

Literacy and Cognitive Abilities Among Elderly Persons: Implications for Intervention Design

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Acknowledgments

Supported by grant 5R01 AG026393-02 from the National Institute on Aging and funding from the Northwestern Memorial Foundation

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Overview

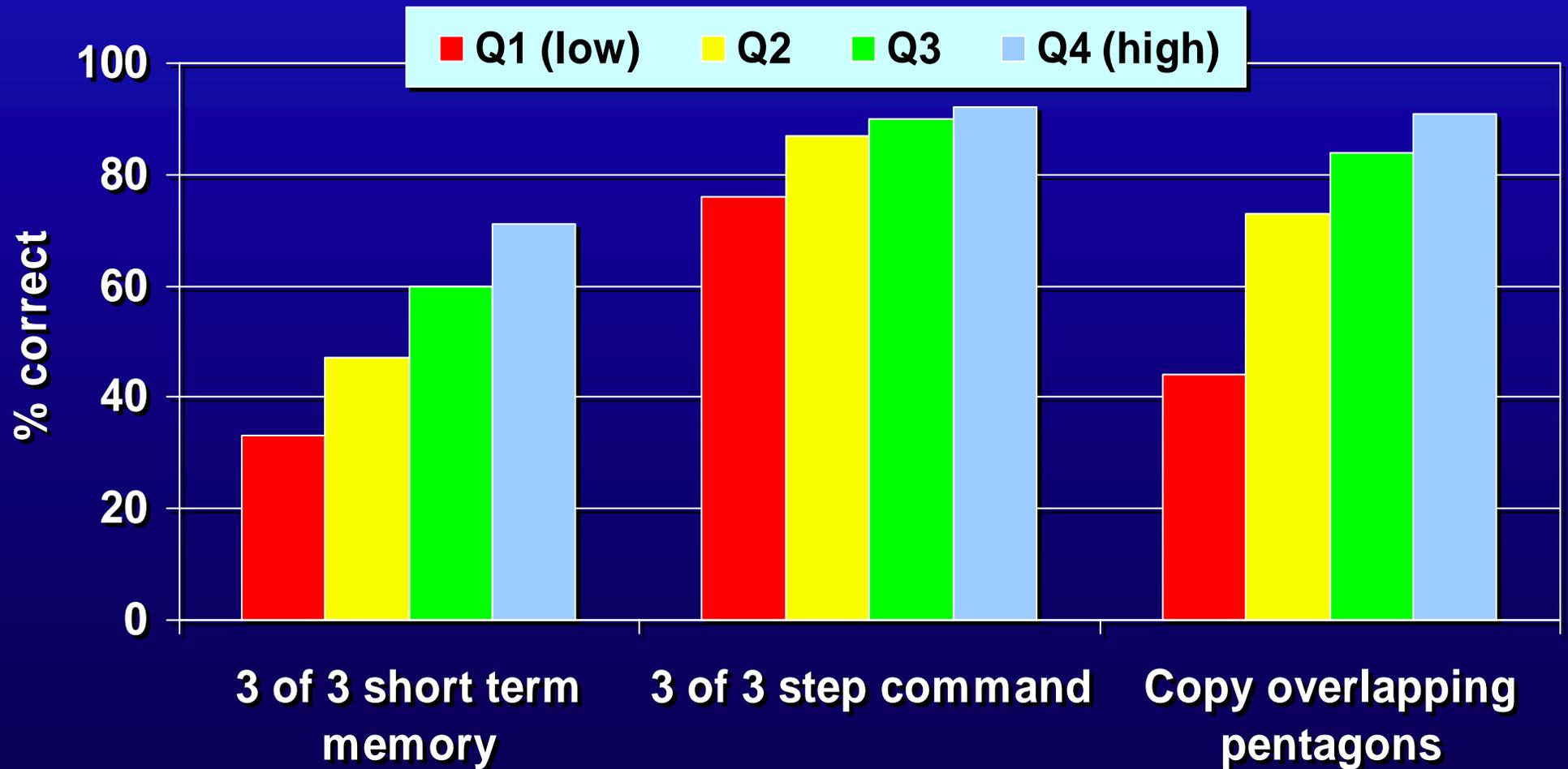
(With apologies to all if I sound like Donald Rumsfeld)

- **What we know**
- **What we believe but don't know for sure**
- **What we don't know**

Overview: What We Know

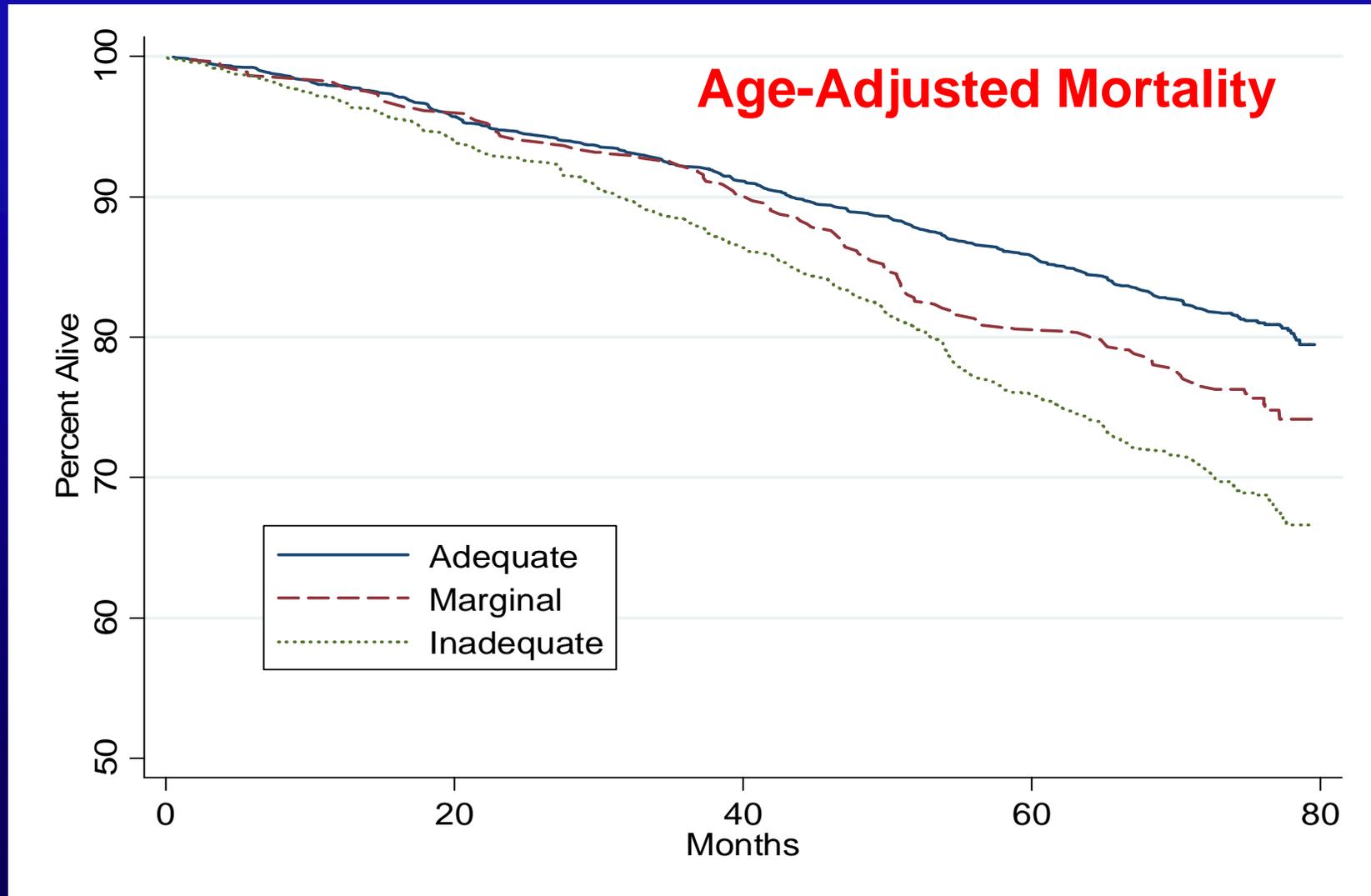
- **The TOFHLA, a test of reading fluency, is associated with the ability of elderly persons to perform cognitive tasks that are similar to those that patients commonly face**
- **Cognitive abilities, particularly short-term memory, are independently associated with mortality and explain about half of the observed association between reading fluency and mortality**

