



# Measuring comprehensive health literacy in general populations: validation of instrument, indices and scales of the HLS-EU study

***Jürgen M. Pelikan, Florian Röthlin, Kristin Ganahl***  
Ludwig Boltzmann Institute Health Promotion Research  
Vienna Austria

6<sup>th</sup> Annual Health Literacy Research Conference  
November 3-4, 2014  
Bethesda, Maryland, Hyatt Regency Bethesda

LBIHPR: A-1020 Vienna, Untere Donaustraße 47, Austria | [office@lbihpr.lbg.ac.at](mailto:office@lbihpr.lbg.ac.at) | [www.lbihpr.lbg.ac.at](http://www.lbihpr.lbg.ac.at) | +43 1 2121493 -10 | FAX - 50

in cooperation with:



Co-funded by:





# Summary & Conclusions 1

## The HLS-EU consortium (2009-2012)

1. developed - based on existing models & definitions – an *expanded and integrated*
  1. conceptual & generic *model &*
  2. *definition* for *comprehensive* HL in *general* populations (Sorensen et al 2012)
2. developed to measure this comprehensive concept an *instrument*
  1. based on a 3 x 4 (health domains x literacy (information processing stages)) matrix
  2. containing 47 standardized questions, to be answered by a Likert scale of 4 categories
  3. using a subjective self-assessment approach (in the tradition of e.g. Chew (2004)) to measure the fit of personal competencies to situational demands for concrete health relevant tasks (in the tradition e.g. of HALS) (Sorensen et al 2013)
3. collected in 2011 *data* with this instrument and a set of further indicators for co-variates of HL (HLS-EU-Q86)
  1. in 8 member states of the EU (Austria, Bulgaria, Germany, Greece, Ireland, Netherlands, Poland, Spain) for multi-stage clustered probability samples of N=1000 for residing EU citizens aged 15+
  2. by CAPI or PAPI personal interview methodology.
4. constructed and validated, based on the 47 items, one general and 19 different more specific HL *indices* following the HLS-EU matrix, and defined 4 *levels* for the 8 main indices



# Summary & Conclusions 2

The HLS-EU consortium (2009-2012)

5. analyzed data, showing as main *results*
  1. that limited HL is not just a problem of minorities, but of nearly every second citizen
  2. that there is a moderate *social gradient* for HL
  3. that HL is related differently with relevant health status & health behavior *consequences*
  4. And, that there is considerable *variation* between countries concerning *distributions* and *associations* of HL (HLS-EU Consortium 2012, WHO 2013)
6. constructed and validated short scales with better psychometric properties, but more limited conceptual representation
  1. a short (HLS-EU-Q16) scale and
  2. a short-short (HLS-EU-Q6) scale.

In the meantime these instruments have been used in further HL studies

- in the 8 original countries ( e.g. Austria, Germany, Netherlands) and
- in other European countries (e.g. Belgium, Denmark, Israel, Portugal, Sweden, Switzerland)
- in Asian countries (e.g. Indonesia, Kazakhstan, Laos, Malaysia, Myanmar, Pakistan, Taiwan, Vietnam).

The HLS-EU Consortium is trying to institutionalize, supported by EC and WHO

- joint regular *monitoring* of population HL and
- joint further *development* of the HLS-EU *instruments*



