Firms

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ABSTRACT

Hispanic workers employed in small businesses may be less likely to experience a strong safety climate on construction worksites, and it may account for their disproportionate injury rates. In order to design effective safety interventions targeted at small construction businesses, it is essential to be able to capture the realities experienced by this population accurately. The overall goal of this study was to translate into Spanish and pilot-test CPWR-The Center for Construction Research and Training's (CPWR) Safety Climate Assessment Tool for Small Contractors (S-CAT^{SC}), which was developed as a Roofing r2p Partnership project, among a population of small Hispanic construction contractors and workers. Cognitive interviews were used to identify potential problems with the Spanish version of the S-CAT^{SC} in the context of small construction businesses owned by Hispanics and employing Hispanic construction workers. An item by item analysis of the S-CAT^{SC} tool allowed the identification of problematic words. Accordingly, the research team replaced them by terms more generalizable to the different Hispanic backgrounds. Feedback from the interviews was used to modify the terminology used in the Spanish version and to understand its applicability to small contractors. The study findings were based on a qualitative analysis of the interviews conducted.

KEY FINDINGS

- Both Hispanic workers and contractors indicated they do not have the organization structure (e.g., managers, supervisors, foremen, temporary workers) described in the S-CAT^{SC} tool.
- Workers and owners from small Hispanic construction businesses who worked in commercial construction reported a better understanding of the terms and the meaning of the items in the S-CAT^{SC} tool than those working in the residential sector because they were more likely to work under a general contractor with staff assigned to oversee safety.
- Workers and owners from small Hispanic construction businesses in residential construction, who mainly did maintenance work (e.g., painting plumbing flooring) in homes already built, indicated there is often no safety supervision and as such the S-CAT^{SC} did not apply to them.
- Hispanic safety experts indicated that workers employed by small Hispanic contractors, particularly those fewer than 10 employees, are less likely to have an educational level that would allow them to understand the terminology used in the tool and the meaning of each item.

INTRODUCTION

The share of Hispanic workers within the construction industry is significant, as shown by data from the US Bureau of Labor Statistics that states that in 2017, the total number of Hispanics or Latinos employed in the construction industry was 3,186,216 (29.8%).[1] Unfortunately, the number of work-related fatalities is also considerable. From the 5,190 fatalities reported in 2016, 17% (879) involved Hispanic workers, and from those one third (32.2%) were in the construction industry.

In 2012, Hispanics/Latinos owned 6% (38,704) of the construction firms with paid employees and employed 222,161 workers[2]. Nearly 70% were businesses with 1-9 employees, 7% had 10-19 employees, and 4% had 20-49 employees. According to CPWR, Hispanic-owned construction firms are more likely to use day laborers, have no full-time employees on their payroll, and to hire temporary workers through temporary help services.[3] It is estimated that every year more than 42,000 injuries resulting in days away from work are not reported in small construction companies[4]. From 1992 to 2015, 7,235 construction deaths occurred in establishments with 10 or fewer employees; and in just 2015, 57% of construction deaths occurred in establishments with fewer than 20 employees[3].

Hispanic workers employed in small businesses may experience poor safety conditions which may derive from the firm's lack of knowledge, resources, or power to implement the required improvements.[5-7] Organizational safety gaps added to individual vulnerabilities may put these workers on a higher risk of suffering injuries and illnesses in the construction site. In order to design effective safety interventions targeted at small Hispanic construction businesses and their employees it is essential to be able to capture the realities experienced by this population accurately.

Furthermore, the validity of the research instruments used to gather information from key groups is essential to define and analyze the problem. Instruments adapted to the context and characteristics of the small construction businesses and their Hispanic workers may contribute to the effectiveness of safety interventions. Using instruments that have been successfully applied in certain groups is not enough reason to assume that they can be use in a different context. Therefore, it is important to guarantee that the new group understands the instrument and understands it in the way that it was intended. Translated instruments in particular need to be validated to address characteristics specific to the population, culture, or the industry where they will be applied.

