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An Experimental Test of the Two-Dimensional Theory of Cultural Sensitivity in Health Communication

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Abstract

Based on a theoretical framework describing culturally sensitive (CS) health communication (Resnicow, Braithwaite, Ahluwalia, & Baranowski, 1999), this experiment tested the relative contributions of surface structure and deep structure in the recall of oral health information from pamphlets varied in written message and images. Using a 2×2 factorial design, Spanish speaking Mexican heritage mothers of children under six (N=160) were randomly assigned to read one of four 12-page pamphlets containing the same oral health information in Spanish: (1) standard written message/standard images; (2) standard written message/CS images; (3) CS written message/standard images; (4) CS written message/CS images. Participants completed a 22-item oral health knowledge questionnaire before and after reading the pamphlet. Controlling for the effects of pre-test scores, acculturation, and educational level on information recall, findings showed significant positive main effects for CS images ($F(1, 152) = 5.03$, $p = .026$, partial $\eta^2 = .032$) and CS written message ($F(1, 152) = 5.21$, $p = .024$, partial $\eta^2 = .033$). There was no interaction. These results support the two dimensions of CS and their independent effects. They should be applicable to a variety of health communication channels. Further research is needed to investigate the causal mechanism behind the observed effects.

Keywords

cultural sensitivity; health communication; Mexican American; oral health

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> "We must endeavor to eliminate, so far as possible, the problem elements that make a difference in health among people."
>
> W.E.B. Du Bois (1899). *The Philadelphia Negro*, p. 148.

Introduction

More than 100 years after DuBois' call for the elimination of racial/ethnic disparities in health and healthcare, they persist according to the latest Centers for Disease Control and Prevention report on Health Disparities & Inequalities (US Department of Health and Human Services, 2013). Considerable attention has been brought to bear on this problem over the last few decades (Betch et al., 2016; Niederdeppe, Bigman, Gonzales, & Gollust, 2013). One aspect of this attention is the increasing acceptance that enhancing the cultural sensitivity of interventions will improve their effectiveness in diverse groups (Betch et al., 2016; Institute of Medicine, 2002). This acceptance is evidenced in the emphasis, over the past fifteen to twenty years, on including a cultural component in communications, services, and interventions aimed at racial, ethnic, and cultural groups (for reviews see: Alizadeh and Chavan, 2016; Barrera, Castro, Strycker, & Toobert 2013; Beach, et al., 2005; Bhui, Warfa, Edonya, McKenzie, & Bhugra, 2007; Healy et al., 2017; Huang & Shen, 2016; Lie, Lee-Rey, Gomez, Bereknyei & Braddock, 2010; Nierkens et al., 2013). These reviews focus on various content areas and report varying degrees of effectiveness for cultural adaptations.

Nierkens et al. (2013) examined culturally adapted interventions targeting smoking cessation, diet, and/or physical activity. They found 17 studies that fit their inclusion criteria which, unlike many other reviews, included a control group receiving the same intervention without cultural adaptation. Of these, only five studies showed statistically significant benefits for the cultural adaptation group while some other studies showed positive trends. Huang and Shen (2016) presented a meta-analysis of culturally adapted cancer communication. Their findings showed a small overall effect for adapted communication although more than half of the 58 studies in the analysis had comparison groups that received no treatment whatsoever rather than a standard (not adapted) treatment. In another review, Healy et al. (2017) selected from any study that concerned health or mental health services and tested a cultural adaptation against a non-adapted control group. Healy et al. (2017) note, "Unless the experimental and comparison groups are identical (but for the adaptation), it is impossible to determine whether any observed effect resulted from the adaptation itself, or some other aspect of the intervention" (p. 2). Of the 31 studies that met their inclusion criteria, only 17 were found to have one or more significant effects for the adapted group (Healy et al., 2017). Many studies report the success of culturally adapted interventions, services, or communications (e.g., Cameron et al., 2017; Kline et al., 2016; Sidhu, Gale, Gill, Marshall, & Jolly, 2015), but they do not test these adaptations against an appropriate control group.