# 1. THE CONCEPT & DEFINITION OF HL



## 1.1 Following Don Nutbeam (2008) – HL is an **evolving concept**

### ■ Evolving in *different* discourses

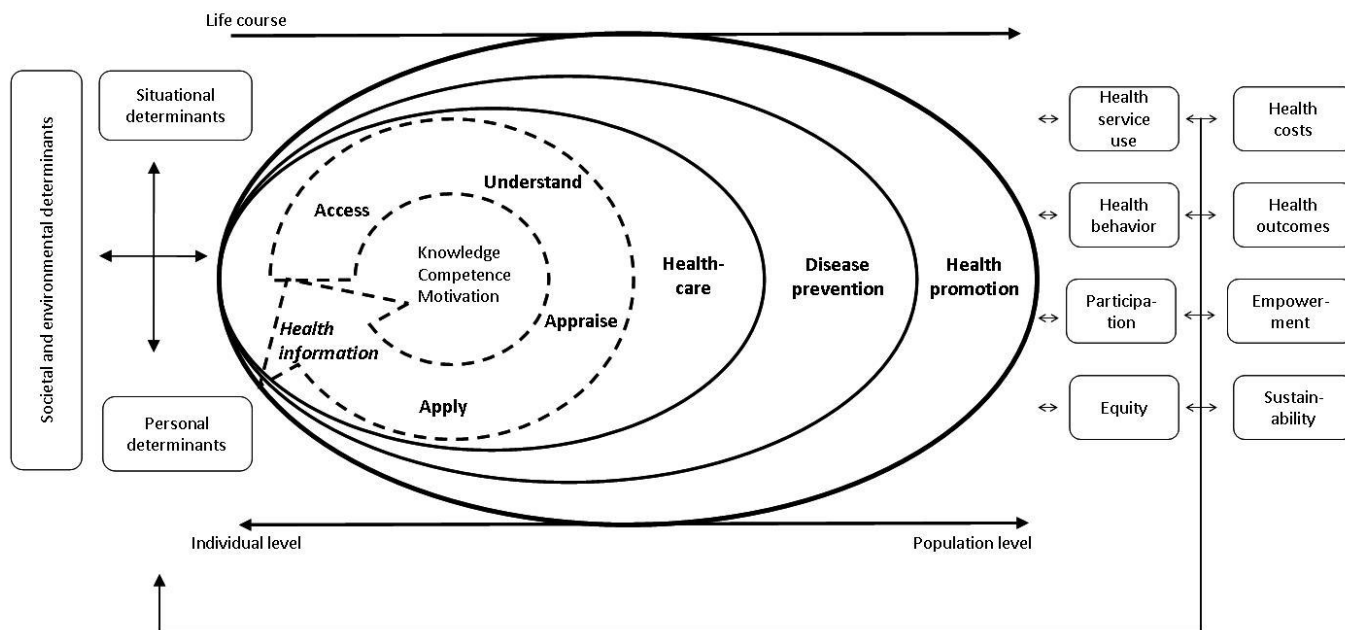
1. Literacy & (health) education
2. Improvement of health care
3. Determinant, mediator, moderator of inequalities in health
4. Empowerment of citizens for healthy living
5. Monitoring of population HL for health policy planning and evaluation

### ■ But with some *common* trends

1. **Broadening of meaning of „health“ & of „literacy“ towards a comprehensive concept of HL**
2. **Differentiation & specialization of the concept of HL**
  1. For different competences (e.g. numeracy or mental HL)
  2. For different specific roles (e.g. patient, consumer, citizen) & tasks
  3. In different stages of life cycle (e.g. children, adolescents)
  4. In relation to specific illnesses / diseases
3. **Attention to the two sides of the HL coin: personal competences / situational conditions**
4. **In at least four dominant research areas / questions**
  1. **Distribution** of levels of HL in specific populations & identification of vulnerable **sub-populations at risk**
  2. **Social gradient** of HL in different populations
  3. Health relevant **consequences** of HL
  4. Diagnosis of specific deficits of / demands for HL for developing evidence based **interventions** to improve HL

- The **HLS-Eu study** intended to contribute to the first three research questions in relation to *general populations with a comprehensive* understanding of HL

## 1.2 The HLS-EU *comprehensive* concept & definition of HL integrates existing Models and Definitions of HL (Sorensen et al. 2012)



*“Health literacy is linked to literacy and encompasses 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.”*

