



Computer-based Administration of Health Literacy and Functional Literacy Measures in Physical Rehabilitation Populations

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Literacy skills are critical for adults to function effectively in their daily lives

Functional literacy: the ability to read, write and speak [in English], and to perform quantitative tasks (H.R. 751--102nd Congress, 1991).

Health literacy: the ability to obtain, process and understand health information and services to make appropriate health decisions (Nielsen et al., 2004).

Health literacy may be significantly worse than functional literacy because of the unfamiliar context and vocabulary of the health care system (AMA, 1999; DeWalt & Pignone, 2005).

Limited health literacy is widespread (Kutner et al., 2006) and is associated with poor health access and outcomes (Baker et al., 2002; Berkman et al., 2004; Berkman et al., 2011; DeWalt et al., 2004; Macabasco-O'Connell et al., 2011; Nielsen-Bohlman et al., 2004; Peterson et al., 2011; Rudd et al., 2007).



People with disabilities are an unrecognized health disparities population

After discharge from in-patient rehabilitation, many people with acquired disabilities (e.g., spinal cord injury, stroke or traumatic brain injury) have long-term physical, functional and cognitive disabilities.

Navigating the health care system requires a high level of sophistication, yet there is little research about how people with acquired disabilities obtain, understand and apply health information (Magasi et al., 2009).

Few studies have measured health literacy in physical rehabilitation populations.



Study Objectives

(community-dwelling individuals with spinal cord injury, stroke or traumatic brain injury)

- 1) to validate computer-based administration of functional and health literacy measures in physical rehabilitation populations
- 2) to evaluate associations between functional and health literacy
- 3) to evaluate associations between health literacy and self-reported health

Study Methods

(community-dwelling individuals with spinal cord injury, stroke or traumatic brain injury)

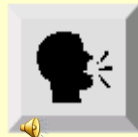
- English-speaking adults, one year post-injury.
- Participants completed health literacy, functional literacy and patient-reported outcome questionnaires.
- Touchscreen computers were used with external speakers and/or headphones, and assistive devices; study staff were available to provide assistance as needed (read questions aloud, enter answers into computer) .
- Testing was scheduled in clinical research space at the collaborating institutions, outside of patient care areas.
- Correlational and analysis of variance methods were used for statistical analyses.

Literacy Measures

| Construct | Instrument | Measurement Task | Mode | Method | Minutes |
|---------------------|---|--|--|---------------------|---------|
| Health Literacy | Health Literacy Assessment Using Talking Touchscreen Technology (Health LiTT) | comprehension of prose, document and quantitative health information (16-item short form or CAT) | self-administered | Talking Touchscreen | 10 |
| Functional Literacy | NIH Toolbox Oral Reading Recognition Test | word recognition (CAT) | interviewer-guided performance | computer | 3 |
| Functional Literacy | NIH Toolbox Picture Vocabulary Test | vocabulary knowledge (CAT) | interviewer-moderated; self-administered | computer | 4 |

Medications for Mr. Beta

| Medication | Start Date | End Date | Instructions |
|-----------------------------|------------|----------|--|
| Hanebrex: 200 mg tablets | Aug. 27 | Sept. 26 | 1 Tablet daily |
| Yostatin: 250 mg tablets | Mar. 8 | None | 1 Tablet twice daily |
| Nandozol: 90 mcg per puff | Mar. 8 | None | 1-2 Puffs by mouth every 4-6 hours as needed |
| Cellacillin: 250 mg tablets | Apr. 22 | Apr. 29 | 2 Tablets on the first day, then 1 Tablet daily after that |



Look at the Medications for Mr. Beta. How many tablets of Cellacillin should he take on the third day?

1

2

3

4



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☰ NIH Toolbox Oral Reading Recognition Test



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☰ NIH Toolbox Picture Vocabulary Test



