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Reaching “hard to reach” workers: Evaluating approaches to disseminate worker safety information via the Mexican consular network

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Abstract

Mexican immigrants suffer a disproportionately large number of work-related injuries and deaths given their share of the workforce. Barriers of language, culture, and mistrust are often cited as factors that complicate efforts to reach these workers with occupational safety and health (OSH) interventions. By partnering with the Mexican government and its consulate network in the United States, researchers from the National Institute for Occupational Safety and Health were able to assess the impact of four different information dissemination approaches (posters, passively distributed brochures, actively distributed brochures, and video kiosks) in Spanish in a five-phase study. Exit interviews conducted with Mexicans seeking consular services indicated that while nearly all respondents considered OSH to be of importance, significant differences in impact measures, such as noticing the materials and liking of content, were found when comparing the different approaches. Despite these differences, even the least effective approaches were noticed by large numbers of individuals and significantly increased their stated behavioral intentions regarding OSH. Considering all materials together, significantly more participants reported liking the materials ($p < 0.001$) than did not, learning something new ($p < 0.01$), trusting the information ($p < 0.05$), intending to seek out additional OSH information ($p < 0.01$), and intending to speak to their bosses about OSH ($p < 0.05$). These findings contribute to building an evidence base for moving research knowledge into practice, which is an essential, but often overlooked, element of occupational safety and health research, particularly among workers from underserved communities.

Keywords

Health equity; intervention effectiveness; Mexican immigrants; occupational safety and health; Spanish-language occupational safety and health education

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Disclaimer

The findings and conclusions in this article are those of the author and do not necessarily represent the views of the National Institute for Occupational Safety and Health.

Introduction

In 2015, foreign-born workers—more than a quarter of whom are Mexicans—comprised 17% of the U.S. labor force (Lopez and Radford 2017). Mexican immigrants have one of the highest rates of fatal workplace injuries (Bureau of Labor Statistics 2017). From 2011–2016, two-thirds of the 3,244 work-related deaths among Latinos were among immigrants, and 70% of those immigrants were Mexican (Bureau of Labor Statistics 2017). Immigrants are at higher risk for non-fatal injuries as well (Orrenius and Zavodny 2013). Given the limited capacity of current occupational safety and health surveillance systems to collect data on nativity and the tendency of immigrant workers to underreport workplace injuries, it is likely that published figures of nonfatal occupational injuries are an underestimate (Souza et al. 2010; National Academies of Sciences et al. 2018). Additionally, greater length of stay in the United States contributes to elevated rates of chronic and mental illness among Latino immigrants (Hovey and King 1997; Chakraborty et al. 2003; Cho et al. 2004; Flynn et al. 2014; López and Golden 2014). It has been suggested these declines are linked to lifestyle changes associated with low-wage employment in the United States, such as adoption of less healthy diets (Escobar Latapí et al. 2013).

These occupational health inequities highlight the importance of providing Mexican immigrant workers with information and resources to support their safety at work. Factors such as language, cultural differences, mistrust of government institutions, and low literacy among populations of interest are often cited as complicating the ability of occupational health organizations to involve vulnerable workers such as Mexican immigrants in research and prevention programs. As a result, these populations are commonly referred to as “hard-to-reach” or “hidden populations” in the public health literature (Shaghghi et al. 2011; Bonevski et al. 2014; Valerio et al. 2016). Recently, some have begun to question this formulation, asking if it is the populations that are “hard-to-reach” or rather the institutions that don’t know how to reach them (Riggs et al. 2014). Collaborative partnerships with institutions trusted by marginalized communities are one way for public health institutions to develop the institutional capacity to work more effectively with diverse communities and ensure they have access to essential health information and resources (Roussos and Fawcett 2000; Eggerth and Flynn 2010; Flynn et al. 2021).

This paper reports the results of a formative evaluation that tested different media for dissemination of occupational safety and health information to Mexican immigrant workers in the United States through a collaborative partnership with the Mexican consular system. Researchers and health communicators at the National Institute for Occupational Safety and Health (NIOSH) at the Centers for Disease Control and Prevention (CDC) created three types of information dissemination materials for the study, which were then distributed and evaluated at Mexican consulates in Los Angeles and Atlanta.

Over the past two decades, Mexico has expanded its consular functions to include programs for improving the general welfare of Mexican nationals living in the United States (Laglagaron 2010). A cornerstone of these efforts is the *Ventanillas de Salud* (VDS, “Health Windows”) strategy, which is a public health initiative of the Government of Mexico that operates in the waiting rooms of 49 out of 50 Mexican consulates across the United

States. While the VDS strategy is co-coordinated by the Ministries of Health and Foreign Affairs, each VDS site is operated and largely funded by a local US-based charitable organization (Gutiérrez 2009; Laglagaron 2010; Rangel Gomez et al. 2017). The VDS and its partners work to improve the health of the Mexican diaspora in the United States through information dissemination, screenings, consultations, and referrals. In 2018, the VDS served 1.7 million individuals across all U.S. locations (VDS 2019). The Ministry of Foreign Affairs' Protection Departments (*Departamentos de Protección a Mexicanos*) operate in all 50 consulates in the United States, offering legal consultation and referral.

While vital, information alone is not enough to help workers from marginalized communities overcome the structural barriers that contribute to their increased risk of occupational injury and illness (Flynn and Wickramage 2017). Workers also need access to resources and institutional support to help them navigate the labor and health systems, address safety concerns with managers, and effectively act on their labor rights. The legal support of the Protection Department together with the VDS health promotion infrastructure provide a powerful combination of information dissemination and institutional supports that can help foreign-born workers navigate both the health and legal aspects of workplace safety in a single trusted space. As such, the consulates can be a valuable partner for organizations looking to improve workplace safety for these workers at high risk of experiencing an occupational injury. For over a decade, NIOSH has collaborated with the VDS (Flynn et al. 2013) to address persistent occupational health inequities for Mexican immigrant workers (Orrenius and Zavodny 2013; BLS 2017).

