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Adult Education and the Health Literacy of Hispanic Immigrants in the United States

Francisco Soto Mas ^a, Holly E. Jacobson^b, and Arturo Olivárez^c

^aCollege of Population Health, University of New Mexico; ^bDepartment of Linguistics, University of New Mexico;

^cDepartment of Teacher Education, University of Texas at El Paso

ABSTRACT

Discussion on the advantages of integrating health literacy into adult education has primarily been theoretical and conceptual. There is a need for studies that assess the impact of adult education on health literacy. This study implemented a quasi-experimental design to explore whether basic adult instruction may constitute a venue for improving health literacy among Spanish-speaking immigrants. Participants included adults in a High School Equivalency program in a US-Mexico border community who received either a standard GED curriculum or a GED curriculum enhanced with health literacy content. The Short Spanish TOFHLA was used to measure health literacy. While S-TOFHLA scores and health literacy levels improved in all participants, no statistically significant differences were observed across groups. Results are consistent with recommendations supporting adult education as a strategy for improving health literacy.

KEYWORDS

Adult education; Latino immigrants; Spanish speakers; High School Equivalency; border community

Background

Health literacy has been defined and interpreted in many ways. Ratzan and Parker (2000) proposed that health literacy is “the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions.” Although this definition has been used widely in both research and practice, many researchers and practitioners prefer a more skill-based definition, such as “an individual’s possession of requisite skills for making health-related decisions” (Paasche-Orlow & Wolf, 2007) or “one’s ability to use print materials to accomplish everyday health tasks” (Rudd, 2007). Speros (2005) went further to list specific proficient health literacy competencies, such as reading and numeracy skills, comprehension, the capacity to use information in health care decision making, and successful functioning in the role of health care consumer.

One common feature of many health literacy definitions is a causal link between literacy (e.g., reading, numeracy, comprehension) and appropriate decision making in health care contexts and environments. If higher health literacy results in informed decisions that bring about improved health outcomes, increasing the health literacy level of the population is a worthwhile endeavor. Consistently, identifying effective strategies to improve health literacy in adults has become a national priority, and also a challenge. One approach that warrants further consideration is the use of adult education instruction. Authors claim that adult education provides the best environment to engage learners in improving health literacy (Diehl, 2004; Golbeck, Ahlers-Schmidt, & Paschal, 2005), that both teachers and learners in adult education are interested in integrating education and health (Bennett, Kripalani, Weiss, & Coyne, 2003), and that adult education instructors do not need to be health experts since they have experience presenting content to limited literacy groups (Rudd, 2004).

CONTACT Francisco Soto Mas, MD, PhD, MPH  fsotomas@salud.unm.edu  Department of Family & Community Medicine, Public Health Program, MSC 09 5060, 1 University of New Mexico, Albuquerque, NM 87131, USA.

In the United States, improving health literacy has become a national priority and experts look at education as a viable strategy. The Institute of Medicine argues that integrating a topic of high interest, such as health, increases student motivation to improve their language, literacy, and math skills (Institute of Medicine, 2004). Similarly, the National Action Plan to Improve Health Literacy recommends expanding local efforts to provide adult education in the community (U.S. Department of Health and Human Services, 2010). These recommendations are consistent with the literature. Early studies emphasized the connection between learning centers and health education (Murphy et al., 1996). Others explored the benefits of integrating health literacy into adult education (Diehl, 2007), and found increased confidence among patients participating in adult education program in terms of disease management and communication skills (Barlow, Williams, & Wright, 1999). More recent studies have reported on collaborative partnership designed to provide health literacy content through adult education instruction (Chervin, Clift, Woods, Krause, & Lee, 2012), debated the potential benefits of adult education for health literacy and health education (Freedman, Echt, Cooper, Miner, & Parker, 2012), and suggested the unique opportunity to address functional health literacy among low-literate populations through adult education (Freedman, Miner, Echt, Parker, & Cooper, 2011).

