

The Relationship of Patient Reading Ability to Self-Reported Health and Use of Health Services

ABSTRACT

Objectives. This study examined the relationship of functional health literacy to self-reported health and use of health services.

Methods. Patients presenting to two large, urban public hospitals in Atlanta, Ga, and Torrance, Calif, were administered a health literacy test about their overall health and use of health care services during the 3 months preceding their visit.

Results. Patients with inadequate functional health literacy were more likely than patients with adequate literacy to report their health as poor. Number of years of school completed was less strongly associated with self-reported health. Literacy was not related to regular source of care or physician visits, but patients in Atlanta with inadequate literacy were more likely than patients with adequate literacy to report a hospitalization in the previous year.

Conclusions. Low literacy is strongly associated with self-reported poor health and is more closely associated with self-reported health than number of years of school completed. (*Am J Public Health*. 1997;87:1027-1030)

David W. Baker, MD, MPH, Ruth M. Parker, MD, Mark V. Williams, MD, W. Scott Clark, PhD, and Joanne Nurss, PhD

Introduction

In terms of a wide array of outcomes across diverse populations, education appears to be good for health.¹⁻²² In the United States, the number of years of school completed is inversely related to overall mortality,² mortality following myocardial infarction,²⁰ and mortality among patients with hypertension.²² Studies of education and health in the United States have used the number of years of school completed to classify educational status. However, the most important factor in analyzing the relationship between education and health is educational attainment: not merely the number of years of schooling but, rather, what was learned during those years. Reading level averages four grades below number of years of schooling,²³ and functional literacy varies widely among people who have completed high school.^{24,25} If low educational attainment directly affects health, then literacy should be a better predictor of health outcomes than number of years of school completed. We undertook this study to examine the relationship between reading ability, self-reported health, and use of health care services.

Methods

This study was conducted at two urban public hospitals: Grady Memorial Hospital in Atlanta, Ga, and Harbor-UCLA Medical Center in Torrance, Calif. The study design and contact forms were approved by the hospitals' human investigations committees. The complete study methods and validation of the literacy measure have been described previously.^{24,26} Adult patients presenting to the Emergency Care Center and Walk-In Clinic with nonurgent medical problems were eligible unless they had unintelligible speech, overt psychiatric illness, illness that precluded participation, or visual acuity worse than 20/100 as measured with the Rosenbaum Handheld Vision Chart. After obtaining informed consent, we interviewed patients to deter-

mine demographics, self-reported reading difficulties, barriers to health care access (e.g., difficulty paying), and health care use.

Patients were then administered the Test of Functional Health Literacy in Adults to measure literacy.²⁶ This instrument uses actual materials that patients might encounter in the health care setting. The reading comprehension section is a 50-item test that uses the modified Cloze procedure²⁷ to measure patients' ability to read and understand prose passages. The numeracy section is a 17-item test using actual hospital forms and labeled prescription vials to test patients' ability to comprehend directions for taking medicines, monitoring blood glucose, keeping clinic appointments, and obtaining financial assistance. The numeracy score is multiplied by a constant, 2.941, to create a score ranging from 0 to 50. The sum of the two sections yields the total score, which ranges from 0 to 100. Scores on the Test of Functional Health Literacy in Adults are classified and interpreted as follows: scores of 0 to 59 represent inadequate health literacy (patients often misread the simplest materials, including prescription bottles and appointment slips); scores of 60 to 74 represent marginal literacy (patients struggle to read more difficult numerical information and prose passages, such as financial screening questions); and scores of 75 to 100 represent adequate literacy (patients successfully

David W. Baker is with the Department of Medicine and the Department of Epidemiology and Biostatistics, MetroHealth Medical Center and Case Western Reserve University, Cleveland, Ohio. Ruth M. Parker and Mark V. Williams are with the Department of Medicine, Emory University School of Medicine, Atlanta, Ga, as was David W. Baker at the time of this study. W. Scott Clark is with the Department of Biostatistics, Emory University School of Public Health, Atlanta. Joanne Nurss is with the Georgia State Center for the Study of Adult Literacy, Atlanta.

