Determinants of Health Information Literacy in Vocational School Students: The Role of Personal Beliefs

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What to expect...

Outline of importance of

- Health information literacy (HIL)
- Health-related locus of control (HLOC)
- Epistemic beliefs about medicine (EBAM)

Overview of research illustrating associations of HIL with

- HLOC
- EBAM
- sociodemographic characteristics

• Presentation of findings on
  - relation of HIL, HLOC, and EBAM in a sample of young adults,
  - controlling for effects of demographic characteristics.
Significance of health (information) literacy in young adulthood

Generally:
• Personal responsibility for health („informed patient“).
• Participation in decision-making and empowerment (Abel & Sommerhalder, 2015).
• Prevention of and successful psychosocial adjustment to illness (Jung, 2014).

Especially in emerging adulthood:
• Designing social environment beneficial to health (DeWalt & Hink, 2009).
• Dealing with information overload even in simple questions like nutrition, sports, sleep (Kickbusch, 2008).
• Setting course for everyday health behavior.

Younger age associated with more information-seeking behavior (Anker, Reinhart & Feeley, 2011), especially on the internet (Spadaro, 2003).
Problems regarding HIL in young adults

Current finding for young German adults regarding problematic or inadequate HL (Schaeffer, Vogt, Berens & Hurrelmann, 2016) in areas of

• Searching for information (47.1 %)
• Understanding information (35.7 %)
• Evaluating information (55.1 %)
• Using information (30.4 %)

Findings correspond with deficiency of information age students in
• conducting advanced information searches.
• judging on trustworthiness of health-related websites and articles.
• differentiating between information sources.
(Ivanitskaya, Boyle & Casey, 2006)
Which factors are related to HIL?

1. Review of literature focusing on individual factors related to health information literacy and health information-seeking behavior.

2. Identification of three major categories:
   - Demographic characteristics
   - Psychological factors
   - Illness-related aspects

3. Development of theoretical model illustrating relationships between variables.

4. Examination of relationships by analyses of variance and correlations as well as multiple regression analyses.
Model cutout focusing beliefs

Demographic characteristics
- Sex
- Level of education
- Profession

Health-related locus of control
- Internal control beliefs
- External control beliefs

Epistemic beliefs about medicine
- Certainty
- Variability
- Trust in the Internet
- Trust in patients / applicability of medical research to practice

HILK
Health Locus of Control: “Degree to which individuals believe that their health is controlled by internal versus external factors” (Wallston & Wallston, 1982, p. 62).

Two separate factors (Krampen, 1981):

- **Internal HLOC**: Belief in being able to control.
- **External HLOC**: Belief in dependence on circumstances (fate) or powerful others.

Influenced by previous experiences in particular situations and by generalized expectancies regarding reinforcement (Rotter, 1982).
Health-related locus of control (HLOC)

Relations of HLOC with HL, health information-seeking, and health behavior (see review by Oberle, 1991; de Brabander, Hellemans, Boone & Gerits, 1996):

Positive correlations of internal HLOC with
- life satisfaction
- participation desire
- adherence to health recommendations

Positive correlation of external HLOC with
- adherence
- and negative correlation with
- desire for control over health care process
Assumptions regarding health-related locus of control

**Selected findings:**

- HL $\leftrightarrow^+$ internal and HL $\leftrightarrow$ external locus of control (Tsai, Lee & Tsai, 2013).
- Internal HLOC $\leftrightarrow$ information-seeking behavior (Ek & Heinström, 2011).
- Fatalistic view on health $\leftrightarrow$ less motivation for information-seeking (Myrick, Willoughby & Verghese, 2016).
- Low external HLOC $\leftrightarrow$ preference for information & decision (Hashimoto & Fukuhara, 2004).
- Information about health status $\leftrightarrow^+$ internal HLOC $\leftrightarrow$ external HLOC (Ferring & Filipp, 1989)

**Hypotheses:** Higher HIL is associated with

1a: higher internal health-related control beliefs
1b: lower external health-related control beliefs
Epistemic beliefs: Assumptions about the nature of knowledge and the process of knowledge acquisition.

Reflective judgment model (King & Kitchener, 1994) of developmental stages:

1. **Pre-reflective** (knowledge is simple, concrete, and absolute)
2. **Quasi-reflective** (a reality exists that is known to authorities)
3. **Reflective** (temporary uncertainty; personal opinion is needed in judgment)
Epistemic beliefs about medicine

Epistemological beliefs as relatively independent dimensions (Hofer & Pintrich, 1997):

<table>
<thead>
<tr>
<th>Structure of knowledge</th>
<th>Certainty (certain/right-wrong vs. tentative / evolving)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Simplicity (simple vs. accumulation of interrelated facts)</td>
</tr>
<tr>
<td>Structure of knowledge acquisition</td>
<td>Source (authority vs. self as constructor of meaning)</td>
</tr>
<tr>
<td></td>
<td>Justification (no justification required vs. knowledge constructs needing reevaluation)</td>
</tr>
</tbody>
</table>
Epistemic beliefs about medicine

Domain-specific epistemic beliefs: Differences between scientific fields (e.g., computer sciences vs. psychology; Birke, Rosman & Mayer, 2016).