Adult education may constitute a particularly attractive venue for improving health literacy among Hispanic immigrants. According to recent data, there are more than 56 million Hispanics in the US (U.S. Census Bureau, 2015), and their health literacy level is of concern. The 2003 National Assessment of Adult Literacy (NAAL) reported differences in health literacy level by sex, age, and education, as well as a strong relationship between health literacy and race or ethnicity. It was found that Hispanic adults had the lowest health literacy scores of any other group, and that adults who spoke only Spanish before starting school had the lowest average health literacy (Kutner, Greenberg, Jin, & Paulsen, 2006). Researchers have concluded that limited English proficiency may constitute a greater health-related risk than low health literacy among Hispanics and other ethnic groups (Sentell & Braun, 2012). Studies have explored the feasibility of using ESL instruction to improve health literacy among Hispanic immigrants (Chen, Goodson, & Acosta, 2015; Santos, Handley, Omark, & Schillinger, 2014; Soto Mas et al., 2015a; Soto Mas, Ji, Fuentes, & Tinajero, 2015b).

Despite the need for effective health literacy interventions for Spanish speakers and the advantages of integrating health literacy into adult instruction, the literature lacks studies that have used and evaluated this strategy. While some experts have argued that education alone would not solve the health literacy problem (Parker, Ratzan, & Lurie, 2003), others support adult basic education as an ideal venue for developing health literacy skills (Chervin et al., 2012; Freedman et al., 2011; Golbeck et al., 2005). The fact is that as Hispanics seek opportunities to access the education system in the US, adult education constitutes an opportunity to contribute to their health and literacy.

Purpose

Health literacy research has generally been conducted in health care settings such as hospitals, emergency departments, and general care facilities. Interventions generally include disease-specific information aimed at mitigating the consequences of low health literacy (Al Sayah, Majumdar, Williams, Robertson, & Johnson, 2013; Fraser et al., 2013; Sheridan et al., 2011; Taggart et al., 2012; U.S. Department of Health and Human Services, 2010). For the most part, these efforts have not translated into more literate and healthy communities. There is a need for community-based approaches that effectively contribute to the improvement of health literacy, and for studies that specifically assess the impact of basic adult education on health literacy. In the US, this is particularly true with Hispanic immigrants and for those with limited English proficiency. The purpose of this study was to explore whether basic adult instruction may constitute a venue for improving health literacy among Spanish-speaking adults. The study was conducted in a US-Mexico border community by a partnership between a community college and a public university. The study received Institutional Review Board approval from the two institutions involved.

Methods

This study employed a quasi-experimental, non-equivalent, pre-test and post-test design. Participants in the comparison group (T1) received a standard GED curriculum facilitated by a qualified adult education teacher. Participants in the treatment group (T2) received the same standard GED curriculum facilitated by a qualified adult education teacher and additional health literacy content by a trained health care provider.

The main contention of this study was that all Spanish speakers participating in an adult education program would improve their post-test health literacy scores, independently of whether they received health-literacy-specific content.

The study was conducted in collaboration with the High School Equivalency/Migrant Access Program (HEP/MAP), offered in Spanish by the local community college. The majority of the students are foreign born from Spanish-speaking countries. The HEP/MAP provides GED test preparation through 180 hours of instruction over a period of 15 weeks. The standard curriculum includes language (writing and reading); social studies (history, civics, geography, economics); science (life science/biology, physical science, earth and space science); and basic mathematics (algebra, geometry, and interpretation of graphs, charts, and tables).

The health literacy component connected the life science content with health and disease (e.g., specifically discussing how poor nutrition and lack of physical activity constitute risk factors for chronic conditions such as cardiovascular disease and diabetes). In addition, it included patient information such as how to select a doctor; patient's rights and responsibilities; communicating with your doctor; completing a medical history form; familiarization with check-up procedures; and recommended physical exams. The content included both disease-specific information as well as health-care-related information and was delivered over five two-hour sessions.

Participants

Participants were recruited voluntarily through self-selection. Inclusion criteria included: (1) enrollment in HEP/MAP; (2) ability to read and write in Spanish; and (3) age 21 years or older. All participants were required to sign an informed consent form. Eleven intact groups/classes at various locations throughout the city were included. Five groups were chosen to be part of the T1 group, and six were chosen to be part of the T2 group. Group selection was based on convenience, considering location, facilities, and logistics for delivering the intervention. A total of 212 students were invited to participate in the study. Of those, 56 were excluded from taking the survey for not meeting the inclusion criteria.