Requests for reprints should be sent to David W. Baker, MD, MPH, MetroHealth Medical Center, 2500 MetroHealth Dr, Room R221A, Cleveland, OH 44109-1998.

This paper was accepted September 9, 1996.

TABLE 1—Characteristics of Patients Completing the Test of Functional Health Literacy in Adults

	Atlanta (n = 979)	Los Angeles	
		English Speakers (n = 913)	Spanish Speakers (n = 767)
Age, y, mean \pm SD	43.0 \pm 15.4	38.0 \pm 13.0	38.2 \pm 13.7
Female, %	58.8	49.5	64.5
Race/ethnicity, %			
African American	91.8	47.4	0.0
White	7.8	29.4	0.1
Latino	0.4	20.7	99.5
Other	0.0	2.5	0.4
Socioeconomic indicators, %			
Own car	24.6	44.8	38.3
Own phone	61.0	50.2	78.5
Receive financial assistance for food	41.6	36.3	26.3
Education, y, %			
6 or less	7.9	2.0	54.8
7–11	37.6	25.9	26.6
12	38.0	42.7	8.0
More than 12	16.5	29.4	10.6

TABLE 2—Self-Reported Poor Health according to Functional Health Literacy and Years of School Completed for the Three Study Populations

	No.	Poor Self-Reported Health, %	P
Literacy level			
Los Angeles: English speakers			<.001
Adequate	711	17.7	
Marginal	87	29.9	
Inadequate	114	32.5	
Los Angeles: Spanish speakers			<.001
Adequate	294	25.5	
Marginal	152	27.0	
Inadequate	321	39.3	
Atlanta			<.001
Adequate	339	11.3	
Marginal	123	10.6	
Inadequate	515	24.5	
Years of school			
Los Angeles: English speakers			.36
12 or more	269	20.0	
12	389	18.8	
7–11	236	24.2	
6 or less	18	27.8	
Los Angeles: Spanish speakers			.01
12 or more	82	28.0	
12	61	23.0	
7–11	204	25.5	
6 or less	420	36.4	
Atlanta			.003
12 or more	77	11.7	
12	367	11.9	
7–11	371	20.2	
6 or less	162	22.1	

complete most of the tasks required to function in the health care setting). A Spanish version of the test is also available, and this version was administered to all participants whose native language was Spanish. A large print version was administered to patients with visual acuity from 20/70 to 20/100. The Test of Functional Health Literacy in Adults has a correlation of .74 with the revised Wide Range Achievement Test²⁸ and a correlation of .84 with the Rapid Estimate of Adult Literacy in Medicine.^{26,29}

Data analysis was performed with STATA.³⁰ Two-sided *t* tests and the Mann-Whitney test were used in analyzing continuous variables. One-way analysis of variance and the Kruskal-Wallis test were used for comparing continuous variables among more than two groups. Categorical variables were analyzed with standard, unadjusted chi-square statistics. We used logistic regression to adjust for demographic variables, indicators of material deprivation, years of school completed (<6, 7 through 11, 12, >12), and functional health literacy category. Self-reported poor health (poor = 1, not poor = 0), having a physician visit in the last 3 months (yes = 1, no = 0), and having been hospitalized in the last year (yes = 1, no = 0) were used as dependent variables in the logistic regression equations. Age and sex were kept in all models regardless of statistical significance. Otherwise, variables were kept in the analysis only if they were significant at the .10 level. The years of school completed variable was not significant in any of the models after adjustment for literacy level. A *P* value of .05 was used to indicate statistical significance without adjustments for multiple comparisons.

