

Evaluating an Entertainment–Education Telenovela to Promote Workplace Safety

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Abstract

Occupational safety and health professionals worked with health communication experts to collaborate with a major Spanish language television network to develop and implement a construction workplace safety media intervention targeting Latino/Hispanic audiences. An Entertainment–Education (EE) health communication strategy was used to create a worksite safety storyline weaved into the main plot of a nationally televised Telenovela (Spanish language soap opera). A secondary analysis of audience survey data in a pre/posttest cross-sectional equivalent group design was performed to evaluate the effectiveness of this EE media intervention to change knowledge, attitudes, and intention outcomes related to the prevention of fatal falls at construction worksites. Results indicate that using culturally relevant mediums can be an effective way of reaching and educating audiences about specific fall prevention information. This is aligned with recommendations by the Institute of Medicine (IOM) to increase interventions and evaluations of culturally relevant and competent health communication.

Keywords

Latino/Hispanic, occupational safety, entertainment–education, media, health communication

Despite the economic downturn, more than 2.5 million native and foreign-born Latinos continued to work in construction trades in 2010 (Motel, 2012), representing approximately 20% of the total construction workforce, and an increase of nearly 150% since 1990. The majority (74%) of these workers are nonnative born (Motel, 2012), with nearly 40% arriving since 2000 (Koschhar, 2008).

With the influx of Latino workers, the number of Latino construction worker fatalities increased rapidly between 2003 and 2006 (Franklin & Little, 2006). While these numbers have dropped significantly from 2006 to 2010, mostly due to a construction slowdown, fatalities due to falls have actually increased among Latino construction workers (U.S. Bureau of Labor Statistics, 2012). In 2010, 68% (compared with 58% in 2006) of Latino construction worker fatalities were due to falls, usually in accidents involving falls from ladders (U.S. Bureau of Labor Statistics, 2012). Jobs that put workers most at risk are often given to foreign-born or undocumented workers, making it likely that the number of fatalities and injuries to Latino workers is underreported (Schneider, 2006).

Past workplace safety interventions have often focused on workplace regulation and policy interventions requiring employers to eliminate hazards (Emmons, 2000). While these laws have been effective in lowering rates of injury in certain workplace sectors (Emmons, 2000), language and literacy barriers, difficulty of disseminating basic safety information, and workplace safety beliefs held by workers are

barriers to effective workplace safety prevention in an industry like construction (Brunette, 2004, 2005; de Castro, Fujishiro, Sweitzer, & Oliva, 2006; Dong, Entzel, Men, Chowdhury, & Schneider, 2004; Goodrum & Jiukun, 2005).

In 2000, the Institute of Medicine (IOM) called for social and behavioral health interventions to engage populations at multiple levels of influence (IOM, 2002). For construction workplace interventions targeting Latinos, occupational health experts suggest integrating culturally appropriate training methods to create more effective workplace safety programs (Brunette, 2004, 2005; O'Connor, 2003; O'Connor, Flynn, & Weinstock, 2011). For example, a safety training intervention for immigrant industrial workers in Santa Clara County, California (Pellow & Sun-Hee Park, 2003), was developed so that safety training was “. . . grounded in the culture of the group being trained: storytelling, drawing and painting, rituals, dances and songs . . . and involved [discussion] of gender and family issues” (O'Connor, 2003). Interviews with some of the more than 200 workers who were trained using this holistic strategy revealed that

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workers not only had increased knowledge of workplace safety risks, but also emerged with a better understanding of their specific rights to a safe workplace (Pellow & Sun-Hee Park, 2003).

Entertainment–Education (EE)

A particularly promising culturally relevant approach to Latino health and workplace safety may be through EE. EE is generally recognized as a “process of purposely designing and implementing media messages to both entertain and educate, in order to increase audience members’ knowledge about an educational issue, create favorable attitudes, shift social norms, and change overt behavior” (Singhal & Rogers, 2004).

For example, the popular daytime soap opera, “The Young and the Restless” featured EE messages about breast cancer screening, diagnosis, and treatment. Researchers from the National Cancer Institute (NCI) conducted 211 interviews with a sample of callers who had called a toll free number promoted by a Public Service Announcement (PSA). It was found that callers moved by the television show and subsequent PSA were more likely than regular callers to seek information about prevention (Beck, 2004). In addition, these callers were more likely to be African American and Latino, traditionally hard to reach populations for the NCI.

Telenovelas

In 1970, a telenovela “*Simplemente Maria*” (*Simply Mary*) shown in Peru featured a young worker who escapes poverty by attending literacy classes and acquiring a Singer brand sewing machine to make money by mending clothes. As the soap opera progressed through other Latin American countries, increased enrollment in literacy classes was accompanied by increased sewing machines sales (Singhal, Obregon, & Rogers, 1995). To the producers of the telenovela and interested public health experts, this demonstrated the potential for this medium to achieve social change. Since then, the telenovela has become a popular source of entertainment frequently watched by millions of U.S. Latinos on the domestic Spanish language TV chains (Telemundo or Univision) (Downey, 2006).