The following report presents the process followed to translate and validate the Spanish version of the S-CAT^{SC}. The S-CAT^{SC}, which was developed by CPWR is an instrument designed to help small construction company employers and their employees assess and improve their jobsite safety climate.

OBJECTIVES

The overall goal of this study was to translate into Spanish and pilot-test the S-CAT^{SC} among a population of small Hispanic construction contractors and workers. The aim was to develop a culturally adapted translation of the S-CAT^{SC} into the specific context of small construction businesses owned by Hispanics and their Hispanic construction employees.

METHODS

The translation into Spanish of the S-CAT^{SC} , which includes the "Summary of Ideas for Improving Leading Indicators to Strengthen Jobsite Safety Climate" was conducted by two independent bilingual (English-Spanish) translators and included a back-translation from a third translator. The Spanish version was then used with individual or group (no more than 3 participants) cognitive interviews, which were conducted using a think out loud approach combined with questions based on an interview guide. Cognitive interviews were used to identify potential problems in the Spanish version of the S-CAT^{SC} tool, to clarify how different terms and items were interpreted by the respondents, and to proposed changes to the Spanish version[8].

The approach used for translating and pilot testing the S-CAT^{SC} under the context of small construction businesses owned by Hispanics and with their Hispanic employees consisted of the following steps:

1. The English version of S-CAT^{SC} was translated into Spanish by two native Spanish-speaker translators from different nationalities.
2. The translated Spanish S-CAT^{SC} was discussed with two Hispanic Safety professionals with experience in the construction industry to evaluate its application to small contractors.
3. A third native Spanish speaker carried out a back-translation.
4. In the first round of cognitive interviews, the Spanish S-CAT^{SC} tool was administered to ten Hispanic construction workers and five small Hispanic construction business owners.
5. The translated Spanish S-CAT^{SC} was modified based on the results from cognitive interviews.
6. Using the modified version of the S-CAT^{SC}, the second round of cognitive interviews were conducted with an additional twenty Hispanic workers and ten small Hispanic construction business owners.
7. Results from the second round of cognitive interviews were incorporated in the final version of the Spanish S-CAT^{SC} tool.
8. The revised translated Spanish S-CAT^{SC} resulting from the second round of cognitive interviews, was discussed with a third Hispanic Safety professional with experience in the construction industry to evaluate its application to small contractors.
9. Presenting a final version of the Spanish S-CAT^{SC}, which included changes for cultural relevance (as noted in "Item by Item section), but did not include suggested changes..

Study Population

The study was conducted in two locations - Pittsburgh, PA and Raleigh, NC. The study participants were a convenience sample consisting of 1) 30 Hispanic construction workers employed in small construction businesses owned by Hispanics and 2) 15 Hispanic owners of small construction businesses.

All participants reported having no other occupation or job different than those related to the construction industry. The interviews were conducted during work hours. Therefore, the owners authorized researchers to get access to the construction sites. The Institutional Review Board from the Indiana University of Pennsylvania and Western Carolina University approved all study protocols, and each participant provided informed consent. Participating workers and owners received a gift card of $20.

Fifteen small construction business' owners, 23 construction workers, 3 supervisors, and 3 lead workers from 15 small construction firms participated in the cognitive interviews. Four construction firms employed less than 10 employees, eight between 10 to 20 employees, and three between 21 to 50 employees. They represented diverse construction trades including roofing, concrete and remodeling, concrete foundation and structure, electrical installations, and painting (Table 1). Participants' average age was 36 years old (range 18 - 54), work experience in the construction industry ranged from 3 to 34 years (mean = 11 years), and, on average, they had lived in the United States for 15 years (range 2 – 29) (Table 1). All participants reported that Spanish was their native language and construction as their only business.

