

# Health Literacy Differences in Older Adult Comprehension of Illustrated Health Documents

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## Overview

- > **What we did:** Eye tracking study of older adults' processing of text and pictures when reading health-related passages.
- > **What we found:** Ability-related differences in use of different pictures (saccades to, and time spent looking at, text-related pictures).
- > **Overall message:** Evidence for ability-related strategies for picture use during reading.

## Background

- Self-care is a challenge for older adults with hypertension, especially those with lower health literacy (HL), defined as cognitive and knowledge-based resources related to health (DeWalt et al., 2004; Levinthal et al., 2008).
- Multimedia formats may reduce resource demands in understanding health information needed for self-care. In fact, pictures are pervasive in patient education materials. However, little is known about how older adults use pictures to understand health information.
- In the current study we used eye-tracking to investigate how older adults with varying levels of health literacy process text and pictures to aid comprehension of health information. Earlier studies have suggested that low-ability or older readers may have difficulty integrating pictures and text (Hegarty & Just, 1993; Liu et al., 2009).

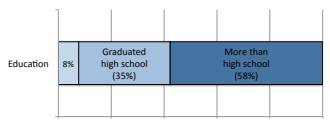
## Predictions:

- A) Elders with lower levels of HL will rely more on pictures (more frequent fixations, longer viewing times) when reading passages about hypertension than those with higher HL, but may be less likely to distinguish pictures that are more or less relevant to the text, perhaps reflecting difficulty integrating pictures and text.**
- B) Lower HL/knowledge elders will understand the passages less accurately, despite more use of pictures to support comprehension.**

## Method

### Participants:

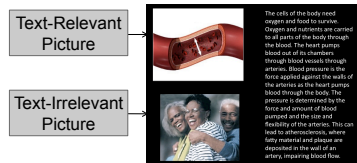
- 35 older adults (eye tracking data lost for 9 participants).
- 26 adults in eye movement analysis.



- 25 diagnosed with hypertension
- Mean age=73; range: 60-85
- Adequate HL levels (avg. STOFHLA = 33.6); correlated with health knowledge,  $r = 0.47$ ; vocabulary,  $r = 0.58$ .

### Text-picture passages:

- 6 text-picture passages on hypertension-related subjects.



Measures: See table below.

Variable	Measure
Health Literacy	STOFHLA (Baker et al., 1999)
Health knowledge	Hypertension knowledge questionnaire (Chin et al., 2009)
General knowledge	ETS-KFT Advanced Vocabulary (Ekstrom et al., 1976)
Comprehension	True/False questions (3 per passage)
Passage processing	Viewing time, # of fixations, fixation duration run times for text/ relevant picture/irrelevant picture; saccades from text to pictures

## Results

### General findings:

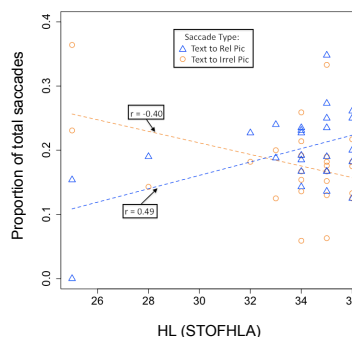
	View Time (ms)	# Fixations	Fixation Duration (ms)
Text	30392 (84%)	126 (86%)	240
Relevant Pic	3749 (10%)	13 (8%)	283
Irrelevant Pic	2199 (6%)	8 (5%)	264

Table 1. Average values per trial. In parenthesis: percentage of the overall values (ViewTime, fixation count) accounted for.

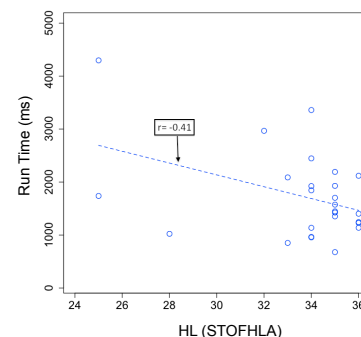
Note: all significant  $p$ 's < 0.05

- Many short-duration fixations on text, fewer longer-duration on pictures (as in Rayner et al., 2001).
- More time spent looking at relevant vs. irrelevant pictures.

### A) Health Literacy/Health knowledge and processing:



- Higher HL elders looked more from text to relevant pictures, and less to irrelevant pictures, than did lower HL elders.



- After looking to relevant pictures, higher HL elders spent less time viewing them before looking away.

- Health knowledge related to saccades to relevant picture ( $r=0.46$ )
- STOFHLA, Health knowledge both unrelated to trial time.

### B) Comprehension and processing:

- Accuracy (mean prop. correct=0.68, SD=0.15) correlated with:
  - Health knowledge ( $r=0.41$ ), vocabulary ( $r=0.40$ ), marginally with # of fixations on text ( $r=0.35$ ,  $p=0.08$ ).
  - Not related to STOFHLA ( $r=0.32$ ,  $p=0.11$ ) or any other eye movement measures (all  $p$ 's > 0.30).

## Conclusions

- A) Evidence of ability-related differences in strategy for looking at pictures (more, shorter looks by higher HL participants), rather than in overall reliance (more time, fixations spent) on pictures. Higher HL elders more likely to discriminate relevant and irrelevant pictures.**
- B) Comprehension wasn't linked to HL.**  
Possibly due to study's limitations: Small sample size, limited comprehension measures, & high HL levels (limited ability to detect links between processing, comprehension, and HL); Use of existing pictures rather than designing more effective ones may account for why lower HL elders didn't benefit from pictures.

## Future Directions

A follow-up analysis investigated in more detail how older adults read the text-picture displays. We split viewing of each passage into two stages: during the initial read of text vs. re-reading. Analysis revealed stage-based picture and text processing differences (saccades, viewing times) that are linked to health knowledge and comprehension levels (D'Andrea et al., 2010).

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