Noting these effects, Mexican television producer and EE pioneer Miguel Sabido developed strategies to create, implement, and evaluate several soap operas incorporating storylines with prosocial change narratives (Sabido, 2004). Intrigued by this work, psychologist Albert Bandura utilized Social Cognitive Theory (SCT) as a conceptual framework to explain the use of EE as a behavior change strategy (Bandura, 2004). One of the tenets of SCT is that an individual’s learned behaviors are strongly influenced by direct observation of their outside environment. Furthermore, this relationship with the outside environment is transactional and follows a reciprocally deterministic model of human

behavior, wherein “people are producers as well as products of their social environments” (Bandura, 2004, p. 45). Personal agency (self-efficacy) is believed to be strongly influenced by our social structures, including our community and interpersonal networks. In Bandura’s mind, dramatic serials embedded with health messages can be used as effective behavior change tools because they could be written in such a way to build on how people create meanings from real life experiences. Telenovelas, with their cultural resonance, offer an excellent way to “speak” to immigrant Spanish-speaking audiences. In her research on the relationship between telenovelas and Latino cultural identity, de la Luz Casas Pérez (2005) explained that telenovelas in Latin America are used by individuals to “help shape the world [they] live in . . . and help viewers relate to social situations.” An EE approach using SCT see the telenovela as an excellent medium because culturally familiar storylines can be manipulated to vicariously model behaviors via positive and negative representations, thus dramatically showing the benefits and costs to the individual (Bandura, 2004).

Apart from the SCT, other frameworks such as the Health Belief Model (HBM) have also been critical to helping EE researchers develop storylines and design the most appropriate measurement devices (Singhal & Rogers, 2004). The HBM framework offers a lens to examine the possible individual changes that would ideally occur following exposure to EE programs. For example, EE programs provide a dramatic narrative that shows the positive and negative consequences of a health behavior (Sood, Menard, & Witte, 2004), transmitting knowledge and awareness of a given health issue or in the vernacular of the HBM, cues to action. Ideally, increased knowledge and awareness induces audiences to dynamically examine their own attitudes and beliefs toward a health issue and a proposed behavior. In other words, EE interventions that are effective spur the individual to examine their perceptions of susceptibility toward an impacting health issue, while also self-evaluating the perceived barriers and perceived benefits involved with the proposed behavior.

Lalonde, Rabinowitz, Shefsky, and Washienko (1997) used a dramatic telenovela to promote awareness about alcohol abuse to improve communication between Latino youth and their families. Through formative research, they created six 22-min telenovela episodes featuring a storyline embedded with Latino cultural values and themes to help communicate the need for parental guidance, healthy youth decision making, and interpersonal communication between families. Pre- and posttest comparisons of data from middle and high school students showed significant improvement in attitudes toward alcohol in female participants, those who spoke English well, and those who viewed more than three of the six episodes. A significant number of students also indicated they would be likely to change their alcohol use behavior based on what they had seen in the show (Lalonde et al., 1997).

The 2006 Telemundo telenovela “*Ladron de Corazones*” (Thief of Hearts) featured breast cancer education messages.

Researchers measured viewer knowledge and beliefs about breast cancer, the degree of information seeking due to a PSA linked with the program, and their intentions to encourage others to have a mammogram (Wilkin et al., 2007). Results showed that knowledge and beliefs relating to two key messages were significantly increased. Results also suggested that promoting a toll free number in a PSA “after a dramatic plot point” (p. 464) produced higher call rates compared with providing the number before the dramatic event. In addition, a national telephone survey ($N = 2,438$) showed that regular and nonregular viewers were both more likely to retell someone about the storyline if they reported identifying with the character.

EE Limitations

While EE research shows effectiveness in changing and improving certain outcomes, other outcomes appear to be dependent on specific audience characteristics. For example, the authors of the breast cancer research found that the storyline was effective at improving male intentions to encourage women to have mammograms, but did not increase intention in women. The authors postulated that the action themed telenovela targeting male viewers may have made it harder for women to feel as engaged with the storyline. High knowledge and behavioral intentions at baseline among women may have also muted increases in behavioral intentions. Similarly, in the alcohol study (Lalonde et al., 1997), male students who watched the telenovela did not show improved attitudes toward alcohol while female students did. Such differential outcomes indicate there is much more to learn about how EE can be most effective in reaching intended audiences. Overall very little evaluation exists on EE programs that target U.S. Latino Spanish-speaking populations (Murphy & Cody, 2003). More importantly, questions remain regarding how audience involvement factors, positive or negative character identification, and/or recognition of storyline might influence potential knowledge, attitudinal, and behavioral intention changes (Sood, 2002; Wilkin et al., 2007).