Table 1. Characteristics of the small construction businesses

	n = 15
Company size	
Less than 10 employees	4
10 - 20 employees	8
21 - 50 employees	3
Construction trade	
Electrical installations	2
Painting	2
Poured concrete foundation and structure	2
Roofing	2
Concrete & remodeling	2
Other	5

Table 2. Demographic characteristics of participants

Participants	n= 45		Age (mean)	Years in construction (mean)	Years living in USA (mean)
	Male	Female			
Construction worker	22	2	35	8.6	12
Lead worker	3		39	12.7	15
Owner	13	2	37	15.6	21
Supervisor	2	1	36	10.3	17
	40	5	37	12	16

Translating the Safety Climate Assessment Tool (S-CAT^{SC}) into Spanish

Two native Spanish speakers translated the S-CAT^{SC} into Spanish. Since terms and understanding of the Spanish language may differ among people with different cultural backgrounds, the translators were from different nationalities, but both had experience in the construction industry. The two translated versions were compared line by line by the principal investigator to identify discrepancies in the two versions. When substantial discrepancies were identified, the principal investigator discussed the terms and potential alternatives with the translators to find the most generalizable option. Thus, to assure conceptual equivalence, an additional review by the principal investigator was carried out centered on assessing that the translation was culturally adapted but as strict as possible to the English version of the S-CAT^{SC}.

Data collection

Cognitive interview data were collected from June to August 2018 in the Pittsburgh (PA) area by the principal investigator and in Raleigh (NC) area by the co-principal investigator. Time and places for the interviews were decided in collaboration with the small construction business' owners based on their work schedules. The interviews lasted 45- 60 minutes. Owners and workers were interviewed separately mainly in individual meetings. Due to tight work schedules, some owners suggested that group interviews be conducted with workers. When this happened, no more than three participants were interviewed simultaneously. A total of six group interviews were conducted in the Raleigh (NC) area covering 14 workers. No group interviews were conducted in the Pittsburgh (PA) area. All workers were interviewed in the workplace while some owners preferred to be interviewed at coffee places close by. (See Tables 1 and 2 for participant demographics.)

Before the cognitive interview started, the participant was introduced to the study purpose and to the thinking out loud approach. The interviewer emphasized that the overall aim was to assess the tool by gaining an understanding of how the participant understood the terms used and item structure. Therefore, participants were instructed on assessing the clarity and meaning of the S-

CAT^{SC} items rather than evaluating safety conditions in their current work environment. Once the participant demonstrated confidence with the process, the interviewer followed the protocol based on an interview guide designed for the study.

Participants were invited to review the S-CAT^{SC} using either a tablet-based version or a hard copy according to their preferences. They were asked to read each item out loud and talk about their understanding of the meaning of each item, ambiguities, difficulties in identifying what information was need to respond to the item, as well as the response scale. In the case that the participant preferred to read silently, the researchers waited until she/he completed the reading to ask for comments; when the participant appeared to have no comments, the researcher read each item aloud and initiated the discussion by using probing questions. When group interviews were carried out, the interviewer read aloud item by item and used open probing questions to promote participants' discussion.

The process of interviewing was conducted in three rounds. In addition to audio recording, notes were taken to document general impressions and any issues such as confusion, contradictions, ambiguity, and participant's reluctance to share thoughts, or questions that the respondent had. In the Raleigh (NC) area, three workers (from different businesses) refused to be audio recorded while in the Pittsburgh (PA) four workers, all from the same company, did it. When the respondent did not authorize audio recording the interview, detailed notes were taken. After each interview round the research team independently listened to the audio recordings, met to discuss overall problems identified, and made suggestions about changes in the translation prompted by the findings, and modified the Spanish version of the S-CAT^{SC}

Review from Hispanic safety experts

The Spanish version of the S-CAT^{SC} tool was assessed by three Hispanic safety professionals with experience in the construction industry. The Spanish S-CAT^{SC} version was sent to the safety professionals, and they were asked to analyze its structure, readability, and appropriateness for a population of Hispanic construction workers and owners in small construction businesses. Then, individual discussions were conducted via phone with each one of these Hispanic safety professionals.