Measures

Health literacy was assessed through the Spanish version of the Short Test of Functional Health Literacy in Adults (S-TOFHLA), a version adapted from the TOFHLA that has shown to be a reliable and valid measure of health-related literacy (Baker, Williams, Parker, Gazmararian, & Nurss, 1999). The S-TOFHLA measures functional health literacy by testing the participant's ability to read sentences using real materials from the health care setting. It consists of 36 reading comprehension items divided into two sections: Passage A (preparation for a gastrointestinal X-ray session) and Passage B (rights and responsibilities section of a Medicaid application form). Each correct item is given one point, with a maximum score of 36 points. A score of 0–16 indicates “inadequate functional health literacy” (unable to read and interpret health texts); 17–22 “marginal functional health literacy” (has difficulty reading and interpreting health texts); 23–36 “adequate functional health literacy” (can read and interpret most health texts). A short demographic section was also included (see [Table 1](#)).

Table 1. Descriptive statistics for the S-TOFHLA pre- and post-test scores across selected demographic and intervention group variables.

Criterion Scores Grouping Variables	N*	Pre-test**		Post-test**	
		M	SD	M	SD
Sex					
Male	10	31.10	5.43	33.00	5.33
Female	79	31.58	5.97	33.54	4.32
Age					
Young Adult	31	31.87	5.19	34.40	2.63
Middle Age	34	31.00	6.35	33.32	4.66
Older Adult	32	31.41	6.00	33.06	5.02
Education					
Elementary School	43	30.05	7.00	32.98	4.71
Middle School	36	32.19	4.54	33.56	4.56
High School	10	35.50	0.53	35.40	0.97
Marital Status					
Single	8	33.50	2.93	34.13	1.72
Married	68	31.25	6.02	33.41	4.64
Divorced	9	30.33	7.50	32.78	5.33
Birthplace					
Mexico	83	31.66	5.89	33.66	3.94
USA	5	28.60	5.85	30.00	9.59
Intervention					
Comparison Group	36	32.14	4.11	33.97	3.02
Treatment Group	61	30.98	6.88	33.34	4.84
Total	97	31.41	6.01	33.58	4.25

*Valid answers only.

**Highest possible test score is 36.

Data collection

The S-TOFHLA was administered in a group setting. The pre-test was completed right before the first instructional session began, and the post-test at the end of the last session. Participants were provided a hard copy of the test and asked to read and answer each question. They were given a seven-minute time limit to complete the test, as prescribed by the administration instructions.

Analysis

Completed tests were entered into the IBM SPSS Statistics 19.0 software program (SPSS Inc., Chicago, IL). Only students who had completed the pre-test and post-test and a minimum of 75% of the sessions were included in the analysis. Analyses included calculating averages and scores, paired-group t-test to determine pre-test and post-test changes across groups; independent group's t-test for overall impact. A two-way factorial analysis of variance with a covariate was employed to determine if there were significant mean gain differences between the two conditions and key demographic variables. Chi-square was used to analyze categorical data and identify potential changes between pre- and post-tests. Finally, a test of reliability was conducted on the S-TOFHLA including internal consistency reliability with all T1 and T2 pre- and post-test data using Kuder-Richardson K-R 20 for dichotomous data and Pearson product moment correlations coefficient for test re-test reliability.

Results

A total of 97 students completed both the pre-test and post-test (36 for T1 and 61 for T2). The response rate was 62%. Most of the participants were female (88.8%), between 26 and 59 years of age (92.2%), married (76.4%), with less than a high school education (94.4%), and born in Mexico (94.9%).

Reliability analysis on the S-TOFHLA yielded moderate to high internal consistency. K-R20 for the overall test (Lecture A and B) was 0.89 on the pre-test and 0.91 on the post-test. The test re-test analysis also showed an acceptable stability between testing times ($r = 0.76$).