The Current Study

The purpose of the current study is to evaluate the effectiveness of a telenovela (described in the “Procedures” section) to increase knowledge about ladder safety in Latino construction work, promote perceptions of workplace risks and safety, and finally, to increase intentions to seek more work safety information and communicate ladder accident prevention with others (friends, family, coworkers).

The following three research questions were addressed:

Research Question 1: Did the telenovela intervention increase knowledge of ladder fall prevention strategies?

Research Question 2: Did the telenovela intervention increase perceptions of construction workplace risks and safety?

Research Question 3: Did the telenovela intervention increase behavioral intentions to seek additional information and to engage in interpersonal communication about ladder fall prevention?

Method

To evaluate the effectiveness of the *Pecados Ajenos* workplace safety intervention, this study performed a secondary analysis of audience survey data in a quasi-experimental pre/posttest cross-sectional equivalent group design. Viewing audience participants answered questions via an online survey tool (described below) before and after the airing of the *Pecados Ajenos* telenovela.

Participants

Participants were solicited from the membership of the “Foro Pecados Ajenos” (*Pecados Ajenos* Forum; $n = 1,100$), a Telemundo online fan user group for viewers of the Telenovela. Due to the high proportion of Latinos, and particularly Spanish-speaking immigrants who work in construction (Labor Occupational Health Program, 2007), it was assumed that among these *Pecados Ajenos* fans, a significant number would be friends and family members of construction workers. Although it was hoped that a significant number of past or present construction workers would also participate, the number of participants who identified themselves as past or present workers was too small (~5% in each of the samples) to allow for separate analysis (discussed below). However, a high percentage of participants did identify as friends and family members of construction workers in each of the samples (more than 50%), making it possible to run comparative analyses for different populations in relation to our outcomes of interest.

Because the key messages were targeted at a Spanish-speaking audience, the surveys were available only in Spanish. Only adults with a self-reported age of 18 years or over were included in the study. Preliminary descriptive data showed that 90% of the posttest survey responses occurred within 2 months of the posting of the survey. Due to a considerable drop in response rates, and differences in completion rates among those who took the postsurvey after 60 days, only data from participants who completed the posttest within 60 days were included in the results. In addition, it was found that very few Internet Protocol addresses (a set of numbers identifying an online computer) were duplicated between the pre- and posttest. Although it was quite likely that participants who took the pretest also took the posttest, the lack of duplicated IP addresses necessitated exclusion of those that did match.

The pre- and posttest surveys achieved a robust response ($n = 743$ and $n = 669$, respectively) from the email blasts recruiting members of the *Pecados Ajenos* fan group. The final sample sizes, adjusted after excluding participants based on the noted criteria, was $n = 712$ for the pretest, and $n = 645$ for the posttest.

Internal Review Board (IRB) approval by the Human Subjects Office at the University of Georgia was obtained in advance of the survey posting. An informed consent message appeared prior to starting the online survey, hosted by SurveyMonkey (SurveyMonkey Inc., Boston, Massachusetts), stating that participation was voluntary and that participants could withdraw at any time without penalty. Because survey participants did not provide personally identifying data and did not have interactions with project personnel, the University of California Berkeley Institutional Review Board exempted this study from human subjects review. In addition, SurveyMonkey provided a secured server and did not store any personally identifying data. No incentives were offered for participating in the survey.

Procedures

This EE intervention involved three components: (a) a storyline focused on construction safety in the primetime telenovela *Pecados Ajenos*, (b) a PSA, and (c) an educational construction safety website, www.mitrabajoseguro.org.

Through a partnership agreement between the Telemundo television network, the National Institute of Occupational Safety and Health (NIOSH), the Center for Construction Work and Safety (CPWR),¹ and Hollywood, Health & Society (HHS),² three specific messages were developed within the amount of information that could be effectively communicated through the telenovela medium: “Choose the right ladder for the job,” “Always secure an extension ladder at the top & bottom before climbing the ladder,” and “Never carry tools or anything else in your hands as you climb a ladder.”

Pecados Ajenos aired the EE storyline over a 2-week period from April 1st to 14th, 2008. The storyline was developed and written by Telemundo writers, who solicited input from experts at CPWR and NIOSH (Castaneda, 2011). The storyline featured two secondary characters and focused on the three ladder safety messages as a tool to communicate knowledge about how to prevent falls from ladders at construction worksites. In the storyline, Ramon is a construction worker who finds out his girlfriend Tere is pregnant. To earn extra money before the baby is born, Tere decides to get a job at Ramon’s construction site. On her 1st day, as the workers are given ladder safety training in English, Tere, who speaks only Spanish, is unable to understand the instructions. Ramon summarizes them for her, but later a coworker advises her to ignore the information, explaining that it makes the work take too long. Dramatically, Tere falls from a ladder and loses her baby. Because she is undocumented and unable to

pay her hospital bills, she and Ramon are forced to flee to Mexico.