*Based on literature review of 12 conceptual models and 17 definitions*



## 1.3 The most important **expansions** of the HL concept can be demonstrated using the matrix for operationalizing the HLS-EU definition (Sorensen et al. 2012) & its relation to other concepts

Health literacy	Access/obtain information relevant to health <b>(navigation)</b>	<u>Understand</u> information relevant to health	Process / appraise information relevant to health	Apply / use information relevant to health	<b>Involved tasks &amp; roles</b>
<b><u>Health care</u></b> <b><u>(Disease care)</u></b>	1) Ability to access information on medical or clinical issues	2) Ability to understand medical information and derive meaning	3) Ability to interpret and evaluate medical information	4) Ability to make informed decisions on medical issues	<b><u>Sick or patient role</u></b>
<b>Disease prevention</b>	5) Ability to access information on risk factors for health	6) Ability to understand information on risk factors and derive meaning	7) Ability to interpret and evaluate information on risk factors for health	8) Ability to make informed decisions on risk factors for health	<b>All other roles like worker, consumer etc.</b>
<b>Health promotion/ health protection</b>	9) Ability to update oneself on determinants of health in the social and physical environment	10) Ability to understand information on determinants of health in the social and physical environment and derive meaning	11) Ability to interpret and evaluate information on health determinants in the social and physical environment	12) Ability to make a informed decisions on health determinants in the social and physical environment	<b>All other roles + citizen</b>
<b>Nutbeam (2000) typology</b>	<b>Interactive HL</b>	<b><u>Functional HL</u></b>	<b>Critical HL</b>	<b>Critical HL</b>	<b>All types for all tasks &amp; roles</b>

1.4 HL is a *Relational Concept* which allows for different types of measurement (& entry points for interventions)



Source: Parker, 2009

**Skills/Abilities X Demands/Complexity = Health Literacy**

Health Literacy Equation: Source: Brach 2013

Consequences for measurement - three approaches:

- **Measuring individual skills / abilities by tests**  
E.g.: REALM, TOFHLA, **NVS**
- **Measuring perceived difficulty of health relevant tasks (= fit skills /demands)**  
E.g.: HALS, HLS-CH, **HLS-EU**, **HLQ**
- **Measuring situational/contextual demands / complexity**  
E.g.: Readability forms, CAHPS, **AHRQ Pharmacy HL Assessment Tool**





## **2. INSTRUMENTS FOR MEASURING HL**



## 2.1 Existing general instruments for measuring HL in English language (using i.a. Haun et al. 2014)

HEALTH LITERACY	ACCESS/OBTAIN / FIND INFORMATION RELEVANT TO HEALTH	UNDERSTAND INFORMATION RELEVANT TO HEALTH	APPRAISE/JUDGE/EVALUATE INFORMATION RELEVANT TO HEALTH	APPLY/USE INFORMATION RELEVANT TO HEALTH	
HEALTH CARE	HC-FHI (2012)	<p><b>Functional HL Tests in Health Care</b> (Word Recognition, Pronunciation, numeracy): REALM (1991), WRAT (1993), TOFHLA (1995), MART (1997), FHLT (2009), METER (2010), HLTS (2010)</p> <p><b>Screening Items:</b> SILS (2006), BRIEF (2008)</p> <p><b>Proxies:</b> SOS Mnemon (2009), DAHL (2008) (proxy-based on TOFHLA)</p> <p>HC-UHI(2012)</p>	HC-JHI (2012)	HC-AHI (2012)	<p>Health LiTT (2011)</p> <p>HLS-EU Sub-index Health Care(2012)</p> <p>HLQ (2013) (9 Scales)</p> <p>HeLMS (2013),</p>
DISEASE PREVENTION	DP-FHI (2012)	<p>(Reading and comprehension of a nutrition label)</p> <p>NVS (2005)</p> <p>DP-UHI (2012)</p>	DP-JHI (2012)	DP-AHI (2012)	HLS-EU Sub-index Disease Prevention (2012)
HEALTH PROMOTION	HP-FHI (2012)	<p>NAAL (HL-Scale) (2006)</p> <p>HP-UHI (2012)</p>	HP-JHI (2012)	HP-AHI (2012)	HLS-EU Sub-index Health Promotion (2012)
	HALS (2004)			HALS (2004)	
	HLS-EU Sub-index Find Information (2012)	HLS-EU Sub-index Understand Information(2012)	HLS-EU Sub-index Judge Information (2012)	HLS-EU Sub-index Apply Information (2012)	<p>HLS-14 (CCHL) (2008/2013), HLSI (2010), AAHLS (2013)</p> <p>HLS-EU (2012)</p>

