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A Cardiovascular Health Intervention for Spanish Speakers: The Health Literacy and ESL Curriculum

Francisco Soto Mas¹, Cheryl L. Schmitt², Holly E. Jacobson³, and Orrin B. Myers²

¹College of Population Health MSC09 5070, 1 University of New Mexico, Albuquerque, NM 87131-0001, USA

²School of Medicine, Family & Community Medicine, University of New Mexico, Albuquerque, NM, USA

³Department of Linguistics, University of New Mexico, Albuquerque, NM, USA

Abstract

Spanish speakers in the United States are in need of effective interventions that address both cardiovascular disease (CVD) and health literacy. However, the literature lacks interventions that have used and evaluated a strategies that focus on both, particularly at the community level. The aim of this study was to explore the effect of a health literacy curriculum on cardiovascular health behavior among Spanish speaking adults. It used a randomized controlled pre-posttest design. Participants included Hispanic adults with a low-to-intermediate level of English proficiency. The intervention group received the health literacy and English as a second language (ESL) Curriculum with CVD specific content, while the control group received a conventional ESL curriculum. Tools included the Spanish Cardiovascular Health Questionnaire (CSC), the test of functional health literacy in adults (TOFHLA), and the Combined English Language Skills Assessment. Analysis of change scores included independent sample *t* test and multiple linear regression. A total of 155 participants completed the study. There was a significant greater improvement for the intervention group in change of CSC score from pretest to posttest ($P= 0.049$) compared to controls. The study also found significantly improved TOFHLA ($P= 0.011$), however it did not find a relationship between changes in CVD behavior and health literacy or English proficiency. The Health Literacy and ESL Curriculum constitutes a valuable resource for addressing the cardiovascular health, literacy, and language needs of Spanish-speaking adults. Interventions that take a multilevel education and health approach may be more effective in addressing the needs of immigrants. Research should further explore the interactions between CVD behavior, health literacy, and English proficiency.

Keywords

Hispanics; Immigrants; Community intervention; Language; English proficiency

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Introduction

Hispanics are in need of effective interventions that address both cardiovascular disease (CVD) and health literacy. Recent data indicate a high prevalence of adverse risk factors [1, 2] and alarming rates of CVD among Hispanics in the United States (US) [3]. National data also show that Hispanics are more likely to experience limited health literacy. The 2003 National Assessment of Adult Literacy (NAAL) found lower levels of health literacy in Hispanics compared to other population groups [4]. On the same note, language seems to be related to both CVD and health literacy. The Institute of Medicine identified language as an important component of health literacy [5], and studies have found gaps in CVD awareness and knowledge among Spanish speakers compared to other ethnic and language groups [6–9].

Researchers and leading organizations such as the American Heart Association continue to emphasize the need for effective interventions to educate Hispanics about cardiovascular health [10, 11]. In this endeavor, the role of health literacy must be considered. Low health literacy has been associated with poor physical functioning in patients with heart disease [12] and hypertension [13, 14], and with increased mortality in patients with heart failure [15]. Other studies have emphasized the role of health literacy in CVD education [16]. There is also evidence on the association between health literacy and other leading chronic conditions such as cancer [17–21].

Although the negative health consequences of low health literacy affect all US population groups, health literacy is particularly relevant for Spanish speakers. Researchers note that most Hispanic immigrants are at risk of having limited health literacy because they must confront the many barriers of a predominately English-language health care system [22, 23]. In fact, NAAL's data indicated that adults who spoke only Spanish before starting school had the lowest average health literacy [4]. Studies with Spanish speaking adults have also found high prevalence of low health literacy [24–27]. This gap must be addressed as the US Spanish speaking population continues to increase. In 2013, 73% of Latinos ages 5 and older said they speak Spanish at home, which constitutes a record 35.8 million people [28].

Despite the need for effective approaches to address CVD and health literacy the literature lacks interventions that have used and evaluated a strategy that focuses on both, particularly at the community level. Most CVD and health literacy studies are clinical-based and do not include a health literacy intervention. Rather, they explore the association/correlation of health literacy on CVD-related outcomes such as knowledge, self-efficacy, medication adherence, or hospitalization [12, 15, 29–37]. Often, health literacy is integrated into statistical modeling looking at the pathways between an observed CVD-related relationship [38, 39].

Although some authors have discussed specific approaches to integrate health literacy into CVD prevention [40, 41] and designed interventions for low literacy individuals [42, 43], very few CVD prevention studies have included health literacy as their primary outcome. Similarly, most community-based CVD education and promotion interventions for Hispanics [44–46] do not actually address low health literacy. A strategy worth exploring for

addressing the CVD health and literacy needs of Hispanic adults is the implementation of community-based programs that simultaneously target these two variables. Furthermore, addressing the English language needs of Spanish speakers may provide an important added value. Research suggests that limited English proficiency may constitute a greater health related risk than low health literacy among Hispanics and other ethnic groups [26]. Other studies have emphasized the connection between adult education, English language and health literacy among Spanish speaking immigrants [22, 47].

