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Tools to measure health literacy among Spanish speakers: An integrative review of the literature

Samantha Stonbraker[a,*], **Rebecca Schnall**[a], and **Elaine Larson**[a,b]

Rebecca Schnall: Rb897@Cumc.Columbia.edu; Elaine Larson: Ell23@Cumc.Columbia.edu

[a]Columbia University School of Nursing, New York, NY, USA

[b]Mailman School of Public Health, Department of Epidemiology, New York, NY, USA

Abstract

Objective—Health literacy measurement can help inform healthcare service delivery. The objective of this study is to identify validated tools to measure health literacy among Spanish speakers and to summarize characteristics that are relevant when selecting tools for use in clinical or research settings.

Methods—An English and Spanish search of 9 databases was conducted between October 2014 and May 2015. Inclusion criteria were peer-reviewed articles presenting initial validation and psychometric properties of a tool to measure health literacy among Spanish speaking patients. Characteristics relevant to tool selection were reviewed and presented.

Results—Twenty articles validating19 instruments met inclusion criteria. Instruments were designed for use with Spanish speakers in numerous contexts and measured different health literacy skills such as reading comprehension or numeracy. Methods used to validate tools were inconsistent across instruments.

Conclusion—Although tools have inconsistencies and inefficiencies, many can be used for assessment of health literacy among Spanish speakers.

Practice implications—Healthcare providers, organizations, and researchers can use this review to select effective health literacy tools to indicate patient's ability to understand and use health information so that services and materials can be more appropriately tailored to Spanish speaking patients.

Keywords

Health literacy; Tool; Instrument; Assessment; Spanish; Measurement; Integrative review

1. Introduction

Health literacy can be defined as, "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions" [1]. This term was first used in 1974 [2], though many

*Corresponding author. Slb2201@Cumc.Columbia.edu (S. Stonbraker).

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definitions of health literacy have since been used in practice and research [3–5]. The concept of health literacy is distinct from general literacy and includes skills such as problem solving, decision-making, information seeking, and other actions pertinent to health management [4,6].

Low health literacy levels among patients can increase health care costs, hinder informed consent, prevent timely screenings, and is a risk factor for numerous adverse health outcomes [6–13]. Negative health outcomes may be exacerbated in vulnerable populations and can contribute to health disparities, particularly among minority groups such as the elderly, immigrants and some cultural subgroups, especially when language barriers are present [12,14,15]. Improving health literacy among the medically under-served has the potential to lower healthcare costs, enhance access to healthcare, improve social conditions, and reduce health disparities [16–18]. The importance of health literacy has been acknowledged in reports by the Department of Health and Human Services, the Institute of Medicine, and the World Health Organization, which have all issued reports in the last decade that highlight health literacy as a priority and indicate the need for further research on the topic [4,19,20].

1.1. Measuring health literacy among Spanish speakers

The Latino population is the largest and fastest growing subgroup in the United States and now comprises more than 17% of the U.S. population [21–23]. For the purpose of this review “Latino” refers to individuals whose origins are in Spanish speaking countries of Latin America [24,25]. Latinos as a group often have lower educational, general and health literacy levels than the general U.S. population [26,27]. Many Latinos speak Spanish as their primary language, which affects both their ability to access services as well as their interactions with providers in healthcare settings [28]. Lower health literacy combined with language differences can lead to additional problems such as hindered ability to navigate the healthcare system and difficulty accessing health insurance coverage [26,28,29]. Additionally, Latinos are disproportionately affected by many different health conditions such as higher rates of obesity, type 2 diabetes, and human immunodeficiency virus in comparison to their white counterparts because of numerous social and genetic factors [25,30]. Therefore, understanding the health literacy levels of Latino patients is necessary to reduce health disparities and requires tools to measure health literacy that are valid for use among Spanish speakers.

Although health literacy is considered a critical area of research, and about one in every six people in the U.S. are Spanish speakers, most health literacy measures have been developed in English [31,32]. This is a limitation to health literacy measurement because some of the methods that have been used to measure health literacy in English are less effective amongst Spanish speakers. One example is the cloze procedure which asks participants to read a list of words out loud. Scoring is then based on the ability to correctly pronounce the word, as literacy has been closely associated with this ability in English [33,34]. This method is less effective among Spanish speakers because the Spanish language has a more phoneme–grapheme correspondence than English, meaning that each letter has one corresponding phonetic sound so Spanish speakers are more likely to pronounce words correctly even if

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they do not know or understand the word that they are reading [35]. In addition, English tools must either be translated or newly developed in Spanish so that they are understandable among the populations in which they are intended for use. Verbatim translation of an English tool into any foreign language, and specifically Spanish, may not account for linguistic and cultural differences of different patient populations [36,37]. As a result, tools that have been directly translated from English to Spanish, without cultural and contextual considerations, may be asking patients about words or terms that have no meaning or significance to them based on their country of origin or specific cultural subgroup. In order to effectively measure a person's understanding of medical terms and information, tools that measure health literacy must be linguistically, culturally, and contextually relevant to the population in which they are administered [32,38]. Tools that have been developed to target a specific subpopulation of interest may be the most informative of patient's actual understanding of health materials [39].

