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Review article

Health literacy and adherence to medical treatment in chronic and acute illness: A meta-analysis

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ABSTRACT

Objective: To use meta-analytic techniques to assess average effect sizes in studies of: (1) the correlation between patient health literacy and both medication and non-medication adherence, and (2) the efficacy of health literacy interventions on improving health literacy and treatment adherence.
Methods: PsychINFO and PubMed databases were searched (1948–2012). A total of 220 published articles met the criteria for inclusion; effect sizes were extracted and articles were coded for moderators.
Results: Health literacy was positively associated with adherence ($r = 0.14$), and this association was significantly higher among non-medication regimens and in samples with cardiovascular disease. Health literacy interventions increased both health literacy ($r = 0.22$) and adherence outcomes ($r = 0.16$). Moderator analyses revealed greater intervention efficacy when health literacy and adherence were assessed using subjective measures compared to objective measures. Health literacy interventions had a greater effect on adherence in samples of lower income and of racial-ethnic minority patients than in non-minority and higher income samples.
Conclusion: This is the first study to synthesize both correlational and intervention studies examining the relationship between health literacy and adherence to both medication and non-medication regimens.
Implications: These findings demonstrate the importance of health literacy and the efficacy of health literacy interventions especially among more vulnerable patient groups.

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Contents

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1. Introduction

Patient adherence (also called compliance) is defined as the degree to which patients follow treatment recommendations prescribed by their clinician or health care provider [1]. Adherence has been found to have positive and significant effects on treatment outcomes [2,3]. Rates of adherence, however, vary widely across different patient populations, treatment regimens, and disease types. On average 25%, of patients are nonadherent to prevention and disease management activities including medication taking, appointment keeping, screening, exercise, and dietary changes [4]. For chronic disease management, nearly 50% of patients fail to adhere to their medical directives [5]. Adherence is driven by many factors including: patients' lack of understanding of their disease and associated treatment, patients' beliefs about the benefits and efficacy of prescribed regimens, real or perceived barriers (e.g., side effects, financial constraints), treatment regimen demands, depression, and patients' lack of social support [3,6,7]. In order to improve adherence, patients need to clearly and appropriately understand health information related to their specific illness or disease. This understanding may be essential to helping patients generate the motivation, beliefs, and appropriate health behaviors needed to improve overall adherence behaviors [3,8].

1.1. Health literacy and adherence relationship

Current research suggests that improving patients' health literacy can be used as an effective education and prevention tool to improve disease management behaviors, including treatment adherence [9–11]. Health literacy is defined as patients' ability to obtain, process, communicate, and understand basic health information and services needed to make appropriate health decisions [9,10]. Thus, when patients are adequately informed and understand clearly what they are asked to do, they are better able to share in the decisions that affect their health, and are thus more adherent to regimens that they had a part in choosing [3,12]. In the United States over 90 million people lack the health literacy skills needed to properly understand and act on health information given by their providers [13]. Low patient health literacy has been associated with poor health outcomes, including: suboptimal use of preventive services, delays in diagnoses, higher rates of hospitalization, and increased risk of mortality among adults [14,15]. Individuals with poor health literacy often incur higher medical costs and have been found in many studies to receive lower quality health services [16–18].

Several empirical studies suggest that health literacy is essential to improving medication adherence because aspects of information exchange and patient's understanding of their medication information are often overlooked by health professionals [19]. Health literacy also predicts the acquisition of

Table 1
Moderator variables coded in 48 correlational, 71 health literacy interventions to improve patient health literacy, and 101 health literacy interventions to improve patient adherence studies.

Moderator variables coded in studies	Distribution of codes analyzed; number of samples in coded categories
Study characteristics	
Source of article[a]	32 from bottom-up search; 174 from top-down search; 14 from reference searches
Location of study	101 studies located in the U.S.; 117 located outside the U.S.; 4 with unspecified locations; 2 located in multiple categories
Context of care	3 studies set in HMOs; 4 in Veterans Affairs hospitals; 41 in University Medical Centers; 6 in private practices; 39 in clinics; 49 in hospitals; 6 in patient homes; 99 in other settings; 24 in multiple categories
Conceptualizations of health literacy	6 studies used health literacy; 31 used health knowledge, education and understanding (no intervention); 74 used health knowledge and understanding (due to intervention); 10 used functional literacy; 32 used education level; 5 used access to health messages or information; 2 used technologies assistance with regimen; 55 used combined categories
Health literacy	
Health literacy assessment	10 studies used surveys; 20 used patient interviews; 94 used questionnaires and assessments (e.g., TOFHLA or REALM); 17 used other forms of assessment; 19 used combined categories
Who rated patient health literacy	78 studies included patients rating health literacy; 11 included doctors; 10 included parents; 12 included other raters; 13 included unspecified raters; 4 included multiple categories
Adherence	
Adherence assessment	Subjective measures included: 88 self-reports or questionnaire studies; 10 patient diary studies; 25 "other" reported studies. Objective measures included: 21 pill count studies; 30 physical examination studies; 16 electronic assessment studies; 8 used MEMS; 9 pharmacy refill studies; 2 appointment-keeping studies; 3 medical record studies; 49 combined category studies
Who rated patient adherence	84 studies included patients rating health literacy; 32 included doctors; 9 included parents; 53 included other raters; 12 included unspecified raters; 38 included multiple categories
Patient & treatment characteristics	
Illness type	18 studies included patients with HIV/AIDS; 13 with cancer; 25 with cardiovascular disease; 5 with end stage renal disease; 17 with pulmonary disease; 6 with gastrointestinal disorders; 2 with blood disorders; 27 with diabetes; 32 with asthma; 3 with OB-GYN related illnesses; 9 with arthritis; 3 with transplants; 1 with infections; 5 with osteoporosis; 76 with other illnesses; 18 with multiple categories
Treatment regimen	144 studies included patients with medication regimens; 27 with diet regimens; 8 with exercise regimens; 10 with screening regimens; 39 with behavior regimens; 21 with appointment regimens; 1 with vaccination regimens; 27 with other regimens; 38 with combined categories
Ethnicity	22 studies included patients of Asian ethnicity; 72 of African ethnicity; 70 of Caucasian ethnicity; 35 of Latino ethnicity; 1 of Pacific Islander ethnicity; 41 of other ethnicity; 126 of unspecified ethnicity; 63 of combined categories
Income	24 studies included patient with incomes less than $8,375; 33 between $8,375 and $34,000; 12 between $34,000 and $82,400; 11 between $82,400 and $171,850; 11 between $171,850 and $373,650; 11 greater than $373,650; 193 with unspecified income; 28 with multiple categories

[a] See the PRISMA flow diagram that shows the samples of studies searched (from the year 1948–2011) and the inclusion and exclusions results to get to the final sample of 220 total empirical articles used in this meta-analysis.