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Health Literacy

Abilities, skills and knowledge in measures of health literacy

Raymond L. Ownby [a,*], Amarilis Acevedo [b], Drenna Waldrop-Valverde [c], Robin J. Jacobs [a], Joshua Caballero [d]

[a] Department of Psychiatry and Behavioral Medicine, Nova Southeastern University, Fort Lauderdale, USA
[b] Center for Psychological Studies, Nova Southeastern University, Fort Lauderdale, USA
[c] Nell Hodgson Woodruff School of Nursing, Emory University, Atlanta, USA
[d] College of Pharmacy, Department of Pharmacy Practice, Nova Southeastern University, Fort Lauderdale, USA

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ABSTRACT

Objective: Health literacy has been recognized as an important factor in patients' health status and outcomes, but the relative contribution of demographic variables, cognitive abilities, academic skills, and health knowledge to performance on tests of health literacy has not been as extensively explored. The purpose of this paper is to propose a model of health literacy as a composite of cognitive abilities, academic skills, and health knowledge (ASK model) and test its relation to measures of health literacy in a model that first takes demographic variables into account.
Methods: A battery of cognitive, academic achievement, health knowledge and health literacy measures was administered to 359 Spanish- and English-speaking community-dwelling volunteers. The relations of health literacy tests to the model were evaluated using regression models.
Results: Each health literacy test was related to elements of the model but variability existed across measures.
Conclusion: Analyses partially support the ASK model defining health literacy as a composite of abilities, skills, and knowledge, although the relations of commonly used health literacy measures to each element of the model varied widely.
Practice implications: Results suggest that clinicians and researchers should be aware of the abilities and skills assessed by health literacy measures when choosing a measure.

1. Introduction

Health literacy, defined as an individual's ability to obtain and use health information to make choices about health care, is related to patients' health [1,2], health status, service utilization, self-care behaviors, and even risk for death [2,3] and has been tied to race- and ethnicity-related disparities [4–6]. In spite of the large amount of research on it, important questions about health literacy remain, such as how it can most effectively be defined to facilitate measurement and develop effective interventions. In most studies, health literacy has been assessed as patient performance on a test of health literacy, but each of the commonly used measures evaluates health literacy in a different way. In some instances, health literacy is defined as reading comprehension (the Reading subtest of Test of Functional Health Literacy in Adults, or TOFHLA [7]), sight-word reading (the Rapid Estimate of Adult Literacy in Medicine, or REALM [8]), calculation (the Numeracy subtest of the TOFHLA), or identifying synonyms (the Short Assessment of Health Literacy for Spanish Adults, or SAHLSA [9]). Each of these strategies assesses something related to health literacy, but their diversity leaves open the question of what each has in common with the "social construct of health literacy". [10]

Each measure samples different content, uses different response formats, and has been developed on different populations [11]. The TOFHLA, for example, evaluates reading comprehension by asking a person to supply words eliminated from the text (the cloze procedure), while its numeracy scale asks that he or she explain how to take medications. The REALM requires the person to correctly read aloud words related to healthcare. The need for a similar measure for Spanish speakers led to the development of the SAHLSA, but the low frequency of orthographically irregular words in Spanish meant that it was necessary to develop a different response format. The SAHLSA asks the person tested to view a

* Corresponding author at: Room 1477, 3200 South University Drive, Fort Lauderdale, FL 33314, USA. Tel.: +1 954 262 1481.
E-mail address: ro71@nova.edu (R.L. Ownby).

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stimulus word on a card and choose which of two other words is most similar in meaning.

Performance on these measures requires reading and health knowledge, and several, especially the TOFHLA subtests, also require reasoning, problem solving and numeracy [12]. The variety of contents and formats, however, suggests that the abilities, skills, and knowledge required for successful performance on each are different [13,14]. Griffin et al., for example, showed substantial differences in which patients were identified as having limited health literacy by different measures [15], and similar findings have been reported in other studies [13,16]. Because of this, it was hypothesized that more clearly establishing the relations of widely used tests of health literacy to other variables might provide a better understand what each measures. It was also hypothesized that a better understanding would also provide a clearer picture of what health literacy is by more clearly delineating its component skills. In this paper, it is hypothesized that the variables most relevant to health literacy are individuals' general cognitive abilities and academic skills, and their health-related knowledge, after their demographic characteristics (race, ethnicity, age, and SES) are taken into account.