Descriptive S-TOFHLA test results are included in Table 1. Post-test scores improved in both groups (T1 and T2). Separate analyses using a dependent sample t-test yielded statistical significant differences between pre-test and post-test. For T1, the result was $t(35) = 4.84, p < 0.001$ and a Cohen's delta of 0.81. For T2, $t(60) = 3.95, p < 0.001$ and a Cohen's delta of 0.51.

To determine treatment effect differences, score changes between pre- and post-test were examined. The independent samples t-test analysis yielded no statistical significant differences between groups [$t(95) = 0.701, p > 0.05$]. Descriptive results for the post-test scores indicated very similar gains across conditions and time (see Table 1).

Finally, analyses were conducted to explore differences between the two conditions and key demographic variables. Preliminary results indicated that self-reported education attainment was the only viable variable. The two-way analysis of variance yielded no statistical significant differences for any of the main and interaction effects. For the treatment main effect: [$F(1, 88) = 0.03, p > 0.05, \eta^2 = 0.004$]. For educational attainment main effect: [$F(2, 88) = 0.69, p > 0.05, \eta^2 = 0.02$]. For the interaction effect: [$F(2, 88) = 0.39, p > 0.05, \eta^2 = 0.009$]. Although no significant interaction effect was observed, Figure 1 indicates that mean difference between T1 and T2 was higher among participants with an elementary-school level of education. Those with a high-school level of education performed similarly on both conditions, and showed less overall gains compared to less educated participants.

Regarding health literacy levels, the overall differences in column proportions indicated a statistically significant gain between pre-test and post-test for those participants in the "marginal functional health literacy" and "adequate functional health literacy" categories. The overall Chi-square was 56.97 (4 degrees of freedom, $p < 0.001$).

Differences in health literacy level between groups are represented in Figure 2. The percentage of participants at the "adequate health literacy" level increased by 5.2% compared to baseline, while the percentage below the "adequate functional literacy" decreased from 11.3% ($n = 11$) at baseline to 6.1% ($n = 6$) at post-test. The post-test gain in S-TOFHLA mean score among these 11 participants was 5.5 points. Overall, only one participant scored at the "inadequate functional health literacy" level at post-test.

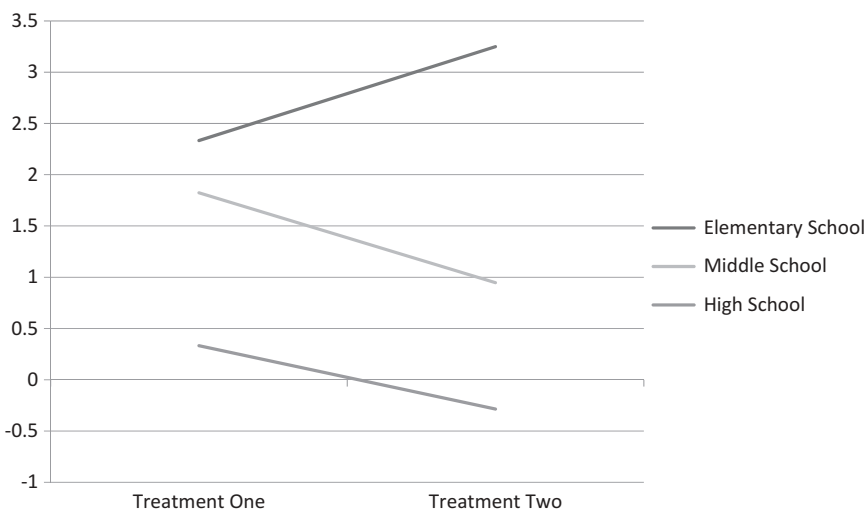


Figure 1. Estimated marginal means of difference score (Post-Pretest).