Numeracy is a critical health literacy skill that refers to an individual's ability to use and understand numbers to achieve tasks such medication dosing, nutrition labels, physiological measures such as blood sugar, and may also directly influences an individual's ability to rate their health status [40,41]. Tools that assess skills such as reading comprehension and numeracy may be the most informative to providers as they represent a patient's ability to comprehend and use the health information provided to them. Potential limitations, including preferred language, of patients must be considered when testing health literacy in a clinical setting. If a patient has poor eyesight or diminished hearing capacity, as is frequently the case in the elderly, they may score poorly on a reading or listening comprehension test respectively regardless of the language of administration [42].

Because the U.S. has such a large Latino population, it is important to provide healthcare services and health information to patients in Spanish. To do that effectively, health literacy measurement in Spanish is warranted. Although tools to measure health literacy are available in Spanish, they have not yet been comprehensively identified and reviewed. The purpose of this review is to identify validated tools to measure health literacy among Spanish speakers and to summarize characteristics that are relevant when selecting tools for use in clinical or research settings.

2. Methods

Using Whittemore and Knafl's updated integrative review methodology [43], a comprehensive literature search was conducted, then pertinent article information was reviewed and summarized. The search was conducted in October and November 2014 and was confirmed in May 2015 in both English and in Spanish. Searched databases included: MEDLINE, PubMed, Embase, PsycINFO, CINAHL, Scopus, Cochrane Library, HAPI, and ERIC. No beginning date parameter was specified for articles for the search and the review included papers published and available online through May 10th, 2015. The English search consisted of the combined terms run as both MeSH headings and keywords, "health literacy", "Spanish", "tool," "instrument," "assessment," "measurement," and "questionnaire." For the Spanish search, the term "health literacy" was applied while using the Spanish language filters for each of the above listed databases. Additionally, the phrase

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health literacy was translated as “alfabetismo de salud,” confirmed in the literature as an applicable translation of the concept [44,45] and other possible translations such as, “conocimiento sobre salud,” “educación para la salud,” “formación sanitaria,” and “conocimiento de la salud” were combined with the following translations of keywords: “herramienta,” “instrumento,” “medir,” “la medida,” “la medición,” “cuestionario,” and “validación”. Citations located in the search were uploaded into Eppi Reviewer 4 and considered for inclusion and exclusion criteria. Duplicates were removed and remaining articles were screened by title and abstract. Inclusion criteria were peer-reviewed articles that presented the initial validation and psychometric properties of a tool to measure health literacy among Spanish speaking patients. Articles were excluded if not published in English or Spanish; were not peer reviewed; did not measure the health literacy of patients; if the purpose of the paper was to use a previously validated tool rather than to assess the tool and if the measure of health literacy was not in Spanish.

2.1. Data extraction

To our knowledge, a validated tool for the quality appraisal of instruments that measure health literacy does not exist. Measurements of health literacy vary greatly based on the reason for conducting health literacy measurement (e.g., screening for low health literacy vs. measuring level of health literacy), the amount of time available for administration, health literacy skills assessed, and health topic addressed. These differences make the consistent assessment of psychometric properties between instruments difficult and the comparison of tools complex [1,4,46,47]. Therefore, in this review we did not appraise the quality of each study but extracted and presented the tool characteristics from each article that are relevant to a healthcare provider or other professional selecting a tool to assess health literacy among Spanish speaking populations. The tool characteristics considered were purpose and context, translation and cultural considerations, item number, health literacy skills assessed, feasibility and method of administration, scoring method, and validity and reliability. Data pertaining to these characteristics were extracted from each article by one researcher (SS) and then confirmed by the other authors and displayed in Table 1 as is specified in the Whittemore and Knafl’s methodology [43,48]. Each tool’s properties were then examined and compared so that a more comprehensive understanding of existent tools to measure health literacy in Spanish could be reached.

3. Results

The search yielded 866 articles, 753 in the English search and 113 in the Spanish (Fig. 1). A total of 261 duplicates were excluded from the English and 33 from the Spanish articles. During the title and abstract screening, an additional 469 English and 80 Spanish articles were removed because they did not meet inclusion criteria. The full text of the remaining 43 English and one Spanish articles were reviewed by SS who is fluent in Spanish. Following the full text review, an additional 23 English articles were excluded.