Nierkens et al. (2013) concluded that "More systematic experiments are needed in which the aim is to gain insight in the best mix of cultural adaptations among diverse populations in various settings, particularly outside the US" (p. 1). Huang and Shen (2016) state "The lack of research that sufficiently controls for other influences is delaying the development of the most effective cultural adaptations" (p. 23). Several scholars (Betch et al., 2016; Harrington,

2013) correctly point out that what is needed most to advance the effectiveness of cultural adaptation is research that falls in Pasteur's Quadrant (Stokes, 1997). Betch et al. (2013) comment:

> … advances in the use of culturally sensitive health communication will depend on more engaged interaction between researchers and practitioners. To this end, initiatives are needed that will better integrate basic and applied research activity and, in particular, that will support investigators who are actively engaged in pursuing advances in understanding and use what Stokes has characterized as Pasteur's quadrant. (p. 826)

The current study targets the combination of theory and applicability that is represented by this quadrant. Below, we describe the development of an oral health pamphlet designed not for distribution but, rather, as a vehicle for testing the two-dimensional theory of cultural sensitivity (Resnicow, Baranowski, Ahluwalia, & Braithwaite, 1999).

Cultural Sensitivity

The current research is based on a theoretical framework developed by Resnicow and colleagues (Resnicow et al., 1999), which distinguishes among different types of culturally appropriate health communications and programs. Resnicow and colleagues use the term "cultural sensitivity" to describe culturally appropriate communications and programs but note that many other terms are used in similar, if not synonymous, ways. It must be emphasized, however, that sensitivity is not a quality of a person or a reaction to someone or something, as easily comes to mind when "sensitivity" is mentioned. Rather, cultural sensitivity (CS) is defined as, "the extent to which ethnic/cultural characteristics, experiences, norms, values, behavioral patterns and beliefs of the target population as well as relevant historical, environmental, and social forces are incorporated in the design, delivery, and evaluation of targeted health promotion materials and programs" (Resnicow et al., 1999, p. 11). Resnicow and colleagues theorized that the structure of culturally sensitive or appropriate health materials has two dimensions: surface structure and deep structure.

Surface structure—Surface structure concerns the observable characteristics of the target population and the materials. Surface structure is sensitive to the extent that it reminds the target population of their culture and may include things such as graphics, images, places, people, activities, and foods which should match those common to the target audience. Therefore, inserting images and graphics consistent with those commonly found in the target culture creates culturally sensitive surface structures (Resnicow et al., 1999).

Deep structure—Deep structure is less obvious than surface structure. As such, it sometimes receives less attention in health messages. Deep structure is typically found within the meaning of a message and the way it is presented; it concerns the cultural, social, historical, environmental, and psychological factors related to a particular group's health behaviors. The deep structure of a culturally sensitive message incorporates the values of the group targeted (Resnicow et al., 1999). It should call up culturally relevant motivations and rewards. In addition, it will offer explanations of events and consequences that are consistent with explanations commonly expressed and accepted in the targeted culture. In other words,

surface structure offers images and graphics that are easily recognized, as part of the culture, by people of that culture, while deep structure offers ideas, descriptions, stories, and explanations that resonate with the ideals, values, beliefs, and ways of understanding the world that are common to a cultural group (Resnicow et al., 1999).

Communication Theory

Communication literature and prior research on health communication offer a variety of explanations of why culturally sensitive communication materials will be more effective than those that are not sensitive. For example, culturally sensitive, surface structure elements are believed to increase the effectiveness of a communication by increasing the attractiveness, relevance, familiarity, or comfort level as well as increasing the source credibility (Kreuter & McClure, 2004). These effects are entirely consistent with enhancing the peripheral route to persuasion proposed in the elaboration likelihood model (Petty & Cacioppo, 1986). Surface structure elements may be more important for those who do not deeply process the information but who simply follow what they consider trusted, familiar, or commonly accepted information. Peripheral processing is important because people cannot always centrally process the wealth of information that inhabits their world. So, the peripheral route is relevant to all types of people for times when they lack the motivation or ability to fully concentrate on a communication. However, central processing is believed to lead to more enduring attitude change (Petty & Cacioppo, 1986). Therefore, it's important to have both peripheral and central elements in a communication for this reason. Communications containing deep structure elements that are congruent with one's own self structure may be more likely to be centrally processed and, thus, be more effective and memorable (Burnkrant, & Unnava, 1995; Petty & Cacioppo, 1986). There is also evidence that images and graphics themselves can enhance the cognitive processing of information in the message (Schnotz, 2002; Schwartz & Collins, 2008; Schwartz, Verdi, Morris, Lee, & Larson, 2007). Deep structure elements may also influence the understanding, interpretation, and effectiveness of oral health communications. This effect may be related to the explanatory models of health and illness held by the target population (Resnicow et al., 1999). That is, if the explanations presented in a culturally sensitive communication address the cultural health beliefs of the target population, the communication may be more effective than one that simply presents new information without relating it to cultural beliefs. Schema theory (Markus, 1977; Markus & Kitayama, 1991) posits that self-schema are shaped by culture. Further, schema theory predicts that communications containing deep structure elements similar to the cultural values and beliefs incorporated into an individual's self-schemata may be perceived as more self-relevant and, thus, better remembered (Levy, Lysne, & Underwood, 1995; Markus, 1977; Markus & Kitayama, 1991).