Methods

Material development

Providing foreign-born Mexican workers with information on workplace hazards and exposures, how to mitigate them, and the rights, entitlements, and responsibilities of both workers and employers is an essential step in helping them stay safe. Three types of communication products were created in Spanish for this study: four brochures (overview of workplace safety, addressing safety concerns at work, safe practices for construction workers, and safe practices for hotel workers), five short video vignettes featuring real testimonies from workers who have faced safety problems at work, and two posters encouraging workers to get help if they are concerned about their safety at work. For a detailed description of how the materials were developed, see online supplemental materials which describe the methods (Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, 2015a). The key messages across the three types of materials include: you should not have to sacrifice your health for a paycheck, you have the right to a safe workplace, there are things you can do to protect yourself, and there are people who can help. The print materials featured illustrations of a family of workers representing different ages, genders, and industries, including construction, hotel housekeeping, and fast food. The evaluated materials were printed in full color but were designed to be clear and retain all meaning if printed in black and white or with lower quality. In the video testimonials, workers described injuries experienced at jobs in

warehousing, fast food, chicken processing, and construction as well as an account of sexual harassment.

NIOSH also provided a tailored OSH training for consulate employees so that they could more effectively address OSH concerns of their clients. The VDS distributed the information and encouraged individuals to visit the Protection Department if they had a specific OSH concern because it was considered unethical to raise awareness and encourage action about occupational safety and health risks without also making participants aware of the legal and personal support available at the intervention site.

To be effective, the esthetics, format, content, and distribution channels of information materials must be tailored specifically for the audience (O'Connor et al. 2014). The content and esthetics were developed in consultation with OSH subject matter experts, consular staff, and Latino immigrant workers themselves. Input was gathered from Latino immigrant workers and consular staff in collaboration with grassroots community organizations and academics at all stages of development using techniques such as focus groups, key informant interviews, and cognitive interviewing (Willis 2005; Fujishiro et al. 2010). The multimedia communication products were tailored to the mechanisms of health information dissemination currently used by VDS in an attempt to facilitate their integration into current VDS activities, reduce the burden of implementation on the Consular staff, and help to ensure their long-term adoption once the data collection period ended. Versions of the materials themselves can be found on the NIOSH website (CDC 2015b).

Implementation

The communication materials (posters, brochures, and short videos) were disseminated in the consulates in five phases, each lasting four weeks: (1) posters hung in the consulate; (2) brochures distributed passively on an information table; (3) videos on closed circuit television in the consular waiting room; (4) brochures distributed actively by consular employees when delivering applications for a passport or other consular service; and (5) the poster, video, and active distribution of the brochure simultaneously. Consular staff were responsible for displaying the information materials and restocking them during each phase. Passive brochure distribution on a variety of health and non-health topics is common in Consulates. Active brochure distribution by Consular staff was hypothesized to increase the chances that clients would notice the brochure compared with brochures distributed passively and potentially to increase trust in the information as it would be transmitted directly by a Consular employee. After each phase finished, all study materials were removed by the consular staff for a period of 1 week (a “wash-out” period) before initiating the next phase.

Los Angeles and Atlanta were chosen for geographic diversity. Los Angeles is a traditional settlement area in the United States for Latinos; Atlanta is a new settlement area. The Mexican consulate in Los Angeles is the busiest consulate in the Mexican consular network, serving roughly 800 individuals daily. While the Mexican consulate in Atlanta is the busiest of new settlement areas, it serves far fewer clients than Los Angeles (roughly 200 clients daily, on average).

Data collection and analysis

Intercept interviews were conducted with adult immigrant workers visiting the Mexican consulates in either Atlanta or Los Angeles by a NIOSH contractor. A convenience sample of potential participants were approached by the NIOSH contractor as they left the consulate and invited to participate in the survey. A 21-item quantitative instrument guided the interviews. The items used in the survey were from a preexisting item bank maintained by the Centers for Disease Control and Prevention (CDC). Only minimal changes were allowed in item wording or response format. Consequently, standard demographic data was collected and coded as categorical. The survey was administered verbally, in Spanish, by a contractor and the responses were recorded using paper and pencil. No sensitive and/or personally identifiable information was collected as part of this study. Each interview took approximately 15 min. Due to logistical difficulties, exit interviews for *Phase 5* were only conducted in Los Angeles. Preliminary data analysis determined that pooling data across the two sites was statistically feasible. The two sites were pooled to reduce the number of statistical comparisons. The study received IRB approval from CDC/NIOSH.

The survey focused on three key areas: (1) did respondents notice the study materials (one item); (2) their impression of the study materials (six items); and (3) how concerned were they about OSH issues and their intentions to discuss OSH with others (five items). Items were either binary with a yes/no response or used a 5-point Likert scale (not at all, not really, somewhat, a little, & a lot). The data were analyzed with statistical software (IBM SPSS Statistics) using the χ^2 test for independent samples (Siegal 1956), a nonparametric statistic commonly used to compare categorical data. This test avoids making assumptions about data distributions and/or level of measure that are inherent to parametric statistics.