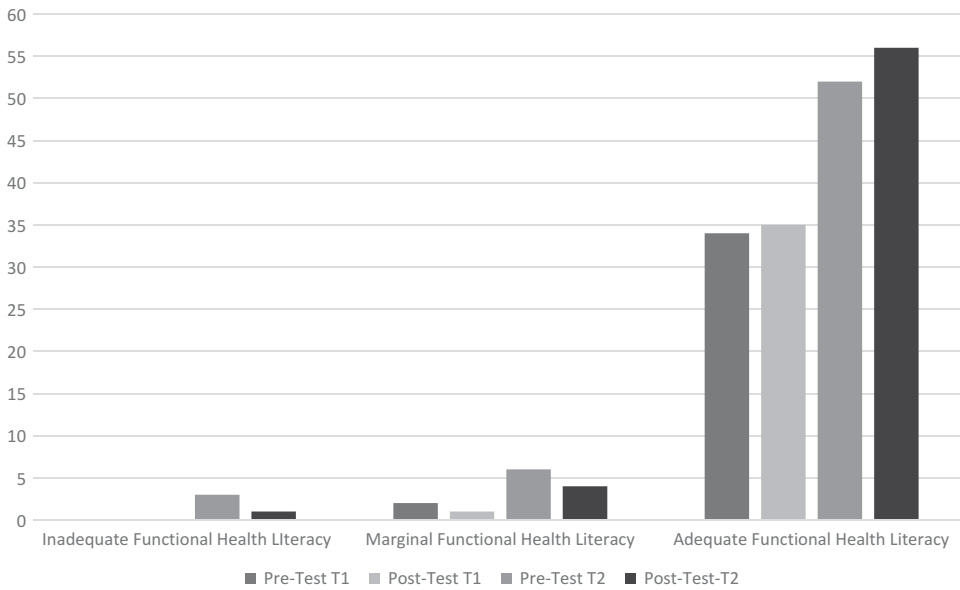


Figure 2. Pre and post-test health literacy levels (number of participants in each category by group).

Discussion

The purpose of this study was to explore whether basic adult instruction may constitute a venue for improving health literacy among Spanish-speaking adults. It was argued that Spanish-speaking immigrants participating in an adult education program (e.g., GED) would improve their health literacy levels independently of whether they received health-literacy-specific content. The results confirmed this hypothesis. Although overall post-test health literacy scores and functional health literacy levels improved in both groups, there were no statistically significant differences across groups. This suggests that a basic adult education program, without specific content, may be enough to improve health literacy among Spanish-speaking adults. A variety of reasons may be attributable to these results. As discussed by the literature, perhaps the standard adult education curriculum has embedded content that increases interest in health issues (Bennett et al., 2003). Another consideration is that adult education instruction improves life skills (Diehl, 2004). It is important to note current efforts directed toward revising the narrow definition of health literacy and provide one that is more comprehensive and “critical,” and includes life and social skills (Chinn, 2011).

Regarding the health literacy level of participants, this study found considerably higher levels than those generally attributed to the general Hispanic population and foreign-born adults. More than 92% ($n = 86$) of the participants scored at the “adequate functional health literacy” level at baseline, which is not consistent with national data. According to the 2003 NAAL, 96% of Hispanic adults did not possess proficient health literacy skills, and 41% were in the “below basic” health literacy range (Kutner et al., 2006). Other studies using the full version of the Spanish TOFHLA have also found high prevalence of low functional health literacy among adult patients (Brice et al., 2008) and women (Garbers, Schmitt, Rappa, & Chiasson, 2010). One study with Hispanic immigrants in Manhattan that used the NVS found that 84% had inadequate health literacy (Dunn-Navarra, Stockwell, Meyer, & Larson, 2012). A regional study in California found high prevalence of low health literacy among Hispanics with low English proficiency (Sentell & Braun, 2012).

The discrepancies may be related to the instrument and/or the level of informal education of the participants in this study. This study assessed formal education and used the short version of

the TOFHLA, which includes reading comprehension but not numeracy questions. Studies have pointed to the fact that measuring different dimensions within health literacy (e.g., reading comprehension vs. numeracy) may result in differences in health literacy level (Berkman et al., 2011). Another consideration is the language of the test. The reliability analyses conducted for this study yielded acceptable consistency and stability values for the S-TOFHLA with the participating population, which is consistent with similar studies using the full version of the Spanish TOFHLA with Spanish speakers (Rivero-Méndez et al., 2010). However, the consistent high baseline scores obtained in this study might indicate that the test is relatively easy for someone with even a basic level of formal education. Similarly, while only a few participants had completed high school, all were enrolled in an adult education program and preparing to take the GED exam. They may have had “informal” education and literacy levels not comparable to the general Hispanic population. One other study that was conducted with a similar population on the same geographic location as the present study did find that more than 98% of the participants who completed the Short Assessment of Health Literacy for Spanish-speaking Adults (SAHLA-50), a word recognition and comprehension instrument for Spanish speakers, had adequate health literacy (Penaranda, Diaz, Noriega, & Shokar, 2012).