S-TOFHLA Is Associated with Performance on Cognitive Tasks that Were Hypothesized to Be Unrelated to Reading Fluency



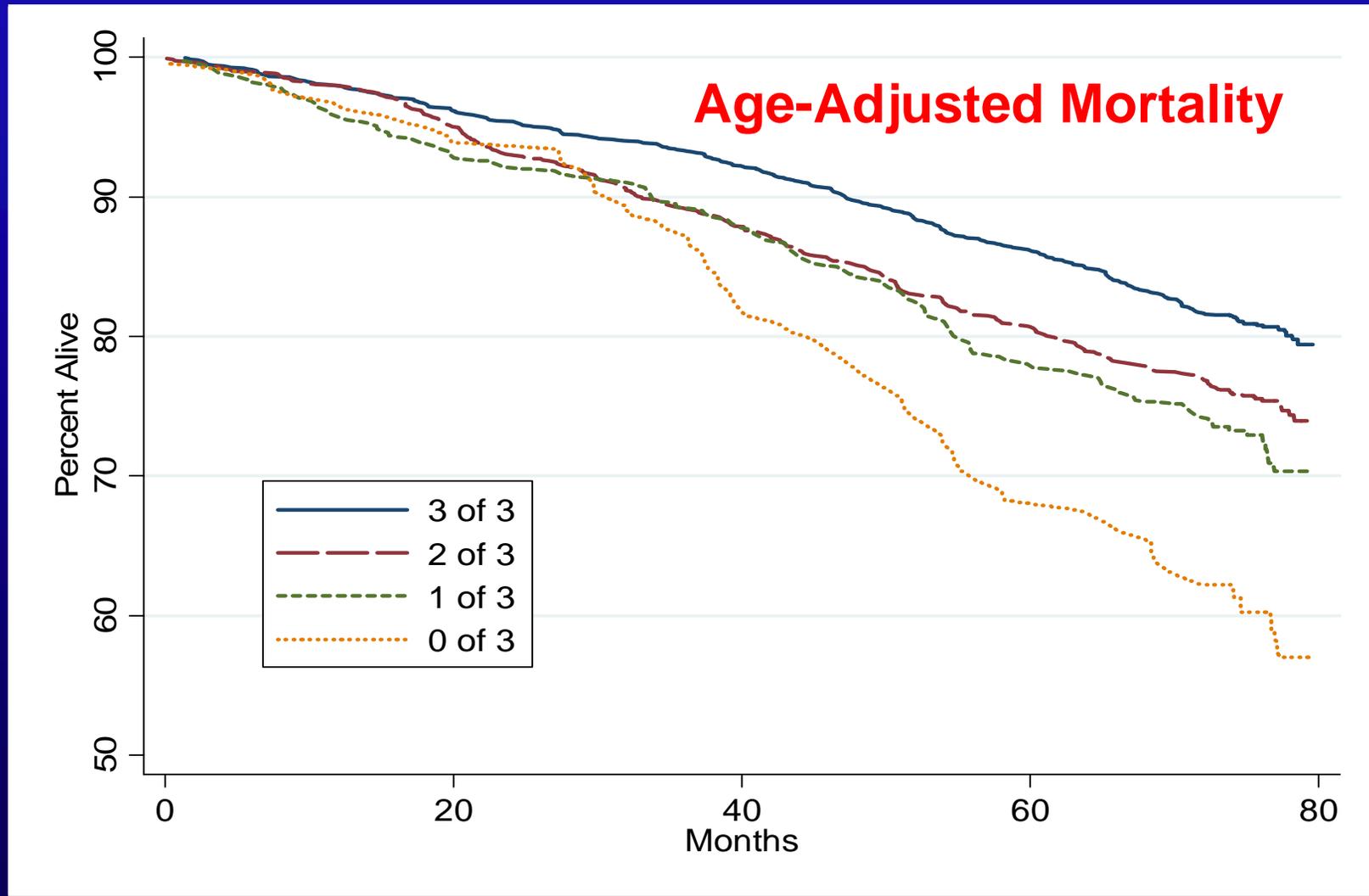
Baker DW, Aging and Mental Health 1999

Medicare Managed Care Enrollees with Inadequate Literacy More Likely to Die



Baker DW, Arch Int Med 2007

Performance on 3-Item Short-Term Memory Task Also Associated with Mortality



Literacy and Cognitive Measures Both Associated with Mortality

	Model 1 ARR (95%CI)	Model 2* ARR (95%CI)	Model 3* ARR (95%CI)
Literacy			
Marginal	1.13 (0.90, 1.42)	-	1.08 (0.85, 1.36)
Inadequate	1.50 (1.24, 1.81)	-	↓ 1.27 (1.03, 1.57)
Memory (of 3 possible items)			
2 correct	-	1.20 (1.02, 1.42)	↔ 1.18 (1.00, 1.39)
1 correct	-	1.29 (1.03, 1.62)	↔ 1.24 (0.99, 1.56)
0 correct	-	1.74 (1.30, 2.34)	↔ 1.64 (1.21, 2.21)