Results

In Atlanta, 1271 patients were approached; 203 (16.0%) were excluded, 89 (7.0%) refused to participate, and 979 (77.0%) completed the Test of Functional Health Literacy in Adults and the initial questionnaire. In Los Angeles, 1997 patients were approached; 114 (5.7%) were excluded, 108 (5.4%) refused to participate, 95 (4.8%) were called to see the doctor prior to completing the interview, and 1680 (84.1%) completed the literacy test and the initial questionnaire. Patient characteristics are shown in Table 1. In Los Angeles, 20.8% of English speakers and 31.7% of Spanish speakers reported poor health. In Atlanta, 15.8% of

all patients reported poor health. Self-reported health was strongly related to literacy (Table 2). Patients with inadequate functional health literacy were more likely than patients with adequate functional health literacy to report their health as poor; unadjusted odds ratios (ORs) were 2.23 (95% confidence interval [CI] = 1.44, 3.45), 1.89 (95% CI = 1.33, 2.66), and 2.55 (95% CI = 1.77, 3.69) for English-speaking patients in Los Angeles, Spanish-speaking patients in Los Angeles, and patients in Atlanta, respectively. Self-reported health was more weakly associated with number of years of school completed (Table 2). In comparisons of high school graduates and patients who had completed 6 years of school or less, the corresponding unadjusted odds ratios for reporting poor health were 1.53 (95% CI = 0.52, 4.48), 1.47 (95% CI = 0.87, 2.48), and 2.13 (95% CI = 1.04, 4.38).

Age, gender, race, and economic indicators (assistance in buying food and phone ownership) were also associated with self-reported poor health in univariate analyses. When logistic regression was used to adjust for age, gender, race, and socioeconomic markers, functional health literacy remained an important predictor of self-reported poor health (Table 3). The adjusted odds ratios for low-literate patients reporting poor health relative to patients with adequate reading ability were 2.19 (95% CI = 1.34, 3.59), 1.72 (95% CI = 1.20, 2.48), and 2.12 (95% CI = 1.38, 3.24) for English-speaking patients in Los Angeles, Spanish-speaking patients in Los Angeles, and patients in Atlanta, respectively. When years of school completed was used instead of literacy in the logistic regression models, years of school was a significant predictor of poor health for Spanish-speaking patients in Los Angeles but not for the other two patient groups. Years of school completed was not significantly associated with poor health after adjustment for literacy.

The relationship between literacy and self-reported poor health did not appear to be explained by differences in barriers to health care access or self-reported use of ambulatory care. There were no differences according to literacy level in insurance status or self-reported difficulty in paying for medical care, getting time off from work, or obtaining child care. In Los Angeles, literacy was not related to the number of physician visits in the last 3 months, presence and type of a regular source of care, or whether the patient reported not receiving

TABLE 3—Adjusted Associations with Self-Reported Poor Health by Study Population

	Los Angeles		Atlanta, OR ^a (95% CI)
	English Speakers, OR ^a (95% CI)	Spanish Speakers, OR ^a (95% CI)	
Age, y			
18–30	Reference	Reference	Reference
31–45	3.35 (2.10, 5.33)	1.38 (0.94, 2.00)	2.51 (1.35, 4.66)
46–60	3.58 (2.13, 6.00)	1.90 (1.21, 2.98)	3.14 (1.62, 6.09)
≥60	2.67 (1.25, 5.71)	1.07 (0.58, 1.99)	2.85 (1.33, 6.10)
Gender			
Male	Reference	Reference	Reference
Female	1.31 (0.93, 1.84)	1.80 (1.28, 2.53)	1.01 (0.68, 1.50)
Race			
White	Reference	... ^b	Reference
Black	0.82 (0.55, 1.21)	... ^b	0.74 (0.39, 1.40)
Latino	1.41 (0.88, 2.26)	... ^b	...
Receives food assistance			
No	Reference	... ^b	Reference
Yes	1.67 (1.16, 2.38)	... ^b	2.21 (1.53, 3.18)
Owens phone			
Yes	... ^b	... ^b	Reference
No	... ^b	... ^b	1.40 (0.94, 2.08)
Literacy			
Adequate	Reference	Reference	Reference
Marginal	1.80 (1.06, 3.06)	1.05 (0.67, 1.66)	0.79 (0.41, 1.52)
Low	2.19 (1.34, 3.59)	1.72 (1.20, 2.48)	2.12 (1.38, 3.24)

Note. OR = odds ratio; CI = confidence interval.