Background

The Health Literacy and ESL Curriculum combines health literacy and English-language instruction within a CVD education and prevention context. Specifically designed for Spanish-speaking adults with a low-to-intermediate level of English proficiency, it focuses on improving English proficiency in listening, speaking, reading, and writing while developing health literacy and CVD prevention knowledge and skills. The health literacy content aims at familiarizing students with the particular literacy demands of health care settings (e.g., writing, reading, and communicating). A main resource for the curriculum was Salud para su Corazón (SPSC) (Health for your Heart), a program developed by the National Heart, Lung, and Blood Institute which has successfully been implemented in Hispanic communities [48, 49]. SPSC includes bilingual (English–Spanish) education materials, which were used to facilitate classroom activities for developing prose, document and numeracy skills (e.g. reading comprehension, dialogues, vocabulary, role play and problem-solving). The aim was to develop personal skills, such as health-related vocabulary and understanding of the role of lifestyle in chronic disease with the purpose of influencing CVD prevention-related behaviors. Additional information on the development process, theoretical framework, and actual format and content of the Health Literacy and ESL Curriculum has been previously reported [50, 51].

The Health Literacy and ESL Curriculum has been evaluated through both experimental and quasi-experimental designs. The results of these evaluation studies have demonstrated effectiveness in improving both health literacy and English proficiency among Spanish speaker adults in diverse community settings, including a community college, a small church, and a large worksite [23, 52]. The curriculum has also been positively evaluated through a recent systematic review [53]. The present study aimed at exploring the effect of the Health Literacy and ESL Curriculum on cardiovascular health behavior.

Methods

A randomized controlled pre-posttest design tested whether participants in the intervention group obtained greater post-test cardiovascular health scores compared to participants in the control group. The intervention group received the Health Literacy and ESL Curriculum; the control group received a conventional ESL curriculum. The study was approved by the University of Texas at El Paso Institutional Review Board, and all participants signed an informed consent.

Participants were recruited through Spanish media outlets. Inclusion criteria included: (a) able to read and write Spanish; (b) 21 years-of-age or older; (c) no previous participation in formal health/cardiovascular education/prevention program; and (d) low-to-intermediate level of English proficiency able to read, write and speak English at a basic level. More than 600 people met criteria (a), (b) and (c). A percentage of those (~ 35%) was randomly selected to complete the Combined English Language Skills Assessment (CELSA) (criterion d). Those who met all requirements were randomly assigned to either the intervention or control group. People who did not qualify for the study were referred to other ESL programs in the community.

Instruments and Data Management

Cardiovascular health behaviors were assessed using an adapted version of the Spanish *Cuestionario de Salud Cardiovascular* (CSC) (Cardiovascular Health Questionnaire) [48, 49]. The self-reported tool, originally developed and used to evaluate SPSC interventions, consists of 34 items on nutrition and physical activity behaviors (e.g. shopping, cooking, eating habits; salt/sodium, fat/cholesterol intake; meeting general recommendations for physical activity). All items include a four options Likert-type response scale from *never* to *always*. Each answer option was given a partial score ranging from 1—*never* to 4—*always*. Total questionnaire score was calculated by adding all partial scores, which ranged from 34 to 136. The inter-item correlation for the total scale for this study yielded a Cronbach's alpha of 0.81.

Health literacy was assessed using the English version of the test of functional health literacy in adults (TOFHLA) [54], which consists of a 50-item reading comprehension and 17-item numerical ability test. Each item answered correctly is assigned a score of one; incorrect items are given a score of zero.

CELSA (Association of Classroom Teacher Testers) is a standard computerized English language skills measure which focuses primarily on grammar in a reading context. Scores range from 0 to 75. CELSA was used for screening (inclusion) and for estimating changes in English proficiency.

Participants were also asked to complete a brief bilingual demographic questionnaire (see Table 1). Only participants who attended at least 75% of the sessions and completed both the pre and post tests were included in the final analysis.

Data Analysis

SAS 9.4 was used to perform data analysis, including descriptive and inferential statistics. Data quality consisted of cross-checking 100% of the cases. There was a focus on calculating frequencies of responses to each question, computing averages and scores, and comparing responses between treatment groups. Descriptive statistics were produced to describe the sample. Means, standard deviations, standard errors and 95% confidence intervals were calculated for continuous variables. Frequency and percentages were calculated for categorical variables. For baseline comparison of demographic and socioeconomic variables we used Wilcoxon nonparametric tests or Fisher exact tests to compare the two treatment groups.