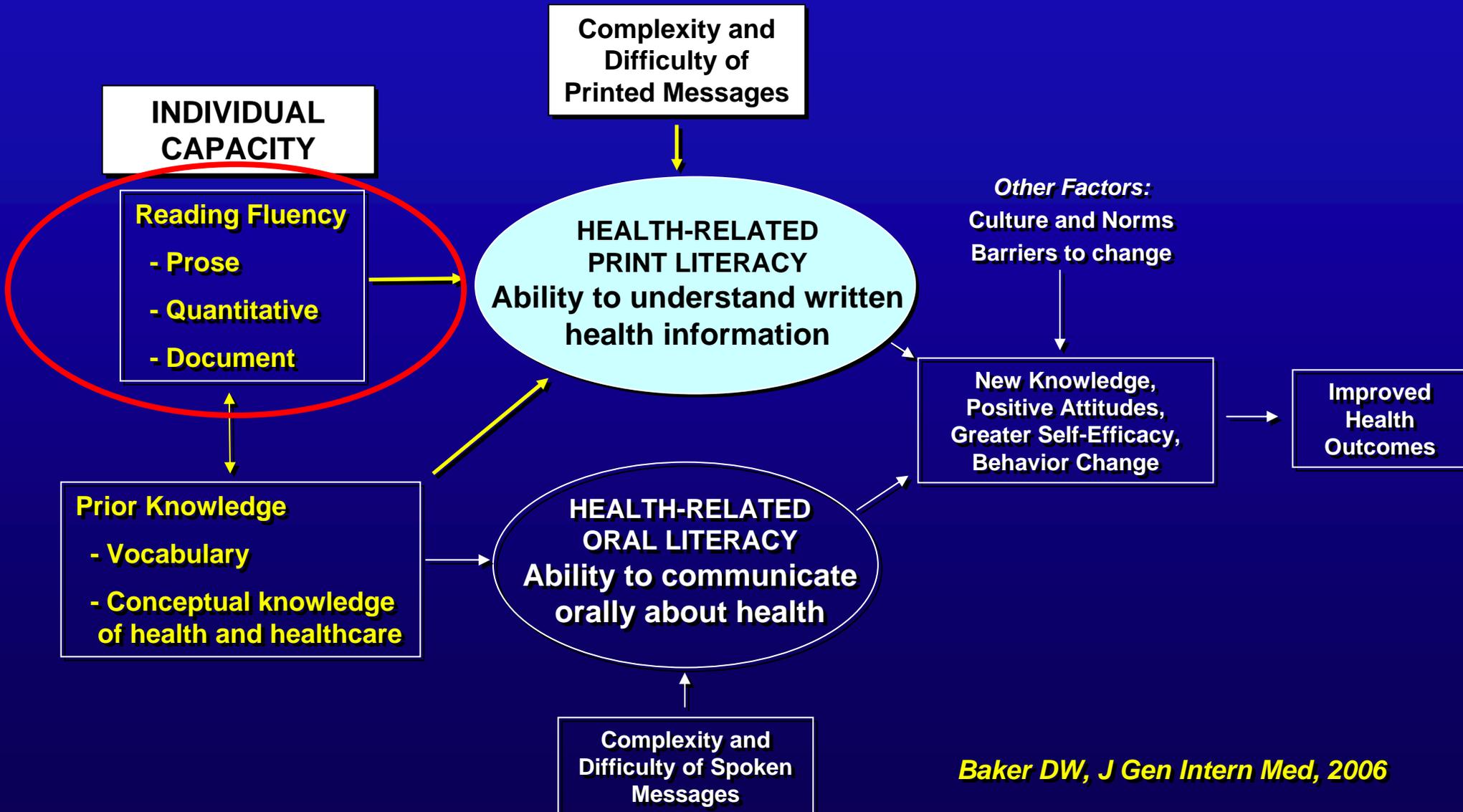
*Adjusted for socioeconomic status, self-reported physical and mental health, chronic diseases, and health behaviors. Performance on serial 7s was also associated with mortality, but 3-step command and pentagon drawing were not.

*Baker DW, Wolf MS, et al.
JGIM 2008*

Overview: What We Believe

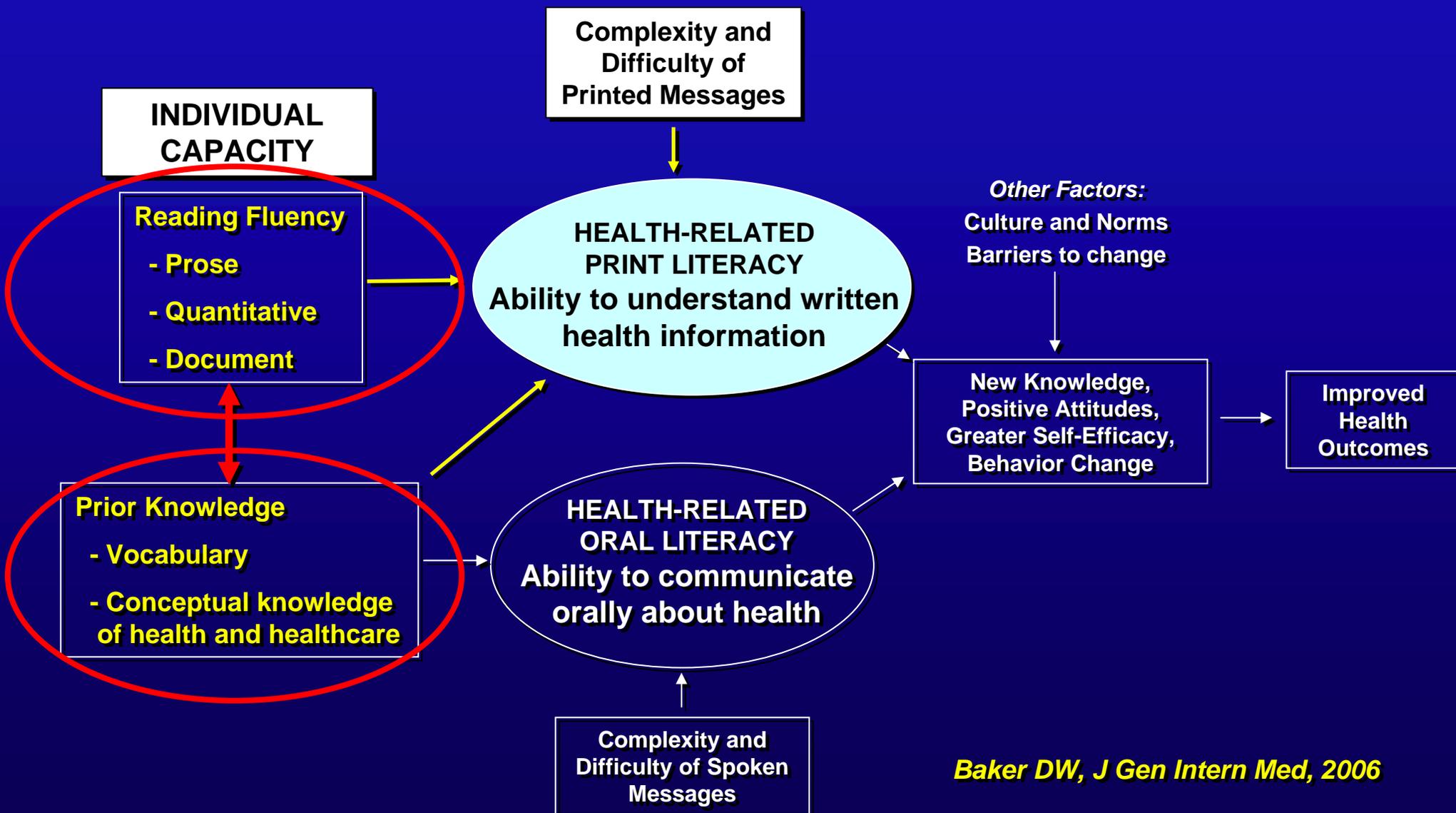
- **Cognitive abilities matter:**
 - **Rewriting materials in plain language is important but not enough**
- **Interventions to improve health education, self-management skills, and health behaviors should pay attention to cognitive load, the need for abstract thinking, and other factors that may affect comprehension and recall**