RESULTS

The participating small construction businesses came from commercial (5 contractors) and residential (10 contractors) construction. On average, contractors involved in commercial construction had 16 employees and the residential contractors had 17 employees. Although those involved in commercial construction indicated that they do not have the organizational structure described in the S-CAT^{SC} tool, because they operate under a general contractor who usually has a superintendent on site who acts as a safety manager, they had a better

understanding of the terms and the meaning of the items in the S-CAT^{SC} tool.[1]

The interviews went a lot smoother when the research team interviewed workers and owners from small companies involved in commercial construction sites. Accordingly, they discussed the S-CAT^{SC} tool quickly and more efficiently than those workers who worked in small residential firms. Commercial construction workers also seemed to have a better understanding of the construction and safety terminology and jargon than those working in residential. Some workers had a basic knowledge of English terms used in construction and used this knowledge to reinforce their understanding of the Spanish words and improve item comprehension.

Small firms in residential construction mainly did maintenance work (e.g., painting, maintenance plumbing, flooring) in homes that were already built. The majority (8 out of 10) of the residential contractors had fewer than 20 employees. Workers and owners from these small firms claimed that they did not have an organizational structure with managers, supervisors, foremen, and temporary workers as is described in the S-CAT^{SC} tool.[a] They indicated that the safety function is occasionally performed by the owner, but often there is no safety supervision other than them taking care of themselves. Participants from small firms in residential construction believed that the S-CAT^{SC} tool did not apply to them.

Some of the participants, mainly those employed by residential contractors, indicated that the tool was long and found it difficult to understand due to their education level.[2] A comment repeated a few times was that "this tool is for more educated Hispanics who went to school." The workers explained that their jargon and dialect was less formal than the language used in the S-CAT^{SC} tool. Owners from firms in residential construction and with fewer than ten employees commented that their "workers would not be able to understand and respond to the survey, due to the lower level of formal education that they had received, not only in the US but also in their countries of origin. Comments made by the Hispanic safety experts coincided with some of the comments reported by participants regarding the potential difficulties that workers, particularly those employed by businesses with fewer than ten workers, may face to understand the S-CAT^{SC} items. The experts highlighted the differences in the organizational structure described in the S-CAT^{SC} tool and the realities of small construction firms. They also anticipated that workers in these types of companies are less likely to have an education level, here in the United States or in their countries of origin, that would allow them to understand the terminology used in the tool and the meaning of each item. They considered that the S-CAT^{SC} tool would be more appropriated for small business with more than 25 workers and in commercial construction.

[1]Changes regarding the organizational structure were not incorporated into the Spanish version. These findings were reported here and in the item by item section

[2] Terms identified by the participants were modified to improve readability level.

Item by item findings

Leading Indicator # 1. Demonstrates Management Commitment to Safety

	My Company…	Comments to the Spanish version
DEMONSTRATES MANAGEMENT COMMITMENT TO SAFETY	1. Has safety policies and procedures and shares them with all employees	The term "safety policies" translates into Spanish as "politicas de seguridad." However, this term created confusion among participants because they were not familiar with it and also there was a tendency to define it in relation to politics. For the second/third round of interviews, we tested the term "principios de seguridad" (safety principles) and "lineamientos de seguridad" (safety guidelines) which were better understood and accepted. NOTE: The word 'lineamientos" was used to translate "policies" and incorporated in the translated Spanish version keeping the word "politicas" (policies) in parenthesis.
	2. Includes money in project budgets to implement safety measures (such as purchasing or renting safer tools and equipment, and conducting training)	No issues were identified with this item.
	3. Frequently visits job sites and interacts with employees about safety	No issues were identified with this item.
	4. Always obeys safety rules and wears all required personal protective equipment (PPE) when on the job site	In its original English version, the second sentence of this item should read as "**My Company** … wears all required personal protective equipment (PPE) when on the job site". This item created confusion since participants were not able to identify who in the company the item refers to. We suggest modifying the original English version as follow: "My Company always **promotes that its employees** obey safety rules and wear all required personal protective equipment (PPE) when on the job site." NOTE: This suggestion was not incorporated into the translated Spanish version.