## 2.2 Differentiation & specialization of specific HL instruments

### For specific (sub-)competences (e.g. numeracy, e-health or mental HL)

3 Items Numeracy Test (1997), Numeracy Scale (2001), Medical Data Interpretation Test (2005), Subjective Numeracy Scale (2007), General Health Numeracy Test (2013), Nutrition Literacy Assessment Instrument (2013)

### For different specific roles (e.g. consumer, citizen) & tasks

Nutrition Literacy Scale (NLS) (2007); Food Label Literacy for Applied Nutrition Knowledge Questionnaire (2012),

### In different stages of life cycle (e.g. children, adolescents)

Parental Health Literacy Activities Test (PHLAT) (2010), Instrument for Measuring Health Literacy for Canadian High School Students (2010)

### In relation to specific illnesses

Literacy Assessment for Diabetes (LAD) (2001), Asthma Numeracy Questionnaire (ANQ) (2006), Test of Functional Health Literacy in Dentistry (TOFHLa iD) (2007), Diabetes HL (Ishikawa, 2008), Brief Estimate of Health Knowledge and Action HIV (BEHKA-HIV) (2010), High Blood Pressure Health Literacy Scale (HBP-HL)(2012), Cancer Message Literacy Tests (CMLT)(2012), Chinese Health Literacy Scale for Chronic Care (CHLCC)(2013), Chinese Health Literacy Scale for Diabetes (CHLSD) (2013)

### Population or language-specific

Spanish Health Literacy Test (SAHLS) (2006), Hebrew health literacy test (HHLT) (2007), Korean Health Literacy Scale (KHLS) (2009), Taiwan Health Literacy Scale (THLS) (2010), Mandarin Health Literacy Scale (MHLS) (2011), HLS-14 (HL Instrument for Japanese Adults) (2013), Swiss Health Literacy Survey (HLS-CH) (2012),

## 2.3 How was HL measured in the HLS-EU-Q47? – 1 Design and format of items

### ■ As **standardized**

- *(better comparability!, but probably more tiresome?, response-set?)*

### ■ **questions**

- *(more simple & direct to answer for respondents)*

### ■ of assumed/experienced **simplicity** or **difficulty**

### ■ of specific, concrete health relevant **tasks / situations**

- *(following tradition of HALS / NALS, Chew (2008); more direct to answer for respondents; better for planning of interventions)*

### ■ for every **cell** of the conceptual HL **matrix**

- *(3-5 items selected by expert consensus)*

### ■ to be answered by a Likert scale of just 4 simple **categories**

- *(no neutral position, easier for translation, easier for (telefon) interviews, easier for dichotomization in analysis)*

- *This standardized **modular format** easily can be used for developing & adding **further specific items** (e.g. for specific vulnerable groups, like migrants in Austria, or relevant national/regional items), which on the level of items can be compared to the core items, and specific indices be build, but better not to be included into the standard indices /scales, when international comparisons are planned.*



## 2.4 How was HL measured in the HLS-EU-Q47? – 2 Selected examples of questions

### Format of questions

- „On a scale from very easy to very difficult, how easy would you say it is to ....  
“very easy” - “fairly easy” - “fairly difficult” - “very difficult”, (don´t know)

### Five examples

#### *Health care*

5. ... understand, what your doctor says to you?
12. ... judge if the information about illness in the media is reliable?