Conceptual Model of Health Literacy



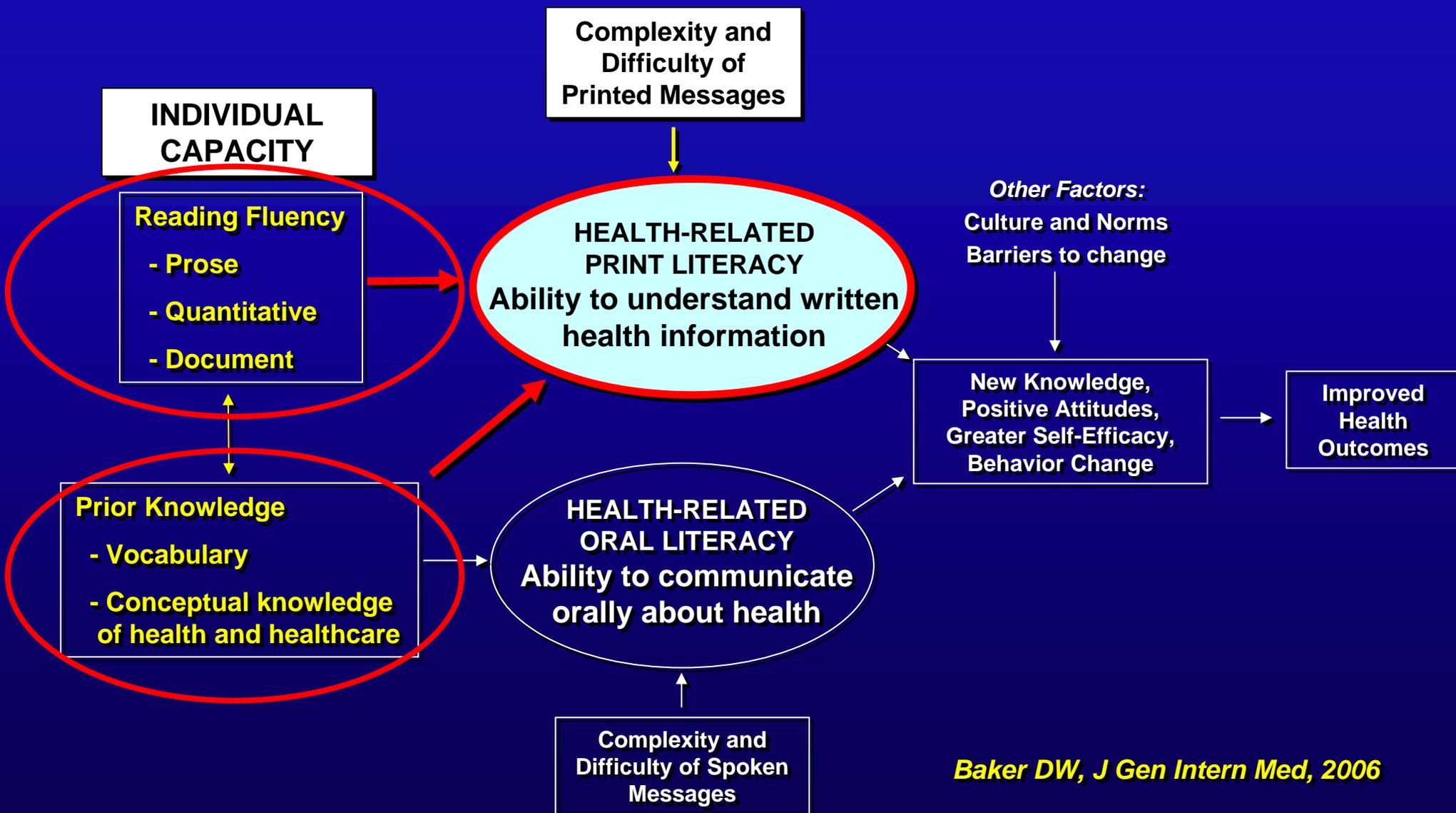
Baker DW, J Gen Intern Med, 2006

Conceptual Model of Health Literacy



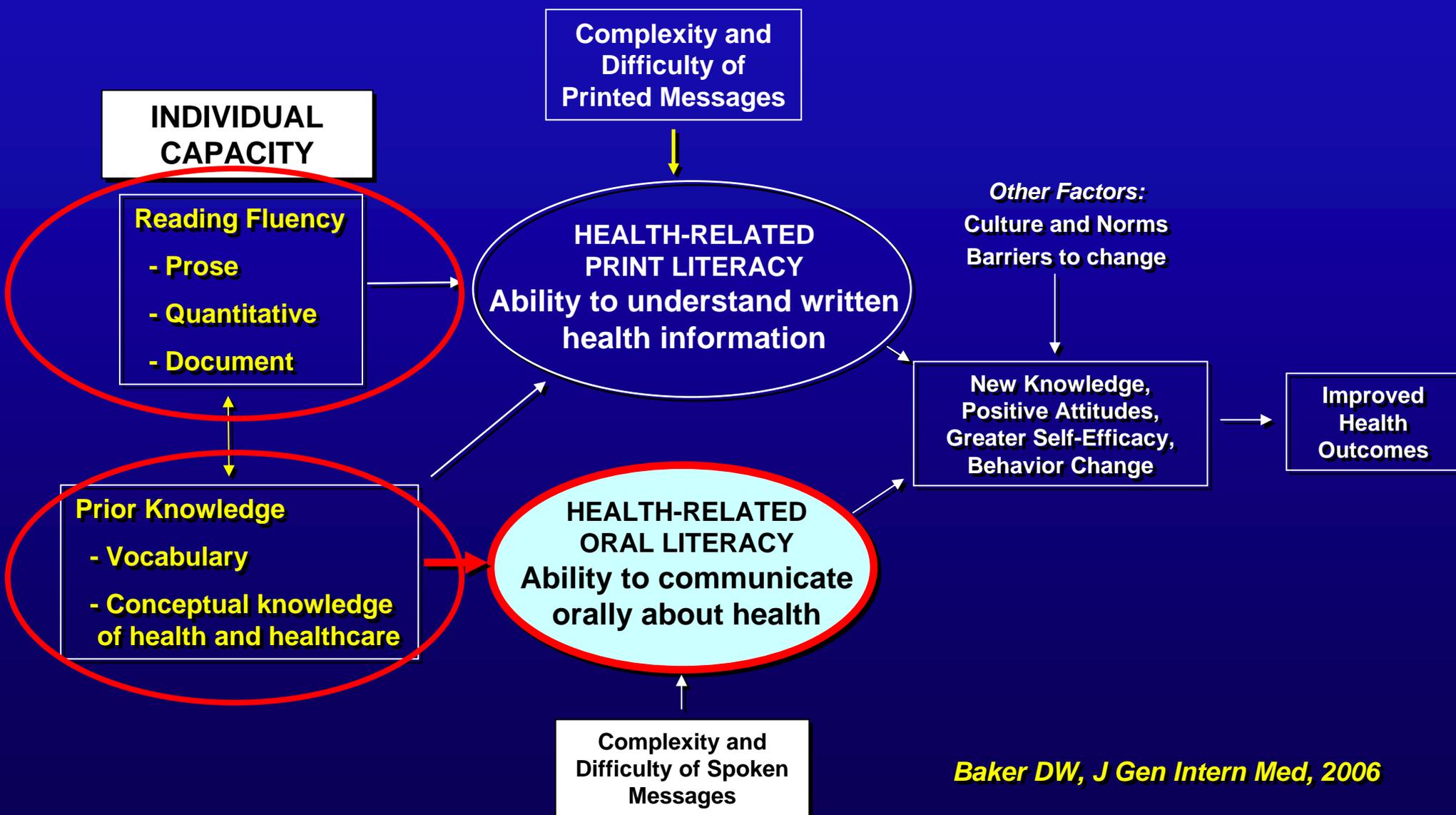
Baker DW, J Gen Intern Med, 2006

Conceptual Model of Health Literacy



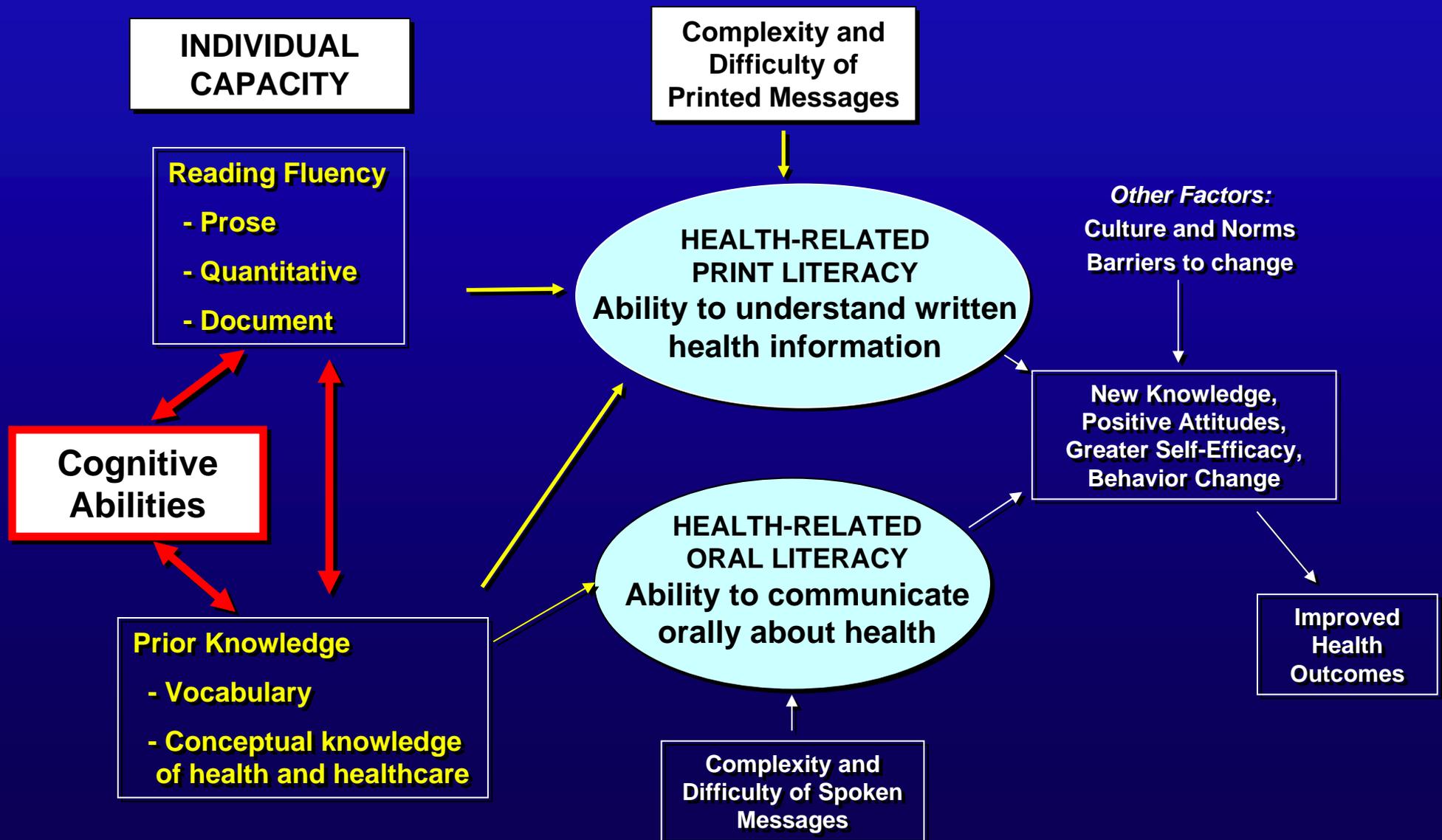
Baker DW, J Gen Intern Med, 2006

Conceptual Model of Health Literacy