It is also important to point out that the mean post-test score gain among those who, at baseline, fell in the “marginal functional health literacy” category was much higher in the treatment group than in the comparison group. In other words, although no significant differences were found between groups in S-TOFHLA scores or functional health literacy levels, participants who were below the “adequate functional health literacy” category did better if they were in the treatment group. These results suggest that specifically including health content may contribute to improved health literacy among those at lower levels.

Finally, this study found that demographic characteristics such as sex, age, marital status, or place of birth did not significantly affect health literacy test scores. The only potential difference between groups was found when controlling for education attainment (formal education), supporting again the theory that those participants with lower level of education may benefit the most from receiving health-literacy-specific content. This is consistent with a recent study with Hispanic adults which found that age, gender, income, and citizenship status were not significant predictors of health literacy, but those who were more educated were significantly more likely to have increased levels of health literacy (Boyas, 2013).

Limitations

A limitation of this study is the relatively small sample size and disproportionate group sizes. In addition, participants were not randomly assigned to the two different groups. However, care was taken to ensure that each group was represented by intact HEP/MAP classes/groups from equivalent geographic locations and time of day the course was offered. The statistical analyses indicated that, despite the disproportionate size of the groups, they were well-balanced in most demographics and the numbers sufficient to detect significant results within and across groups. Although the facilitator delivered the health curriculum in all locations, more than one instructor delivered the HEP/MAP curriculum. This may have had an impact on how participants responded to the test. Another limitation refers to the administration of the S-TOFHLA. Although the content of the test was not modified and the reliability tests yielded acceptable consistency and stability, results may not be comparable to the standard one-on-one administration. Similarly, the test’s level of difficulty may also be a limiting factor, given that a majority of participants scored at the highest possible level. Since an identical version of the S-TOFHLA was used in the pre-test and post-test, there may be a threat to internal validity due to experience with the test. However, although the curriculum consisted of five sessions and the classes met once a week, there was a six-week period between the pre-test and the post-test due to a holiday, limiting the impact of the potential interaction.

Conclusions

This study explored the potential contribution of adult education programs to improving health literacy among adults, an issue that has not been sufficiently discussed by the health literature. The results are consistent with recent recommendations to support adult education as a strategy for improving health literacy (Freedman et al., 2012, 2011; Soto Mas et al., 2015b), and suggest that the approach may be particularly relevant to Spanish-speaking adults. Incorporating health-literacy-specific content may enhance health literacy outcomes among those with low level of formal or informal education. Regarding health literacy measurement instruments, the Spanish version of the S-TOFHLA may not be suitable for people with a basic level of education. Future studies should include a true experimental design and a larger sample size, as well as an instrument that is more appropriate for higher levels of education.