Data collection for the pretest began on March 25, 2008, when members of the Telemundo *Pecados Ajenos* online user group were sent an initial recruitment email asking them to give their opinion and views about the show. The subject heading of this initial recruitment email read, “Greetings *Pecados Ajenos* fans-tell us what you think.” A reminder email was sent 3 days later with similar language. With regard to the posttest, 10 days after the airing of the final episode featuring the storyline, members of the online user group were emailed again and asked to fill out another audience opinion survey. Similar language was used in the pretest and posttest recruitment phases, although the posttest email blasts added language that advised respondents that they could take the survey again even if they had previously done so. The words “*pre and posttest*” were not used in the recruitment emails. No mention of the workplace safety storyline was made in either the pre- or posttest recruitment emails. Each of the recruitment emails contained a link to the aforementioned SurveyMonkey survey.

NIOSH and CPWR also worked in partnership with Telemundo to write a script for a 30-s PSA that aired 10 times during the *Pecados Ajenos* time slot in the 2 weeks following the airing of the storyline. The PSA reiterated the ladder safety messages and acted as the link between the television and Internet by advertising the URL of the construction safety website and encouraging viewers to seek more information there. The PSA featured a short clip of Tere falling, and the actor who played Ramon giving a brief testimonial in which he discusses the preventable nature of deaths and injuries from construction falls and the importance of sharing this life-saving information with others. At the end of the PSA, he also provides the address for the construction worker safety website.

The intervention also utilized several web-based components; the *Mi Trabajo Seguro* [My Safe Workplace] website (www.mitrabajoseguro.org) was produced by CPWR and featured Flash-animated ladder safety information related to the *Pecados Ajenos* storyline, downloadable and printable information, and the option to watch the PSA. The Flash-animation described seven key steps to ladder safety, including the three main messages from the storyline. On viewing the animated feature, users were offered additional resource links. The website also encouraged viewers to email the website link to a friend.

In addition to the website, NIOSH and CPWR helped Telemundo prepare a web feature on construction safety that appeared on the *Pecados Ajenos* website for approximately 1 week during the airing of the storyline. This web feature, accessed via a web link, included a picture gallery of stills from the filming of the construction workplace storyline and basic statistics on the numbers of workers who die every year from falls. These features encouraged readers to watch the show and visit the website. Hence, multiple sources of

Table 1. Key Variables in the *Pecados Ajenos* Workplace Safety Online Survey.

Primary independent variable	Primary dependent variables	Additional information collected in the survey		
		Demographic	Media and Telenovela viewing characteristics	Exposure to workplace safety messages
Recognition of storyline	<ul style="list-style-type: none"> • Knowledge workplace safety messages • Perceptions (attitudes and beliefs) about workplace safety • Behavioral intentions to communicate and/or seek workplace safety information 	<ul style="list-style-type: none"> • Age • Gender • Language used in home • Educational level • Ethnicity or race • Income level • Relationship to construction work 	<ul style="list-style-type: none"> • Frequency and type of media use • Degree of trust in sources of health information • Frequency of telenovela viewing • Recognition of <i>Pecados Ajenos</i> Characters • Believability of ladder safety storyline 	<ul style="list-style-type: none"> • Public Service Announcement (PSA) seen on TV • From someone they knew • Newscast • MiTrabajoSeguro website • Telenovela viewing

ladder fall prevention, stemming from the telenovela, were announced and available to the fan club.

Measures

The survey instrument. The pre- and posttest parts of the survey instrument incorporated simple to read and follow instructions in Spanish, and were designed to each take approximately 20 to 30 min to complete. The pretest, conducted March 25 to April 1, 2008, included 26 questions assessing demographic information, telenovela and media viewing habits, and construction workplace safety knowledge, perceptions of workplace safety risk, and intentions to seek information and to communicate workplace safety messages. Examples of actual questions that appeared were, “Do you work in construction?” “How often do you watch the following programs?” and “Please indicate whether you disagree or agree with the following statement about the safety of construction workers at worksites.” The posttest opened on April 25, and closed on June 25, 2008, included the same 26 questions, plus eight additional questions (described below) regarding the telenovela storyline and characters, use of the *Mi Trabajo Seguro* website, and exposure to workplace safety message from other sources. Table 1 summarizes the measures collected in the surveys. Below is a description of the key variables and theoretical rationale used to analyze the effectiveness of the telenovela.

Key demographic and Telemundo audience variables. Demographic data collected in pre- and posttests included participants’ age, gender, income, education, primary language spoken in the home, and race/ethnicity. Relationship of viewer to construction work was captured by a series of yes/no questions: “past or present construction worker,” “family and/or friend of a construction worker,” and “no relationship at all to construction work.” Due the low numbers of past or present construction workers responding to the

pre- and posttest surveys (<7% in both surveys), separate statistical analyses with this group was not done.