1.1. Health literacy and demographic variables

Studies have shown that health literacy is related to age, race, ethnicity, and socioeconomic status. For example, persons older than 65 years of age performed at lower levels on the Health Literacy scale of the National Assessment of Adult Literacy [17]. Blacks and Hispanics have also been shown to perform at lower levels on measures of health literacy. Closely intertwined with other demographic characteristics is socioeconomic status, itself related to health literacy [18]. The finding that English-speaking Hispanics may be at a disadvantage to non-Hispanics when their health literacy is assessed in English [19] suggests that preferred language may also be a key characteristic. Gender may also be related to performance on tests of health literacy [19].

1.2. Health literacy and cognition

Understanding the relation of tests of health literacy to basic cognitive abilities (or intelligence, often assessed by IQ tests) may be especially important since research has shown that both general intellectual abilities and health literacy are related to health [20–23]. General intellectual ability can be defined as reflecting a person's acquired knowledge and communication ability (crystallized ability) and capacity to reason and solve novel problems (fluid ability) [24–26]. Baker et al. [23] showed that overall performance on the Mini-mental State Exam (MMSE; [27]) was related to S-TOFHLA scores. Levinthal et al. [28] evaluated the relation of demographic and cognitive variables to performance on the S-TOFHLA and found that both were related. Chin et al. [21] found that age, education, basic cognitive abilities, and disease-related knowledge were related to performance on the S-TOHLA and REALM. Others have shown that performance on tests of health literacy is related to various abilities including memory, verbal fluency, reasoning, and general intellectual functioning [22,29,30].

1.3. Health literacy and academic skills

By its very nature, health literacy appears related to academic skills such as reading and mathematics [31–33]. Academic skills can be distinguished from basic cognitive abilities by their acquisition via formal instruction during schooling. While basic cognitive abilities are thought to be stable over time [34], academic skills such as reading, writing, and arithmetic are amenable to change through formal interventions well into adult life [35]. While it is important to distinguish between general reading skills and health literacy [36,37], the correlation between patients' performance on measures of academic skills and health literacy has been presented as evidence of the measures' validity [7,38].

1.4. Health literacy and health knowledge

In addition to demographics, cognitive abilities and academic skills, health knowledge is related both to performance on tests of health literacy and health. Disease-specific knowledge, for example, has been linked to health literacy in diabetes [39], hypertension [21,40], HIV infection [41], asthma, and congestive heart failure [40].

1.5. Synthesis: the ASK model

These studies illustrate the diverse influences affecting performance on tests of health literacy. Demographics, cognitive abilities, academic skills, and health knowledge are each related to scores on measures of health literacy. Few studies have included variables from all of these domains, however, and studies that have used variables from multiple domains have shown that variables from one domain may reduce the importance of others. In this paper, it is hypothesized that after taking demographic characteristics into account, each group of variables will define health literacy as a unique entity depending on a person's general intellectual abilities, academic skills and health-related knowledge (ASK).

2. Method

As part of a larger study whose purpose has been to develop a new computer-administered measure of health literacy [42], participants completed a battery of general intellectual, academic skills, and health literacy measures. They were recruited from the community through publicity at various local organizations, distribution of flyers, and referral by persons who had already completed the study.

2.1. Measures

2.1.1. Demographics

Participant age, education, occupation, income, gender, and race were recorded. Principal factor analysis was used to construct a composite index of socioeconomic status based on education, income, and occupational prestige index [43]. The index was constructed to address the limitations of single-indicator measures [44], as single indicators such as education, income, and occupational status are only moderately correlated and only partially represent an individual's status [45]. The index was calculated by including education, occupational prestige, and income in a principal factor analysis [46]. Each indicator's loading on a single factor (0.27, 0.27, and 0.16 for education, occupational status, and income, respectively) provided weights for calculation of factor scores for each participant.

2.1.2. Cognitive abilities

Crystallized general cognitive abilities [24,25] were assessed using the Verbal Composite score of the Woodcock-Johnson Psycho-Educational Battery for English speakers and the Woodcock-Muñoz Psycho-Educational Battery for Spanish speakers (WJPEB/WMPEB; [47,48]). These measures tap word knowledge, general information, and verbal reasoning in a series of tasks that yields a single score. Fluid general cognitive abilities were assessed with the Block Design and Matrix Reasoning subtests of the Wechsler Adult Intelligence Scale, Third Edition [49]; the average of these subtests' age-corrected scores yielded an index [24,25].