For analysis, Likert scale responses were dichotomized into two groups: (1) negative (not at all, not really, and somewhat) and (2) positive (a little and a lot). The rationale for collapsing response categories lies in the concept of *disengagement*. (Flynn et al. 2015). Disengagement is a strategy by which immigrants seek to limit their exposure to potential hostile interactions with the host culture. When immigrants are unable to limit their physical and/social interactions with the host culture as much as desired, they attempt to limit vulnerability by lowering their visibility and actively avoiding behaviors that might get them noticed. The first two authors of the current paper have found that in data collection circumstances with immigrants, disengagement manifests in choosing the most neutral response—often the response at the middle of a scale. Consequently, they prefer to use categories that force a clearly positive or negative response. Because the items used in this survey were drawn from a CDC bank of pre-approved survey items and substantial changes were not allowed, the authors made the decision to dichotomize the responses during analysis. Neutral responses were categorized with the negative responses so that only the clearly positive responses were categorized as such. Statistically, this is a conservative approach that makes it harder to find significant results in favor of the tested materials and as such increases confidence in the study findings.

To assess noticing the study materials, participants were simply asked if they had seen the study materials. If they responded affirmatively, they were asked to assess the quality (i.e., likeability) and usefulness of the information (i.e., learned something new, trust, clarity,

follow-up advice) and then whether they expected to interact with others concerning OSH (i.e., discuss with coworkers, discuss with bosses). Individuals who responded negatively regarding noticing the study materials were not administered the items rating the quality of the materials. However, they were asked four of the five items related to behavioral intentions and were treated analytically as a “no treatment” control group to contrast with the behavioral intentions responses of those participants who did see the study materials. This group is referred to as the “did not notice” group throughout.

Results

This pilot study allowed for the rapid vetting of the prevention materials by the population of focus and the subsequent national distribution of these materials through the VDS. This project also helped lay the foundation for establishing OSH as an integral part of the Mexican government’s health promotion efforts with their U.S. diaspora and has led to further collaborations between OSH organizations and the Mexican consular network. In addition, this project establishes a health promotion model that can be easily adapted for use with different OSH topics or consular networks from other countries. A total of 364 intercept interviews were conducted with adult Latino immigrant workers visiting the Mexican consulates in either Atlanta (n = 156) or Los Angeles (n = 208).

Demographics

The demographics of the study sample are described in Table 1. The majority of participants in this study were of typical working age—more than 90% were between 18 and 55 years old—and had low levels of formal schooling. The overall sample was fairly balanced between male and female (52.1% male), but there were significant differences in gender distribution across sites, with significantly more female participants in Los Angeles than Atlanta (58.5% vs. 47.9%, respectively; $\chi^2 = 9.46$, $p < 0.01$). Most workers (58.9%) were employed full time, with no significant differences across sites. The full sample reported low family incomes (nearly 85% below \$40,000 per year); income was lower on average for participants in Los Angeles than in Atlanta ($\chi^2 = 20.9$, $p < 0.001$). Given that the distributions of age, education level, or employment status did not differ significantly between the two sites, data were pooled for the remaining analyses.

Phases I-V

Results for each phase of distribution are summarized in Table 2. Less than half (48.2%) of participants noticed the passively-distributed brochure (*Phase 2*), while nearly all (97%) noticed the video (*Phase 3*). Only those who reported noticing the materials were asked follow-up questions related to their impressions of them. Because only one participant reported not noticing the video, no statistical comparisons were made between groups who noticed and those that did not notice for that phase.

Quality of the materials

The actively distributed brochure (*Phase 4*) was viewed positively by the lowest proportion of participants (53%), while more than three-quarters of participants who saw the brochure passively (*Phase 2*) had a favorable impression (76.9%). Nearly two-thirds of participants

(63.9%) rated the materials favorably during the combined phase (*Phase 5*). The video was rated positively by the largest proportion of participants (93.5%).

Usefulness of the materials

However, participants reviewed the video as least useful of all the materials, with only 45.9% rating it useful, followed by the poster (*Phase 1*; 48.6%). Around two-thirds of participants rated the other materials positively for usefulness: 69.2% for the passively distributed brochure, 69.5% for the actively distributed brochure, and 66.7% for all materials together in *Phase 5*. Around three-quarters of participants in each phase reported that they would follow the advice on the materials, ranging from 70.8% for the combined phase to 78.1% for the actively distributed brochure.

Attitude and behavioral intent

Attitude and behavioral intention questions were asked of all participants whether or not they reported noticing the materials and results were examined for statistical differences. Nearly all participants felt that protecting themselves at work was important. There were significant differences in intentions to seek out more OSH information among those who did and did not notice the poster ($\chi^2 = 6.98$, $p < 0.01$). Participants who noticed the brochure (both active and passive distribution) and the combined materials reported higher intentions to seek additional OSH information, but these differences did not reach statistical significance.

Statistically significant differences were detected between those who reported noticing and not noticing the materials for intentions to discuss OSH with coworkers for the poster (54% vs. 26.3%; $\chi^2 = 3.89$, $p < 0.05$), passive brochure (66.7% vs. 32.4%; $\chi^2 = 8.9$, $p < 0.01$, and combined materials (54.7 vs. 14.3%; $\chi^2 = 3.96$, $p < 0.05$); and intentions to discuss OSH with bosses for the poster (51.5% vs. 22.2%; $\chi^2 = 9.98$, $p < 0.01$) and combined materials (59.4% vs. 0%; $\chi^2 = 8.59$, $p < 0.01$).