Nine Likert-type scale items collected information about the frequency of use (*never, once a month, 3 times a week, and every day*) for Spanish and English language media including television, radio, print, Internet, and the *Telemundo* website. In addition, nine Likert-type items assessed degree of trust (*none at all, a little, don’t know, some, a lot*) about health information when presented through Spanish language media including: newscasts, websites, telenovelas, talk shows, radio programming, and print media. Questions on the pre- and posttest surveys collected information about viewing various Spanish language telenovelas, including *Pecados Ajenos*.

Knowledge of workplace safety messages. Pre- and posttest surveys featured one question with three specific knowledge items about ways to reduce the risk of falling at work. Three dichotomous yes/no questions asked about participants’ knowledge of the three ladder safety messages embedded in the storyline “use the right ladder for the job,” “tie off ladders at both ends,” and “do not carry tools or materials in your hands when climbing a ladder.” Due to the focus by the public health partners to have the intervention communicate these three specific fall prevention messages, knowledge items were analyzed separately for statistical significance (described below).

Perceptions toward construction workplace safety and risks. Using behavioral constructs from the HBM (Strecher & Rosenstock, 1997), pre- and posttests incorporated a question with nine separate items developed specifically to measure participants’ perceptions (attitudes and beliefs) about construction workplace risks. The HBM describes individuals’ motivations toward a particular behavioral action or message in the context of the individual’s perceived values toward the health issue in question (Strecher & Rosenstock, 1997). A 5-point

Likert-type scale score was used to measure respondents' level of agreement from "strongly agree" to "strongly disagree." Examples of perceptions and beliefs assessed included attitudes about their understanding of the risk of death and injury for their family members and/or friends at construction worksites, beliefs about the usefulness of protective equipment at a worksite, and beliefs about injury prevention at construction worksite. A check of the reliability of this scale showed a Cronbach's alpha coefficient of .84, indicating good internal consistency. A composite index score from these items was then created to analyze this dependent outcome.

Behavioral intentions. According to SCT, proper evaluation of an EE program should assess whether the intervention increased information seeking and interpersonal communication about the embedded health message or behavior (Bandura, 2004). In the context of a telenovela with ladder safety messages, recognition of the storyline may result in an individual reporting increased probability of information seeking and interpersonal communication about ladder safety. Based on this thinking, the pre and posttest featured a group of seven items with Likert-type scale scoring to measure the likelihood that in the next 6 months a participant would communicate workplace safety information to a friend or family member working in construction. Examples of items included participants' intention to communicate safety messages to a family or friend in construction, or suggest the use of personal protective equipment, among others. A composite index score of these seven items formed the "behavioral intentions to seek information and engage in interpersonal communication" dependent outcome variable. Reliability testing of this scale revealed a Cronbach's alpha of .94, indicating strong internal consistency.

Analysis of Data

After exportation of an Excel (2007, Microsoft Corp., Washington) data file containing the participant data from the SurveyMonkey website, data were cleaned, managed, and analyzed using SPSS version 17.0 (2008, SPSS Inc., Illinois). Information from the pre- and posttests allowed for descriptive statistical analyses for demographic data, media use (including frequency of telenovela viewing), and degree of trust in media for health information. Data collected from the posttest survey allowed for descriptive statistical information for the Mi Trabajo Seguro website visits, the recognition of telenovela characters and workplace safety storyline, and other exposure to workplace safety messages described above.

Comparisons between pre- and posttest data were conducted using independent-sample *t* tests for ordinal data, while all categorical data were analyzed with chi-square tests. Pearson's chi-square values are reported where appropriate.

The statistical analysis described above serves to answer the main research questions. Apart from the independent and dependent variable analysis, key demographic, as well as other control variables were also examined to rule out and/or provide alternative explanations for the statistical tests (Anashensel, 2002).

An analysis of the sample data using the Missing Value Analysis tool in the SPSS software was used to identify whether any significant patterns existed in questions with greater than 10% of the sample missing (accounting for survey skip patterns).

Results

Key Demographic Variables and Telemundo Audience Characteristics

Table 2 shows key demographic and Telemundo audience information demonstrating that the pre- and posttest samples were virtually equivalent. For example, no significant differences between pre- and posttest samples were found for age, income, education, race, language, construction worker status, and relationship to construction work. While significantly more females did respond to the posttest versus pretest (87% and 80%, respectively); $\chi^2(1) = 8.52, p < .01$, gender did not affect the pattern of results addressing the research questions. With regard to audience viewing characteristics, pre- and posttest samples reported watching Spanish language television daily (90% and 93%, respectively), and the *Pecados Ajenos* telenovela at least three times per week (also 90% and 93%, respectively).

