

Assessing health information literacy by performance tests

The Health Information Literacy Knowledge Test (HILK)

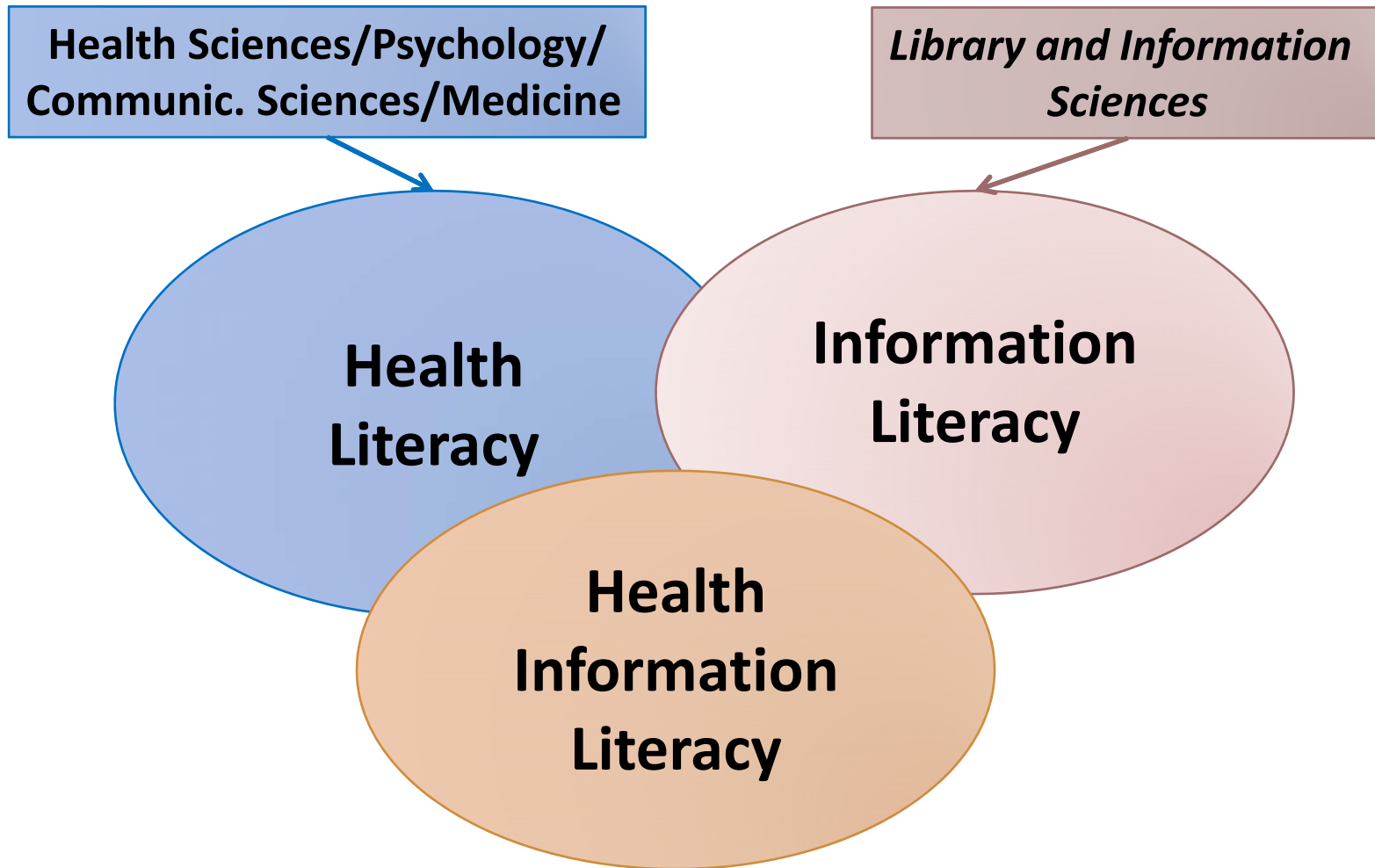
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ZPID-Symposium "Health Literacy Across the Life Span",
March 10, 2017, Trier

Overview

- Basic Concepts & Definitions
- Standardized Assessment of Health Literacy (HL): Subjective vs. Objective (Performance) Measures
- The Health Information Literacy Knowledge Test (HILK):
 - Construction
 - Empirical findings
- Discussion & Reflections on Future Assessment of H(I)L

