

# Project ESCUCHE: A Spanish-language Radio-based Intervention to Increase Science Literacy

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## ABSTRACT

Project ESCUCHE was developed to evaluate the potential to increase science literacy among Spanish-language radio listeners. In collaboration with community partners, we developed a 10-week culturally applicable science and health curriculum delivered through Spanish-language radio. Science literacy was assessed before and after the intervention.

Among the 51 participants, 70% were female, 76% were > 35 years old, 60% reported some college education, and 90% preferred speaking in Spanish versus English. The majority of participants (>94%) demonstrated adequate baseline functional health literacy, and 70% reported listening to all ten of the radio programs. Participants demonstrated significant increases in science knowledge post intervention (mean score before intervention 68.4% and after intervention 77%). This improvement was consistent across gender, education level, age, and baseline functional health literacy.

Radio has the potential to be an effective method of engaging the Spanish-speaking community to improve science literacy. The results from the ESCUCHE program add to the groundwork for further exploration of how radio programming and other media platforms can be used to impact health.

**KEYWORDS:** Latino, Spanish, radio, intervention, health literacy, science literacy

## INTRODUCTION

Healthy People 2020 identifies limited health literacy as a public health concern, and includes health communication as a focus area for intervention with the goal of using communication to strategically improve health.<sup>1,2</sup> The Institute of Medicine noted that nearly half of all American adults, or 90 million individuals, may have difficulty understanding and acting upon health information, and that the problem of health literacy is greater amongst minority populations.<sup>3</sup> Low health and science literacy is linked to poor health outcomes in the United States<sup>4</sup> and improving health and science literacy is a national health priority.

Spanish-speaking adults also have disproportionately low

health literacy, with 65% having basic or below basic health literacy compared with 28% of white adults.<sup>5</sup> While health and well-being can be negatively impacted by multiple factors, literacy and language barriers may contribute to or exacerbate health disparities by deterring patients from seeking health care, and/or making it difficult to follow through on clinical recommendations.<sup>6</sup>

Providing culturally competent health communication and placing health education materials in public venues may help meet the health education needs of the Spanish-speaking community.<sup>7,8</sup> Prior research suggests that Latinos prefer to receive health information via Latino social environments and Spanish-language programming rather than through English programming.<sup>7,9</sup> Media-based interventions have proven effective in changing Latino populations' knowledge, attitudes, and behaviors on cancer screening,<sup>11</sup> diabetes care,<sup>9</sup> and condom use.<sup>7</sup> A recent national-representative survey found that Spanish-speaking adults may particularly favor health messages delivered from the radio relative to other forms of media.<sup>10</sup>

Recognizing the importance of improving health and science literacy in the Spanish-speaking community, and the potential for radio to be an effective venue for our intervention, we developed a partnership with Latino Public Radio (LPR) as well as collaborations with local leaders in the Latino community to develop a radio-based educational intervention. Our study objective was to develop and evaluate a Spanish-language radio program targeted at increasing health and science literacy. Our hypothesis was that delivering a health and science curriculum in Spanish over a 10-week period to a Spanish-speaking radio audience could increase science literacy and health knowledge among program listeners.

## METHODS

"Evaluating the Spanish radio Community's Understanding of Clinical research and Health topics" (ESCUCHE, or "listen" in Spanish) was designed to develop a science literacy program for a Spanish-language radio audience. ESCUCHE, conducted between January 2009 and March 2010, was implemented in two phases: a formative qualitative component conducted through community forums and surveys (ESCUCHEI), and a 10-week Spanish radio-based intervention aimed at increasing science and health literacy (ESCUCHE

II). This study was an academic-community partnership between Latino Public Radio (LPR) and Brown University/Women & Infants Hospital. This academic-community partnership was guided by the principles of Community Based Participatory Research (CBPR) in which community members were closely involved in the intervention design. This study was approved by the Institutional Review Board at Women & Infants Hospital (IRB NET ID# 792315).

In ESCUCHE I, the community's interest in program participation and the clinical subject areas for the intervention were assessed through community-based forums held with leadership from prominent Latino organizations, discussions on the radio with call-in listeners, and anonymous surveys. The surveys and forums assessed what types of technology are accessible to community members, their health concerns and topics of interest, optimal program length and frequency, how community members might access programs that they are not able to listen to live, and overall interest in such a program.

ESCUCHE II incorporated the findings from the initial qualitative assessment which informed the following ten primary health issues addressed in ESCUCHE II: health screenings, immunizations for HPV and cervical cancer, risk of cardiovascular disease (cholesterol and hypertension), diet and exercise (obesity), diabetes, breast cancer, contraception, HIV/AIDS, smoking, and asthma. This ten-week curriculum was delivered via the radio from January 27 to March 31, 2010.