Knowledge of Workplace Safety

The first research question addressed whether the telenovela increased knowledge of the workplace safety messages embedded in the storyline. Table 3 shows the results of a chi-square analysis comparing pre- and posttest differences. Chi-square analysis revealed that posttest respondents were significantly more likely to know all three of the specific knowledge items explicitly conveyed in the telenovela: (a) Use the right ladder for the job ($\chi^2 = 15.8, p < .001$); (b) Don't carry tools in your hands while climbing up a ladder ($\chi^2 = 19.1, p < .001$); and (c) Tie off the ladder at both ends ($\chi^2 = 10.2, p < .001$). For the pre- and posttest samples in this analysis, 90% of the participants reported watching the telenovela greater than 4 times per week.

Perceptions of Workplace Safety and Risks

The second research question asked whether the telenovela could increase perceptions of workplace risks. Pre- and posttest scores on an index composed of perceptions of risk, susceptibility, and barriers to workplace safety were compared using a *t* test of independent-sample means. No

Table 2. Sample Demographics and Media Use.

	Pretest	Posttest
Sample Size	712	645
Ethnic identification		
Hispanic/Latino	86%	88%
White/Anglo-Saxon	7%	4%
Language spoken at home		
Only Spanish	24%	25%
Mainly Spanish and some English	44%	40%
Socioeconomic status		
Household income less than U.S. \$50,000	55%	54%
Graduated high school	49%	53%
Some college or technical school	27%	24%
Relationship to construction work		
Current or past construction worker	9%	7%
Family or friend of construction worker	47%	48%
Media and Telenovela use		
Watched <i>Pecados Ajenos</i> at least 3 times per week	90%	93%
Everyday Viewer of Spanish Language TV	90%	93%

Table 3. Knowledge Change After Telenovela Workplace Storyline Airing.

Workplace safety knowledge item	Pre-storyline airing (% yes)	Post-storyline airing (% yes)	χ^2	<i>p</i>
Use the right ladder for the job	72	84	15.8	<.001
Don't carry tools in your hands while climbing up a ladder	75	87	19.1	<.001
Tie off ladders at both ends	79	87	10.2	<.001

significant differences were found in perceptions of workplace safety risks.

Behavioral Intentions to Seek Information and Communicate about Workplace Safety

The third and final research question asked whether the telenovela airing was associated with changes in behavioral intentions to seek more information and to engage in interpersonal communication about ladder fall prevention. Similarly to the analysis of perceptions, a *t* test of independent-sample means revealed no significant pre- and postdifferences on the index of behavioral intentions.

Supplemental Analyses on Knowledge Outcomes

Storyline recognition and knowledge outcomes. Respondents taking the posttest were asked (prior to any questions about construction work and ladder safety) to answer questions about their recognition of the *Pecados Ajenos* storyline. Respondents were given a choice of five narratives (one of which was false) and asked to select the ones they recognized. The correct ladder safety storyline choice was, "Tere falls off a ladder at work." Given that the storyline was central to the delivery of the workplace safety messages, supplemental

analyses were performed to further explore the link between knowledge outcomes and storyline recognition.

Pearson chi-square analyses were used to test for any significant associations between storyline recognition on the three knowledge outcome items. Results show that recognition of the storyline was not statistically significantly associated with being able to recall any of the three knowledge items.

Storyline recognition, knowledge outcomes, and connection to construction work. Despite the non-significance of the above analysis, it was decided to conduct a final supplemental analysis to compare the association between recognition of storyline and knowledge outcomes, in participants with and without a personal connection to construction work (i.e., family members and friends of construction workers as well as present and past construction workers themselves). This analysis was particularly important given the inability to statistically analyze past or present construction workers due to the low numbers responding to the surveys. A Pearson chi-square was used to compare knowledge outcomes between participants with and without a personal connection to construction work based on recognition of the storyline. As can be seen in Table 4, results show that having a personal connection to construction work and recognizing the storyline

Table 4. Knowledge of Workplace Safety Items and Recognition of Storyline Analyzed by Relationship to Construction Work.

Knowledge item	% correctly identifying Knowledge item and recognized storyline		Test statistic	
	Family member or friend of construction worker/ past or present construction worker	No relationship with construction worker or to construction work	χ^2 (1, $N = 399$)	p
Use the right ladder for the job	80%	69%	5.2	.02
Don't carry tools in your hands while climbing up a ladder	81%	68%	7.73	.01
Tie off ladders at both ends	80%	68%	6.8	.01

was consistently associated with correctly identifying all the knowledge items, “use the right ladder” ($\chi^2 = 5.2, p < .05$), “don’t carry tools in hands” ($\chi^2 = 7.73, p < .01$), and “tie off ladders at both ends” ($\chi^2 = 6.8, p < .01$).

