Navigating Through the World of Health Information

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ZPID and its Mission

• **Information for Psychology - supporting open science:**
  - reference database PSYNDEX
  - search portal PubPsych
  - data archive PsychData
  - publication platform PsychOpen
  - [www.zpid.de](http://www.zpid.de)

• **Research on information technologies and information behaviors:**
  - Improving technologies (e.g., data management tools, cross-lingual search technologies)
  - Supporting adequate information behaviour and information literacy
Outline

• Introduction

• Health Information Literacy: concept

• The Health Information Literacy Knowledge Test (HILK):
  • Construction
  • Findings: Associations with
    • subjective health (information) literacy measures
    • health information seeking: sources, strategies and evaluation criteria
    • epistemic beliefs about medicine

• Summary and outlook
Health Information Needs and Decisions in Everyday Life

• norm/ideal to take responsibility for one’s health → information about issues related to prevention and health promotion

• concern over health issues, triggered by symptoms → information about possible causes and necessity of treatment

• health problems requiring contact with the medical system
  • as a patient → information about treatment and self-management (e.g. shared decision-making, informed consent, management of chronic conditions) or
  • as a consumer → e.g., information about treatments not covered by health insurance
World of health information

- easy & convenient access to numerous health information sources of highly divergent quality
  - low quality: inaccurate, incomplete or “fake news”
  - high quality: medical reference databases, information portals, medical journals etc.

- „information overload“ (e.g. Wilson, 2001):
  - psychosocial stress
  - discontinue information searches
  - rely on inadequate information

- predictors of health information overload (Kim et al., 2007):
  - low search expertise
  - low topic-specific literacy / knowledge
  - high concerns about information quality
  - low level of education
Health Information Literacy: Definitions

• „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)
Basic Concepts

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" (Soerensen et al., 2012)
Basic Concepts

**Definition:** set of knowledge and skills necessary to recognize an information need and to locate, evaluate, and use information adequately (ACRL, 2000)
Basic Concepts

- Health Literacy
- Information Literacy

Medicine/Health Sciences/Psychology/Communic. Sciences/Nursing Sciences

Library and Information Sciences
Standardized Assessment of Health Information Literacy

- **Perception-based/subjective measures**, e.g. self-report questionnaires:
  - **Everyday Health Information Literacy Screening Tool** EHILS ($k = 10$; Niemilä et al., 2012): Motivation to obtain health information and confidence in ability to find, evaluate and understand health information
  - **Self-Efficacy Scale for Information Behavior** SES-IB-16 (Behm, 2015): self-efficacy beliefs related to information behavior

- **Problem**: generally low validity of self-assessments of ability and competencies (e.g. Brackett & Mayer, 2003; Freund & Kasten, 2012; Kruger & Dunning, 1999; see Rosman, Mayer & Krampen, 2015, for scholarly information literacy)
Standardized Assessment of Health Information Literacy

• **Performance-based / objective measures** of health information literacy, e.g.
  - **Research Readiness Self-Assessment RSSA** (Ivanitskaya et al., 2006): scholarly information literacy of medical or health science students
  - **Critical Health Competence Test CHCT** (Steckelberg et al., 2009): understanding of medical concepts, statistics, experimental designs, sampling, ...

• **Problems:**
  - limited relevance for everyday health information behaviors
  - too complex for people without university education
Health Information Literacy Knowledge Test  
(HILK; Mayer & Holzhäuser, 2015)

• **Aim:** “objective”, performance-based assessment of HIL by a test of “generic” knowledge about everyday health information seeking in various sources and basically evaluating the quality of information

• **Construction Background:** skill decomposition derived from process models of information seeking:
  • **Big6-Skills:** general descriptive process model of information literacy (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  
<table>
<thead>
<tr>
<th></th>
<th>1.2 Identify information needed</th>
</tr>
</thead>
</table>
| 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 health information search)
   1.2 Identify information needed

2. Plan the search
   2.1 Select information sources based on knowledge about qualities of 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

Please take a look at the book covers below. Which book(s) probably contain(s) particularly balanced (e.g. pointing to advantages as well as disadvantages) information about „Health effects of sports in old age“?

<table>
<thead>
<tr>
<th>Book</th>
<th>Does apply</th>
<th>Does not apply</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Book 1</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Book 2</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Book 3</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
Sample Item

You want to find information on „Health Nutrition in Old Age“ to change your diet. Which of the following actions is the best first step during your information search. Please select only one answer.