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HD



Sociodemographic Characteristics of Study Participants, by Injury Type

| | Spinal Cord Injury (<i>n</i> =209) | Stroke (<i>n</i> =211) | Traumatic Brain Injury (<i>n</i> =184) | <i>p</i> -value |
|-------------------------|-------------------------------------|-------------------------|---|-----------------|
| Female Gender | 45 (22%) | 106 (50%) | 66 (36%) | <0.001 |
| Age in Years, mean (SD) | 46 (14) | 56 (13) | 40 (17) | <0.001 |
| Ethnicity, race | | | | |
| Hispanic, any race | 18 (9%) | 11 (5%) | 13 (7%) | <0.001 |
| Non-Hispanic, Black | 60 (29%) | 100 (48%) | 29 (16%) | |
| Non-Hispanic, White | 125 (60%) | 86 (41%) | 128 (70%) | |
| Non-Hispanic, Other | 5 (2%) | 12 (6%) | 13 (7%) | |
| Education | | | | |
| Less than HS | 18 (9%) | 24 (11%) | 20 (11%) | 0.961 |
| HS/GED | 48 (23%) | 46 (22%) | 42 (23%) | |
| Some college | 76 (36%) | 80 (38%) | 65 (35%) | |
| College degree | 67 (32%) | 61 (29%) | 57 (31%) | |



Computer-based administration of functional and health literacy measures in physical rehabilitation populations

- Study staff primarily provided assistance due to an individual's physical limitations.
- Missing data for the literacy measures were less than 4%.

Literacy and Self-reported Health, by Injury Type

| Instrument/Measure | Spinal Cord Injury (n=209) | Stroke (n=211) | Traumatic Brain Injury (n=184) | p-value |
|---|----------------------------|----------------|--------------------------------|---------|
| <i>Health Literacy</i> | | | | |
| Health LiTT | 58.1 (7.1) ^a | 53.6 (9.2) | 57.8 (7.5) ^a | <0.001 |
| <i>Functional Literacy</i> | | | | |
| NIH Toolbox Oral Reading Recognition Test | 103.0 (9.4) | 100.9 (9.5) | 103.8 (8.3) | 0.006 |
| NIH Toolbox Picture Vocabulary Test | 103.5 (12.5) | 101.4 (14.0) | 102.5 (10.4) | 0.214 |
| <i>Overall Health</i> | | | | |
| Poor | 1 (1%) | 13 (6%) | 7 (4%) | <0.001 |
| Fair | 33 (16%) | 66 (31%) | 26 (15%) | |
| Good | 84 (42%) | 85 (41%) | 77 (43%) | |
| Very Good | 62 (31%) | 31 (15%) | 58 (33%) | |
| Excellent | 21 (10%) | 14 (7%) | 9 (5%) | |

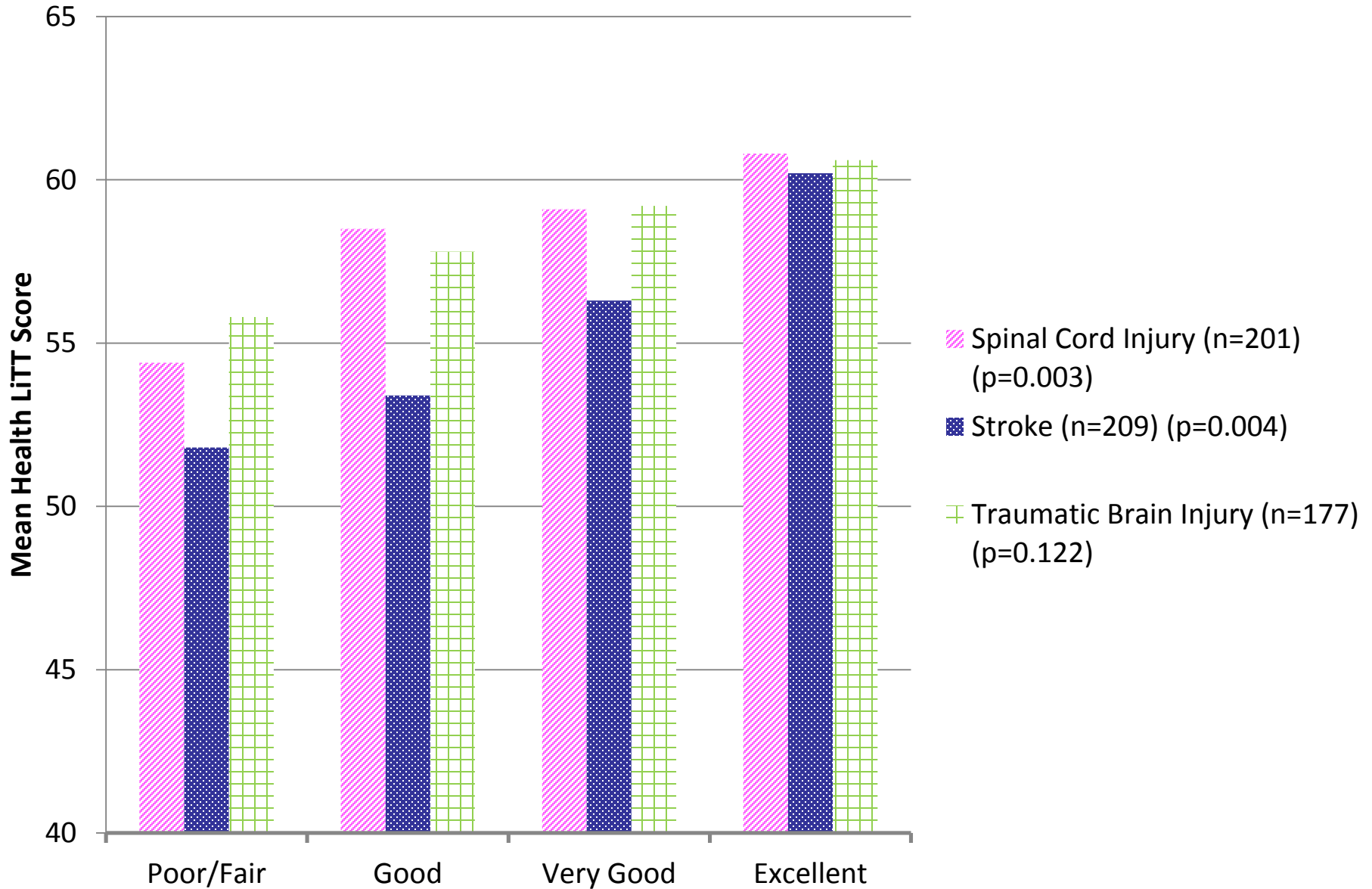
^a: Mean values with the same superscript were not significantly different from one another (Tukey-Kramer test)