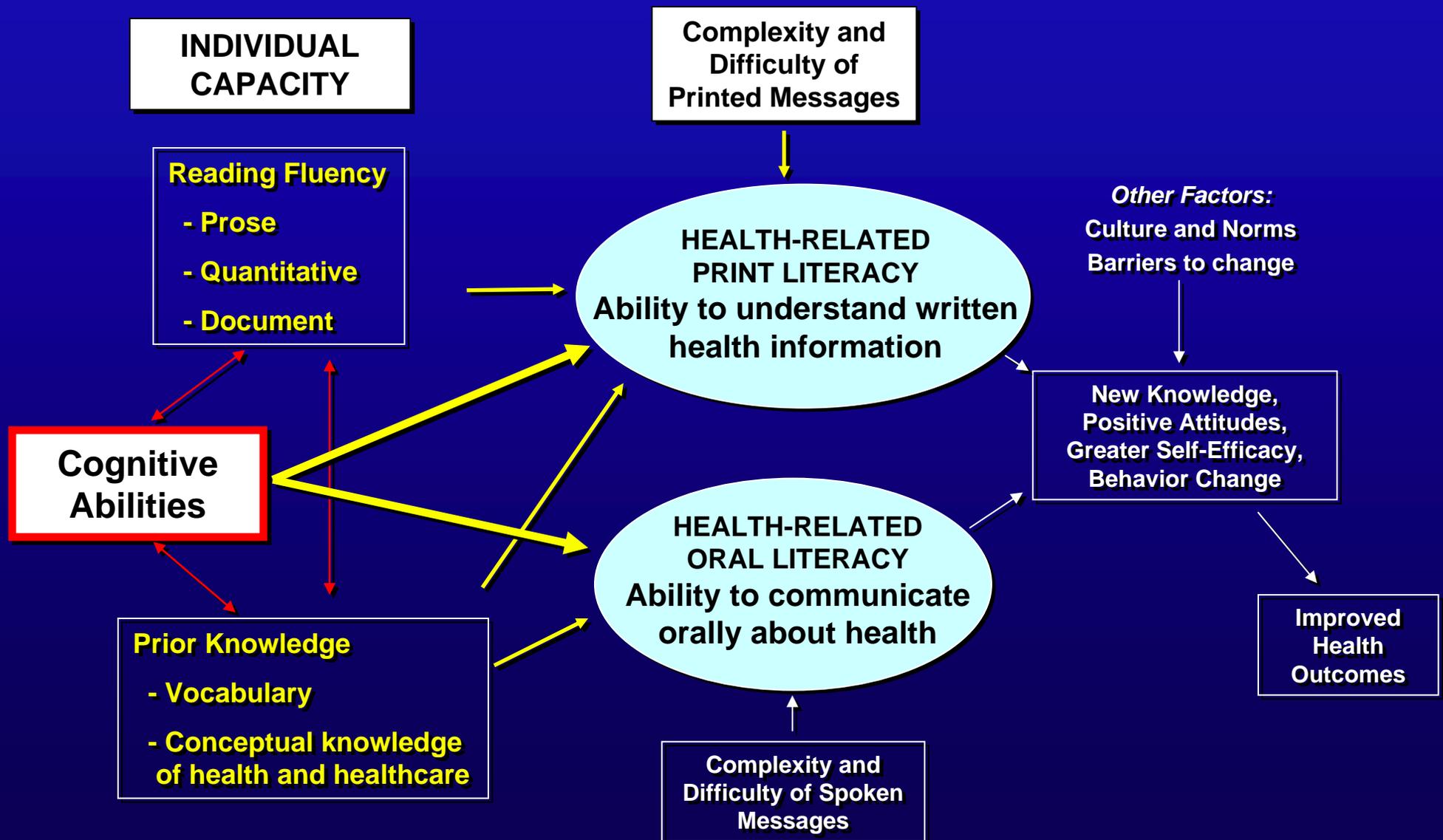


Baker DW, J Gen Intern Med, 2006

Hypothesized Model of Health Literacy Incorporating Cognitive Abilities



Hypothesized Model of Health Literacy Incorporating Cognitive Abilities



Implications for Designing Health Education Materials

- Define objectives, analyze learning tasks
- Remove all extraneous information to limit “cognitive load”