<table>
<thead>
<tr>
<th>Action</th>
<th>Does apply</th>
</tr>
</thead>
<tbody>
<tr>
<td>I should reflect on the topic to see which aspects are most important for me ad how/where I might get information about these aspects.</td>
<td>□</td>
</tr>
<tr>
<td>I should make an appointment with my physician to get some information.</td>
<td>□</td>
</tr>
<tr>
<td>I should type „Healthy Nutrition in Old Age“ into the search mask of a Web Search Engine to see what is on the web.</td>
<td>□</td>
</tr>
<tr>
<td>Don‘t know</td>
<td>□</td>
</tr>
</tbody>
</table>
### Sample Item

Which of the following aspects point(s) to the appraisal that a specific internet board/forum on health is a reliable discussion platform?

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Does apply</th>
<th>Does not apply</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>The board is provided by a well-respected organization (e.g., a university or a patient organization).</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Medical experts (e.g., physicians) take care of board.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>The board explicitly points to the fact that internet information can not replace seeing a physician.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
HILK versions (Overview)

• **Draft version** \((k = 57)\):
  - Expert Study \((N = 11\) psychologists with expertise in information literacy research): consensus about correct answers; refinement of item wording

• **Pilot version** \((k = 53)\):
  - Study A \((N = 138)\): P&P format
  - Study B \((N = 100)\): online format, change in response mode

• **Final version** \((k = 24)\):
  - selected based on exploratory factor analyses, item statistics, and content validity; further refinement of response mode
## Psychometric Properties of the Final HILK

<table>
<thead>
<tr>
<th></th>
<th>Study 1</th>
<th>Study 2</th>
<th>Study 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sample size / domain of studies</strong></td>
<td>( N = 144 ) university students (languages, humanities, mathematics, computer sciences)</td>
<td>( N = 144 ) university students (educational sciences, nursing sciences)</td>
<td>( N = 317 ) vocational school students (administration, technology, health professions; Kuhberg &amp; Mayer, in prep.)</td>
</tr>
<tr>
<td><strong>Age/gender</strong></td>
<td>18-36 yrs. (( M = 23.4 )); 69% female</td>
<td>18-36 yrs. (( M = 23.7 )); 73% female</td>
<td>16-34 yrs. (( M = 20.8 )); 70% female</td>
</tr>
<tr>
<td><strong>( M (SD) )</strong></td>
<td>0.63 (0.11)</td>
<td>0.65 (0.10)</td>
<td>0.42 (0.13)</td>
</tr>
<tr>
<td><strong>Range</strong></td>
<td>.36-.86</td>
<td>.28-.86</td>
<td>.17-.81</td>
</tr>
<tr>
<td><strong>( p ) (item difficulties)</strong></td>
<td>.17-.91</td>
<td>.18-.93</td>
<td>.08-.62</td>
</tr>
<tr>
<td><strong>Cronbach’s Alpha</strong></td>
<td>.78</td>
<td>.72</td>
<td>.72</td>
</tr>
</tbody>
</table>
„Objective“ and „Subjective“ H(I)L
## Associations of the HILK with Self-Reported IL and HIL

<table>
<thead>
<tr>
<th>Measure</th>
<th>Study 1</th>
<th>Study 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Efficacy Scale for Information Behavior SES-IB-16 (Behm, 2015)</td>
<td>.28**</td>
<td>--</td>
</tr>
<tr>
<td>Everyday Health Information Literacy Screening Tool EHILS (Niemilä et al., 2012)</td>
<td>.22**</td>
<td>.32**</td>
</tr>
</tbody>
</table>

**p < .01**
# Associations of the HILK with Self-Reported HL

<table>
<thead>
<tr>
<th></th>
<th>Study 1</th>
<th>Study 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HLS-EU-Q47</strong> (Soerensen et al., 2013)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Score ((k = 47))</td>
<td>.13+</td>
<td>.20*</td>
</tr>
<tr>
<td>Access/obtain information ((k = 13))</td>
<td>.14+</td>
<td>.24**</td>
</tr>
<tr>
<td>Understand information ((k = 11))</td>
<td>.18*</td>
<td>.28**</td>
</tr>
<tr>
<td>Process/appraise information ((k = 12))</td>
<td>.08</td>
<td>.09</td>
</tr>
<tr>
<td>Apply/use information ((k = 11))</td>
<td>.04</td>
<td>.07</td>
</tr>
<tr>
<td><strong>eHEALS</strong> (Norman &amp; Skinner, 2006; German: Soellner et al., 2014; (k = 8))</td>
<td>.13+</td>
<td>---</td>
</tr>
</tbody>
</table>

** \(p < .01\); * \(p < .05\); + \(p < .10\)
HIL and Self-Reported Information Behaviors
When seeking information about health and illness, I get xx percent of information from ...