Basic Concepts



Health Literacy: Definition

- „people’s knowledge, motivation and competences to ...
 - access,
 - understand,
 - appraise, and
 - apply
- health information in order to make judgments and take decisions in everyday life concerning
 - healthcare,
 - disease prevention and
 - health promotion
- to maintain or improve quality of life during the life course”

(Sørensen et al., 2012)

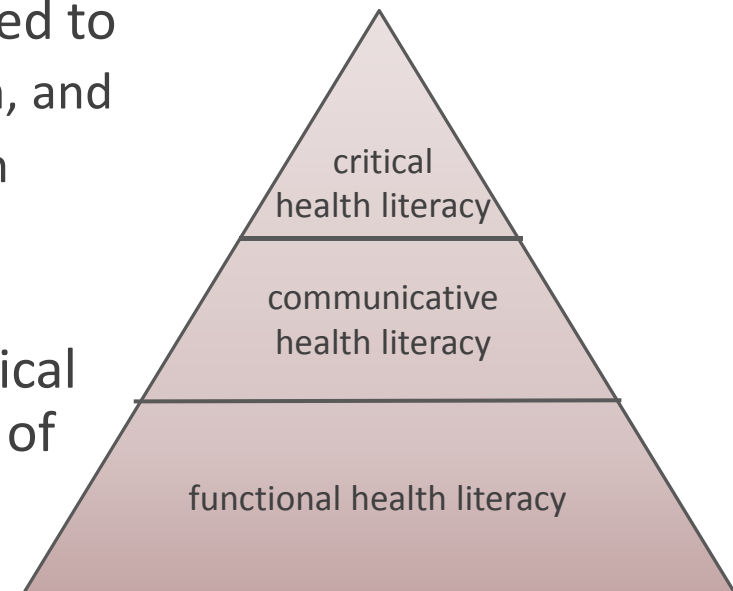
Health Information Literacy: Definition

- „set of abilities needed to:
 - recognize a health information need;
 - identify likely information sources and use them to retrieve relevant information;
 - assess the quality of the information and its applicability to a specific situation;
 - and analyze, understand, and use the information to make good health decisions”.

(Medical Library Association MLA, 2003)

Types of Health Literacy (Nutbeam, 2000)

- **Functional Literacy:** basic literacy (reading, writing) and numeracy
- **Communicative Literacy:** abilities related to
 - accessing and understanding information, and
 - personalising the meaning of information
- **Critical Literacy:** abilities related to critical analysis, evaluation, reflection and use of health information (Sykes et al., 2013)



Standardized Assessment of Health Literacy: Subjective Measures

- self-report questionnaires applied in P&P-, online- or structured interview format (CAPI/CATI), e.g.
 - HLS-EU-Q47 (Sørensen et al., 2013)
 - eHEALS (Norman & Skinner, 2006)
- Pro:
 - easy to administer
 - (often) comprehensive / covering multiple aspects of HIL
- Con:
 - questionable validity: self-assessment of literacy (ability, knowledge, skills) or measure of self-efficacy?
 - underlying response biases

Standardized Assessment of Health Literacy: Performance Measures

- domain-/illness-specific health knowledge, e.g.
 - Mental Health Literacy Scale MHLS (O'Connor & Casey, 2015)
 - Literacy Assessment in Diabetes LAD (Nath et al., 2001)
- functional health literacy, e.g.
 - *Test of Functional Health Literacy in Adults* TOFHLA (Parker et al., 1995)
 - *Rapid Estimate of Adult Literacy in Medicine* REALM (Davis et al., 1993)
- critical health (information) literacy, e.g.
 - Research Readiness Self-Assessment RSSA (Ivanitskaya et al., 2006)
 - Critical Health Competence Test CHCT (Steckelberg et al., 2009)

Some Problems of Existing Health Literacy Performance Measures

- Tests of health knowledge:
 - domain-/illness-specificity → comparability/generalizability of results?
 - literacy measure or predictor/outcome measure?
- Tests of functional literacy:
 - cover only very limited part of the HL construct
 - ceiling effects: do not discriminate among persons with more than basic education
- Tests of critical literacy:
 - too difficult/complex for most people without university education and knowledge in statistics/empirical research methods;
 - usefulness? (focus: scholarly information literacy/evidence-based medicine) → limited relevance for everyday health information behaviors

Everyday Health Information Need: Scenario

Imagine a 45-year-old friend of yours tells you that he has changed his diet and started to exercise regularly. He believes that this lifestyle can prevent diseases such as diabetes or dementia.

He invites you to join him but you first want to find more information on whether these changes in lifestyle are appropriate.