Mexican American Oral Health

A wide range of minorities experience health disparities; however, the Centers for Disease Control and Prevention state that in comparison to non-Hispanic white children, "The greatest racial and ethnic disparity among children aged 2–4 years and aged 6–8 years is seen in Mexican American and black, non-Hispanic children" (2017). Mexican American children face a particularly profound oral health disparity (Atchison & Der-Martirosian, 1998; Dietrich, Culler, Garcia, & Henshaw, 2008). According to the Healthy People 2010

report, 43% of Hispanic children 6–8 years old have untreated dental caries, as compared to only 26% of non-Hispanic white children of the same age (US Department of HHS, 2000). The 2016 report from the National Survey of Children's Health shows improvement in Hispanic children's oral health (71% excellent/very good and 7.6% fair/poor)(Child and Adolescent Health Measurement Initiative, 2016). Still, compared to the latest numbers in the same report for white, non-Hispanic children (83.3% and 3.7%), a marked oral health disparity continues. Creating culturally sensitive oral health education can be one way to help Mexican Americans gain and retain oral health information more readily. While researchers have investigated knowledge of, and beliefs about, oral health in Mexican heritage mothers (Hoeft, Masterson, & Barker, 2009; Hoeft, Barker, & Masterson, 2010), little work has addressed the efficacy of cultural sensitivity in oral health communications.

Mexican American Culture

In the sections that follow, we describe the content of, and, briefly, the process used to develop culturally sensitive oral health written messages and graphics for Mexican American mothers of children under six years old. The culturally sensitive deep structures incorporated in the written messages were drawn from cultural values and beliefs attributed to the Mexican American community. Lest the reader believe we are stereotyping Mexican Americans, it is necessary to comment on cultural heterogeneity. No cultural group is homogeneous. While the degree of heterogeneity may vary among groups, people within any cultural group vary in the degree to which they endorse, follow, and maintain the core values, beliefs, and customs of the group. Mexican Americans form a heterogeneous group due to many factors, such as place of birth, the time spent in the USA, the degree of discrimination experienced, education, acculturation, language use, and social class. Nonetheless, when developing health communication materials to target a particular cultural group, culturally sensitive materials tend to aim at the core, or essential values and beliefs of that group, knowing full well that not all members of the group will be affected equally. Doing so does not assume that any members can be reduced to those core beliefs nor that all members endorse those core values.

Method

Experimental Design

A 2 × 2 between subjects factorial design was used to test the effects of deep structure, surface structure, and their interaction on the recall of oral health information. As described below, deep structure was manipulated by developing a culturally sensitive written oral health message and a control message which emulated the standard written message commonly found on oral health websites. A set of photos depicting Latinos represented the culturally sensitive level of surface structure while photos of Anglos constituted the control level of surface structure. Readers should keep in mind that we developed these pamphlets as a way to test the two-dimensional theory of cultural sensitivity described previously within an experimental setting. The pamphlets were not meant for wide distribution but, given successful outcomes, may serve as prototype for future applications.