Despite extensive search, the initial development of the Spanish version of the Shortened Test of Functional Health Literacy in Adults (S-TOFHLA), the most commonly used tool to assess health literacy in Spanish speakers, was not located. Only the development of the

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English, shortened version is available as are the directions for administration of the Spanish S-TOFHLA [29,49]. We, therefore, included the article, “Performance of the English and Spanish S-TOFHLA among publicly insured Medicaid and Medicare patients”, to demonstrate the psychometric testing of the instrument [34]. The Spanish article retained in the study did not specifically mention health literacy, but because the article met all other inclusion criteria and measured medication literacy in a similar way to one of the English language articles [50], it was included. Thus, the final sample consisted of 20 articles published between 1995 and 2015 (Fig. 1). The psychometric properties of the Spanish version of the three-question tool rapid screening tool, the Single Item Literacy Screener (SILS), were independently assessed in two separate studies that are included together in Table 1 [51,52]. The tool characteristics presented in Table 1 therefore include 20 articles [22,26,31,34,50–65] that describe the initial development and/or validation of 19 different tools.

3.1. Purpose and context

Tools were designed to measure either general health literacy or health literacy related to a specific condition such as nutrition or type of cancer, and their purpose was clearly stated in all 20 articles. The contexts in which tools were intended for administration were primary care or health promotion settings, in “any setting”, or among specific populations. All were developed for use with Spanish speaking adults with the exception of one [52], which tested the validity of the single item literacy screener (SILS) questions among bilingual speakers (Spanish and English) [52].

3.2. Translation and cultural considerations

Because most tools 15/19 (78.9%) [22,26,31,34,51,56–63,65] that measure health literacy in Spanish were created from a previously validated English tool, the method of translation and who conducted the translation for each tool were reviewed (Table 1). Professional translators, interdisciplinary teams of experts and bilingual or bicultural researchers or a Delphi process were used to develop or confirm 16 of the tools [22,26,31,50,51,53,54,56,57, 59–61,63–65], while the remaining three [34,55,58] did not report their translation process. The extent to which cultural meaning and word usage were maintained was also assessed for each tool; of the 15 tools that were translated into Spanish, 11 specified their intent to safeguard the meaning and usage of the words, phrases or concepts being translated [22,26,31,54,57–63]. The remaining four articles [34,51,56,65] did not refer to cultural considerations during their translation processes. The linguistic and cultural translation method of the two cancer literacy assessment tools [60,61] was further confirmed in an additional article by Rivera-Vasquez et al. [66]. Three tools were developed for specific subgroups, one among populations on the U.S.–Mexican border [50], the second among Spanish speaking parents of young children [62] and the third, for the adult Mexican population [64].

3.3. Health literacy skills assessed

Specific health literacy skills assessed in each of the 19 tools were identified based on a previously established health literacy skills taxonomy [3,4]. They included: reading comprehension, listening comprehension, confidence, responsibility, application/ function,

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conceptual knowledge, and numeracy. Reading comprehension was addressed by 14/19 (73.7%) of the articles [22,26,31,34,50,53–58,62–64]. After reading comprehension, numeracy was the second most assessed skill in 10/19 (52.3%) of tools [50,53,55,56,58,59,62–65]. Listening comprehension was assessed by two of the tools, the Vive Desarrollando Amplia Salud (VIDAS) [55], a computer administered instrument and the Rapid Estimate of Adult Literacy in Genetics (REAL-G-Sp) [65]. Confidence and responsibility were both assessed in the articles by Cordasco et. al. [51] and Sarkar et. al. [52] which aimed to identify individuals with limited health literacy based on their responses to three short questions previously validated in English [9,51,52,67]. Application/ function, the ability for an individual to use the information that they have just been presented, was assessed in 6/19 (31.6%) of the included tools [22,53,57,62–64].

3.4. Feasibility and method of administration

Feasibility was assessed by the estimated time required for a participant to complete the tool as well as the method of administration. Time estimates ranged from a matter of seconds in the case of the rapid screening instruments to upwards of 30 min. Administration time was not addressed in five of the articles [50,55,60,62,63]. Health literacy assessments were administered via computer, read allowed to participants, or required a patient or participant to complete a written questionnaire.

3.5. Scoring method

The scoring method for each tool depended on the type of question used, the health literacy skills assessed and how tools were administered. For example, computerized assessments detailed a computer-scored method and pronunciation tests are scored on a participant's ability to correctly pronounce a word whereas comprehension tests are based on correct association of two words. Most categorized the final scores generated from their assessment by the level of health literacy (e.g., inadequate, adequate and functional) depending on how participants scored. The specific method of scoring for four tools was not reported.

3.6. Validity and reliability

Most studies thoroughly described how the content for their tool was selected and reviewed and by whom. In 7/19 (36.8%) of tools, validity was assessed by comparing results of the newly developed tool to the S-TOFHLA [22,26,31,50,54,58,59], the accepted gold standard for health literacy measurement [9,68] and in 4/19 (21.1%), validity was established through comparisons to other tests of health literacy such as the Newest Vital Sign (NVS) or the Short Assessment of Health Literacy for Spanish-speaking Adults (SAHLSA) [22,54,55,65]. Other indicators associated with health literacy such as level of education or age, or self-assessment of health literacy were used to validate six (31.6%) tools [31,34,59,60,62,64]. Remaining tools confirmed validity through the use of differential item functioning, principal component analyses, factor analyses or by calculating sensitivity and specificity of the tool, comparison to other measures such as self-identified literacy or a combination of methods. Depending on the scoring method of each tool, dichotomous or ordinal, the reliability of instruments was assessed using the Kuder–Richardson or Cronbach’s alpha, respectively [69–71]. Cronbach’s alpha was reported in 13/19 (68.4%) of tools [26,31,34,53–58,60,61,64,65] and the Kuder–Richardson coefficient of reliability was used

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in 4/ 19 (21.1%) [22,50,59,62]. Two of the 19 tools (10.5%) did not report reliability (Table 1) [51,52,63].