Fifty-one participants were recruited to participate in ESCUCHE II. Eligibility criteria included listening to LPR, 18 years of age or older, and Spanish-speaking. Participants in ESCUCHE I were not eligible for ESCUCHE II. Participants were recruited via LPR broadcasts, and radio callers interested in participating in the program were then contacted by research study staff. Informed consent was obtained from all participants.

The LPR Network ([www.lprri.org](http://www.lprri.org)) was launched in 2005 as a non-profit organization. Ninety percent of listeners live in Rhode Island and approximately one third of Latinos in the state listened to LPR daily.<sup>4</sup>

Each of the ten primary health topics were covered in a thirty-minute pre-recorded structured radio broadcast, followed by a live, thirty-minute, phone-in question and answer session. Both parts of this program were led by a study investigator (Dr. Pablo Rodriguez). The programs were developed using principles from the National Research Council's National Science Education Standards and the American Association for the Advancement of Science's Benchmarks for Science Literacy.<sup>12, 13</sup>

Study assessments were offered to participants in either English or Spanish. Baseline survey included socio-demographic information, usage of LPR, and sources of health-related information. The pre-test assessment included functional health literacy and science literacy using validated scales including the Short Assessment of Health Literacy for

Spanish Adults (SAHLSA-50),<sup>14</sup> the Rapid Estimates of Adult Literacy in Medicine–Short Form (REALM-SF),<sup>15</sup> and the Newest Vital Signs (NVS) Health Literacy Assessment.<sup>16</sup> To measure science and health knowledge, participants completed a survey adapted from the Program for International Student Assessment (PISA).<sup>17</sup> Following each radio program, participants completed an evaluation that provided information about interest in and feedback about the show.

Within 6 weeks of the final radio program, participants completed a post-test survey, which included the same science and health questions assessed at the pre-test survey. In addition, participants evaluated each element of the program and interest in the health and science content of the intervention.

Changes in science and health knowledge were calculated overall and stratified by gender (male vs. female), functional health literacy level, age >50 years, and education. Scores were presented as the percentage of correct items. Mean science and health knowledge scores were compared between the pre- and post-test time points by paired T-tests. To compare proportions, chi-square ( $\chi^2$ ) statistics were used. All data analyses were conducted using STATA (STACORP, version 10.0, College Station, TX) software. A p-value <0.05 was considered statistically significant.

## RESULTS

Of the 51 enrolled ESCUCHE II participants, 35 were female (Table 1). One participant did not provide demographic information and was excluded from subsequent analysis. Forty percent of participants were between 36–50 years of age and 34% were >50 years of age. Almost two-thirds (60%)

**Table 1.** Baseline socio-demographic characteristics

Participant characteristics at baseline	Overall, % (N=50)	Men, % (N=15)	Women, % (N=35)
<b>Socio-demographic variables:</b>			
<b>Gender</b>			
Male	30.0	--	--
Female	70.0		
<b>Age, years</b>			
18-35	24.5	13.3	29.4
36-50	40.8	53.3	35.3
>50	34.7	33.3	35.3
<b>Education</b>			
Some formal education	18.0	33.3	11.4
High school graduate	22.0	20.0	22.9
Some college education	42.0	26.7	48.6
College graduate	18.0	20.0	17.1
<b>Language preference</b>			
Spanish	90.0	86.7	91.4
English	10.0	13.3	8.6
<b>Employed in health care or a science-related field</b>	28.0	20.0	31.4

of participants reported some college education. Ninety percent of participants preferred speaking in Spanish compared with English.

Seventy-one percent of participants reported listening to all ten of the radio programs, and 22% reported listening to between seven and nine of the radio programs. Only three participants reported listening to fewer than six radio programs.

Baseline functional health literacy scores and the proportion of participants with access to health information and media were high (Table 2); this did not vary when stratified by gender. The majority of participants (>94%) had adequate health literacy per the SAHLSA-50 and REALM-SF assessments, while only 66% achieved adequate health literacy per the NVS assessment. The REALM-SF was a reliable measure of functional health literacy relative to the SAHLSA-50 (Kuder-Richardson coefficient of reliability of 0.91); in contrast, the NVS was not as reliable relative to the SAHLSA-50 (Kuder-Richardson coefficient of 0.13).

Sources of health and science information included physician (76%) and the internet (58%). (Table 2) Participants reported a high interest in LPR with 90.9% listening to “Nuestra Salud” program. Socio-demographic characteristics, baseline functional health literacy, and access to health information and media were similar between men and women.

After participating in the ESCUCHE II Program, the 41 participants who completed the post-test showed significant increases in health and science knowledge compared to their performance on the pre-intervention assessment (mean score 68.4% pre-intervention, 95% CI: 63.7 to 73.0 versus mean score 77.0% post-test, 95% CI: 73.6 to 80.5) (Figure 1). The eight participants who did not complete the post-test had significantly lower science and health knowledge scores at baseline compared with participants who completed the post-intervention assessment (mean score 55.6% vs. 68.4%, p=0.003).