Health Information Literacy: Definition

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Health Information Literacy Knowledge Test

(HILK; Mayer & Holzhäuser)

- **Objective:** Development of an economic test of knowledge about systematically planning & conducting everyday health information searches in various sources (printed media, internet, medical professionals) & “scanning” the results
- **Theoretical Background:** skill decomposition derived from process models of information seeking
 - general process model of information literacy (Big6, Eisenberg & Berkowitz, 1990)
 - Information Problem Solving using Internet model (IPS-I, Brand-Gruwel et al., 2009)

Big6™ Skills (Eisenberg & Berkowitz, 1990)

1. Task Definition

- 1.1 Define the information problem
- 1.2 Identify information needed

2. Information Seeking Strategies

- 2.1 Determine all possible sources
- 2.2 Select the best sources

3. Location and Access

- 3.1 Locate sources (intellectually and physically)
- 3.2 Find information within sources

4. Use of Information

- 4.1 Engage (e.g., read, hear, view, touch)
- 4.2 Extract relevant information

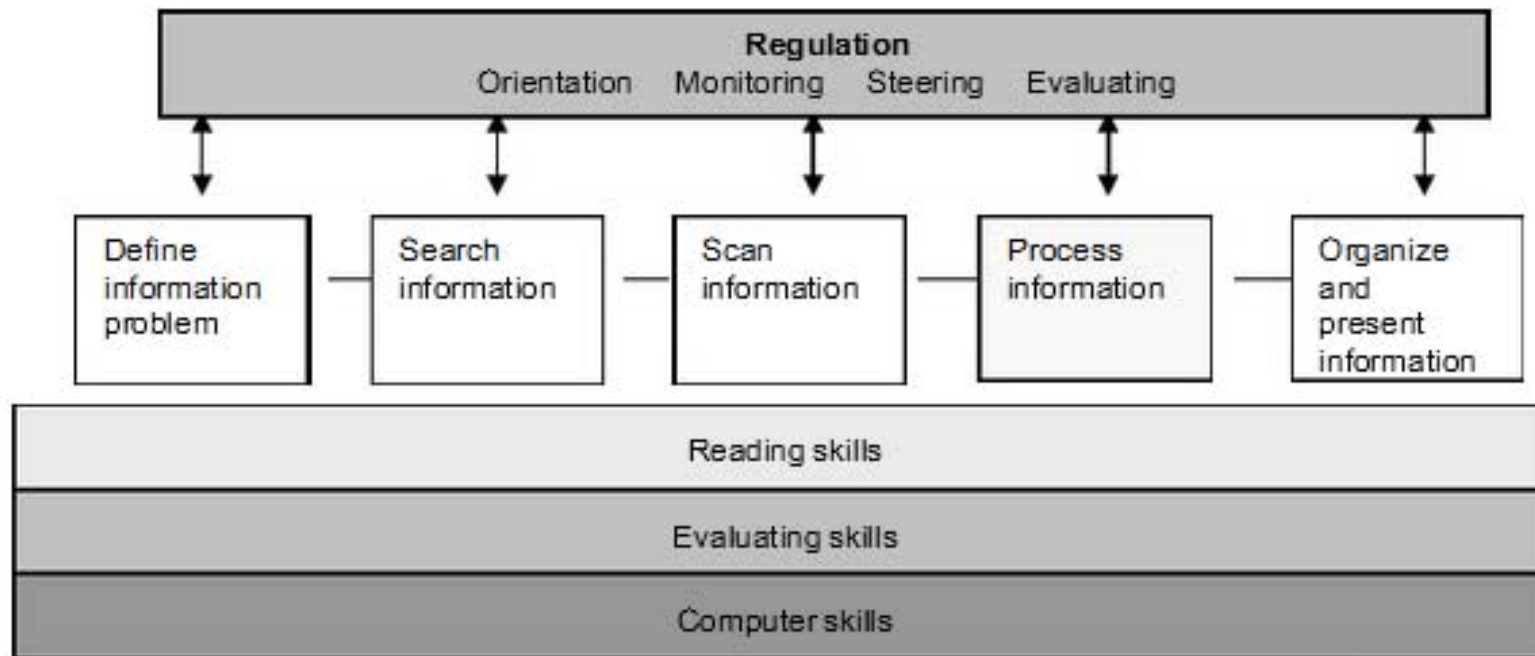
5. Synthesis

- 5.1 Organize from multiple sources
- 5.2 Present the information

6. Evaluation

- 6.1 Judge the product (effectiveness)
- 6.2 Judge the process (efficiency)