The Pamphlets

Deep structure—To operationalize deep structure, two written versions of the same oral health information were developed. The factual oral health information presented in both versions was based on established oral health guidelines (e.g., the American Dental Association (http://www.mouthhealthy.org/en/babies-and-kids/). The first version was a culturally sensitive written message that was infused with Mexican cultural beliefs and values. In doing so, we drew on existing research on oral health beliefs and knowledge in the Mexican American community (Barker & Horton, 2008; Hoeft, Barker, & Masterson, 2009; Horton & Barker, 2009; Hoeft, Barker, & Masterson, 2010; Swan, Barker, & Hoeft, 2010) as well as traditional Mexican cultural values such as *familismo* (familism)(e.g., Farris & Glenn, 1976; Marin, 1993), *simpatía* (the importance of smooth and pleasant social interactions)(e.g., Ramírez-Esparza, Gosling, & Pennebaker, 2008) and *marianismo* (a traditional female gender role) (Mendez-Luck & Anthony, 2016). In addition, several sections used conversations between fictional female characters to deliver oral health information. In accord with the Mexican cultural values of *personalismo* (warm, personalized social interactions) and *simpatía*, the sensitive written message endeavored to be conversational in tone (Cuéllar, Arnold, & González, 1995). Although researchers worked mostly in English, Mexican heritage Spanish-speaking members of the research team were consulted about Mexican cultural values as well as about best-fit word and phrase translation. If a particular sentence did not translate well, the English was re-written to make translation straightforward and easily understandable.

To develop the standard, or control, written message, the research team used exactly the same oral health information included in the sensitive written message. However, in writing the standard message we drew on the style and presentation we observed on websites such as the American Dental Association sponsored website mouthhealthy.org and the Academy of General Dentistry sponsored knowyourteeth.com. That is, the standard message was constructed in a direct, authoritative, impersonal manner with a prescriptive tone that emulated the communication style commonly seen in generic, written oral health messages for a general American audience that have not been culturally adapted for any particular racial or ethnic subgroups.

The final step of the written message development was to translate both of the messages into Spanish. Although Spanish-speaking team members translated much of the written message during development, we decided to employ a professional translation firm that was familiar with oral health communications for Mexican Spanish-speakers.

After they were developed, the two written messages were subjected to a content analysis (Singelis, 2013) to identify the Mexican cultural content and oral health information contained in both written messages. The research team read each written message and identified oral health information presented in each. The sensitive and standard written messages contained the same specific oral health information on six basic topics: 1) Baby teeth, 2) Caries (cavities), 3) Brushing, 4) Snacks (diet), 5) Bottles and Sippy Cups, and 6) Visiting the Dentist. The content analysis showed that both written messages contained exactly the same oral health information.

A second content analysis focused on the cultural content that was designed to be different. Forty-nine cultural differences between the standard and CS written messages were identified. Each difference consisted of a culturally based word, phrase, or idea that was present in the sensitive version but not found in the standard version. *Orgullo, cariño, and marianismo* were the most frequently identified cultural values in the culturally sensitive written message. *Familismo* and cultural identity were the next most frequently identified values.

To confirm the deep structural content of the culturally sensitive written message, a focus group study was conducted (Hernandez, et al., 2015). Four focus groups with 22 Spanish speaking Mexican heritage mothers discussed the culturally sensitive and standard written messages in Spanish. Respondents favored many aspects of the sensitive written message because they related to those values. For example, one participant commented, “I like the part about a beautiful smile...[it’s] motivating to us”, indicating that having a child with a healthy smile was a source of *orgullo*. Participants felt that the sensitive written message was written in a style that seemed more understanding of the importance that they placed on their role as mothers, offering explanations and tips to help guide them in the oral health care process—“I like the part... [that] says we know you want to give to your child everything they want but sometimes to protect your child you have to do the right thing, even if it’s not the easiest thing.” Based on the comments from the focus groups, it was concluded that the sensitive written message did, in fact, contain the intended cultural content. Feedback from the focus groups was also used to make minor changes before the written messages were considered finalized.

Surface structure—Surface structure was operationalized through the images included in the pamphlets. Images of mothers, children, and families were purchased from internet sites for inclusion in the study. The first author and one research assistant chose a set of photos of light skinned Anglo appearing people and darker skinned Mexican heritage looking people. Images were chosen so that the individuals in matched images were similar in number, age, and depicted activities. For example, one pair of images shows a smiling mother with her smiling son on her shoulders, with the only differences in the skin color and features of the two women and two sons. After being chosen, all 24 photos (12 in each set) were viewed by ten members of the research group who were not involved in the original image selection process. The group was able to unambiguously categorize every photo into the intended Anglo and Mexican heritage sets. These two sets of photos, then, comprised the surface structure manipulation: standard vs Mexican (culturally sensitive).

