Health Literacy Is Related to Problem Solving Skills

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Acknowledgement

 Project STAR was supported by grant MH74664 to Dr. Waldrop-Valverde from the National Institute of Mental Health.

Background

- Health literacy is linked to basic academic abilities such as reading.
- Basic cognitive abilities don't explain everything about health literacy (e.g., Baker, 2002).

Baker DW et al. (2002). Health literacy and performance on the Mini-Mental State Examination. Aging and Mental Health, 6, 22-29.



Example

- Test of Functional Health Literacy in Adults (TOFHLA)
- Reading comprehension assessed via the "cloze" procedure



• "You are going to have a CT scan of the head to help diagnose your condition. A CT scan is a special kind of X-ray, and will help us look at your brain. If there is something abnormal about your ______, we may be able to see it on the CT scan."

Example

- Component analysis:
 - Reading
 - Visual scanning and analysis
 - Grammatical analysis
 - Working memory
 - "CT Scan," "special X-ray," head, brain
 - Recall information about health care
 - Condition for which the CT scan is relevant
 - Put it all together
 - The word that goes in the blank must fit both grammatically and semantically



Other Examples

- TOFHLA quantitative subtest
 - Reading medicine bottle labels.
 - Determining when a refill is available.
 - Deciding whether a lab test result is normal or abnormal.



Hypothesis

- Health literacy depends not only on education and basic cognitive skills.
- It also depends on complex abilities such as executive function and problem solving.

Health Literacy in HIV

- Successful treatment with antiretrovirals requires very high levels of medication adherence (> 90%).
- Errors in taking antiretrovirals may happen because patients don't understand medications instructions.
- If patients don't understand instructions at the beginning of treatment, they won't be able to follow them over time

HL and Medication Adherence

- Low health literacy, age and education have been associated with poor understanding of prescription dosing instructions in HIV/AIDS patients.
- Levels of health literacy are associated with medication adherence in persons treated for HIV.

Kalichman SC, Rompa D (2000). Functional health literacy is associated with health status and health-related knowledge in people living with HIV-AIDS. J Acquir Immune Defic Syndr 25(4):337-44.

Kalichman et al. (2008). Association between health literacy and HIV treatment adherence: Further evidence from objectively measured medication adherence. J Int Assoc Physicians AIDS Care, 7(6):317-23.

Project STAR

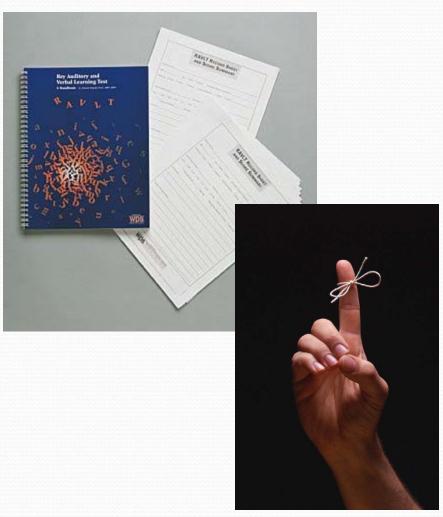
- Project STAR evaluated cognition, health literacy, and medication adherence in individuals just beginning antiretroviral treatment.
- Analyses for this presentation focus only on the relation of cognitive abilities to health literacy.
- Data from this study were used to test the hypothesis that problem solving is related to health literacy.

Variables

- Demographics: Age and ethnicity
- Education: Strong relation to health literacy
- Memory
 - Verbal learning
 - Visual delayed recall
- Psychomotor speed: Important in HIV cognition
 - E.g., consistently predicts medication adherence
 - Purdue Pegboard
- Problem solving
 - Tower of London