#### *Disease prevention*

18. ...find information on how to manage mental health problems like stress or depression?
29. ...decide if you should have a flu vaccination?

#### *Health promotion*

38. ... understand information on food packaging?
47. ... take part in activities that improve health and well-being in your community?



## 2.5 The standardized modular format of HLS-EU-Q47 allows to construct 20 indices & 2 scales and to have additional items & indices

### Concrete items

Difficulty of 47 core tasks, representing the HLS-EU matrix

### **Optional:**

difficulty further specific tasks (e.g. for countries, specific illnesses, vulnerable groups)

### Indices & scales

20 (Sub)Indices

1 Short scale

1 Short-short scale

Specific indices / scales



## 2.6 HLS-EU Survey Overview: Sampling, Data collection

<b>Countries</b>	Austria (AT), Bulgaria (BG), Germany (DE) (only NRW), Greece (EL) (only Athens +), Spain (ES), Ireland (IE), Netherlands (NL), Poland (PL)
<b>Survey Institut</b>	TNS Opinion on behalf of the HLS-EU Consortium
<b>Survey Periode</b>	Summer 2011
<b>Target Population, Population Coverage</b>	EU citizens (!) aged 15 years and over (Euro-barometer Methodology)
<b>HL Instrument</b>	HLS-EU-Q86 (including HLS-EU-Q47 and NVS Test)
<b>Data collection</b>	by computer-assisted personal interviewing technique (CAPI) (BG, IE = PAPI)
<b>Sampling design</b>	Euro-barometer Methodology Stratified probability sampling (multistage random sample): <ul style="list-style-type: none"><li>National sampling points selected randomly (applying random-walk procedure) after stratification for population size and population density (metropolitan, urban and rural areas).</li></ul>
<b>Response Rates</b>	Austria (67%), Bulgaria (75%), Germany (DE) (53%), Greece (65%), Spain (62%), Ireland (69%), Netherlands (36%), Poland (67%)
<b>Sample Sizes</b>	Austria (1015), Bulgaria (1002), Germany (DE) (1057), Greece (1000), Spain (1000), Ireland (1005), Netherlands (1023), Poland (1000)
<b>Weights</b>	National samples were weighted by gender, age group and size of locality, based on national census data. Country size was not used as a weighting criterion for the analyses of the total sample. Total sample values therefore represent a 'country average' where all countries are represented with equal weights regardless of their population size.



# **3. CONSTRUCTING INDICES FOR HLS-EU-Q47**



## 3.1 Types of Health Literacy Indices by the HLS-EU Model: 1 comprehensive index, 7 sub-indices and 12 sub-sub-indices

<b>Comprehen. HL Index</b>	<b>OI-Index (13Items) Access/obtain health information</b>	<b>UI-Index (11Items) Understanding health information</b>	<b>PI-Index (12 Items) Process/Appraise health information</b>	<b>AI –Index (11 Items) Apply/Use Health information</b>
<b>HC-HL Index (16Items) Health Care</b>	1) Ability to access information on medical or clinical issues (4 Questions) HC-FHI (2012)	2) Ability to understand medical information and derive meaning (4 Questions) HC-UHI (2012)	3) Ability to interpret and evaluate medical information (4 Questions) HC-JHI (2012)	4) Ability to make informed decisions on medical issues (4 Questions) HC-AHI (2012)
<b>DP-HL Index (15 Items) Disease prevention</b>	5) Ability to access information on risk factors for health (4 Questions) DP-FHI (2012)	6) Ability to understand information on risk factors and derive meaning (3 Questions) DP-UHI (2012)	7) Ability to interpret and evaluate information on risk factors (5 Questions) DP-JHI (2012)	8) Ability to judge the relevance of the information on risk factors (3 Questions) DP-AHI (2012)
<b>HP-HL Index (16 Items) Health promotion</b>	9) Ability to update oneself on health related issues (5 Questions) HP-FHI (2012)	10) Ability to understand health related information and derive meaning (4 Questions) HP-UHI (2012)	11) Ability to interpret and evaluate information on health related issues (3 Questions) HP-UHI (2012)	12) Ability to make a informed decision on health related issues (4 Questions) HP-AHI (2012)