- Identify “building blocks”: teach these first and refer back to them with identical text and images when presenting new information
- Create “schemas” or information categories
 - This can increase recall by 50%
- Find analogies that convey abstract ideas

Quantitative Skills (Numeracy):

Is your blood sugar normal today?

Normal blood sugar is 60 - 150.

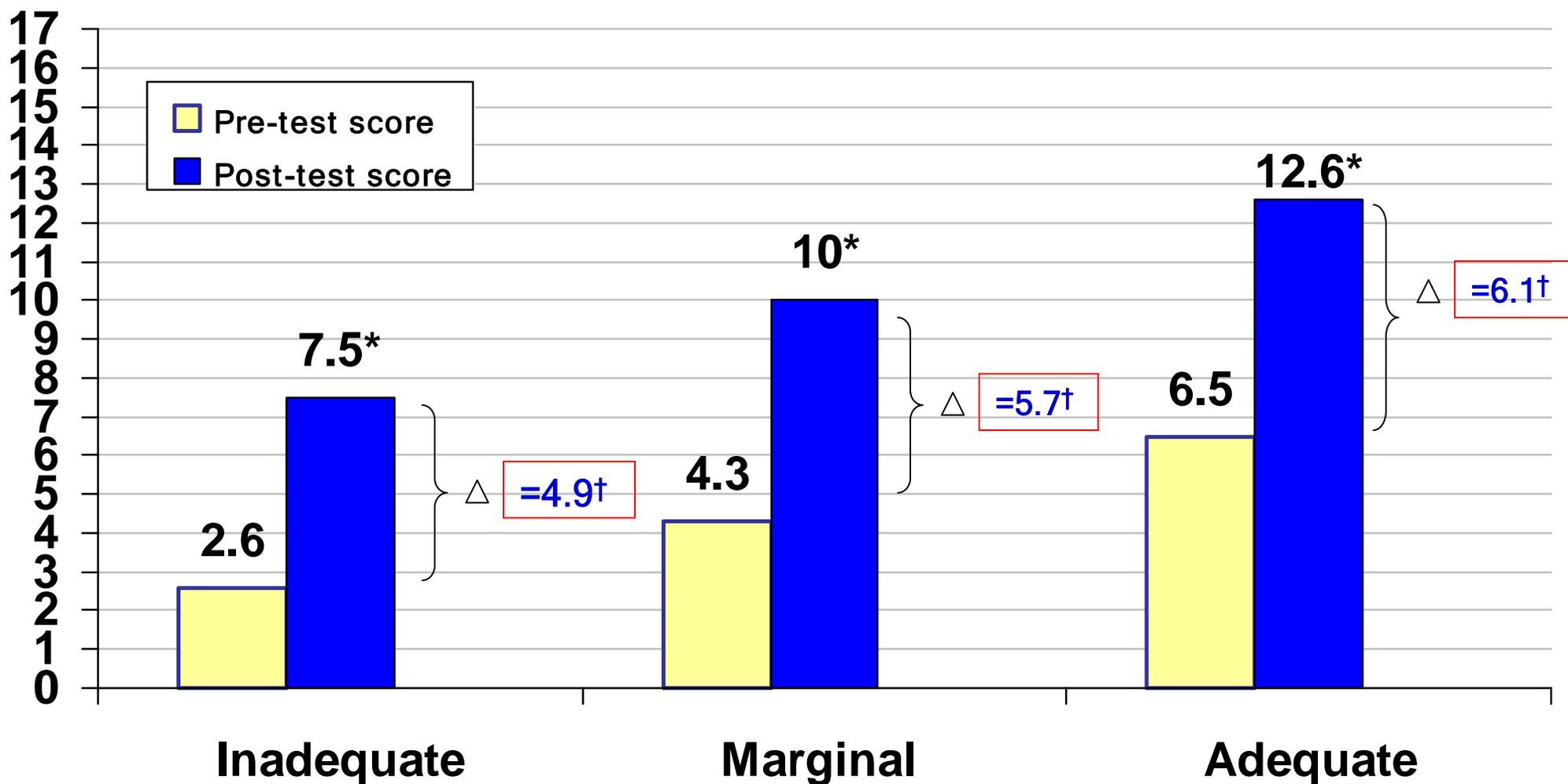
Your blood sugar today is 160.