4. Discussion and conclusion

4.1. Discussion

This integrative review identified 20 articles that described the development and psychometric testing of 19 tools to measure health literacy among Spanish speakers. Our findings indicate that tools vary widely in what they measure, the contexts in which they should be used, as well as the methods through which they were verified. These findings mirror results from other reviews of health literacy instruments [1,2,47], which present health literacy as a broad concept without well-defined constructs. Lack of consensus about the concept of health literacy limits comprehensive agreement on what components are necessary for tools to measure health literacy should entail. Nonetheless, the 19 tools that are available to measure health literacy in Spanish form a foundation that can further inform researchers and providers about how to more effectively address the healthcare needs of Spanish speaking populations.

Some have suggested that it is not necessary to screen for health literacy [72] and that patients completing a health literacy assessment may be embarrassed [2,61,73]; however, understanding patient's strengths and limitations in acquiring and using health information is a necessary consideration for healthcare providers who are communicating health information to patients. Beyond the utility of health literacy measurement for providers, organizations can use health literacy measurement to inform patient-centered services such as enhancing patient involvement in service design, providing navigation assistance, creating education materials that are intelligible and verifying understanding at multiple points in a clinical visit [74,75]. Materials designed for low health literacy populations can include visuals as part of educational materials or content can be tailored to lower reading levels to maximize understandability [76,77]. Beyond organizational structure, interventions developed to address low health literacy have been associated with improvement in patient outcomes such as decreased levels of depression and increased ability to access and use preventive services [78,79]. Using the results presented in Table 1, professionals can select a tool that will improve understanding of patient's ability to receive and use information in healthcare settings will help inform how these interventions and patient education materials are designed to more effectively meet the needs of Spanish speaking patients.

Native Spanish speakers living in the U.S. have to navigate a healthcare system and acquire and use information often presented to them in a language other than their own. It is the responsibility of organizations and providers to take note of discordant language concerns and take steps to appropriately provide care among these populations. As previously mentioned, health literacy assessments that are validated in Spanish only assess patients' ability to comprehend and use information that is presented to them in Spanish, not in English. However, the assessment of health literacy in either language can facilitate this understanding and inform the ability to tailor healthcare services and interventions to Spanish speakers. Tools to measure health literacy that are validated in Spanish are critical to inform the provision of language-appropriate care by illuminating the extent of language

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and educational differences. In this review, we found that health literacy instruments are not generally translated for specific cultural subgroups so caution must be used when selecting tools. Studies have shown that even if a country's official language is Spanish, there may be different usages for specific words, and measurement instruments must be translated accordingly [80]. Further research is therefore needed to develop tools to measure health literacy in Spanish that are tailored to specific populations, contextually relevant, and psychometrically sound.

This study has several limitations. First, the Spanish literature search only included articles that have been indexed in large international databases. As a result, articles published in smaller, country-specific or less well-known journals may not have been identified. Second, the quality of the psychometrics was not assessed in a standardized way, as a tool does not exist to compare health literacy measurement tools. Further research should be conducted to define the concept of health literacy as well as the domains and skills that it contains to enable more effective comparisons across tools. Regardless of limitations, these findings will enable readers to identify the available and valid tools that measure health literacy in Spanish speaking populations as well as enhance their ability to select the most appropriate tool for the context in which they will use it.

4.2. Conclusion

Nineteen tools to measure health literacy that are validated in Spanish were identified through this review, but the extent of psychometric testing, health literacy skills measured, administration, scoring methods, and contexts in which they are intended for use varied between the instruments. Nevertheless, the use of any of these tools to assess health literacy can lead researchers, organizations, and individual clinicians to an enhanced understanding of Spanish speaking patient's health information needs. This study contributes to the literature by identifying and presenting the tools that have been validated to measure health literacy among Spanish speaking populations. This will aid individuals looking for tools to measure health literacy among Spanish speakers as well as form a foundation from which further research of health literacy instruments in Spanish can take place.