Intervention effectiveness was evaluated based on change in CSC scores for the two treatment groups. Change in CSC scores and secondary outcomes (TOF-HLA-reading comprehension, numeracy- and English proficiency) were computed as posttest values minus pretest values so that positive change scores indicate improvement during the study. Associations among change scores were assessed using Pearson correlations. Student's *t* tests were used to compare change in primary and secondary outcomes between groups. Multiple linear regression models were used to assess treatment differences in change scores adjusted for baseline English proficiency scores and participant education level. Least squares adjusted means and 95% confidence intervals are used to present results adjusted for average covariate values. *P* values for tests on multiple secondary outcomes were not adjusted. *P* values < 0.05 were considered to be significant.

Results

A total of 181 people participated, and 155 (85.6%) completed the intervention and both the pretest and posttest evaluations. Demographic characteristics of participants are included in Table 1. Years in the US (*P*= 0.024) and level of education (*P*= 0.022) were the only demographic variables unbalanced between intervention and control at baseline with controls more likely to have lived in the US longer and more likely to have less than a high school education. The intervention group had higher TOFHFLA and higher numeracy scores at baseline compared to controls.

Table 2 shows average change for CSC and other outcomes for control and intervention. All outcomes increased significantly from pre to post intervention assessments for intervention and for control groups (95% confidence intervals do not overlap 0.0 in Table 2). CSC increased by 6.3 (4.6–7.9) for controls and by 4.3 (2.8–5.8) for the intervention, but these increases were similar (*P*= 0.067). TOF-HLA scores (*P*= 0.012) and numeracy scores (*P*= 0.037) showed a significantly larger changes in controls compared to the intervention group. Significant correlation were not detect between CSC scores and change in TOFHFLA scores (*P*= 0.78) or with change in English proficiency score (*P*= 0.18).

Results that control for potential confounders, baseline English proficiency and education, are shown in Table 3. Change in CSC was significantly greater in the intervention group compared to controls (2.3, 0.01–4.7, *P*= 0.049). The analysis also yielded significantly greater improvements for the intervention compared to controls for TOFHFLA (5.0, 1.2–8.8, *P*= 0.011) and for numeracy (1.0, 0.1–2.0, *P*= 0.037).

Discussion

Previous studies using experimental and quasi-experimental designs showed that the Health Literacy and ESL Curriculum significantly improved health literacy levels and English proficiency among Spanish-speaking adult participants [23, 52]. The present study estimated intervention effect on cardiovascular health behavior. The adjusted multiple linear regression analysis yielded a significant difference in CSC score change across groups, indicating a positive treatment effect. The results of the present study are encouraging given the high rates of CVD among US Hispanics [3], the high prevalence of adverse risk factors in this

population [1, 2], and the need for increasing CVD prevention awareness and knowledge among Spanish speakers [6–9].

Heart disease, stroke, diabetes and hypertension are among the leading cause of death in Hispanics, and compared with whites they experience higher prevalence of diabetes (133%) and obesity (23%) [55]. Other studies have also found that Hispanic patients have poorer hypertension control compared with whites [56, 57]. Despite the fact that overall heart disease death rate is lower among Hispanics than among non-Hispanic whites [55], there is evidence that CVD greatly contributes to disparities in mortality among ethnic groups, and that eliminating disparities can significantly decrease the number of deaths among Hispanics from heart attack, stroke, and other CVD [58].

Effective strategies that address risk factors for CVD are needed among Hispanics in general and Spanish speakers in particular. A substantial proportion of CVD could be prevented by not smoking, maintaining a healthy body weight, eating a healthy diet, and being physically active. Increasing awareness of the importance of screening and early detection (e.g. blood pressure, cholesterol, diabetes) and disease management should also be a priority among Spanish speakers. Many adult immigrants do not have access to appropriate health information and education, and often struggle with the literacy, linguistic, and cultural competencies for negotiating the complex and predominately English-based public health and healthcare systems. Therefore, a curriculum that simultaneously addresses CVD prevention, health literacy, and English proficiency, would constitute a valuable resource.

Despite the fact the present study did not find a relationship between changes in cardiovascular disease behavior and health literacy or English proficiency, combining education and health content has many advantages. Research has shown that integrating health issues into ESL instruction can develop both language skills and critical thinking [59], and that the combination results in positive outcomes outside of the classroom, such as “increased activity within the community and learners taking healthful action for themselves [60, 61].” The National Action Plan to Improve Health Literacy (NAPIHL) emphasizes the importance of community-based opportunities for education, including English as a second language (ESL) programs. It recommends collaborations among the adult literacy and ESL communities [62]. The strategy may even be more advantageous for Hispanics. ESL is perceived by Hispanic immigrants as an economic and social opportunity and a valued resource [63]. In fact, Hispanics comprise the majority of ESL participants [64, 65].