## 3.2 Procedure of Index Construction

1. Index scores were only **computed** for respondents who **answered** at least 80% of the items associated to the specific indices. Depending on the index no value could be calculated for 2,4 – 12, 7 % of the total sample ! But other strategy is possible!
2. For calculation the **item values** were **inverted** – so that a higher value of the index denotes better health literacy.
3. The comprehensive index and the 7 sub-indices were **standardized** on a scale from a minimum of **0** to a maximum of **50** (=best possible HL)

$$Index = (mean - 1) * \left(\frac{50}{3}\right)$$

4. The 12 sub-sub-indices were standardized on a scale from a minimum of 0 to a maximum of 5 (= best possible HL)



### 3.3 Cronbach's alphas for all HLS-EU indices for countries and total

> Cronbach's alphas are sufficiently high, with few exceptions!

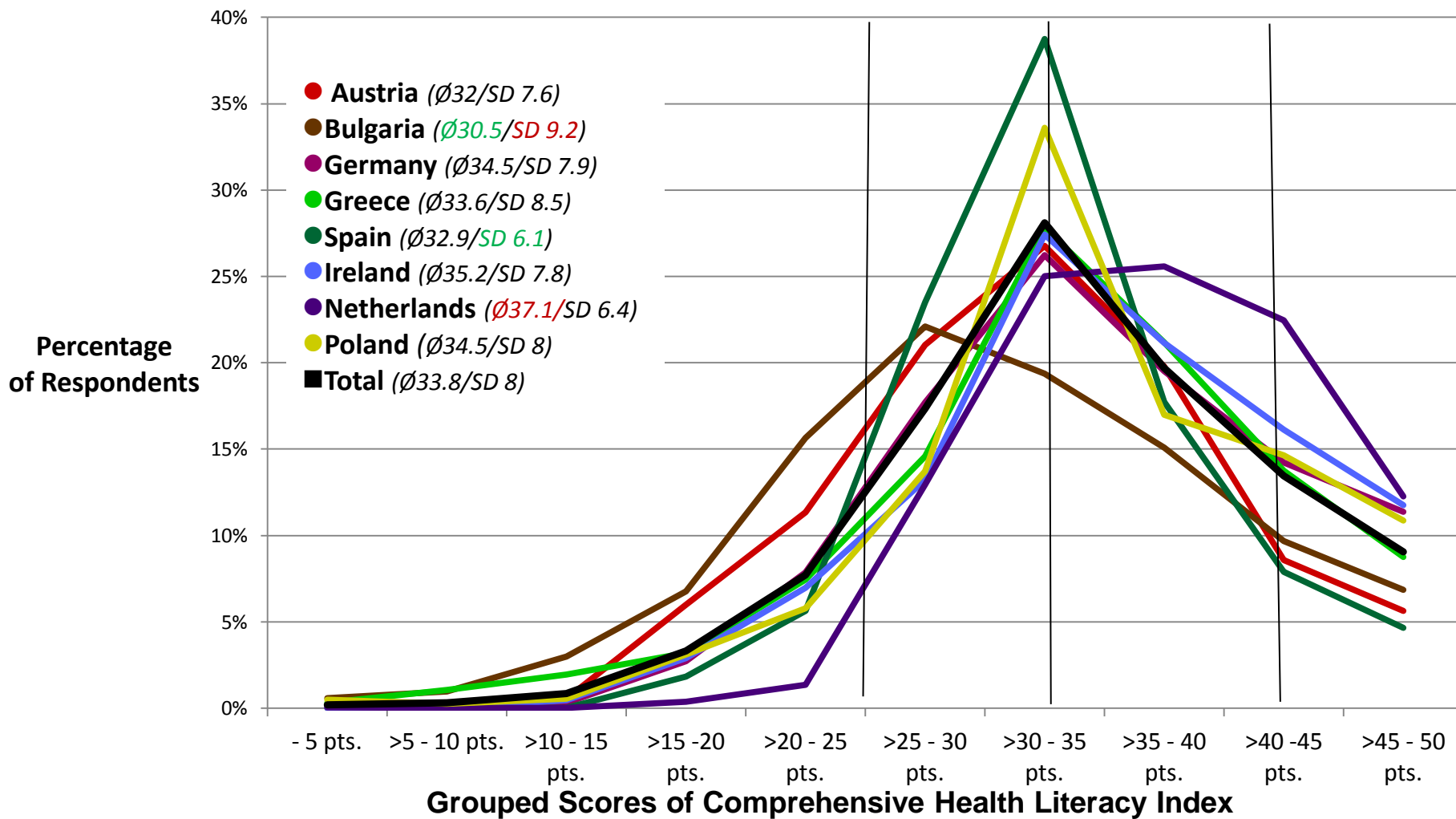
Cronbach's $\alpha$	AT	BG	DE(NRW)	EL	ES	IE	NL	PL	TOTAL
GEN HL	0,96	0,97	0,96	0,97	0,96	0,97	0,95	0,98	0,97
HC HL	0,90	0,93	0,90	0,92	0,90	0,91	0,88	0,93	0,91