Exposure to Workplace Messages

Cross-tabulation suggests that each of the different media used in the communication campaign added value to the other components and enhanced viewers’ potential exposure to workplace safety messages. For example, 57% of respondents reported seeing messages on the Pecados Ajenos website while 58% reported being exposed through the PSA. A deeper analysis reveals that 14% of respondents recalled the PSA but did not recall the website as a source of workplace safety messages, while 17.5% of the sample recalled the website but not the PSA. Adding these numbers to 39% of the total sample who recalled both exposures, more than 70% of respondents were exposed to workplace safety messages through at least one medium, compared with 58% or fewer if each medium is considered separately.

Similarly, if we assume that most of the individuals who indicated that they saw a workplace safety message on a telenovela were Pecados Ajenos viewers (90% of respondents say they watch Pecados Ajenos at least 3 times a week), a cross-tabulation shows that nearly 10% of the total sample saw workplace safety messages on the PSA but not a telenovela, 22% saw the information through a telenovela but not the PSA, and 43% of respondents saw both. This indicates that an additional 10% of respondents were reached by the PSA who would not otherwise have been reached.

Mi Trabajo Seguro Website Use

While more than half of all individuals reported hearing or seeing messages about workplace safety via the PSA, only 10% of posttest survey respondents reported visiting the Mi Trabajo Seguro website. Website traffic data provided by WebTrends Marketing Lab (www.webtrends.com), however, showed substantial increases in website traffic during the airing of the PSAs with the number of visits spiking tremendously during and shortly after the Pecados Ajenos time slot (10-11 p.m.) during the 1st week of the PSA.

Discussion

The purpose of the current study was to evaluate the effectiveness of a Spanish language telenovela containing embedded construction workplace safety messages. The workplace safety storyline was developed to promote construction work safety by increasing knowledge about ladder safety, promoting perceptions of workplace risks and safety, and increasing intentions to seek more work safety information as well as communicate with others (friends, family, coworkers) about ladder accident prevention. Results are relevant to the growing literature about (EE) interventions, and consistent with recommendations by the IOM to increase interventions and evaluations of culturally relevant and competent health communication designed for public consumption (Smedley & Syme, 2000).

Over the last 30 years, EE programs have demonstrated effectiveness in promoting health in diverse populations (Singhal et al., 2004), and usefulness with Latino Spanish speakers (Crist, 2005; Lalonde et al., 1997; Wilkin et al., 2007). This literature is supported by the current study, which found that the telenovela was effective in increasing audience knowledge of workplace safety of three specific messages about how to prevent dangerous construction site ladder falls. While storyline recognition was not significantly associated with knowledge gain, a subsequent analysis did show significant gains on all three knowledge items in viewers with a personal connection to construction work (i.e., friends and family of construction workers, and workers themselves) versus those with no such connection. Taken together, these findings demonstrate that an EE-based telenovela incorporating a storyline embedded with specific knowledge messages can enhance fall prevention safety education to general audiences, and also highlights the relevance of how audience members react differently dependent on their own real life personal relationships with a specific public health issue. Future interventions of this type may consider “priming” audiences in advance of such viewings (e.g., advertise the telenovela as especially important to construction workers and those related to them, and challenge the audience to spot the embedded messages).

In the current study, neither perceptions of workplace risks and safety, nor behavioral intentions to seek more such

information, as well as communicate it to others, were increased by the telenovela. While this finding contrasts with previous research showing that exposure to a dramatic serial drama with embedded health messages can increase intentions to engage in interpersonal communication (Papa et al., 2000; Sood, 2002), the perception and behavioral intention outcomes seen in this intervention are not entirely inconsistent. Past research, similar to the current study, has also struggled with behavioral change. For example, in an EE telenovela broadcast on Telemundo that contained embedded messages about breast cancer, survey data revealed that acquired knowledge and changes in perceptions similarly did not translate to increased behavioral intentions to get mammograms (Wilkin et al., 2007). Researchers speculated that high pretest behavioral intention scores mitigated change in posttest scores. In the current *Pecados Ajenos* study, a similar “ceiling effect” phenomenon may have occurred given the fairly high preintervention scores on the perception and intentions outcome variables.

Perceptions and behavioral intention outcomes in the *Pecados Ajenos* study may also have been due to not being able to collect more nuanced qualitative data from the participants. For example, in conducting in-depth interviews with viewers of two telenovelas from Peru with embedded HIV/AIDS health messages, a researcher was able to find that these in-depth qualitative interviews were able to detect perception of risks and behavioral intention outcomes long after the airing of the telenovelas (Obregon, 1999). Because the *Pecados Ajenos* study methods were limited to the quantitative survey, perception and behavioral intention outcomes may not have been detected. In the future public health professionals working on an EE project should try to reach out to a smaller sample of online survey respondents and conduct more in-depth questioning. Interview data with key personnel corroborated this idea of expanding evaluation techniques to include individual interviews with posttest respondents. Interviewees also suggested recruiting participants well past the airing of the telenovela to see if the immediacy of the posttest may have masked future changes in participant perceptions of risk or behavioral intentions.