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ORCID

Francisco Soto Mas  <http://orcid.org/0000-0001-9621-2283>

References

- Al Sayah, F., Majumdar, S., Williams, B., Robertson, S., & Johnson, J. (2013). Health literacy and health outcomes in diabetes: A systematic review. *Journal of General Internal Medicine*, 28, 444–452. doi:10.1007/s11606-012-2241-z
- Baker, D., Williams, M., Parker, R., Gazmararian, J., & Nurss, J. (1999). Development of a brief test to measure functional health literacy. *Patient Education and Counseling*, 38, 33–42. doi:10.1016/S0738-3991(98)00116-5
- Barlow, J., Williams, B., & Wright, C. (1999). Instilling the strength to fight the pain and get on with life: Learning to become an arthritis self-manager through an adult education programme. *Health Education Research*, 14, 533–544. doi:10.1093/her/14.4.533
- Bennett, I., Kripalani, S., Weiss, B., & Coyne, C. (2003). Combining cancer control information with adult literacy education: Opportunities to reach adults with limited literacy skills. *Cancer Control*, 10(suppl 5), S81–S83.
- Berkman, N., Sheridan, S., Donahue, K., Halpern, D., Viera, A., Crotty, K., . . . Viswanathan, M. (2011). *Health literacy interventions and outcomes: An updated systematic review*. Evidence Report/Technology Assessment No. 199. AHRQ Publication Number 11-E006. Rockville, MD: Agency for Healthcare Research and Quality.
- Boyas, J. (2013). Correlates of health literacy among Latinos in Arkansas. *Social Work in Public Health*, 28, 32–43. doi:10.1080/19371918.2010.489396
- Brice, J., Travers, D., Cowden, C., Young, M., Sanhueza, A., & Dunston, Y. (2008). Health literacy among Spanish speaking patients in the emergency department. *Journal of the National Medical Association*, 100, 1326–1332. doi:10.1016/S0027-9684(15)31512-1
- Chen, X., Goodson, P., & Acosta, S. (2015). Blending health literacy with an English as a second language curriculum: A systematic literature review. *Journal of Health Communication*, 20(suppl 2), 101–111. doi:10.1080/10810730.2015.106646
- Chervin, C., Clift, J., Woods, L., Krause, E., & Lee, K. (2012). Health literacy in adult education: A natural partnership for health equity. *Health Promotion Practice*, 13, 738–746. doi:10.1177/1524839912437367
- Chinn, D. (2011). Critical health literacy: A review and critical analysis. *Social Science & Medicine*, 73, 60–67. doi:10.1016/j.socscimed.2011.04.004
- Diehl, S. (2004). Life skills to life saving: Health literacy in adult education. *Adult Learning*, 15, 26–29.
- Diehl, S. (2007). Incorporating health literacy into adult basic education: From life skills to life saving. *North Carolina Medical Journal*, 68, 336–339.
- Dunn-Navarra, A., Stockwell, M., Meyer, D., & Larson, E. (2012). Parental health literacy, knowledge and beliefs regarding upper respiratory infections (URI) in an urban Latino immigrant population. *Journal of Urban Health*, 89, 848–860. doi:10.1007/s11524-012-9692-8
- Fraser, S., Roderick, P., Casey, M., Taal, M., Yuen, H., & Nutbeam, D. (2013). Prevalence and associations of limited health literacy in chronic kidney disease: A systematic review. *Nephrology Dialysis Transplantation*, 28, 129–137. doi:10.1093/ndt/gfs371