^aRelative to the reference group.

^bVariable not significant in the final model for this study group.

needed medical care during the last 3 months. In Atlanta, patients with inadequate literacy were more likely than those with adequate reading skills to have seen a doctor in the preceding 3 months (69.4% vs 61.2%; $P = .014$); also, they were more likely to have had two or more physician visits (44.4% vs 36.9%; $P = .028$) and to have a regular source of care (83.8% vs 73.6%; $P < .001$). However, after adjustment for age, health status, and economic indicators, there were no differences in ambulatory care use according to literacy level.

Although literacy was not associated with ambulatory care use, patients in Atlanta with inadequate literacy were more likely than patients with adequate literacy to report being hospitalized during the year preceding study entry (25.6% vs 14.9%; unadjusted OR = 1.96, 95% CI = 1.39, 2.76). After adjustment for age, gender, race, economic indicators, and self-reported health, patients with inadequate literacy were still more likely to have been hospitalized (adjusted OR = 1.53, 95% CI = 1.02, 2.30). Lit-

eracy was not related to hospitalization in Los Angeles.

Discussion

In this study, patients with inadequate functional health literacy were consistently more likely to report poor health than patients with adequate reading skills. Although number of years of education has been the standard measure used when examining the relationship between education and health or health behaviors, the relationship between number of years of school completed and self-reported health was weaker and statistically significant only among Spanish-speaking patients. This weak relationship may have resulted from our use of relatively coarse categories of number of years of school completed (0 through 6, 7 through 11, 12, >12). More likely, the lack of association between number of years of school completed and self-reported health results from the fact that the former is an inaccurate indicator of educational attainment. Previous research

has shown that literacy and years of school completed are only modestly correlated.²³⁻²⁵ What we really care about when studying the relationship between educational level and health outcomes is education attained; number of years of school completed merely signifies education attempted. Literacy level is both a better indicator of what a person learned in school and a better indicator of a person's ability to acquire new knowledge and cope with societal demands. Future studies of education and health outcomes should use literacy as their measure of educational attainment.

This association between functional health literacy and self-reported poor health should be interpreted cautiously. Self-reported health was assessed with only a single item measuring global health perceptions. More detailed studies using complete health status measures are required to determine whether the association between literacy and health is valid. In addition, individual questions and health status scales need to be validated in low-literate patients to ensure that any differences in reported health do not merely result from differences in response styles between patients with low literacy and those with adequate reading ability. Nevertheless, our unadjusted data showed that patients with inadequate functional health literacy in Atlanta used more health care services, and this is consistent with their reports of poorer health.

Our findings suggest that poor reading skills do not impair access to care, and the relationship between literacy and health is not explained by underuse of health care services. However, it is still possible that low-literate patients use fewer services than necessary. Low-literate patients may receive ineffective care because they do not understand providers' directions for their care.³¹ Thus, they could actually need more visits to achieve the same therapeutic goal. Any conclusions from our study about literacy and use of services are also limited by the fact that we used patients' retrospective reports of physician visits; prospective studies with adequate case-mix adjustments are necessary to answer this question definitively.

Most of the relationship between literacy (or educational attainment) and health is probably accounted for by indirect effects. Low literacy makes it more difficult to get a job (e.g., problems in filling out application forms) and more difficult to adequately perform a job, leading to impoverishment and all of the

associated health risks. Available jobs may be less desirable and could negatively affect health. People with reading problems may also lack knowledge about proper health behaviors. The problem of illiteracy in America costs billions of dollars as a result of lower productivity in the workplace.³² It may also result in higher health care costs due to worse health, ineffective health care, and higher rates of hospitalization. Although the main costs of illiteracy are the shame, frustration, and lost opportunities for the millions of Americans who do not read well enough to fully participate in society, worse health outcomes and higher health care expenditures may need to be added to this list. □

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