Correlations Among Education, Health Literacy and Functional Literacy

| | Educa- tion | Health LiTT | NIH TB Reading | NIH TB Picture |
|-------------------|----------------|----------------|-------------------|-------------------|
| Education | --- | | | |
| Health LiTT | 0.40 | --- | | |
| NIH TB Reading | 0.48 | 0.62 | --- | |
| NIH TB Picture | 0.48 | 0.65 | 0.72 | --- |

All correlations were significantly different from zero at $p < 0.05$ (two-tailed)

Mean Health LiTT Scores, by Health Status and Injury Group





Health Literacy in Rehabilitation Research or Clinical Practice

- Computer-based technologies to measure health literacy and functional literacy are feasible in medical rehabilitation populations.
- Lower health literacy was associated with poorer health in this study.
- A measure of health literacy is likely to be more closely related to health outcomes than a measure of general (functional) literacy (Baker, 2006).
- Self-administration of a health literacy measure:
 - enables efficient measurement of health literacy with limited administration burden on research/clinical staff
 - could avoid the potential stigma patients may feel related to low literacy



Health Literacy in Rehabilitation Research or Clinical Practice

- Consideration of health literacy in rehabilitation practice:
 - Health literacy is important because it represents people's abilities to obtain, understand and use health information to make informed decisions about their health and health care.
 - Could enhance the effectiveness of the client-provider relationship (Levasseur & Carrier, 2010) and identify strategies to improve health-related quality of life.
- To effectively address limited health literacy among people with disabilities, and ensure that they are able to be informed partners in their health care, intervention is required at the level of individual patients, providers and health care delivery systems (Magasi et al., 2015).
- Better integration of health literacy, health equity, and patient-centered care initiatives (Hasnain-Wynia & Wolf, 2010; Paasche-Orlow & Wolf, 2010) would help to shift the focus from the negative effects of low health literacy to a positive model of how health literacy can be used to improve health (Pleasant et al., 2015) .



Acknowledgements

Grant #H133B090024 from the National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR)*

Co-Investigators: Susan Magasi (UIC), Noelle Carlozzi (UofMich), David Tulsy (UofDel), Alex Wong (WashU), Sofia Garcia (NU), Jin-Shei Lai (NU), Joy Hammel (UIC), Ana Miskovic (NU), Sara Jerousek (NU), Arielle Goldsmith (NU), Kristian Nitsch (NU), Allen W. Heinemann* (NU)

Hahn et al., Health and Functional Literacy in Physical Rehabilitation Patients. HLRP: Health Literacy Research and Practice 2017;1(2): e71-e85.

Thanks to all the patients who participated in our research project!