Elements of medicine-specific epistemic beliefs (EBAM, Kienhues & Bromme, 2012)

1. **Certainty** of medical knowledge
2. **Variability** of medical knowledge
3. **Credibility** of the internet as source of knowledge
4. **Trust in medical experts** and applicability of medical knowledge
Selected findings:

• EB ↔ handling of information (e.g., in decision-making) & ↔ experience (Kienhues, Stadtler & Bromme, 2010).

• EB ↔ dealing with conflicting information, search techniques, and source appraisal (Whitmire, 2003).

• Competent research approaches ↔ trust in Internet as information source (Kammerer, Amann & Gerjets, 2015).

• Ill-structured problems: EB ↔ information-seeking & processing (Roex & Degryse, 2007; Rosman, 2016).

Hypotheses: Higher HIL is associated with
2a: lower perceived certainty and stability of medical knowledge
2b: higher trust in the internet as a possible source of reliable information
2c: lower trust in the general authority of medical experts.
Selected findings:

- **Gender**: Female → health information-seeking & information needs (e.g. review by Tong, Raynor & Aslani, 2014, Ek & Heinström, 2011, Eurobarometer, 2014). HL a little better in women (HLS-EU Consortium, 2012).


- **Vocation**: HIL ↔ experiences with and knowledge about health and illness (Berkman, Divis & McCormack, 2010).

**Hypotheses**: Higher HIL is associated with

3a: female gender.

3b: higher level of education.

3c: health-related vocations.
$N = 352$ adolescents and young adults (60.2 % female) aged 16 to 34 years ($M = 20.8, SD = 3.15$).

<table>
<thead>
<tr>
<th>Direction of vocational school</th>
<th>Vocation</th>
<th>female</th>
<th>male</th>
<th>total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economy and administration</td>
<td>Retailers</td>
<td>35</td>
<td>23</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td>Tax accountant assistants</td>
<td>34</td>
<td>20</td>
<td>54</td>
</tr>
<tr>
<td>Technical occupations</td>
<td>Electricians industrial engineering</td>
<td>-</td>
<td>26</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>Bath technology assistants</td>
<td>7</td>
<td>14</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Automotive mechatronics technicians</td>
<td>4</td>
<td>33</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>Industrial mechanics</td>
<td>1</td>
<td>17</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Photographers</td>
<td>14</td>
<td>2</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Laboratory chemists</td>
<td>9</td>
<td>5</td>
<td>14</td>
</tr>
<tr>
<td>Health</td>
<td>Medical assistants</td>
<td>86</td>
<td>-</td>
<td>86</td>
</tr>
<tr>
<td></td>
<td>Dental assistants</td>
<td>22</td>
<td>-</td>
<td>22</td>
</tr>
<tr>
<td>Variables</td>
<td>Assessment instrument</td>
<td>Scales</td>
<td>Number of items</td>
<td>Reliability (α)</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>-----------------------------</td>
<td>-----------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Demographic characteristics (age, level of education, profession)</td>
<td>Questionnaire</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Epistemic beliefs</td>
<td>Epistemic Beliefs about Medicine (EBAM, Kienhues &amp; Bromme, 2012), German version</td>
<td>Certainty</td>
<td>9</td>
<td>.78</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Variability</td>
<td>5</td>
<td>.71</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trust in the Internet</td>
<td>3</td>
<td>.66</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trust in patients</td>
<td>3</td>
<td>.85</td>
</tr>
<tr>
<td>Health-related locus of control</td>
<td>Health-Related Locus of Control Questionnaire (FEGK, Ferring &amp; Filipp, 1989)</td>
<td>Internal control</td>
<td>16</td>
<td>.68</td>
</tr>
<tr>
<td></td>
<td></td>
<td>External control</td>
<td>13</td>
<td>.80</td>
</tr>
<tr>
<td>Health information literacy knowledge</td>
<td>Health Information Literacy Knowledge Test (HILK, Mayer &amp; Holzhäuser, 2015)</td>
<td></td>
<td>24</td>
<td>.72</td>
</tr>
</tbody>
</table>
Effects of demographic characteristics tested by analyses of variance

**Gender:**
No significant effects.

**Vocation:**
No significant effects.

**Education:**
Significant effect for level of education $F_{(2,315)} = 21.74$ ($p < .001$), $d = .38$.

Higher educational attainment $\rightarrow$ greater health information literacy ($p < .001$ for both comparisons).