Comparison across the phases—Each phase was statistically compared against each other phase to understand the relative effectiveness of each material type on the dimensions of noticing, impressions of the materials (liking, usefulness/learned something new, trust), and behavioral intentions (seeking OSH information, speaking to boss about OSH) that were significant in the cross-phase analysis. These results are summarized in Table 3. The highest proportions of participants reported noticing materials during *Phase 3* (closed-circuit television video; 97%), *Phase 4* (brochure actively distributed by consular staff, 81.5%), and *Phase 5* (all materials distributed simultaneously; 87.8%). The least noticed information materials were the posters (*Phase 1*; 61.4%) and the passively distributed brochure (*Phase 2*, 48.2%). The differences between the three most and two least noticed materials was statistically significant. Looking at data from all five phases together, among participants who noticed the materials, significantly more liked the materials ($\chi^2 = 21.6$, $p < 0.001$; data not shown) than those that did not like them, learned something new ($\chi^2 = 17.9$, $p < 0.01$; data not shown), trusted the information ($\chi^2 = 10.2$, $p < 0.05$; data not shown), intended to seek out additional OSH information ($\chi^2 = 15.4$, $p < 0.01$; data not shown), and intended to speak to their bosses about OSH ($\chi^2 = 11.43$, $p < 0.05$; data not shown). There was no

significant difference overall among respondents who noticed the materials on proportions that reported that they found the OSH information to be clear, could follow the advice given by the OSH information, would follow the advice given by the OSH information, thought protecting themselves at work was important, or intended to speak to their coworkers about OSH.

As shown in Table 3, compared with the posters (*Phase 1*), significantly more participants reported liking the brochure when it was actively distributed (*Phase 4*) and the whole set of materials distributed in *Phase 5*. More participants reported finding materials useful than the posters in every phase except *Phase 3* (video). There was no significant difference in intention to seek out more information between the posters and any subsequent phase.

Higher proportions of respondents reported liking the actively-distributed brochure (*Phase 4*) than the passively distributed brochure (*Phase 2*), and like the combined materials presented in *Phase 5* more than either the video (*Phase 3*) or the actively distributed brochure (*Phase 4*). There were no other significant differences between phases in respondents liking the materials (Table 3).

Participants felt that the video (*Phase 3*) was significantly more useful only than the passively distributed brochure (*Phase 2*). Both the actively distributed brochure (*Phase 4*) and the combined *Phase 5* materials were rated significantly more useful than the video (Table 3).

The passively distributed brochures (*Phase 2*) and *Phase 5* materials were significantly more trusted than the posters (*Phase 1*). Otherwise, there were no significant differences in trusting of the materials across phases. Respondents reported significantly more intention to seek out OSH information after seeing the video (*Phase 3*) than the passively distributed brochure (*Phase 2*), and when noticing the actively distributed brochure (*Phase 4*) and the combined materials (*Phase 5*) than the video. More respondents reported intention to speak with a boss about OSH in every other phase (*Phases 2, 3, 4, and 5*) compared with the posters (*Phase 1*), but there were no other significant differences across phases in this intention (Table 3).

Discussion

The results of these pilot study exit interviews provide evidence to inform decisions about disseminating occupational safety and health information to Mexican immigrant workers around the United States. It is not surprising that the materials that involved increased engagement were the most noticed methods. For example, the video was the most noticed, and the television screen is centrally located in the waiting room with the volume turned on. Although it was not surprising that the brochures on the information table were the least noticed intervention, yet almost half the respondents reported seeing them. This suggests that this form of distribution should not be discounted, especially as they are among the least burdensome of the materials to implement. There are indeed calls to make high-quality, relevant health promotion materials readily available to immigrants through trusted sources, placed where immigrants will encounter them passively (Rojas-Guyler et

al. 2016). This “incidental information seeking,” particularly in print formats, can help disseminate accurate and understandable information through immigrant communities as the person passively encountering the material can then pass on the information in active ways through subsequent interpersonal interactions (Rojas-Guyler et al. 2016).

Active distribution of the brochure was one of the more successful ways to reach individuals, with more than eight out of 10 participants reporting noticing them. Although it was not statistically significant, there was a 15-percentage point difference in trust between the actively-distributed and the passively distributed brochures despite identical content in the materials (Table 2). This suggests that personally receiving the material from a staff member may increase its credibility, which is consistent with other studies that posit that immigrants are more likely to find health promotion materials that come from a respected individual as the source, such as Consular staff, acceptable (Larson et al. 2009).

Participants, however, liked receiving the OSH materials this way significantly less than all the other dissemination approaches except video (Table 3). Although data were not collected on why this dissemination method was not preferred, the pattern of responses suggest that more passive approaches were preferred by the respondents. This could be in contrast to literature that has found that immigrants, particularly those with less than a decade in the United States, prefer in-person modes of receiving health information that require interpersonal interaction (Caidi et al. 2010; Cristancho et al. 2014). On the other hand, individuals oriented to health information and are seeking it prefer active communication channels, for example those that involve interpersonal interaction. Those individuals who are not as health-oriented may prefer passive channels such as television or video (Dutta-Bergman 2004). While we have no basis on which to assign immigrant workers the attitude of health-oriented or not, this orientation could be thought of as situational rather than fixed. Studies of immigrants in the Midwest have found that immigrants tend to seek information actively when they have a particular information need or problem to solve (Caidi et al. 2010). If this represents a situational “health orientation,” then active channels may be preferred. In the current study, participants were seeking non-health related services from the Consulate and therefore may have been in a non-health-oriented situation, leading them to rate the active dissemination strategy less favorably. Active distribution as participants were seeking information and assistance for non-health issues, e.g., passports and vital records registry, could have seemed irrelevant or confusing, whereas passive strategies may provide participants with a level of control on what to interact with and when to do so.