Addition of the Internet-based components to more traditional television-based EE campaign to communicate workplace safety messages added an extra dimension to what has been done before. Data collected about respondents’ exposure to workplace safety message showed that using a multi-pronged media campaign led to an effective expansion of the reach of the workplace safety messages and support the hypothesis that rather than competing, television and Internet use may work in synergy through media multitasking (Le et al., 2009). For example, data showing spikes in web traffic to mitrabajoseguro.org suggest that online information seeking can be a complementary part of a television-focused health communication campaign, and that viewers accessed the website while watching the telenovela. The cross-sectional design of this study limited the ability to make a

causal interpretation, but given the distinct rise in web traffic on dates and at times that corresponded to the airing of the announcement of the *Mi Trabajo Seguro* website on the PSA, it is probable that the PSA influenced website visits. It is not clear from the available information whether the PSA was set to coincide with dramatic plot points, as Wilkin (2007) reported was done to increase the viewing of their PSA. Still, these data also suggest that the interaction between media, with the PSA driving viewers to the website, can be an effective means of encouraging information-seeking behaviors. Future research may expand this array of media to include social media and new devices such as mobile-telephone-accessed media.

Several limitations need to be considered in this study. The quasi-experimental study design lacked a true nonintervention control group. Due to the inability to collect personally identifiable data, participants who took the pretest survey were not matched with participants responding to the posttest. This limited how well we could attribute postscore knowledge scores to the intervention. In addition to a control group, creating a “panel” of respondents who are followed up from pretest to posttest would have allowed for more valid pre- and posttest comparisons. The general equivalence on key demographic and media use variables between the pre- and posttest samples in the current study may have overcome this limitation, however. Another limitation to sampling was the use of the Internet to collect survey data. It is not clear whether the typical Telemundo telenovela audience resembled the sample utilized in this study. Evidence exists that foreign-born and native-born Latinos differ in their access to the Internet (Livingston, 2010). This may even have contributed to the low number of construction workers taking the survey.

Conclusions and Implications for Future Research

Current findings illustrate the value of using popular entertainment media to communicate health messages in culturally relevant ways. For example, our work shows the value of using telenovelas as popular vehicles for outreach in Latin America, corroborating media scholars who believe in their power to help societies create meaning (de la Luz Casas Pérez, 2005; Tufte, 2004). In our storyline, the affected character only undergoes a negative outcome and does not go through a transition to achieve a positive outcome, an element that is usually part of the EE communication strategies (Bandura, 2004; Sood et al., 2004). Not reported in the results of this study was that nearly 75% of participants reported that they felt the storyline was believable and that they identified with the character. Achieving believability in the storyline and identification with the character is thought to be an important part of creating an effective EE intervention (Papa et al., 2000; Sood, 2002) and may trump the necessity of having a transitional character. Other researchers have seen improvements in interpersonal communication

when audiences report identifying with the character (Papa et al., 2002; Sood, 2002; Wilkin, 2007), pointing to issues with data collection and evaluation. As described above, a more effective study design and evaluation tool could have captured how the viewing population reacted to the intervention. A second issue in creating future EE interventions is the ability to overcome the dilemma between those working in entertainment media needing to add dramatic value versus those in public health needing to design actionable and accurate information. The depiction of a pregnant construction worker as the protagonist in the workplace safety storyline may have enhanced a dramatic element; however, labor data clearly show that construction work is male dominated and males are more likely to be injured on the job (U.S. Bureau of Labor Statistics, 2012). From interviews with principal stakeholders on this project, it appears that there may have been disconnect between writers of the narrative and suggestions by public health experts to apply EE theory to the storyline (Castaneda, 2011). According to writers and TV executives, public health professionals do not adequately understand the pressures of creating a network television program. Future interventions should incorporate more process outcomes to provide much-needed research on collaborative efforts (Bouman, 2002; Castaneda, 2011). The application of theory-driven storyline is not always feasible. In previous EE interventions, a protagonist who plays a diabetic on a popular telenovela dies despite doing his best to take care of himself (Rodriguez-Zamudio, 2008). According to those associated with this intervention, this storyline quirk was due entirely to the actor having a contract issue with the network, thereby making it impossible to do the storyline as planned.

More research is needed to better understand what drives changes in perceptions and behaviors, especially in less studied Spanish-speaking consumers of EE. For example, follow-up focus groups with audience members could be used to inquire about why some did and did not manifest the desired changes (Obregon, 1999).

EE interventions have shown promise to effectively engage hard-to-reach populations about important health topics. Research about the effectiveness of these interventions is still at an early stage, however. EE interventions such as the one in the current study highlight the power of using popular entertainment to engage diverse viewers and persuade them to participate in a research study.

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1. Center for Construction Work and Safety (CPWR) is an independent not-for-profit workplace safety consulting group.
2. Hollywood, Health & Society (HHS) facilitates partnerships between public health and entertainment media and is part of the Annenberg School of Communication at the University of Southern California.

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