Information Problem Solving using Internet model (IPS-I, Brand-Gruwel et al., 2009)



Skill Decomposition Underlying the HILK

4 skills with 2 subskills each:

1. Define the information need
 - 1.1 Define the search problem (topic of search)
 - 1.2 Identify information needed
 2. Plan the search
 - 2.1 Select information sources based on knowledge about these sources
 - 2.2 Determine search strategy
 3. Access information sources
 - 3.1 Identify type of source
 - 3.2 Gain access to source (e.g., full text)
 4. Scan information
 - 4.1 Assess relevance and basic quality of source
 - 4.2 Find information within source
- **Fixed Choice-Items:** 3 options each (0 - 3 correct) plus “don’t know”-option

Sample Items

8. Bitte schauen Sie sich die Buchdeckel in der Abbildung an. Welches Buch enthält bzw. welche Bücher enthalten wahrscheinlich besonders ausgewogene (d.h. auf mögliche Vor- und Nachteile eingehende) Informationen zum Thema „Gesundheitliche Wirkungen von Sport im Alter“?

	Trifft zu	Trifft nicht zu	Weiß ich nicht
Buch 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Buch 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Buch 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Book 1



Book 2



Book 3

Sample Items

Welches sind Hinweise darauf, dass es sich bei einem Internetforum zum Thema „Gesundheit“ um eine seriöse Diskussionsplattform handelt?

	Trifft zu	Trifft nicht zu	Weiß ich nicht
Das Forum wird von einer angesehenen Organisation (z.B. einer Universität, einem Patientenverband) bereitgestellt.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Das Forum wird von Fachleuten (z.B. Ärzten / Ärztinnen) betreut.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
In dem Forum wird darauf hingewiesen, dass Ratschläge im Internet einen Arztbesuch normalerweise nicht ersetzen können.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Sie möchten sich über das Thema „Gesunde Ernährung im Alter“ informieren, um Ihre Ernährung umzustellen. Welche der folgenden Handlungen ist als erster Schritt am besten geeignet? Bitte wählen Sie nur eine richtige Antwort aus!

Ich sollte mir überlegen, welche Gesichtspunkte des Themas für mich besonders wichtig sind und wie oder bei wem ich dazu etwas erfahren kann.	<input type="checkbox"/>
Ich sollte einen Termin mit meinem Hausarzt / meiner Hausärztin vereinbaren und mir von ihm/ihr Tipps geben lassen.	<input type="checkbox"/>
Ich sollte einfach „Gesunde Ernährung im Alter“ in das Suchfeld einer Internet-Suchmaschine eingeben und schauen, was es dort zu diesem Thema so gibt.	<input type="checkbox"/>
<i>Weiß ich nicht</i>	<input type="checkbox"/>

HILK versions (Overview)

- **Draft version** ($k = 57$):
 - Expert Study ($N = 11$ psychologists with expertise in information literacy research; 6 male / 5 female): consensus about correct answers; improvement of item wording
- **Pilot version** ($k = 53$)
 - Study 1 ($N = 138$ psychology students, mean age = 22.6 yrs., 87% female): P&P format
 - Study 2 ($N = 100$ students of law/economics; mean age = 23.1 yrs.; 64% female): online format, change in response mode
- **Final version** ($k = 24$; selected based on exploratory factor analyses, item coefficients [difficulty, item-total correlations], and semantic considerations: content validity)
 - Study 3: ($N = 144$ students of languages, humanities, mathematics and computer sciences; mean age = 23.4 yrs.; 69% female): online format, further refinement of response mode

Psychometric Properties of the HILK (24-item-version)

	Study 1	Study 2	Study 3
<i>M</i> (SD)	0.79 (0.10)	0.62 (0.11)	0.63 (0.11)
Range	.47-.93	.31-.86	.36-.86
<i>p</i> (item difficulties)	.37-.93	.15-.87	.17-.91
Cronbach's Alpha	.71	.77	.78
r_{it-i} (item-total correlation)	.11-.38	.05-.57	.13-.53

Validation?