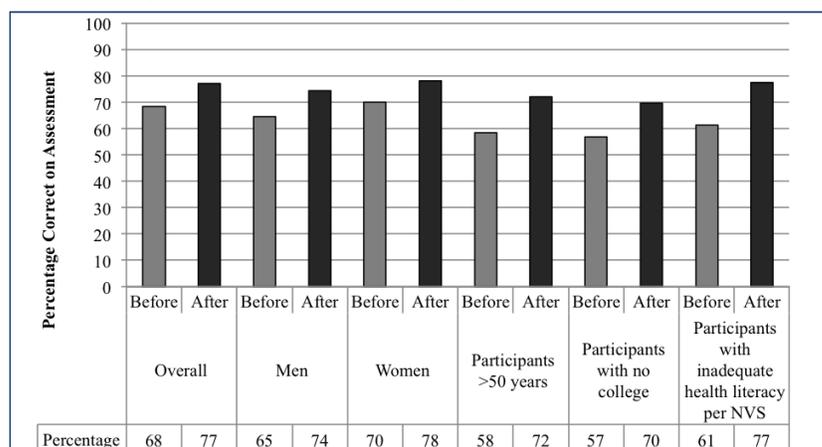
Men and women demonstrated significant increases in health and science knowledge after the intervention. (Figure 1) Participants over 50 years old demonstrated higher health and science knowledge following the radio intervention (mean increase in score of 13.7% [95% CI 7.8 to 19.5; p-value<0.01]). Those with less than a college education and those

**Table 2.** Baseline functional health literacy and access to health information and media

Participant characteristics at baseline	Overall, % (N=50)	Men, % (N=15)	Women, % (N=35)
<b>Adequate functional health literacy:</b>			
SAHLSA-50 (score of ≥38 out of 50 points)	96.0	93.3	97.1
REALM-SF (score of 7 out of 7 points)	94.0	93.3	94.3
NVS (score of ≥4 out of 6 points)	66.0	66.7	65.7
<b>Access to health information and media:</b>			
I would advise a family member to pursue a career in health care or science	100.0	100.0	100.0
I understand my physician’s health instructions			
All of the time	50.0	53.3	48.6
Most of the time	38.0	40.0	37.1
Some of the time	10.0	0.0	14.3
Never	2.0	6.7	0.0
I understand current health issues in the news			
All of the time	34.0	26.7	37.1
Most of the time	42.0	53.3	37.1
Some of the time	24.0	20.0	25.7
Never	0.0	0.0	0.0
I am interested in being able to better understand health and science topics in the news	94.0	100.0	91.4
Source of health and science information			
Internet	58.0	60.0	57.1
Library	16.0	20.0	14.3
Traditional healer	10.0	6.7	11.4
Community organization	10.0	6.7	11.4
Medical reference book	32.0	26.7	34.3
Physician	76.0	73.3	77.1
Children	56.0	0.0	8.6
Family	28.0	13.3	34.3
Friends	16.0	0.0	22.9
Natural food store	18.0	26.7	14.3
I have access to:			
Radio	94.0	93.3	94.3
Podcasts	26.0	40.0	20.0
Cell phone	80.0	73.3	82.9
Home phone	70.0	93.3	60.0
Internet	74.0	86.7	68.6

SAHLSA-50 (Short Assessment of Health literacy for Spanish Adults); REALM-SF (Rapid Estimates of Adult Literacy in Medicine—Short Form); NVS (Newest Vital Signs); LPR (Latino Public Radio)

**Figure 1.** Changes in science and health knowledge after the radio intervention



with inadequate health literacy per the NVS scale demonstrated significant, albeit lower, knowledge gains following the radio intervention.

Following the radio intervention, participants (97.6%) reported their willingness to participate again in a similar program and would recommend the radio intervention to a friend.

## DISCUSSION

The aim of this intervention was to improve science literacy in a Spanish-speaking community through a novel and culturally appropriate radio-based curriculum. The ESCUCHE Program demonstrated that the radio can be an effective method of engaging the Spanish-speaking community on health and science topics. Participants who completed the post-test demonstrated significant gains in health and science knowledge following the 10-week radio program. While the study itself took place in 2009-2010, these findings suggest that the radio or other media may be useful in improving health and science literacy.

This study involved developing evaluation tools for health knowledge and science literacy, as well as the science and health curriculum. Although this program was not directly linked to health outcomes, the distribution of an evidence-based science literacy program to a Spanish-speaking audience has the potential to increase access to health information and knowledge, which could in turn have an impact on overall health.