- Freedman, A., Echt, K., Cooper, H., Miner, K., & Parker, R. (2012). Better learning through instructional science: A health literacy case study in “how to teach so learners can learn.” *Health Promotion Practice, 13*, 648–656. doi:10.1177/1524839911432928
- Freedman, A., Miner, K., Echt, K., Parker, R., & Cooper, H. (2011). Amplifying diffusion of health information in low-literate populations through adult education health literacy classes. *Journal of Health Communication, 16*(suppl 3), S119–S133. doi:10.1080/10810730.2011.604706
- Garbers, S., Schmitt, K., Rappa, A., & Chiasson, M. (2010). Functional health literacy in Spanish-speaking Latinas seeking breast cancer screening through the national breast and cervical cancer screening program. *International Journal of Women’s Health, 1*, 21–29.
- Golbeck, A., Ahlers-Schmidt, C., & Paschal, A. (2005). Health literacy and adult basic education assessments. *Adult Basic Education, 15*, 151–168.
- Institute of Medicine. (2004). *Health literacy: A prescription to end confusion*. Washington, DC: The National Academies Press.
- Kutner, M., Greenberg, E., Jin, Y., & Paulsen, C. (2006). *The health literacy of America’s adults: Results from the 2003 National Assessment of Adult Literacy (NCES 2006–483)*. U.S. Department of Education. Washington, DC: National Center for Education Statistics.
- Murphy, P., Davis, T., Mayeaux, E., Sentell, T., Arnold, C., & Rebouche, C. (1996). Teaching nutrition education in adult learning centers: Linking literacy, health care, and the community. *Journal of Community Health Nursing, 13*, 149–158. doi:10.1207/s15327655jchn1303_2
- Paasche-Orlow, M., & Wolf, M. (2007). The causal pathways linking health literacy to health outcomes. *American Journal of Health Behavior, 31*(suppl 1), S19–S26.
- Parker, R., Ratzan, S., & Lurie, N. (2003). Health literacy: A policy challenge for advancing high-quality health care. *Health Affairs, 22*, 147–153. doi:10.1377/hlthaff.22.4.147
- Penaranda, E., Diaz, M., Noriega, O., & Shokar, N. (2012). Evaluation of health literacy among Spanish-speaking primary care patients along the US-Mexico border. *Southern Medical Journal, 105*, 334–338. doi:10.1097/SMJ.0b013e31825b2468
- Ratzan, S., & Parker, R. (2000). Introduction. In C. Selden, M. Zorn, S. Ratzan, & R. Parker (Eds.), *National library of medicine current bibliographies in medicine: Health literacy* (pp. v–vii). Bethesda, MD: National Institutes of Health, U.S. Department of Health and Human Services.
- Rivero-Méndez, M., Suárez, E., Solís-Báez, S., Hernández, G., Cordero, W., Vázquez, I., ... Holzemer, W. (2010). Internal consistency of the Spanish health literacy test (TOFHILA-SPR) for Puerto Rico. *Puerto Rico Health Sciences Journal, 29*, 49–53.
- Rudd, R. (2004). Adult education and public health partner to address health literacy needs. *Adult Learning, 15*, 7–9.
- Rudd, R. (2007). Health literacy skills of U.S. adults. *American Journal of Health Behavior, 31*(1), S8–S18. doi:10.5993/AJHB.31.s1.3
- Santos, M., Handley, M., Omar, K., & Schillinger, D. (2014). ESL participation as a mechanism for advancing health literacy in immigrant communities. *Journal of Health Communication, 19*(suppl 2), 89–105. doi:10.1080/10810730.2014.934935
- Sentell, T., & Braun, K. (2012). Low health literacy, limited English proficiency, and health status in Asians, Latinos, and other racial/ethnic groups in California. *Journal of Health Communication, 17*(suppl 3), S82–S99. doi:10.1080/10810730.2012.712621
- Sheridan, S., Halpern, D., Viera, A., Berkman, N., Donahue, K., & Crotty, K. (2011). Interventions for individuals with low health literacy: A systematic review. *Journal of Health Communication, 16*(suppl 3), S30–S54. doi:10.1080/10810730.2011.604391
- Soto Mas, F., Cordova, C., Murrietta, A., Jacobson, H., Ronquillo, F., & Helitzer, D. (2015a). A multisite community-based health literacy intervention for Spanish speakers. *Journal of Community Health, 40*, 431–438. doi:10.1007/s10900-014-9953-4
- Soto Mas, F., Ji, M., Fuentes, B., & Tinajero, J. (2015b). The health literacy & ESL study: A community-based intervention for Spanish speaking adults. *Journal of Health Communication, 20*, 369–376. doi:10.1080/10810730.2014.965368
- Speros, C. (2005). Health literacy: Concept analysis. *Journal of Advanced Nursing, 50*, 633–640. doi:10.1111/jan.2005.50.issue-6
- Taggart, J., Williams, A., Dennis, S., Newall, A., Shortus, T., Zwar, N., ... Harris, M. (2012). A systematic review of interventions in primary care to improve health literacy for chronic disease behavioral risk factors. *BMC Family Practice, 13*, 49. doi:10.1186/1471-2296-13-49
- U.S. Census Bureau. (2015). *Annual estimates of the resident population by sex, single year of age, race alone or in combination, and Hispanic origin for the United States: April 1, 2010 to July 1, 2014*. Suitland, MD: U.S. Census Bureau, Population Division.
- U.S. Department of Health and Human Services. (2010). *National action plan to improve health literacy*. Washington, DC: HHS, Office of Disease Prevention and Health Promotion.