It might be that a different moment of the client/staff interaction would be a better time to actively distribute the information. In addition, handing out OSH materials represents an additional burden on already busy consulate staff. Despite the high levels of visibility and trust in the information of active brochure distribution, being less preferred by participants and more burdensome for Consular staff may make it a less attractive option for long-term implementation (Table 1). More inquiry into why this method is not preferred and whether there is a more effective way to implement it is warranted.

Respondents in any intervention phase in which brochures were distributed (passive distribution, active distribution, and all in combination) were significantly more likely to

report learning something than in the intervention phases using posters or videos alone. This is likely due to the brochures being the most content-heavy of the materials produced and were intended to provide concrete information on staying safe at work. The posters and videos were intended to raise awareness of OSH rather than to increase knowledge.

With the exception of the combination of all formats (*Phase 5*) vs. posters (*Phase 1*), there were no statistically significant differences in the influence a given information approach had on trust in the information. Respondents reported the lowest level of trust in the information during *Phase 5* (66.1%) and passive distribution of the brochures (*Phase 2*; 66.7%). Even in these phases, however, two-thirds of respondents reported trust in the information, indicating that most respondents considered the consulate a reliable source of OSH information. This is consistent with characterizations of trusted sources of health information for immigrants as culturally and linguistically appropriate and safe spaces (Caidi et al. 2010).

None of the study interventions led more than 50% of the respondents to report information-seeking intentions (Table 2). Except for the video, which only moved 15.5% of respondents to report information-seeking intentions, there were no statistically significant differences between the phases (Table 3). It is unclear why the video performed so poorly despite being widely noticed and liked. The video content included a series of individuals describing real stories of injuries at work of varied occupations and the importance of acting to either improve safety at work or get help after an injury. While other studies have found that immigrants and particularly workers prefer video for health promotion and work safety training (Cristancho et al. 2014; Ramos et al. 2018), the most effective materials have a meaningful, purpose-driven message that focuses on the health consequences of exposures and actionable recommendations for job-specific equipment and prevention practices (Larson et al. 2009; Díaz Fuentes et al. 2016). It is possible that participants liked that passive dissemination and format of the testimonial video but found it lacking useful action-oriented messaging.

All other information approaches were significantly more likely than the poster to lead respondents to report intentions to speak with their boss about OSH (Table 3). The posters contained the least information content and, unlike the other materials, did not explicitly mention speaking with their boss as a possible action item. However, given that more than half (51.5%) of respondents in the poster phase did report the intention of speaking to their boss about OSH, even such a minimal intervention can move substantial numbers of individuals to action.

The combination of poster, active brochure distribution, and video broadcast used in *Phase 5* of the study was among the most noticed and most liked interventions. However, the impact of this combination on behavioral intentions was not greater than the individual impact of its component parts of the actively-distributed brochure or video presented individually. Consequently, the added resources required to implement this intervention could potentially be used more efficiently elsewhere.

Building an evidence base for how to move research knowledge into practice is an essential, but often overlooked, element of occupational safety and health research (Schulte et al. 2017). Specifically, this study aligns with the third stage of the translation research framework known as institutionalization, which examines the degree to which an intervention can be adopted by “real-world” partners. The RE-AIM framework provides one way of thinking about a health intervention’s impact (Glasgow et al. 1999). This framework understands the potential impact of a health intervention as a combination of five factors: reach, efficacy, adoption, implementation, and maintenance. In this study, ongoing, long-term partnership with the Mexican Consulates provides the opportunity for a strong and representative national reach with Mexican immigrant workers, the population of focus for these materials. Most Mexican immigrants will interact with the Consulates as trusted sources of support and information as well as the only local source of essential services such as passport and identification card administration and vital statistics registration. There are 50 Consulates around the United States and the Consulates do their own outreach to rural and remote areas to provide services to constituents who cannot make it to the official outpost. In addition, the high levels of respondents in both Consulates who reported noticing materials demonstrates specific reach for the tested dissemination modes. Similarly, the high proportions of respondents reporting intentions to take action after seeing the materials and usefulness of print materials in particular indicates a positive level of efficacy of materials.

Tailoring the interventions to fit with the ongoing activities at the VDS helps to reduce the burden of implementation on the Consular staff. Designing interventions in this way helps leverage the existing infrastructure and decrease the cost of implementation, improving the chances of adoption, implementation, and maintenance. While this can limit the design options for the intervention or project, it increases feasibility and therefore the likelihood of fidelity in implementation and long-term sustainability even after the study is complete. The process of outreach and engagement of consular staff and workers themselves to develop the materials, the highly positive response to the materials among participants on the dimensions of quality and clarity, as well as the long-term partnership aspect of this project also support adoption, implementation and maintenance over time of this intervention beyond the two Consulates involved in the study.

Limitations

The findings in this study should be interpreted in light of several limitations. First, the sample is likely not representative of all Mexican immigrant workers or even *Ventanillas de Salud* clients in all Mexican consulates across the United States. The foreign-born Mexican population in the United States is not homogeneous and settlement patterns can be influenced by factors such as ethnicity, language, geographic location of sending community, and social class. In addition, the Atlanta and Los Angeles consulates were chosen to gather data in an emerging and established settlement area, but they are not necessarily representative of all Mexican consulates or VDS programs. Indeed, each represents the largest consulate in their respective regions. While the interventions were tailored to fit with the ongoing activities at the VDS across the consular network, data collection in a larger number of consulates would have helped to determine how factors such as the consulate size and geographic location may have impacted the fidelity of implementation and prescriptions of the clients.