4.3. Practice implications

The effective measurement of health literacy can inform researchers, organizations and providers about how to mitigate challenges to providing high quality, cross-cultural healthcare [42,79,81]. This review is useful for any member of the healthcare community working with Spanish speaking adults to identify an appropriate tool to measure health literacy to inform healthcare services. Researchers will be able to use these results to both inform more effective health literacy instrument design as well as more effective tool selection relevant to specific study methods and settings. Similarly, healthcare organizations will be able to select a tool that lends itself to effective use among their context and patient population so that services may be more appropriately tailored to the specific needs of their patients, particularly those generated from language differences. Providers can use the shorter health literacy measurements in the clinical setting to quickly identify patients who may need information communicated at a more granular level. The use of health literacy measurement tools by all of these different healthcare professionals can inform better and

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more linguistically appropriate healthcare services for Spanish speaking patients. This can contribute to better healthcare services, improved healthcare outcomes [38] and lessen the healthcare disparities that are evident among Spanish speaking populations.

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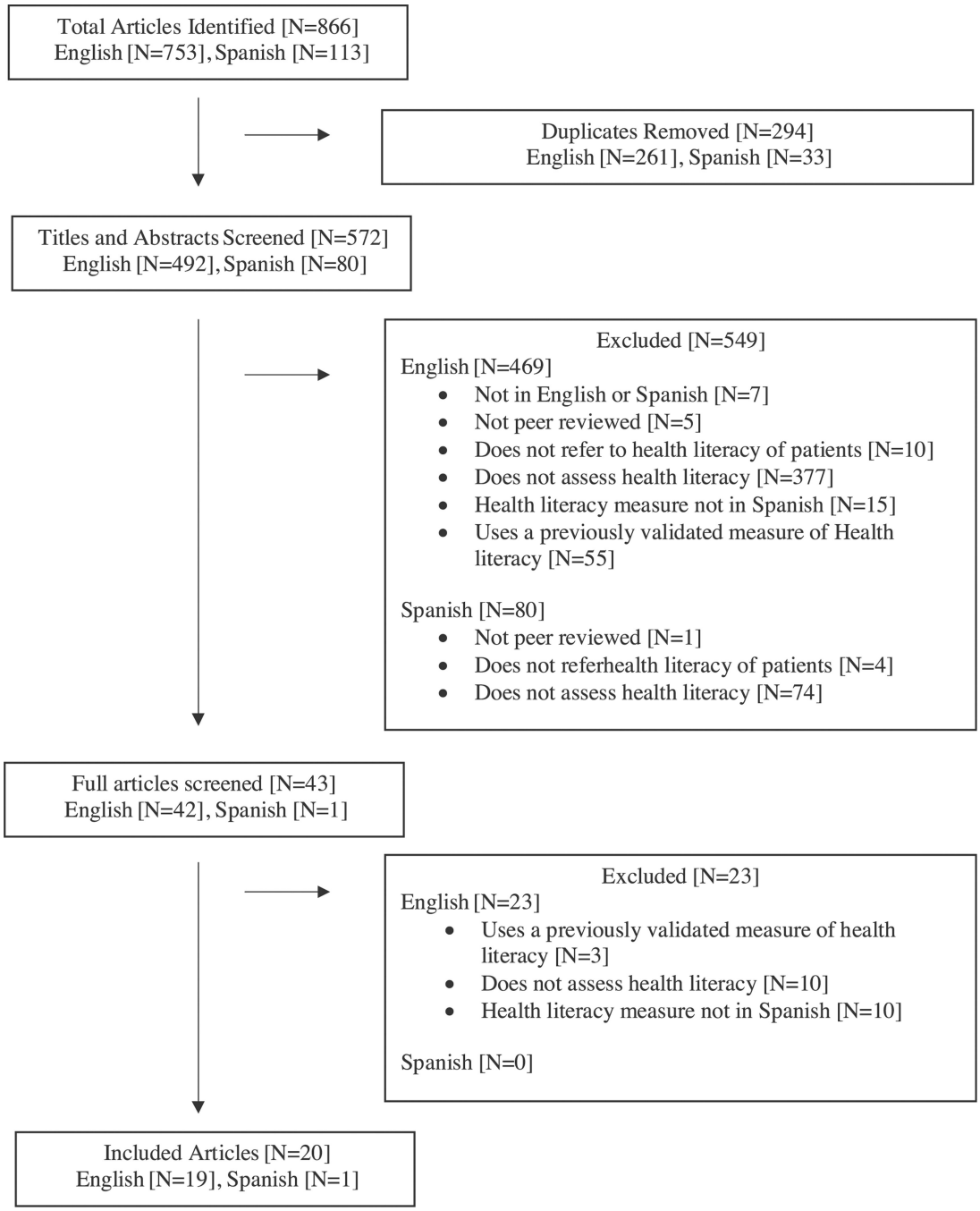

Fig. 1.
Flow diagram of articles included and excluded in search.

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Table 1

Characteristics of Tools to Measure Health Literacy in Spanish.