Effect can be found in every vocational group.

Health vocations: Only significant difference between lowest and highest educational attainment.
HIL in subjects with different vocational orientation and level of education
Correlations

- Correlation of HILK with locus of control:

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>r</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal HLOC</td>
<td>317</td>
<td>-.01</td>
<td>.801</td>
</tr>
<tr>
<td>External HLOC</td>
<td>317</td>
<td>-.12</td>
<td>.033</td>
</tr>
</tbody>
</table>

- Correlation of HILK with epistemic beliefs:

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>r</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certainty</td>
<td>315</td>
<td>-.11</td>
<td>.059</td>
</tr>
<tr>
<td>Variability</td>
<td>315</td>
<td>.33</td>
<td>.000</td>
</tr>
<tr>
<td>Trust in the Internet</td>
<td>315</td>
<td>-.16</td>
<td>.004</td>
</tr>
<tr>
<td>Trust in practical value</td>
<td>315</td>
<td>-.08</td>
<td>.148</td>
</tr>
</tbody>
</table>

N = sample size, r = Pearson’s correlation coefficient, p = significance level (red figures: p < .05).
Regression analysis

<table>
<thead>
<tr>
<th></th>
<th>b</th>
<th>CI b</th>
<th>SE b</th>
<th>β</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.35</td>
<td>0.17</td>
<td>0.09</td>
<td></td>
<td>.001</td>
</tr>
<tr>
<td>Block I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>-0.02</td>
<td>-0.05</td>
<td>0.02</td>
<td>-.06</td>
<td>.330</td>
</tr>
<tr>
<td>Age</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>.04</td>
<td>.492</td>
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<tr>
<td>Block II</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary modern school (9 years)</td>
<td>-0.11</td>
<td>-0.15</td>
<td>0.02</td>
<td>-.32</td>
<td>.001</td>
</tr>
<tr>
<td>Secondary school (10 years)</td>
<td>-0.08</td>
<td>-0.11</td>
<td>0.02</td>
<td>-.30</td>
<td>.001</td>
</tr>
<tr>
<td>Vocational school for economy and administration</td>
<td>-0.01</td>
<td>-0.04</td>
<td>0.02</td>
<td>-.02</td>
<td>.726</td>
</tr>
<tr>
<td>Vocational school for technics</td>
<td>-0.02</td>
<td>-0.07</td>
<td>0.02</td>
<td>-.09</td>
<td>.267</td>
</tr>
<tr>
<td>Block III</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal HLOC</td>
<td>0.00</td>
<td>-0.03</td>
<td>0.01</td>
<td>-.01</td>
<td>.897</td>
</tr>
<tr>
<td>External HLOC</td>
<td>-0.02</td>
<td>-0.04</td>
<td>0.01</td>
<td>-.11</td>
<td>.039</td>
</tr>
<tr>
<td>Block IV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Certainty</td>
<td>0.01</td>
<td>-0.02</td>
<td>0.01</td>
<td>.03</td>
<td>.557</td>
</tr>
<tr>
<td>Variability</td>
<td>0.06</td>
<td>0.04</td>
<td>0.01</td>
<td>.28</td>
<td>.001</td>
</tr>
<tr>
<td>Trust in the Internet</td>
<td>-0.01</td>
<td>-0.03</td>
<td>0.01</td>
<td>-.07</td>
<td>.183</td>
</tr>
<tr>
<td>Trust in practical value of medical science and in patients</td>
<td>-0.02</td>
<td>-0.04</td>
<td>0.01</td>
<td>-.09</td>
<td>.098</td>
</tr>
</tbody>
</table>

Significant relationships

- Secondary modern school: $\beta = -0.32$
- Secondary school: $\beta = -0.30$
- External control beliefs: $\beta = -0.11$
- Variablility: $\beta = 0.28$
Conclusions

• Impact of education, but not of vocation:
  ➢ Significance of school education.
  ➢ Possibly mediated by intelligence.

• Negative correlation with external HLOC:
  ➢ More knowledge / skills ➔ less belief in fate / dependence on others.
  ➢ High external HLOC ➔ no search behavior & no corrective experiences.

• Relationship to variability and certainty of knowledge:
  ➢ Sophisticated research ➔ insight in dynamics of knowledge.
  ➢ Awareness of dynamics ➔ motivation for information-seeking.
  ➢ Higher HILK ➔ trend to awareness of subjective opinions.
  ➢ Belief in uncertainty ➔ need of knowledge / skills in information evaluation.
Conclusions

• Promotion of HIL in healthy young adolescents should aim at
  
  ➢ addressing health information literacy skills in school education.
  
  ➢ challenging belief in certainty and stability of medical knowledge, thereby increasing motivation for information-seeking and evaluation.
  
  ➢ reducing external HLOC that may prevent acquisition of health information literacy and information-seeking behavior.