37% Unable to Answer Correctly

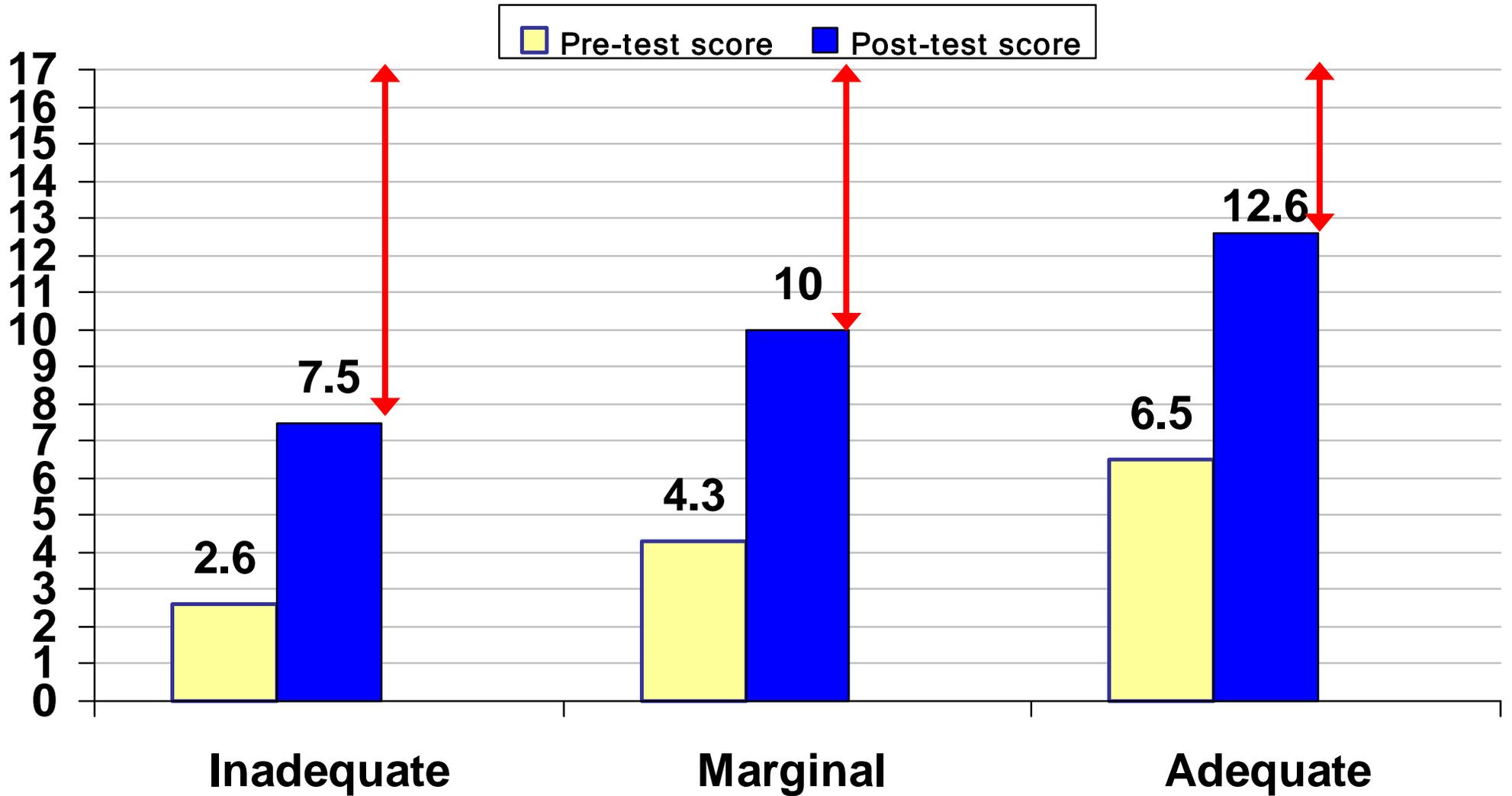
Building Blocks for Understanding the Range of Normal Blood Sugar and Identifying an Abnormal Value

- **Everyone has sugar in their blood**
- **It comes from the foods you eat**
- **Foods that don't taste sweet have sugar**
- **Sugar goes from your stomach into your blood. Your body uses this for energy**
- **Your body needs just the right amount of sugar in the blood:**
 - **not too much, not too little**

Diabetes Knowledge Gained According to Literacy Level



But Large Gap Remains: Need “Teach to Goal”



Overview:

What We Do Not Know

- **Are interventions that pay attention to cognitive factors more effective for patient education, improving patient self-management skills, and promoting behavior change?**
- **What does the S-TOFHLA really measure?**
 - **Information processing speed? Working memory?**
- **What is the best way to measure cognitive skills?**
- **Does reading fluency decline with age, and is this due to decline in specific cognitive abilities (e.g., processing speed, working memory)?**
 - **Is decline in reading ability a marker of aging?**

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Reading Comprehension: Medicaid Rights and Responsibilities (10th grade level)

PASSAGE B

I agree to give correct information to _____ if I can receive Medicaid.

- a. hair
- b. salt
- c. see
- d. ache

I _____ to provide the county information to _____ any

- a. agree
 - b. probe
 - c. send
 - d. gain
- a. hide
 - b. risk
 - c. discharge
 - d. prove

statements given in this _____ and hereby give permission to

- a. emphysema
- b. application
- c. gallbladder
- d. relationship

the _____ to get such proof. I _____ that for

- a. inflammation
 - b. religion
 - c. iron
 - d. county
- a. investigate
 - b. entertain
 - c. understand
 - d. establish