Author (date)	Tool title	Purpose and context	Translation and cultural considerations	Item number and skill(s) assessed	Method of administration and feasibility	Scoring	Validity	Reliability
Aguirre et al. (2005)	Article presents the validation of the Spanish Test of Functional Health Literacy Assessment (Spanish S-TOFHLA)	• To quickly assess health literacy of Medicare and Medicaid enrollees	• Not indicated	• 36-item instrument • Reading comprehension assessed with two separate passages	• Self-administered • Paper based survey requires 7min to complete	• 36-point scale • Scores are divided into three categories of health literacy, inadequate, adequate, and functional	• Strong positive, linear relationship with formal education levels • Significant inverse relationship with age	• Cronbach's alpha >0.95 in each of the three groups assessed
Coffman et al. (2012)	Spanish Nutrition Literacy Scale (NLS)	• Measure nutrition literacy among Spanish speaking adults	• NLS translated into Spanish then culturally adapted • Professional translators translated the final version into English then back into Spanish	• 30-question survey • Reading comprehension and application/ function pertaining to nutrition labels	• Survey administered via face to face interviews • English survey takes about 10 min, not indicated for Spanish version	• Scores range from 0 to 30 • Higher scores indicate higher nutrition literacy	• Content validity assessed with a focus group • Significant relationship with S-TOFHLA and a marginally significant relationship with the NVS	• Kuder–Richardson coefficient of reliability (KR-20 = 0.95)
Cordasco et al. (2012), Sarkar et al. (2011)	Single Item Literacy Screener (SILS)	• Identify patients with high probability of inadequate health literacy (IHL) in either bilingual [52] or in monolingual [51] Spanish speakers	• Cordasco et al. SILS questions translated into Spanish then back translated into English by a certified translator • Sarkar et al. SILS questions administered by bilingual research assistants	• 3 questions that measure an individual's confidence and reading comprehension during medical appointments	• Administered in a clinical setting or over the phone • Less than a minute to complete	• Likert style responses for each question • Scores range from 3 to 15 with higher scores representing lower health literacy	• Specificity and sensitivity calculated for each potential cut off point • One of the SILS questions is effective in bilingual patients and none of the questions should be used in older, monolingual Spanish speakers	• Not addressed
García et al. (2009)	No title specified	• To measure the level of knowledge that patients have about their medications • Designed for quick use among any	• Developed in Spanish by two panels of experts with expertise in pharmaceuticals • Cultural appropriateness	• 11-item questionnaire • Measures reading comprehension, application/ function and	• Self-administered paper questionnaires • Takes patients 2–12 min to complete the	• For each item, 5 patient responses are considered: knows, insufficient information, incorrect information, does	• Material confirmed by a panel of experts • Construct validity assessed and principal component	• Cronbach's alpha = 0.677 • Intra-class correlation coefficient = 0.745

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Author (date)	Tool title	Purpose and context	Translation and cultural considerations	Item number and skill(s) assessed	Method of administration and feasibility	Scoring	Validity	Reliability
		patient in any environment patient in any environment	verified through pre-tests	numeracy about medications	questionnaire average is 4.9 min	not know, and invalid response	analysis conducted • All but one item had significant Pearson's correlations	
Lee et al. (2006)	Short Assessment of Health Literacy for Spanish-speaking Adults (SAHLSA)	• To develop an easy to use health literacy test for the Spanish speaking adults	• A Delphi process with five bilingual experts used to translate meaning and cultural usage of the Rapid Estimate of Adult Literacy in Medicine (REALM)	• 50-item tool • Assesses reading comprehension of commonly used medical terms	• Examinees are asked to read aloud a list of terms and associate each with a related word • Takes 3–6 min to administer	• Scores range from 0 to 50 • A cutoff established of ≤37 as an indicator of inadequate health literacy	• Significantly associated with the TOFHLA-S • Confirmatory factor analysis conducted	• Cronbach's alpha = 0.92 • Test-retest reliability demonstrated with Pearson's *r*=0.86
Lee et al. (2010)	Short Assessment of Health Literacy —Spanish and English (SAHL-S&E)	• To compare health literacy measures between Spanish and English speaking adults	• A Delphi process with five bilingual experts used to translate meaning and cultural usage of the Rapid Estimate of Adult Literacy in Medicine (REALM)	• 18-item tool • Assesses reading comprehension of commonly used medical terms	• Examinees are asked to read aloud a list of terms and associate each with a related word • Takes 2–3 min to administer	• Scores range from 0 to 18 • Scores ≤14 indicate low health literacy	• Item response theory, differential item functioning, exploratory and confirmatory factor analyses conducted • Spanish version significantly correlated with the SAHLSA and TOFHLA-S	• Cronbach's alpha = 0.8 • Test information function indicates high reliability for individuals with low reading ability levels
Lee et al. (2013)	Oral Health Literacy Assessment in Spanish (OHLA-S)	• To measure the oral health literacy of Spanish speaking adults	• A Delphi process used for tool creation, panel included bilingual experts to ensure translation and cultural acceptability	• 24-item instrument • Measures reading comprehension of oral health information	• Examinees are asked to read aloud a word and associate it with another related word • Takes 2–3 min to administer	• 3 scoring methods assessed, final scoring method included both pronunciation and comprehension components	• Significantly correlated with the TOFHLA-S and 5 other measures such as, understanding of medical materials and educational attainment	• Cronbach's alpha = 0.70
Ownby et al. (2013)	Fostering Literacy for Good Health Today (FLIGHT)/Vive Desarollando Amplia Salud (VIDAS)	• To measure a wide range of health literacy content via computer administration among diverse populations	• Some items were developed in English and others in Spanish then cross-translated. Items meant to be culturally and	• 95-item tool • Assesses reading comprehension, numeracy, conceptual knowledge, and	• Administered by computer and with questionnaires • Time to administer not specified	• Computer scored, exact scoring mechanism not discussed	• Factor analysis conducted • Tool is significantly associated with the SAHLSA	• Cronbach's alpha calculated for multiple assessments of health literacy