Auditory Verbal Learning Test

- List of 15 words
- Read aloud 5 times
- Total number of words learned = score



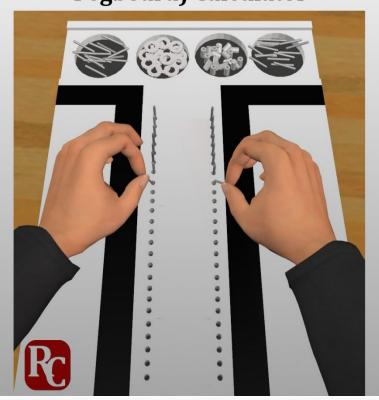
Rey Complex Figure

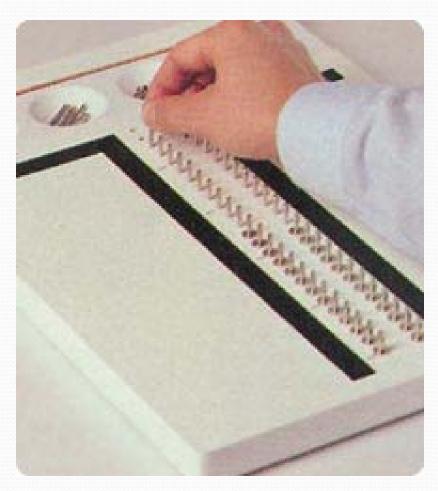
- Evaluates visuospatial skills.
- Copy a complicated geometric figure using pencil and paper.
- Draw it from memory.
- Visuospatial memory.
- Number of elements of the design remembered is the score



Purdue pegboard

Fine Finger Dexterity (Purdue Pegboard) Calculator





Tower of London

- The problem:
 - Reproduce order of disks on the left by moving to the middle or right (actually on pegs).
 - Only place *small* disks on top of *large* ones.



Analysis strategy

- In a multi-step regression model, evaluate predictors of health literacy.
- Take possible alternate explanations into account.
 - Age, education, ethnicity
 - Verbal and visual memory
 - Psychomotor speed
- Test problem solving.

Blocks in regression analysis

- **Block 1:** Education, age, ethnicity;
- **Block 2:** *Add* visual and verbal memory and psychomotor speed;
- **Block 3:** *Add* a measure of problem solving (Tower of London) to test the hypothesis that problem solving is related to health literacy.

Descriptive statistics (n = 191)

	Mean	SD
Age (Years)	44.8	8.4
Education (Years)	11.6	2.2
Income	\$9,115	\$11,764
Time Since Dx (Months)	120	81

Race

	Frequency	Percent
White Non-Hispanic	8	4.2
Hispanic	21	11.0
Black	159	83.2
American Indian	1	.5

Gender

	Frequency	Percent
Men	108	56.5
Women	83	43.5

Block 1: Education, age, ethnicity

	В	SE	Beta	t	p
Intercept	22.30	4.81		4.64	.00
Age	-0.08	0.08	-0.07	-1.05	.29
Hispanic	0.03	2.13	0.00	0.02	.99
Education	1.75	0.30	0.40	5.88	< .001

Block 2: Visual & verbal memory & psychomotor speed

	В	SE	Beta	t	p
Intercept	10.32	6.44		1.60	.11
Age	03	.08	03	43	.67
Hispanic	-2.22	2.12	07	-1.05	.30
Education	1.45	.30	.33	4.90	< .001
Visual Memory	.18	.13	.10	1.33	.19
Purdue	.003	.11	.002	.03	.98
Verbal Memory	.27	.08	.27	3.53	.001

Block 3: Problem solving

	В	SE	Beta	t	p
Intercept	19.52	6.95		2.81	.006
Age	05	.08	04	59	.56
Hispanic	-3.53	2.11	11	-1.67	.10
Education	1.40	.29	.32	4.83	< .001
Visual Memory	.14	.13	.07	1.05	.30
Purdue	01	.11	01	09	.93
Verbal Memory	.22	.08	.21	2.81	.005
Tower of London	10	.03	22	-3.10	.002

Results

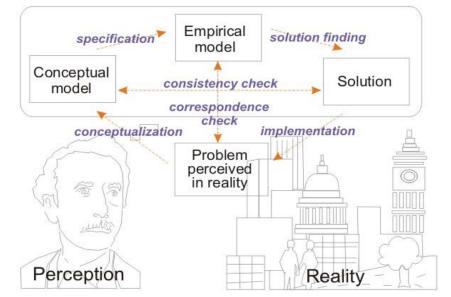
- Analyses show that education is related to health literacy
- Verbal learning and memory are related

• Problem solving is

Conceptual model

 Problem solving is also related to health literacy





Conclusion

 Health literacy is a skill that is related to educational background and verbal abilities.



 Health literacy may also require problem solving ability.

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