The two written messages and two sets of images were crossed to create four pamphlets, each 14 pages long and completely in Spanish, corresponding to the 2 X 2 factorial design: 1) standard written message/Anglo images, 2) standard written message/Mexican images, 3) culturally sensitive (Mexican) written message/Anglo images, and 4) culturally sensitive (Mexican) written message/Mexican images.

Measures—A brief demographic questionnaire was developed for the study. This questionnaire also contained a short form of the Bidimensional Acculturation Scale (BAS; Marin & Gamba, 1996). The scale consists of 10 items from the original 24 Likert-type

response items measuring two domains: English and Spanish language usage. Respondents who score highly on both are considered bicultural. The scale was developed simultaneously in English and in Spanish, and this short form has been shown to be highly correlated with the full scale (Marin & Gamba, 1996).

The pretest and posttest were identical 22 item multiple-choice questions on oral health information contained in the pamphlets. Some items were created for this study and other items were drawn from the Basic Research Factors Questionnaire (BRFQ) (see Albino et al., 2017) with permission of the NIDCR Early Childhood Caries Collaborative Centers[5] . Multiple choice items on the pre- and posttest were scored as correct or incorrect. Missing responses and multiple responses on the same item were scored as incorrect.

A questionnaire to assess the participants' perceptions of the pamphlet was developed. It consisted of 22 items with four point Likert-type response formats. Items such as, "I trusted the information in the pamphlet" were written to assess trustworthiness, personal relevance, personalization, cultural fit, appearance, and information. Open ended perception questions on these topics were also asked in a brief face-to-face interview after participants completed the written questionnaire?.

A questionnaire to assess the participants' behavioral intentions was also developed for this study. It consisted of twelve items with five point Likert-type response formats. Items such as, "I intend on making sure that my child's teeth are brushed before going to bed" assessed a variety of appropriate oral health behaviors that were covered in the pamphlets.

Procedure—Participants were drawn from the mothers of children enrolled in Migrant Head Start Programs in Northern California. The mothers responded to flyers and announcements soliciting Spanish-speaking Mexican heritage mothers of children under six years old. Participants were run in groups of five to fifteen using the facilities where their children attended class. All materials were presented in Spanish. After informed consent, participants completed a demographic questionnaire, the BAS, and the oral health knowledge pretest. Participants were then given one of the four randomly assigned pamphlets and asked to read it carefully and notify a researcher when they were finished. Participants were allowed as much time as they needed to read the pamphlet and given a ten-minute break with snacks and beverages after finishing. After their break, participants completed the oral health knowledge posttest, the closed and open-ended perceptions measures, and finished with the measure of behavioral intentions. Participants received a gift bag containing a $30 gift card to a popular local supermarket, English and Spanish oral health information pamphlets produced and distributed by the NIDCR, a children's oral health kit with brush, toothpaste, timer, and reveal tablets, and a list of local free and reduced rate oral health providers.

[5]Some items on the pretest and posttest instruments used in this work were developed by NIDCR Early Childhood Caries Collaborative Centers cooperative agreements to Boston Univ. U54 DE019275, Univ. California San Francisco U54 DE 019285, and Univ. Colorado Denver U54 DE019259 from the National Institute of Dental and Craniofacial Research, National Institutes of Health

Results

Data were collected from 169 participants. Nine were dropped from the analysis for the following reasons: three indicated other than Mexican cultural heritage, four indicated no children under 6 years old, one had substantially incomplete responses, and one had difficulty reading the pamphlet and questionnaire. Demographic data for the remaining 160 Mexican heritage mothers are shown in Table 1.

Table 2 shows the means, standard deviations, marginal means, standard errors, and Cronbach Alphas for the quantitative measures. To ensure that random assignment had, indeed, equalized the four experimental groups prior to the manipulation, demographic variables in Table 1 were each used as dependent variables in 2 × 2 ANOVAs with written message and images as the independent variables. No significant differences or interactions were found. Similarly, the pretest of oral health knowledge was analyzed and again no significant differences were found, $F(3, 156) = 0.67$, $p = .57$, demonstrating that the four groups were not different in their prior knowledge of oral health.