Another limitation of this study, as well as an avenue of future research, is that this data collection did not explore the factors that contributed to responses regarding the relative effectiveness of and preferences for some materials over others. As mentioned previously, to expedite oversight of the project, items were taken from a pre-approved list which limited the scope of the inquiry to the topics presented in this paper. In addition, while behavioral intentions were captured, it was not possible to determine if these translated into actual behaviors by the respondents.

Conclusion

The occupational health inequities faced by Mexican immigrants highlights the need for OSH organizations to find effective ways of reaching these workers with information and institutional support. The extensive infrastructure of the VDS makes it an attractive partner for OSH organizations looking to develop their capacity to reach some of the most vulnerable and underserved workers in the United States. The results of from this study confirm that partnering with the VDS is an effective way to reach large numbers of Mexican immigrant workers with OSH information. The results also confirm that clients of the VDS tend to trust the information they receive there and report intending to act upon it.

It is very hopeful that the overwhelming majority of respondents in this study reported they considered OSH to be an important topic. One of the major challenges faced by any public health information campaign is to ensure its relevance to the target audience. This study certainly suggests that OSH information is recognized as relevant within the Mexican immigrant community. Another very hopeful finding is that even the least-well received intervention approach still inspired a sizeable number of respondents to report positive behavioral intentions. Consequently, any of the tested intervention approaches could be tailored to local needs and resources without adversely impacting outcomes. While all the information materials contain the same basic messages as described above, each mode requires a different level of personnel and financial resources to produce and implement. This study suggests that even a very simple, non-resource intensive approach—such as a poster or passively distributed brochure—can catch the attention of significant numbers of individuals, teach them something, and move them to action.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

References

- Bonevski B, Randell M, Paul C, Chapman K, Twyman L, Bryant J, Brozek I, Hughes C. 2014. Reaching the hard-to-reach: a systematic review of strategies for improving health and medical research with socially disadvantaged groups. *BMC Med Res Methodol.* 14(1):42–71. doi:10.1186/1471-2288-14-42 [PubMed: 24669751]
- Bureau of Labor Statistics 2017. Static charts, Census of Fatal Occupational Injuries, 2016. Washington (DC): Department of Labor, Bureau of Labor Statistics (US); [accessed 2020 Feb 20]. <https://www.bls.gov/iif/oshcfoi1.htm>.
- Caidi N, Allard D, Quirke L. 2010. Information practices of immigrants. *Ann Rev Info Sci Tech.* 44(1):491–531. doi:10.1002/aris.2010.1440440118

- Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. 2015a. Protect yourself at work. Washington (DC); [accessed 2020 Oct 5]. <http://www.cdc.gov/niosh/topics/protejase/default.html>.
- Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. 2015b. Protect yourself at work: a series of print and video materials for Spanish-speaking immigrant workers. Washington (DC): NIOSH Science Blog; [accessed 2020 Oct 5]. <http://blogs.cdc.gov/niosh-science-blog/2015/09/01/protejase1/>.
- Chakraborty BM, Mueller WH, Reeves R, Poston WS, Holscher DM, Quill B, Hanis CL, Foreyt JP. 2003. Migration history, health behaviors, and cardiovascular disease risk factors in overweight Mexican-American women. *Ethn Dis.* 13(1):94–108. PMID: 12723018 [PubMed: 12723018]
- Cho Y, Frisbie WP, Hummer RA, Rogers RG. 2004. Nativity, duration of residence, and the health of Hispanic adults in the United States. *Int Migr Rev.* 38(1):184–211. doi:10.1111/j.1747-7379.2004.tb00193.x
- Cristancho S, Peters K, Garces M. 2014. Health information preferences among Hispanic/Latino immigrants in the U.S. rural Midwest. *Glob Health Promot.* 21(1):40–49. doi:10.1177/1757975913510727
- Díaz Fuentes CM, Martínez Pantoja L, Tarver M, Geschwind SA, Lara M. 2016. Latino immigrant day laborer perceptions of occupational safety and health information preferences. *Am J Ind Med.* 59(6):476–485. doi:10.1002/ajim.22575 [PubMed: 26901777]
- Dutta-Bergman MJ. 2004. Primary sources of health information: comparisons in the domain of health attitudes, health cognitions, and health behaviors. *Health Commun.* 16(3):273–288. doi:10.1207/S15327027HC1603_1 [PubMed: 15265751]
- Eggerth DE, Flynn MA. 2010. When the third world comes to the first: ethical considerations when working with Hispanic immigrants. *Ethics Behav.* 20(3-4):229–242. doi:10.1080/10508421003798968
- Escobar Latapí A, Lowell L, Martin S. 2013. Binational Dialogue on Mexican Migrants in the US and Mexico: Final Report. Guadalajara, Mexico: CIESAS. Washington (DC): Georgetown University.
- Flynn MA, Carreón T, Eggerth DE, Johnson AI. 2014. Immigration, work, and health: a literature review of immigration between Mexico and the United States. *Revista Trab Soc (Santiago).* 6:129–149. PMID: 28260831. [PubMed: 28260831]
- Flynn MA, Check P, Eggerth DE, Tonda J. 2013. Improving occupational safety and health among Mexican immigrant workers: a binational collaboration. *Public Health Rep.* 128(6_suppl3):33–38. doi:10.1177/00333549131286S306
- Flynn MA, Rodriguez LA, Lara J, Rosales C, Feldstein F, Dominguez K, Wolkin A, Sierra MI, TJ, Romero-Steiner S, Dicient-Taillepierre J, et al. 2021. An innovative United States-Mexico community outreach initiative for Hispanic and Latino people in the United States: a collaborative public health network. *Public Health Rep.* doi:10.1177/0033354920972699
- Flynn MA, Wickramage K. 2017. Leveraging the domain of work to improve migrant health. *IJERPH.* 14(10):1248. doi:10.3390/ijerph14101248
- Flynn MA, Eggerth DE, Jacobson CJ. 2015. Undocumented status as a social determinant of occupational safety and health: the workers' perspective. *Am J Ind Med.* 58(11):1127–1137. doi:10.1002/ajim.22531 [PubMed: 26471878]
- Fujishiro K, Gong F, Baron S, Jacobson CJ Jr., DeLaney S, Flynn M, Eggerth DE. 2010. Translating questionnaire items for a multi-lingual worker population: the iterative process of translation and cognitive interviews with English-, Spanish-, and Chinese-speaking workers. *Am J Ind Med.* 53(2):194–203. doi:10.1002/ajim.20733 [PubMed: 19650081]
- Glasgow RE, Vogt TM, Boles SM. 1999. Evaluating the public health impact of health promotion interventions: the RE-AIM framework. *Am J Public Health.* 89(9):1322–1327. doi:10.2105/AJPH.89.9.1322 [PubMed: 10474547]
- Gutiérrez CG. 2009. The Institute of Mexicans Abroad: an effort to empower the diaspora. In: Agunias DR (ed.). *Closing the distance: how governments strengthen ties with their diasporas.* Washington (DC): Migration Policy Institute. p. 87–98.