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Author (date)	Tool title	Purpose and context	Translation and cultural considerations	Item number and skill(s) assessed	Method of administration and feasibility	Scoring	Validity	Reliability
			linguistically equivalent linguistically equivalent	listening comprehension	Participants found test useful and easy to use			• Two of the four scales had high reliability
Parker et al. (1995)	Test of Functional Health Literacy in Adults—Spanish version (TOFHLA-S)	• To assess Spanish speaking patient's ability to read health related materials	• TOFHLA was translated into Spanish and then back translated into English • Discrepancies were corrected by bilingual staff and a Spanish literacy expert	• 67-item test • 50-item reading comprehension and a 17-item numeracy section	• Patients read from commonly used hospital materials and interpret information from a cue card or labeled prescription bottle	• Reading section scored between 0 and 50, numeracy score is weighted by multiplying by 2.941 to create a score between 0 and 50, the sum of the two scores gives a score from 0 to 100	• Content derived from actual hospital medical materials • Correlations with other existing tests were not available for the Spanish version of the test, English version significantly correlated with the WRAT-R and REALM	• Intercorrelations between the reading comprehension and numeracy subtests were 0.70 • Spearman Brown = 0.84 • Cronbach's alpha = 0.98
Rodriguez et al. (2015)	The Spanish language Rapid Estimate of Adult Literacy in Genetics (REAL-G-Sp)	• To assess genetic health literacy of Spanish speaking patients	• REAL-G was translated and back translated by two native Spanish speakers then certificate of translation was obtained from a certified translator	• Full version has 62 words to be pronounced, and the short version, 8 words • Each test is followed by a 19 item word familiarity and comprehension section that assesses conceptual knowledge, listening comprehension, and numeracy	• Interviewer administered • Full version takes 3– 4 min the short, 1 min • Familiarity and comprehension section takes 5 min • Numeracy section 1– 2min	• Scoring based on words correctly pronounced (0–62) or (0–8) • Scoring for familiarity section is average of sum of familiarity ratings (0–7) • Comprehension and numeracy are scored based on number of correct answers (0–8) or (0–3), respectively	• Both full and short versions are significantly associated with the SAHLSA • ROC curve used to determine sensitivity and specificity	• Cronbach's alpha = 0.70
Sauceda et al. (2012)	Medication Literacy Assessment in Spanish and English ($MedLitR_x$ SE)	• Assess patient's ability to access, understand, and act on information related to medication use • For populations along the U.S.–Mexican border	• Spanish and English versions created simultaneously by an expert panel • Tools were edited and revised by certified Spanish translators and bilingual researchers	• 14-item test • 10 questions that assess reading comprehension • 4 questions assess numeracy related to prescribed medications	• Test is verbally administered to patients • Length of administration not specified	• Dichotomous scoring method • Scores range from 0 to 14	• Significantly correlated with the S-TOFHLA and between document literacy and numeracy when confirmatory factor analysis was conducted	• Kuder–Richardson coefficient of reliability (KR-20 = 0.77)