Problem: no established health literacy test which is applicable in student samples → necessity to draw on other validation criteria

a) **performance measures** assessing related constructs:

- H1: HILK is associated with **scholarly IL** (HIL = domain-specific IL)
- H2: HILK is associated with **generalized cognitive abilities** [(a) directly: problem-solving skills, verbal intelligence ...; b) indirectly: education/experience with information search & evaluation]

b) **self-report measures of HL/HIL** (however: usually low / moderate associations of self-reports and performance tests of abilities (for IL see Rosman et al., 2015)

- H3: HILK is associated with self-reported HL (3a) / HIL (3b) / IL (3c)

Associations of HILK with Information Literacy and Cognitive Ability Measures

Study 1:

- **Scholarly Information Literacy:** Information Literacy Test for Psychology ILT-P (Leichner et al., 2013): $r = .48^{**}$

Study 2:

- **Verbal Intelligence:** Verbal Analogy Tasks from I-S-T 2000R (Liepmann et al., 2007): $r = .19^*$
- **Fluid Intelligence:** Raven's APM (20-minute version; Hamel & Schmittmann, 2006): $r = .36^{**}$

Associations of the HILK with Self-Reported HL, HIL, and IL

- **Study 1:**
 - **HL:** eHEALS (German version; Soellner et al., 2014): $r = -.02$
 - **IL:** SES-IB-16 (Behm, 2015): $r = .15^*$
- **Study 2:**
 - **HL:** HLS-EU-Q47 (German version; total score): $r = .22^{**}$
 - **HIL:** EHILS (German version; own translation of Niemilä et al., 2012): $r = .22^{**}$
- **Study 3:**
 - **HL:** HLS-EU-Q47 (German version; total score): $r = .13^+$
 - **HL:** eHEALS (German version; Soellner et al., 2014): $r = .13^+$
 - **HIL:** EHILS (German version; own translation of Niemilä et al., 2012): $r = .22^{**}$
 - **IL:** SES-IB-16 (Behm, 2015): $r = .28^{**}$

Discussion

- **Evaluation of the HILK:**
 - adequate reliability (at least for research purposes)
 - validity:
 - moderate associations with cognitive abilities and information literacy
 - small associations with subjective HIL/IL measures →
- **Further development of the HILK:**
 - ongoing study: mode of testing (unproctored online testing)
 - validation studies using behavioral measures (e.g., health information search tasks)
 - applications in diverse samples outside of university context: research on predictors, correlates and consequences of HIL
 - continuous monitoring of item contents to ensure content validity in changing health information environments

Some Challenges for Future H(I)L Assessment:

(1) Person- vs. Environment-Focused Assessment (see also Schulz, 2016)

- Person-focused assessment: individuals' ability to understand, interpret and use everyday health information
 - of different types: verbal – numeric – pictorial
 - in different modalities: written – oral
 - in different modes: passive [read/listen] – active [ask/communicate]
- Environment-/information-focused assessment:
 - availability / accessibility of information, e.g., for specific groups, in specific settings or cultures
 - usability of information search tools
 - design of health information materials → „division of cognitive labor“ between experts and laypeople (e.g., Bromme et al., 2016): development of *reliable* and *understandable* science-based health information by experts

Some Challenges for Future H(I)L Assessment:

(2) Health Literacy: „Skill“ and „Will“?

- „skill components“:
 - abilities needed to seek, evaluate, and use health information
 - methodological/medical knowledge related to evaluating scholarly health information;
 - knowledge about formal evaluation criteria (e.g., timelines, authorship, ...) → „evaluation heuristics“
 - domain-specific epistemic beliefs (beliefs about the nature of knowledge / of knowing)
- „will components“: motivation to use the skill components → based on „critical stance“ toward (health) information

(see „ACRL-Framework for IL in Higher Education“ (2015): „threshold concepts“ at the core of IL: basic understanding of the nature and construction/production of information, e.g. „Authority Is Constructed and Contextual“, „Research is inquiry“, ...)

Some Challenges for Future H(I)L Assessment:

(3) How to Conceptualize Critical Health Literacy?

- two types of information evaluation (e.g., Bromme et al., 2016; Wilson, 1993)
 - „first hand evaluation“ („What is true?“): Evaluation of knowledge per se: Logically consistent? Consistent with individual experiences / previous knowledge?; „critical thinking“) and
 - „second hand evaluation“ („Whom to believe?“): evaluation of source of knowledge & ascription of „cognitive authority“ in specific situations: relevance? trustworthiness? benevolence? (cf. „*epistemic trust*“; Hendricks, Kienhues, & Bromme, 2016)
- extension of the concept of critical health literacy to include metacognitive abilities related to distinctions between these evaluation types:
 - acknowledging the principle of „division of cognitive labor“ (experts – laypeople)
 - self-assessing one’s abilities to conduct first hand evaluations
 - relying on adequate (relevant/trustworthy/knowledgeable/benevolent) sources for second hand evaluations
 - being vigilant to the risk of being misinformed by putative „experts“

Thank you!

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