<table>
<thead>
<tr>
<th>Source</th>
<th>Percentage M (SD)</th>
<th>r (HILK)</th>
</tr>
</thead>
<tbody>
<tr>
<td>experts</td>
<td>27 (22)</td>
<td>-.25**</td>
</tr>
<tr>
<td>laypeople</td>
<td>20 (13)</td>
<td>-.05</td>
</tr>
<tr>
<td>printed sources</td>
<td>15 (12)</td>
<td>.13</td>
</tr>
<tr>
<td>digital / internet sources</td>
<td>38 (21)</td>
<td>.21*</td>
</tr>
</tbody>
</table>
### HILK and Cognitive and Metacognitive Activities During Information Search

<table>
<thead>
<tr>
<th>Information Behavior Questionnaire (Mayer, in prep.)</th>
<th>Study 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning ((k = 5))</td>
<td>.15*</td>
</tr>
<tr>
<td>Monitoring ((k = 6))</td>
<td>.08</td>
</tr>
<tr>
<td>Openness for Information ((k = 6))</td>
<td>.25**</td>
</tr>
<tr>
<td>Reflection ((k = 3))</td>
<td>.04</td>
</tr>
</tbody>
</table>

**p < .01; * p < .05**
## Associations of the HILK with Evaluation Criteria „Typically“ Applied

<table>
<thead>
<tr>
<th></th>
<th>Study 1</th>
<th>Study 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formal/scientific quality (k = 8)</td>
<td>.26**</td>
<td>.35**</td>
</tr>
<tr>
<td>Clarity of presentation (k = 4)</td>
<td>-.19*</td>
<td>-.13+</td>
</tr>
</tbody>
</table>

** p < .01; * p < .05; + p < .10
Summary

• HIL (as assessed by the HILK) is associated with some HIBs that should be „functional“ with regard to navigating through the health information world:
  • systematic planning of the search process
  • open-mindedness during the search
  • application of adequate evaluation criteria
  • critical stance toward (often) unreliable sources of health knowledge
HIL and Epistemic Beliefs about Medicine
Epistemic Beliefs

• **Definition:** individual conceptions of the nature of knowledge and knowing (Hofer & Pintrich, 1997), e.g.,
  - *Structure:* How “simple”/certain versus “complex”/uncertain is knowledge?
  - *Stability:* How “stable” vs. “dynamic” is it over time?
  - *Justification:* How / by which sources may knowledge claims be justified?
    → domain-general vs. domain-specific (e.g., medicine)

• **developmental sequence** (Kuhn & Weinstock, 2002; Hofer & Pintrich, 1997): *absolute* → *relativistic* → *evaluativistic*
## Associations of the HILK With Epistemic Beliefs About Medicine

<table>
<thead>
<tr>
<th>Epistemic Beliefs Assessment for Medicine (EBAM) questionnaire (Kienhues &amp; Bromme, 2012)</th>
<th>Study 1</th>
<th>Study 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certainty of knowledge ($k = 9$)</td>
<td>-.13+</td>
<td>-.09</td>
</tr>
<tr>
<td>Stability of knowledge ($k = 4$)</td>
<td>-.13+</td>
<td>-.12+</td>
</tr>
<tr>
<td>Source of knowledge: Trust in laypeople (vs. research; $k = 3$)</td>
<td>-.33**</td>
<td>-.27**</td>
</tr>
<tr>
<td>Source of knowledge: Trust in the Internet ($k = 3$)</td>
<td>-.18*</td>
<td>-.20**</td>
</tr>
</tbody>
</table>

** $p < .01$; * $p < .05$; + $p < .10$
Limitations and Future Research

- only self-reports of HIB → observational data needed
- homogenous samples, highly educated → more diverse samples with regard to age and education needed
- only low to moderate associations of subjective (self-assessed) and objective HIL point to discrepancies between them → effects of under-/overestimation of knowledge and skills on HIB („dangerous health literacy“; see Schulz, in prep.)
- Focus on information seeking and basic evaluation → what about more complex evaluation/judgement skills?
Types of Information Evaluation

- **two types of information evaluation** (e.g., Wilson, 1993; Bromme et al., 2016)
  - **first hand evaluation** („What is true?“):
    - Evaluation of knowledge per se: Logically consistent? Methodologically sound? Consistent with individual experiences/previous knowledge?
  - **second hand evaluation** („Whom to believe?“):
How to Conceptualize Critical Health Information Literacy in Laypeople?

• Health information literate individuals
  • acknowledge the principle of „division of cognitive labor“ (experts - laypeople; Bromme et al., 2016)
  • have developed advanced (evaluativistic) epistemic beliefs about the complexities and dynamics of medical and health sciences
  • adequately self-assess their abilities to conduct first hand evaluations
  • are able to identify adequate (relevant/trustworthy/ knowledgeable/benevolent) sources for second hand evaluations (e.g. based on formal criteria)
  • stay vigilant to the risk of being misinformed by putative „experts“
Thank you!

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References (1)


References (2)


References (3)


References (4)


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