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Author (date)	Tool title	Purpose and context	Translation and cultural considerations	Item number and skill(s) assessed	Method of administration and feasibility	Scoring	Validity	Reliability
							• Differential item functioning showed no bias	
Sorensen et al. (2013)	European Health Literacy Survey Questionnaire (HLS-EU-Q)	• To measure health literacy • For use in European populations	• Translation into seven languages performed by interdisciplinary experts • Intention was to create a culturally sensitive version of the tool	• 47 questions cover the 12 sub-scales of the European Health Literacy Survey (HLS-EU) matrix • Measures reading comprehension and application/ function	• Interviewer administered survey • Administration takes 20–30min	• Four choice, Likert-type scales used to score each question	• Content and construct validity verified by health literacy experts • Principal component analysis performed • Face validity assessed in focus groups in three countries	• Cronbach's alphas range from 0.51 to 0.91
Villanueva Vilchis et al. (2015)	Spanish Oral Health Literacy Scale (SOHLS)	• Comprehensively assess oral health literacy • For use in the adult, Mexican population	• Tool developed in Spanish, in Mexico, by a team of oral health experts • Cultural appropriateness verified through pre-tests	• 29 item tool • Five domains address reading comprehension, application/ function and numeracy	• Self-administered • Mean time for completion is 24.6 min	• Summative score between 0 (lowest literacy) and 29 (highest literacy)	• Positive correlation between score and the questions on self-perceived oral health • Negative correlation between score and the OHIP-EE-14 tool to assess oral health quality of life	• Cronbach's alpha = 0.75 • Intraclass correlation coefficient (ICC) = 0.77
Weiss et al. (2005)	Newest Vital Sign (NVS)	• To quickly and accurately identify limited literacy among Spanish and English speaking adults in primary health care settings	• English version translated into Spanish then back translated • Cultural appropriateness verified through pre-tests	• Nutrition label accompanied by 6 questions to measure reading comprehension and numeracy related to the label	• Interviewer administered • Average length of administration is 3.4 min	• 1 point given for each correct answer (scores range from 0 to 6) • Scores < 4 indicate the possibility of limited literacy	• Significantly correlated with the TOFHLA-S • Area under ROC curve = 0.72	• Cronbach's alpha = 0.69
White et al. (2011)	Diabetes Numeracy Test (DNT-15 Latino)	• To measure numeracy in a diabetic, Spanish speaking population	• Iterative translation and back translation for each item on the DNT performed by interdisciplinary, bilingual researchers	• 15 items that measure numeracy related to effective diabetes self-management	• Verbally administered by trained, bilingual research assistants	• Scores are reported as a percentage of items correct (ranging from 0 to 100%)	• Construct validity assessed by comparing to measures of health literacy (S-TOFHLA), general numeracy,	• Kuder-Richardson coefficient of reliability (KR-20 = 0.78)

Author (date)	Tool title	Purpose and context	Translation and cultural considerations	Item number and skill(s) assessed	Method of administration and feasibility	Scoring	Validity	Reliability
			• Cultural context verified with patients and relevant healthcare providers		• Average time to complete is 23 min		education, and income • Spearman's correlations were significant for all four constructs	
Williams et al. (2013)	Breast Cancer Literacy Assessment Tool (Breast-CLAT)	• To create a linguistic and culturally sensitive measure of functional breast cancer literacy • For use in culturally diverse settings	• Original Breast-CLAT was modified and then culturally and linguistically translated using a validated methodology	• 30-item tool • Assesses conceptual knowledge of breast cancer	• Orally administered by a layperson • Time to administer not specified	• Responses include true/false, multiple-choice, and fill in the blank • Specific scoring method not discussed	• Item response theory conducted, loadings < 0.30 were eliminated • Family history of breast cancer used to evaluate concurrent validity of subscales	• Cronbach's alpha for total scale reliability among Latina women = 0.73
Williams et al. (2013)	Cervical Cancer Literacy Assessment Tool (C-CLAT)	• To assess functional cervical cancer health literacy • Can be used in community-based, health promotion settings	• Original C-CLAT culturally and linguistically translated by a professional translator and confirmed by 3 independent and experienced translators	• 16-item survey that assesses conceptual knowledge of cervical cancer	• Orally administered by a layperson • Takes approximately 10 min to complete	• Reponses involve multiple choice, true/false and agree/disagree options • Specific scoring method not discussed	• Confirmatory and exploratory factor analyses and item response theory conducted • No significant differences in scores across languages	• Cronbach's alpha for scale reliability among Latina women = 0.76
Yin et al. (2012)	Spanish Parental Health Literacy Activities Test (PHLAT Spanish)	• To assess the health literacy and numeracy skills of Spanish speaking parents of young children	• PHLAT translated into Spanish, then back translated into English • Emphasis placed on translating meaning and maintaining context	• 8-item tool • Measures reading comprehension, numeracy, and application/ function related to nutrition, growth charts and medication dosages	• Orally administered by bilingual research assistants trained in sensitivity to low literacy populations	• Scores calculated based on the percentage of questions answered correctly	• PHLAT-10 scores significantly associated with education, the S-TOFHLA, and the WRAT-3 • PHLAT-8 highly correlated with the PHLAT-10 and single literacy skills items	• Kuder-Richardson coefficient of reliability for the PHLAT-8 (KR-20 = 0.64)
Yost et al. (2009)	The Talking Touchscreen/ La Pantalla Parlanchina	• Computer measure of health literacy that is comparable in English and Spanish	• Translation conducted by a team of language coordinators and translators using a validated methodology	• 90-item paper questionnaire • Contains prose, document, and quantitative sections to measure reading	• Spanish version is Self-administered using paper and pencil, computerized method not available	• Items are either scored as correct or incorrect, complete scoring method not addressed	• Items verified across literacy levels and covered the difficulty continuum	• Not addressed

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Author (date)	Tool title	Purpose and context	Translation and cultural considerations	Item number and skill(s) assessed	Method of administration and feasibility	Scoring	Validity	Reliability
		• Designed for use in primary care settings	• Goal of translation was to capture meaning, not just literal translation	comprehension, numeracy, and application/ function of commonly used medical terms	• Time to administer not specified			