Limitations

This study was exploratory and the sample was relatively small, therefore generalizations should be made cautiously. The Health Literacy and ESL Curriculum was specifically developed for Spanish-speaking adults with a low to intermediate level of English, and may only be appropriate for this population group. The same cardiovascular health instrument was used for both the pretest and posttest. The experience with the pretest may have had an effect on post-test answers, which constitutes a threat to internal validity. However, there was a 6-week period between the pretest and the posttest, limiting the impact of the potential threat. Finally, the CSC is self-reported and responses may have been biased by inappropriate recall, social desirability, or personal feelings.

Conclusions

Interventions that take a multilevel education and health approach may be more effective in addressing the health, literacy, and communication barriers faced by many immigrants. The findings of this study suggest that the Health Literacy and ESL Curriculum may constitute a valuable resource for addressing the cardiovascular health needs of Spanish-speaking adults, as well as their health literacy and English language needs. Additionally, as was the case in this study, implementing and evaluating the curriculum in a variety of community settings (e.g. community college, church, worksite) facilitates recruitment and retention.

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Table 1

Demographic characteristics and pretest scores of participants

	Intervention (n = 77)	Control (n = 78)	P value ^a
Age (years), [% (n)]			
20–30	10.4 (8)	7.7 (6)	0.38
31–45	42.9 (33)	34.6 (27)	
46 or more	46.7 (36)	57.7 (45)	
Sex [% (n)]			
Male	23.4 (18)	15.4 (12)	0.23
Female	76.6 (59)	84.6 (66)	
Place of birth [% (n)]			
Mexico	94.8 (73)	88.5 (69)	0.15
United States	2.6 (2)	10.3 (8)	
Other	2.6 (2)	1.3 (1)	
Years in the United States [% (n)]			
< 1	1.3 (1)	2.6 (2)	0.02
1–3	18.2 (14)	7.7 (6)	
4–7	10.4 (8)	6.4 (5)	
8 or more	59.7 (46)	80.8 (63)	
Missing	10.4 (8)	2.6 (2)	
Highest level of education [% (n)]			
Elementary school	5.3 (4)	5.1 (4)	0.02
Middle school	4.0 (3)	19.2 (15)	
High school	43.4 (33)	38.5 (30)	
Associate/technical degree	22.4 (17)	15.4 (12)	
Bachelor's degree	21.0 (16)	19.2 (15)	
Master's degree	3.9 (3)	– (0)	
Doctoral degree	– (0)	2.6 (2)	
Attended ESL classes [% (n)]	100 (77)	100 (78)	1.00
Pretest Instrument [Mean (95% CI)]			
CSC	53.6 (51.8–55.5)	52.9 (50.8–55.0)	0.59
TOFHLA	65.5 (62.1–68.9)	59.9 (56.1–63.8)	0.03
Reading comprehension	34.1 (32.1–36.2)	32.4 (30.3–34.5)	0.24
Numeracy	10.3 (9.7–11.0)	9.2 (8.5–10.0)	0.04
English proficiency	100.2 (99.1–101.3)	99.4 (98.1–100.8)	0.37

CSC Cardiovascular Health Questionnaire, TOFHLA Test of Functional Health Literacy, Reading–reading comprehension section of TOFHLA, Numeracy–numeracy comprehension section of TOFHLA, English–English Proficiency exam

^aFisher exact test or Wilcoxon rank-sum test

Table 3

Change in pre to post test scores for primary (CSC) and secondary outcomes adjusted for baseline English proficiency and education (positive change is improved score)

Outcome ^a	Control (n = 78) pre to post change Mean ± SE	Intervention (n = 77) pre to post change Mean ± SE	Adjusted difference in change Mean (95% CI)	P value ^b
CSC	2.3 ± 1.2	4.7 ± 1.2	2.3 (0.01–4.7)	0.049
TOFHLA	7.8 ± 1.9	12.8 ± 2.0	5.0 (1.2–8.8)	0.011
Reading	4.2 ± 1.0	5.3 ± 1.1	1.1 (–0.9–3.2)	0.285
Numeracy	1.4 ± 0.5	2.4 ± 0.5	1.0 (0.1–2.0)	0.033
English	2.2 ± 0.6	2.2 ± 0.6	0.0 (–1.1–1.2)	0.930

^aCSC Cardiovascular Health Questionnaire, TOFHLA Test of Functional Health Literacy, Reading–reading comprehension section of TOFHLA, Numeracy–numeracy comprehension section of TOFHLA, English–English Proficiency exam

^bP values are tests for equality of change in the two treatment groups using a linear model adjusted for education and baseline English proficiency (except for English proficiency outcome)