- Hovey JD, King CA. 1997. Suicidality among acculturating Mexican Americans: current knowledge and directions for research. *Suicide Life Threat Behav.* 27(1):92–103. doi: 10.1111/j.1943-278X.1997.tb00506.x [PubMed: 9112727]
- Laglagaron L. 2010. Protection through integration: the Mexican government's efforts to aid migrants in the United States. Washington (DC): Migration Policy Institute.
- Larson EL, Wong-McLoughlin J, Ferng Y. 2009. Preferences among immigrant Hispanic women for written educational materials regarding upper respiratory infections. *J Community Health.* 34(3):202–209. doi:10.1007/s10900-008-9142-4 [PubMed: 19127414]
- López G, Radford J. 2017. Employment status, by nativity and region of birth: 2015. Washington (DC): Pew Hispanic Center.
- López L, Golden SH. 2014. A new era in understanding diabetes disparities among U.S. Latinos—all are not equal. *Diabetes Care.* 37(8):2081–2083. doi:10.2337/dc14-0923 [PubMed: 25061137]
- Mexican Ministry of Health. 2019. Strategy: Ventanillas de Salud. Mexico City (Mexico); [accessed 2020 Sept 15]. https://www.juntosporlasaludvds.org/wp-content/uploads/2019/03/VDS_ingles.pdf.
- National Academies of Sciences, Engineering, and Medicine. 2018. A smarter national surveillance system for occupational safety and health in the 21st century. Washington (DC): National Academies Press.
- O'Connor T, Flynn M, Weinstock D, Zaroni J. 2014. Occupational safety and health education and training for underserved populations. *New Solut.* 24(1):83–106. doi:10.2190/NS.24.1.d [PubMed: 25053607]
- Orrenius PM, Zavodny M. 2013. Immigrants in risky occupations. In: Constant AF, Zimmerman KF editors. *International handbook on the economics of migration*. Cheltenham (UK): Edward Elgar Publishing. p. 214–226.
- Ramos A, Carlo G, Grant K, Bendixsen C, Fuentes A, Gamboa R. 2018. A preliminary analysis of immigrant cattle feedyard worker perspectives on job-related safety training. *Safety.* 4(3):37. doi:10.3390/safety4030037
- Rangel Gomez MG, Tonda J, Zapata GR, Flynn M, Gany F, Lara J, Shapiro I, Rosales CB. 2017. Ventanillas de Salud: a collaborative and binational health access and preventive care program. *Front Public Health.* 5:151. doi:10.3389/fpubh.2017.00151 [PubMed: 28713806]
- Riggs E, Gussy M, Gibbs L, Van Gemert C, Waters E, Kilpatrick N. 2014. Hard to reach communities or hard to access services? Migrant mothers' experiences of dental services. *Aust Dent J.* 59(2):201–207. doi:10.1111/adj.12171 [PubMed: 24861395]
- Rojas-Guyler L, Britigan DH, King KA, Zulig J, Vaughn LM. 2016. Health information seeking behaviors and preferences among Latino immigrants: the role of acculturation and functional health literacy. *Health Educator.* 48(1):10–18.
- Roussos ST, Fawcett SB. 2000. A review of collaborative partnerships as a strategy for improving community health. *Annu Rev Public Health.* 21(1):369–402. doi:10.1146/annurev.publhealth.21.1.369 [PubMed: 10884958]
- Schulte PA, Cunningham TR, Nickels L, Felknor S, Guerin R, Blosser F, Chang C-C, Check P, Eggerth D, Flynn M, et al. 2017. Translation research in occupational safety and health: a proposed framework. *Am J Ind Med.* 60(12):1011–1022. doi:10.1002/ajim.22780 [PubMed: 28990211]
- Shaghghi A, Bhopal RS, Sheikh A. 2011. Approaches to recruiting 'hard-to-reach' populations into research: a review of the literature. *Health Promot Perspect.* 1(2):86–94. doi:10.5681/hpp.2011.009 [PubMed: 24688904]
- Siegel S. 1956. *Nonparametric statistics for the behavioral sciences*. New York (NY): McGraw-Hill.
- Souza K, Steege AL, Baron SL. 2010. Surveillance of occupational health disparities: challenges and opportunities. *Am J Ind Med.* 53(2):84–94. doi:10.1002/ajim.20777 [PubMed: 20094988]
- Valerio MA, Rodriguez N, Winkler P, Lopez J, Dennison M, Liang Y, Turner BJ. 2016. Comparing two sampling methods to engage hard-to-reach communities in research priority setting. *BMC Med Res Methodol.* 16(1):146. doi:10.1186/s12874-016-0242-z [PubMed: 27793191]
- Willis GB. 2005. *Cognitive interviewing: a tool for improving questionnaire design*. Thousand Oaks (CA): Sage Publications.