To determine if participants improved their recall of oral health information after reading a pamphlet, a repeated measures t-test was conducted on the entire sample. Results showed that all participants improved their knowledge: the posttest total correct ($M = 17.98$) was significantly higher than the pretest total ($M = 14.52$), $t(159) = -17.18$, $p < .001$.

Prior to testing the effects of the written message and image manipulations on recall, we wanted to determine what else might affect the posttest recall scores by estimating the correlations between the demographic variables in Table 1 and the pretest and posttest scores. Pretest scores were, as expected, strongly related to posttest scores, $r(158) = .56$, $p < .001$. In addition, English acculturation ($r(158) = .19$, $p = .02$), Spanish acculturation ($r(158) = .17$, $p = .04$), and highest grade completed ($r(158) = .24$, $p < .01$) were all significantly correlated with posttest scores. Consequently, these three variables and pretest scores were included as covariates in the analyses that follow.

To test the effects of cultural sensitivity a 2 × 2 ANCOVA with written message (standard vs Mexican) and images (Anglo vs Mexican) as the independent variables was conducted. Results are reported in Table 3. As shown, main effects for written message ($F(1, 152) = 5.21$, $p = .024$, partial $\eta^2 = .033$) and image ($F(1, 152) = 5.03$, $p = .026$, partial $\eta^2 = .032$) were observed while their interaction was not significant. Table 4 shows the means, standard deviations and group sizes for the 2 × 2 ANCOVA.

While this ANCOVA demonstrates the theoretically significant independent effects of written message and images, in a practical sense one should compare the group with both Mexican (culturally sensitive) written message and images to the group with both standard written message and images (i.e., Mexican-Mexican vs standard-Anglo). Again controlling for pretest scores, English Acculturation, Spanish Acculturation, and highest grade level, these two groups were compared. Those exposed to the Mexican messages and images scored higher (marginal $M = 18.61$) than those exposed to the standard messages and images (marginal $M = 16.06$), ($F(1, 79) = 9.42$, $p = .003$, partial $\eta^2 = .107$). It should be noted that

the effect size in this comparison is substantially larger than that for the main effects observed in the ANCOVA presented previously.

To test the effects of cultural sensitivity on perceptions of the pamphlets and on behavioral intentions, separate 2 × 2 ANOVAs with written message (standard vs Mexican) and images (Anglo vs Mexican) as the independent variables were conducted. No significant effects were found. Perhaps due to social desirability, these variables seemed to have ceiling effects given the high means and low standard deviations (see Table 2). Further analysis showed that on a 5-point scale 77.5% of the intention scores were 4 or higher and 67.7% of the perception scores were 4 or higher. Clearly, all the participants liked the oral health information and intended to behave accordingly. These conclusions were borne out in the open-ended responses. The formal analyses of these responses is beyond the scope of this report.

Discussion

Results show that the experiment provided support for the theoretical framework developed by Resnicow and colleagues (1999). Cultural sensitivity was associated with enhanced oral health knowledge in both the surface structure (images) and deep structure (written message) manipulations. Given the lack of a significant interaction between the two dimensions and the larger effect size when the doubly culturally sensitive pamphlet was compared to the doubly standard pamphlet, the two effects of surface and deep structure may have different causal mechanisms. While no other study that we know of has specifically compared the effects of surface and deep structure, the meta-analysis by Huang and Shen (2016) examined these aspects of cultural sensitivity. They found that while the effects of cultural adaptations were generally small, those including deep structure adaptations were considerably more effective than those including only surface structure adaptations. However, their analysis did not actually separate the effects because studies including both deep and surface adaptations were coded as deep structure studies and those which included only surface structures were coded as surface. Their finding, then, appears similar to ours in as much as both found adaptations including both deep and surface structures to be more effective than those including only one or the other.