The limitations to this study include potential selection bias as participants were radio listeners. A high level of satisfaction and participation in the current study may reflect that participants were utilizing the radio as a primary mode of accessing information. Participants had a high level of baseline health literacy; therefore, it is difficult to extrapolate these findings to a group with lower health literacy. Given the limited sample size, inclusion criteria, and convenience sample (Rhode Island residents), the findings of the current study may not be generalizable to the greater Spanish-speaking population. Future studies utilizing the radio and other media platforms to deliver an evidence-based curriculum to improve health and science literacy among a larger population-base are warranted.

The current study demonstrated that the radio is a feasible and efficacious media outlet to reach this community. A unique strength of this study was the collaborative development of an empiric culturally suitable science and health curriculum that could be delivered via the radio. Important health topics that emerged from this community-based collaboration were used to develop the radio program. Furthermore, this study involved a structured approach to assessing baseline functional health literacy among a sample of the target population and systematically assessed changes in science and health knowledge to determine the impact of the radio intervention.

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## References

1. Healthy People 2020. Washington, DC: U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion. Retrieved July 11, 2016 from: <https://www.healthypeople.gov/2020/topics-objectives/topic/health-communication-and-health-information-technology>
2. U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion. (2010). National Action Plan to Improve Health Literacy. Washington, DC: DHHS. Retrieved October 12, 2012, from: [https://health.gov/communication/hlactionplan/pdf/Health\\_Literacy\\_Action\\_Plan.pdf](https://health.gov/communication/hlactionplan/pdf/Health_Literacy_Action_Plan.pdf).
3. Nielsen-Bohlman L, Panzer AM, Kindig DA. 2004. Health Literacy: A Prescription to End Confusion. Washington, DC: The National Academies Press. Available from: <http://www.ihl.org/knowledge/Pages/Publications/HealthLiteracyAPrescriptiontoEndConfusion.aspx>
4. United States Census Bureau. 2016. QuickFacts. Available from: <http://www.census.gov/quickfacts/table/PST045215/44007>.
5. Services USDoHaH. America's Health Literacy: Why We Need Accessible Health Information. 2008; <http://www.health.gov/communication/literacy/issuebrief/>. Accessed October 10, 2012.
6. Victorson, D., Banas, J., Smith, J., Languido, L., Shen, E., Gutierrez, S., Cordero, E., Flores, L. (2014). eSalud: Designing and Implementing Culturally Competent eHealth Research With Latino Patient Populations. *American Journal of Public Health*, 104(12), 2259–2265. <http://doi.org/10.2105/AJPH.2014.302187>
7. Elder JP, Ayala GX, Parra-Medina D, Talavera GA. Health communication in the Latino community: issues and approaches. *Annu Rev Public Health*. 2009;30:227-251.
8. Flores G, Fuentes-Afflick E, Barbot O, Carter-Pokras O, Claudio L, Lara M, McLaurin JA, Pachter L, Ramos-Gomez FJ, Mendoza F, Valdez RB, Villarruel AM, Zambrana RE, Greenberg R, Weitzman M. The health of Latino children: urgent priorities, unanswered questions, and a research agenda. *JAMA*. Jul 3 2002;288(1):82-90.
9. Cortés D. Diabetes Health Education for Latinos through Innovative Informational Materials. 2003. Retrieved October 12, 2012 from: <http://www.hsph.harvard.edu/healthliteracy/practice/diabetes-health-education-for-latinos-through-innovative-informational-materials/index.html>.
10. Viswanath K, Ackerson LK. Race, ethnicity, language, social class, and health communication inequalities: a nationally-representative cross-sectional study. *PLoS ONE*. 2011;6(1):e14550.
11. Yancey AK, Tanjasiri SP, Klein M, Tunder J. Increased cancer screening behavior in women of color by culturally sensitive video exposure. *Preventive medicine*. Mar 1995;24(2):142-148.
12. National Committee on Science Education Standards and Assessment NRC. National Science Education Standards. Washington, DC: The National Academies Press; 1996.
13. American Association for the Advancement of Science. Benchmarks for Science Literacy. New York: Oxford University Press; 1993.
14. Lee SY, Bender DE, Ruiz RE, Cho YI. Development of an easy-to-use Spanish Health Literacy test. *Health services research*. Aug 2006;41(4 Pt 1):1392-1412.
15. Davis TC, Long SW, Jackson RH, et al. Rapid estimate of adult literacy in medicine: a shortened screening instrument. *Family medicine*. Jun 1993;25(6):391-395.
16. Weiss BD, Mays MZ, Martz W, et al. Quick assessment of literacy in primary care: the newest vital sign. *Annals of family medicine*. Nov-Dec 2005;3(6):514-522.
17. Organization for Economic Co-operation and Development Organization for Economic Co-operation and Development. PISA 2009 Assessment Framework: Key competencies in reading, mathematics, and science 2009; <http://www.oecd.org/pisa/pisaproducts/44455820.pdf>.

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