	5. Provides appropriate PPE for all employees on every job site	The term **personal protective equipment (PPE)** was not well known among participants, especially those in companies with less than 20 workers. Thus, we suggest adding prompts in parentheses such as hard hats, respirators, safety boots, and safety glasses. NOTE: This change was incorporated into the translated Spanish version.
	6. Recognizes employees for obeying safety rules and wearing proper PPE on the job site	No issues were identified with this item.
	7. Identifies and takes steps to correct hazardous situations	No issues were identified with this item.
	8. Collects information about and follows up on injuries and incidents with managers, supervisors, and employees	For several participants, the hierarchy of managers, supervisors, and employees is not representative of the organizational structure in small constructions businesses. In most of these companies, often the owner acts as a manager and a supervisor. Therefore, it was suggested replacing "managers and supervisors" with "owner" or "boss." NOTE: This change was not incorporated into the translated Spanish version.
	9. Helps injured workers so they can return to work	No issues were identified with this item.

Leading Indicator # 2. Promotes and Incorporates Safety as a Value

My Company…		Comments to the Spanish version
PROMOTES AND INCORPORATES SAFETY AS A	1. Holds regular meetings with employees to discuss safety	No issues were identified with this item.
	2. Never compromises safety to increase productivity, meet a schedule, or save money	The combination of a negative question and the response scale was very confusing for all participants. **Suggestion:** "gives priority to safety over other project goals such as increasing productivity, meeting a schedule, or saving money. NOTE: This change was not incorporated into the translated Spanish version.

	3. Uses incident and near miss information to improve safety	In the safety field, the technical term to translate "near misses" is "cuasi-accidentes." However, the word "cuasi" was not clearly understood for participants. Thus, we preferred to use the word "casi" which is more accepted among people with no safety background. NOTE: This change was incorporated into the translated Spanish version. For some participants, there was no difference between incidents and near misses. Many described incidents like events that almost happened or those without negative health consequences. **Suggestion:** replace the word "incident" with "injuries" NOTE: This change was not incorporated into the translated Spanish version.

Leading Indicator # 3. Ensures Accountability at All Levels

My Company…		Comments to the Spanish version
ENSURES ACCOUNTABILITY AT ALL LEVELS	1. Discusses safety with everyone in the company and reinforces expectations daily	Although no issues were identified with this item, some participants found that this item is very similar to item #1 in section 2.
	2. Rewards managers, supervisors, and foremen for maintaining and improving safety	No issues were identified with the structure or wording of this item. However, similarly to what was described in item #8 in section 1, participants do not consider that this organizational structure reflects the reality of small construction businesses. They reported that small firms do not have a foreman in the worksite. Thus, workers interact directly with the owner. When the work requires crews (i.e., roofing), a worker is designed as the crew leader to facilitate communication between crew members and owner. NOTE: This change was not incorporated into the translated Spanish version. Some participants inquired why workers or employees were not included in this item.

	3. Holds everyone, including managers, supervisors, foremen, and employees, accountable for safety	No issues were identified with the structure or wording of this item. See comments on the previous item regarding organizational structure. Some participants found this item very similar to item #4 in section 1.
	4. Gives supervisors and foremen the authority to make changes to correct hazards on the job site	Similar comments regarding organizational structure in small construction businesses were made by participants. During the third round of interviews, the word "boss" was tested to replace the terms "supervisors and foremen," and it was very well-accepted. NOTE: This change was incorporated into the translated Spanish version.

Leading Indicator # 4. Supports Effective Supervisory Leadership

My Company…		Comments to the Spanish version
SUPPORTS EFFECTIVE SUPERVISORY LEADERSHIP	1. Clearly defines supervisor and foreman safety roles and responsibilities	No issues were identified with the structure or wording of this item. However similar comments regarding organizational structure in small construction businesses were made. Some participants found this item very similar to item #4 in section 3.
	2. Provides supervisors and foremen with leadership training, they are able to communicate and motivate employees about safety	No issues were identified with the structure or wording of this item. However, participants considered that this item may not apply to small construction businesses since the owner acts as a supervisor or foreman.
	3. Rewards supervisors and foremen for leading by example and promoting safe work practices	Similar comments regarding the role of owners as supervisors and foremen in small construction firms were made by participants. Some participants found this item very similar to item #2 in section 3.

