The Association between Health-Related Problem Solving and Health Literacy Among Older Adults with Hypertension

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Introduction

• Health literacy, defined as the capacity to obtain, process and understand health information to make health decisions (Nielsen-Bohlman, et al., 2004), has been linked to patient self-care behaviors and health outcomes, especially among older adults with chronic illness (DeWalt et al., 2004).
• While health literacy couples patient abilities and task demands (Baker, 2006), we know little about these abilities and how they are deployed to accomplish key health tasks such as medication-taking.
• Health literacy is also related to broader cognitive abilities such as fluid ability (e.g., Levinthol et al., 2008), as predicted by theories of aging and comprehension (Stine-Morrow et al., 2006).
• Self-care activities such as taking medication may also require fluid ability (e.g., processing speed) and crystallized ability (e.g., vocabulary) to the extent they depend on comprehension, planning, and other complex cognitive activities.

Our Predictions:

I. Health literacy is associated with health-related problem solving performance among older adults.
II. The association between health literacy and health-related problem solving can be mediated by cognitive ability.

Methods

146 adults (60-87 yrs old; 103 diagnosed with hypertension; 43 without chronic illness). 60% were female. 35% had high school or less education and 8% had less than adequate health literacy for both the REALM and the STOFHLA.

Explanatory Variables | Measures
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Health Literacy | STOFHLA (Baker et al., 1999), REALM (Davis et al., 1993)
Fluid Ability (9 tasks) (Cronbach α=0.83) | Processing speed: Letter and Pattern Comparison (Kathouse, 1991), etc.
Working memory: List Memorization (Wechsler, 2001)
Inductive reasoning: List Sets Test (Ekstrom et al., 1976), etc.
Visual spatial processing: Card Rotation Test, Hidden Pattern Test (Ekstrom et al., 1976)
Crystallized Ability (4 tasks) (Cronbach α=0.87) | Verbal ability: Advanced Vocabulary, Extended Vocabulary (Ekstrom et al., 1976)
General literacy: NAAT (Ull, 2002), Author Recognition Test (Stanovich et al., 1995)
Hypertension Knowledge (Cronbach α=0.90) | Expanded Version of a German Version of the Interview (see Chin et al., 2009)

Health Problem Solving Task (6 questions from Everyday Problem Solving (Marisike & Willis, 1995))

Nutrition Label (e.g., How many calories are added to a serving of cereal if whole milk is used instead of skim milk?)
Use of cough medicine (e.g., maximum # teaspoons you should take in 24 hours?)
Medicare Benefits Payment Schedule (e.g., Mr. Jones entered a nursing home on Jan 1 of 1990. How much did Part A Medicare pay for his care in July 1990?)

Results

I. Health-related Problem Solving
Average accuracy (proportion correct) for the 3 tasks was 0.63 (S. D. =0.23). Healthy older adults had higher scores (Mean =0.70; S. D. =0.18) than older patients with hypertension (Mean =0.60; S. D. =0.23) (t(205.17)=2.67, p=0.005).

II. Correlations among Health-related Problem Solving and Other Abilities

<table>
<thead>
<tr>
<th>Health Task - Problem Solving</th>
<th>Age</th>
<th>Education</th>
<th>Fluid Ability</th>
<th>Crystallized Ability</th>
<th>STOFHLA</th>
<th>REALM</th>
<th>Hypertension Knowledge</th>
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</thead>
<tbody>
<tr>
<td>Age</td>
<td>r=0.18*</td>
<td>r=0.388**</td>
<td>r=0.51**</td>
<td>r=0.40**</td>
<td>r=0.35**</td>
<td>r=0.24**</td>
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<td>REALM</td>
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Note: * p<0.05, ** p<0.01

III. Cognitive Abilities Mediate the Association between Health Literacy and Health Tasks Problem Solving

Health tasks problem solving scores were analyzed in a regression with predictor variables entered in the following order: 1) Age, 2) Education, 3) Fluid ability, Crystallized Ability, 4) Health literacy (STOFHLA, REALM).

After entering fluid ability, health literacy didn’t explain more variance of health task problem solving.
In the final model, education and fluid ability were the most predictive variables.

Discussion

• Health literacy was associated with health problem solving performance among older adults, which is presumably an important component of self-care, which might lead to better health outcomes. The link between health literacy and problem solving in turn reflected broader cognitive abilities, primarily fluid ability.
• In our study, we also found that healthy older adults performed better in the health problem solving tasks than older patients with hypertension. Although our study was not designed to unravel causal relationships among problem solving ability and health outcome among older adults, we still found the health status measures (e.g., SF 36, comorbidity index, self-report health status, etc.) had significant correlations with patients’ health problem solving abilities as well as their health literacy level which better health literacy and better health problem solving performance were associated with better health outcome. The link between health literacy, patients’ problem solving/self care abilities and health outcomes should be investigated in future studies.

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