Images may have increased the elaboration of the information, as suggested by Petty and Cacioppo (1986), and the peripheral route to persuasion. Increased recall for information in pamphlets containing culturally sensitive images is also consistent with theories that suggest images can enhance the cognitive processing of written message information (Schnotz, 2002; Schwartz & Collins, 2008). On the other hand, increased recall for information in pamphlets containing culturally sensitive deep structure (written message) are consistent with schema theory (Markus, 1977) because the ideas expressed in the written message are consistent with the culturally based self-schema of the Mexican heritage mothers. References to *marianismo* may have been especially potent in this regard. While the causal mechanisms accounting for the increased recall of information in the culturally sensitive pamphlets is beyond the scope of the current research, they are interesting and important topics for future research.

Although the current results support the effectiveness of two dimensions of cultural sensitivity, the limited and specific written messages and images, as well as the sample included in this study limit the generalizability of the results. Future tests of the two-dimensional model of cultural sensitivity should include other ethnic and cultural groups as well as a variety of different health messages to extend the generalizability. The current research was also limited in that it only tested short term recall and behavior intentions. Future research should also explore the longer term memory for the newly learned health information and especially the mechanisms through which the two dimensions affect recall and memory. Clearly, this study is only preliminary; much work needs to be done to determine the ways cultural sensitivity affects message effectiveness.

Conclusion

This study supports our focus on research in Pasteur's Quadrant (Stokes, 1997). Results presented here are both theoretically interesting and directly informative to those concerned with applications. Although the current research was focused on the Mexican American community, the theoretical findings should apply to a variety of cultural adaptations for other ethnic/cultural groups and other media. While pamphlets may still be present in some dentists' offices, our findings should be directly applicable to other health communication channels. The separate effects of deep and surface structures can inform research and application in areas such as the nascent field of health apps for mobile devices (Hingle & Patrick, 2016) and the growing dissemination of health information on the internet (Chesser, Burke, Reyes, & Rohrberg, 2016; Viswanath & Kreuter, 2007). In addition, health messages on social media (Gibbons, Fleisher, Slamon, Bass, Kandadai, & Beck, 2011; Smith & Denali, 2014) should not miss the opportunity to enhance their culturally sensitive messages with appropriately congruent images.

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Table 1

Demographic Variables

	Minimum	Maximum	Mean	SD
Age	18	64	33	7.56
Highest Grade	3	16	10.17	3.05
Children	1	7	2.66	1.30
Age of Youngest	.5	5	2.53	1.44
English Acculturation	1.00	4.00	2.16	.85
Spanish Acculturation	2.20	4.00	3.60	.43

Note: Age = participant age in years, Highest grade = self-report of highest grade in school competed, Children = number of participant's children, Age of youngest = age of youngest child in years, English and Spanish Acculturation = Average response of 5 items each having a Likert-type 1–4 response scale. Higher responses indicate higher acculturation levels.

Table 2

Descriptive Statistics for Measured Variables

	Minimum	Maximum	Mean	Std. Deviation	Cronbach Alpha
Pretest	6.00	20.00	14.52	2.73	.53
Posttest	9.00	22.00	17.98	2.71	.66
Perceptions	2.28	4.83	4.15	.45	.84
Intentions	1.00	5.00	4.45	.78	.93

Note: Pretest and Posttest = number correct on 22 items. Perceptions = average response of 22 items each having a 1–4 response scale. Higher responses indicate higher positive perceptions of the pamphlet viewed. Intentions = average response of 12 items each having a 1–4 response scale. Higher responses indicate greater intention to follow the guidance offered in the pamphlet viewed.

Table 3

ANCOVA Results with Posttest Scores as the Dependent Variable

Source	*df*	*F*	*partial* η^2	*p*
Corrected Model	7	14.368	.398	.000
Intercept	1	10.131	.062	.002
Pretest Score	1	65.467	.301	.000
English Acculturation	1	.003	.000	.955
Spanish Acculturation	1	3.162	.020	.077
Highest Grade	1	5.173	.033	.024
Written message	1	5.208	.033	.024
Image	1	5.030	.032	.026
Written message * Image	1	.192	.001	.662

Table 4

Posttest Score by Experimental Group

Written message	Image	Mean	Std. Deviation	Estimated MarginalMean	Std. Error	*n*
Standard	Anglo	17.28	3.05	17.11	.343	40
	Mexican	18.21	2.47	18.03	.347	39
Mexican	Anglo	17.97	3.06	18.05	.359	36
	Mexican	18.42	2.23	18.66	.322	45