Leading Indicator # 5. Empowers and Involves Employees

My Company…		Comments to the Spanish version
EMPOWERS AND INVOLVES EMPLOYEES	1. Encourages employees to report all incidents and near misses	No issues were identified with the structure or wording of this item. For some participants, there was no difference between incidents and near misses. Many described incidents like events that almost happened or those without negative health consequences. **Suggestion:** replace the word "incident" with "injuries" NOTE: This change was not incorporated into the translated Spanish version.
	2. Actively solicits employee input on how to solve safety problems and make jobs safer	No issues were identified with this item.
	3. Rewards employees for improving safety	No issues were identified with this item. Some participants found this item very similar to item # 6 in section 1.

Leading Indicator # 6. Communicates Effectively

My Company…		Comments to the Spanish version
COMMUNICATES EFFECTIVELY	1. Provides employees with feedback on their suggestions for improving safety	No issues were identified with this item.
	2. Makes sure safety policies and procedures are understood by all employees	As reported in item #1 section 1, the word "policies" was not easily understood. Thus, we tested the term "principios de seguridad" (safety principles) and "lineamientos de seguridad" (safety guidelines) which were better understood and accepted. NOTE: The word 'lineamientos" was used to translate "policies" and incorporated in the translated Spanish version keeping the word "politicas" (policies) in parenthesis.
	3. Communicates a positive safety message	No issues were identified with this item.

Leading Indicator # 7. Provides Training at All Levels

My Company…		Comments to the Spanish version
PROVIDES TRAINING AT ALL LEVELS	1. Provides ongoing safety training for all employees, temporary workers, supervisors, foremen, and managers	No issues were identified with the structure or wording of this item. However, participants stated that it does not represent the organizational structure of a small construction business. Particularly, they highlighted that there are no temporary workers in the small construction business. NOTE: This change was not incorporated into the translated Spanish version.
	2. Makes sure every employee is OSHA 10-hour trained	Most participants were not aware of either OSHA nor OSHA 10-hour training.
	3. Makes sure every employee is OSHA 30-hour trained	Most participants were not aware of either OSHA nor OSHA -hour training.
	4. Encourages all employees to identify training needs	No issues were identified with this item.
	5. Regularly assesses safety knowledge and skills	It was not clear for participants whom this item refers to (workers, bosses, or owners) NOTE: No changes were incorporated into the translated Spanish version based on these comments.

Leading Indicator # 8. Encourages Owner/Client Involvement

My Company…		Comments to the Spanish version
ENCOURAGES OWNER/	1. Involves the project owner in safety meetings	This section was challenging since participants were not clear regarding who the item refers to as the "project owner." Since most of this small construction companies are subcontractors, some participants mentioned the
	2. Works with the project owner to identify safe work practices	

	3. Encourages the project owner to help promote safe work practices	contractor as the "project owner," others referred the general contractor, and others such as those in roofing and painting identified the house owner as the "project owner." NOTE: No changes were incorporated into the translated Spanish version based on these comments.

S-CAT^{SC} tool Response scale[†]

My Company…	Comments to the Spanish version
Already does this well	The word "already" was understood from some participants as a comparison with a prior condition. They suggested removing it. In the last round of interviews, the option "My Company does this well" was tested and no comments were reported. Suggestion: "does this well"
Could do this better	No issues were identified with this item.
Would need help doing this	Participating owners did not report any issues with this option while participating workers mentioned having no knowledge to evaluate whether the company would need help to do it.
Is not able to do this	Participating owners did not report any issues with this option. However, participating workers considered this option very "rude" and as a value judgment. They mentioned not having the knowledge to assess if the company was or not "able" to do it. Thus, they could respond to regarding facts but not the motivations behind them. They only could identify whether the company does or does not do it. They suggested using the option "does not do this" rather than "Is not able to do this." This option was tested in the last round of interviews, and it was well-accepted. Suggestion: "does not do this"
I don't know	No issues were identified with this item.

The Spanish version of the S-CAT^{SC} tool is attached in the Appendix.

[†]Please note that the S-CAT Spanish version attached in this report does not include the changes suggested to the scale in this table.

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