Table 1.

Study sample characteristics.

	Full Sample (n = 364)	Los Angeles (n = 208)	Atlanta (n = 156)
Age (%)			
18–34 years	38.9 ^{NS}		
35–54 years	53		
55+ years	8.1		
Gender (% female)	47.9 ^{**}	58.5	42.3
Schooling % <10 years	61.6 ^{NS}		
Annual family income (%)			
<\$20,000	41.8 ^{***}	51.0	25.9
\$20,000–39,999	42.8	35.1	56.3
\$40,000+	15.4	13.9	17.9
Employment status			
Full-time	58.9 ^{NS}		
Part-time	13.7		
Unemployed/not in the job market	10.7		
Work in the home	16.7		

NS not significant

^{**} p < 0.01^{***} p < 0.001

Table 2.

Percent of participants responding positively^a to intercept interview questions in each phase.

	I. Poster (<i>n</i> =73)		II. Brochure—Passive (<i>n</i> =87)		III. Video (<i>n</i> =42)		IV. Brochure—Active (<i>n</i> =94)		V. Combined Phase ^d (<i>n</i> =65)	
Access										
Noticed	61.4	48.2	97	81.5	87.8					
Impression										
Quality/liked	79.4	76.9	93.5	53	63.9					
Usefulness/learned something new	48.6	69.2	45.9	69.5	66.7					
Trust	87.5	66.7	85.7	82.1	66.1					
Clarity	86.1	76.3	77.1	92.2	80.6					
Could follow advice	80.5	75	71.4	77.9	60.3					
Will follow advice	75.8	75	75	78.1	70.8					
Attitude & behavioral intent	Noticed	Did not notice	Noticed	Did not notice	Noticed	Did not notice	Noticed	Did not notice	Noticed	Did not notice
Protecting yourself at work is important	100	95 ^{NS}	94.9	95	97.2 ^{NS}	95	100 ^{NS}	95	100 ^{NS}	95
Seek out information	42.8	15.8 ^{**}	15.5	50	36.4 ^{NS}	1	46.0 ^{NS}	35.9	49.2 ^{NS}	25
Discuss with coworkers	54.5	26.3 [*]	62.8	66.7	32.4 ^{**}	0	60 ^{NS}	73.3	54.7 [*]	14.3
Discuss with bosses	51.5	22.2 ^{**}	64.7	67.5	47.4 ^{NS}	0	65.2 ^{NS}	62.5	59.4 ^{**}	0

^aOn a 5-point Likert scale offering “not at all”, “not really”, “somewhat”, “a little”, “a lot as possible responses”, “not at all”, “not really”, and “somewhat” were considered negative responses and a little and a lot were considered positive responses.

^bFor each phase, *n* refers to respondents for the initial access question and the series of six behavioral intent questions. Only those who responded positively to the first question were asked about their impressions of the material.

NS not significant

* *p* < 0.05

** *p* < 0.01

^cBecause only one participant reported not seeing the video presentation, no statistical comparisons were made between the two groups.

^dCombined phase included the poster, video presentation, and active brochure distribution. Exit interviews were conducted in Los Angeles only.

Table 3.

Pairwise comparison of relative effectiveness of materials across study phases among participants reporting having noticed the materials.

Noticing the OSH Materials				
	II. Brochure-Passive.	III. Video	IV. Brochure - Active	V. Combined Phase
I. Posters	NS	***	***	***
II. Passive distribution brochure	—	***	**	***
III. Video	—	—	*	NS
IV. Active distribution brochure	—	—	—	NS
Liking the OSH materials				
	II.	III.	IV.	V.
I. Posters	NS	NS	*	*
II. Passive distribution brochure	—	NS	**	NS
III. Video	—	—	NS	*
IV. Active distribution brochure	—	—	—	***
Usefulness/learning anything new from the OSH materials				
	II.	III.	IV.	V.
I. Posters	**	NS	**	**
II. Passive distribution brochure	—	*	NS	NS
III. Video	—	—	*	*
IV. Active distribution brochure	—	—	—	NS
Trusting the OSH materials				
	II.	III.	IV.	V.
I. Posters	*	NS	NS	*
II. Passive distribution brochure	—	NS	NS	NS
III. Video	—	—	NS	NS
IV. Active distribution brochure	—	—	—	NS
Intention to seek out more OSH information				
	II.	III.	IV.	V.
I. Posters	NS	NS	NS	NS
II. Passive distribution brochure	—	**	NS	NS
III. Video	—	—	***	***

Noticing the OSH Materials					
	II. Brochure-Passive.	III. Video	IV. Brochure - Active	V. Combined Phase	
IV. Active distribution brochure			—		NS
Intention to speak with boss about OSH					
	II.	III.	IV.	V.	
I. Posters	*	*	***		*
II. Passive distribution brochure	—	NS	NS		NS
III. Video		—	NS		NS
IV. Active distribution brochure			—		NS

NS not significant

* *p* 0.05

** *p* 0.01

*** *p* 0.001