Medicaid I must report any _____ in my circumstances

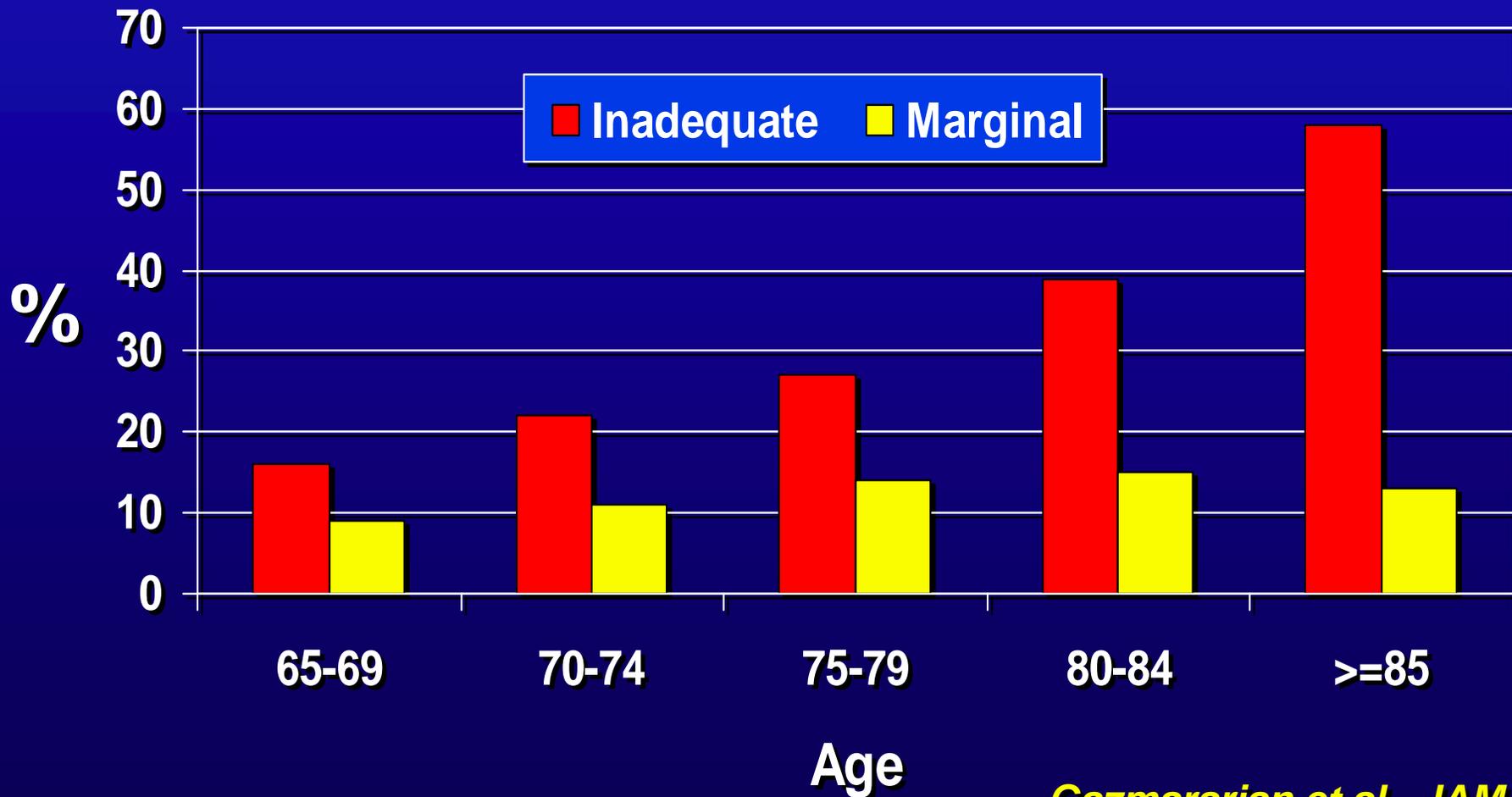
- a. changes
- b. hormones
- c. antacids
- d. charges

Overview:

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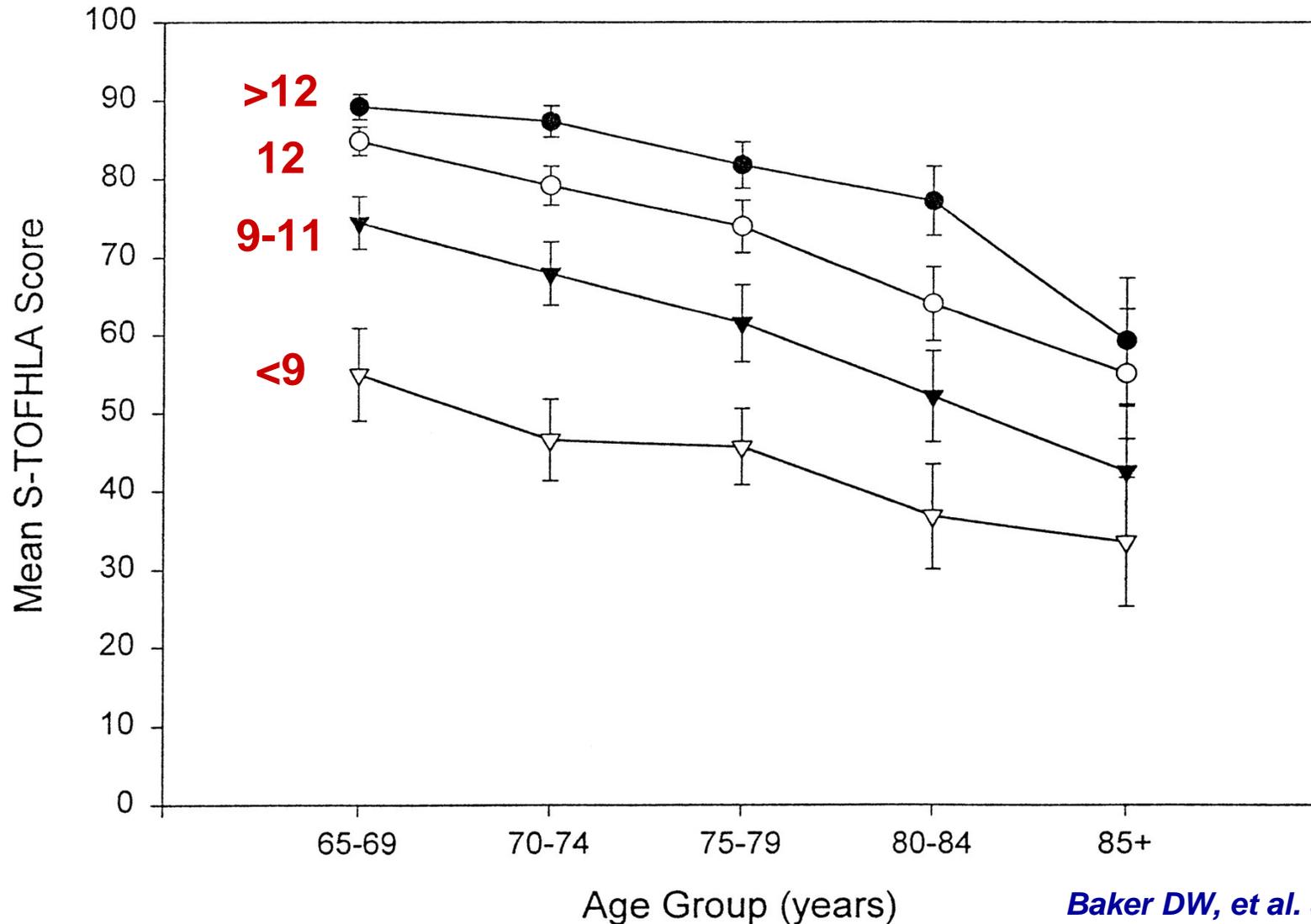
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Prevalence of Low Health Literacy Increased with Age



Gazmararian et al. JAMA '99

Mean scores on the S-TOFHILA for five age groups, stratified according to years of school completed



Baker DW, et al. J Gerontol B Psychol Sci Soc Sci. 2000

Graphical Representation of What We Know (And Don't)

- What we know
- What we believe but don't know for sure
- **What we don't know**

"And yet, it moves."