PREV HL	0,90	0,93	0,91	0,92	0,89	0,91	0,86	0,94	0,91
HP HL	0,90	0,93	0,90	0,93	0,90	0,92	0,88	0,94	0,92
OBTAIN HL	0,88	0,93	0,87	0,93	0,87	0,88	0,85	0,93	0,91
UNDERSTAND HL	0,84	0,90	0,86	0,89	0,84	0,86	0,83	0,90	0,87
PROCESS HL	0,87	0,91	0,87	0,89	0,87	0,88	0,85	0,91	0,88
APPLY HL	0,81	0,86	0,82	0,85	0,82	0,85	0,77	0,88	0,84
HC OBTAIN HL	0,78	0,83	0,78	0,83	0,76	0,77	0,68	0,83	0,80
HC UNDERSTAND HL	0,75	0,81	0,71	0,77	0,74	0,73	0,73	0,82	0,76
HC PROCESS HL	0,73	0,81	0,78	0,81	0,75	0,78	0,76	0,78	0,78
HC APPLY HL	0,73	0,78	0,74	0,76	0,75	0,72	0,69	0,77	0,74
PV OBTAIN HL	0,80	0,87	0,83	0,89	0,79	0,78	0,75	0,85	0,84
PV UNDERSTAND HL	0,75	0,82	0,81	0,73	0,71	0,79	0,75	0,83	0,79
PV PROCESS HL	0,79	0,82	0,77	0,81	0,79	0,77	0,74	0,86	0,79
PV APPLY HL	0,61	0,71	0,68	0,73	0,61	0,69	0,62	0,76	0,68
HP OBTAIN HL	0,77	0,88	0,77	0,86	0,76	0,81	0,72	0,86	0,82
HP UNDERSTAND HL	0,72	0,78	0,73	0,82	0,71	0,76	0,73	0,81	0,76
HP PROCESS HL	0,80	0,85	0,80	0,86	0,76	0,84	0,77	0,84	0,82
HP APPLY HL	0,74	0,80	0,76	0,82	0,74	0,84	0,71	0,81	0,79
MEAN	0,80	0,86	0,81	0,85	0,80	0,82	0,78	0,86	0,83



# 3.4 Distribution of Comprehensive HL-Index

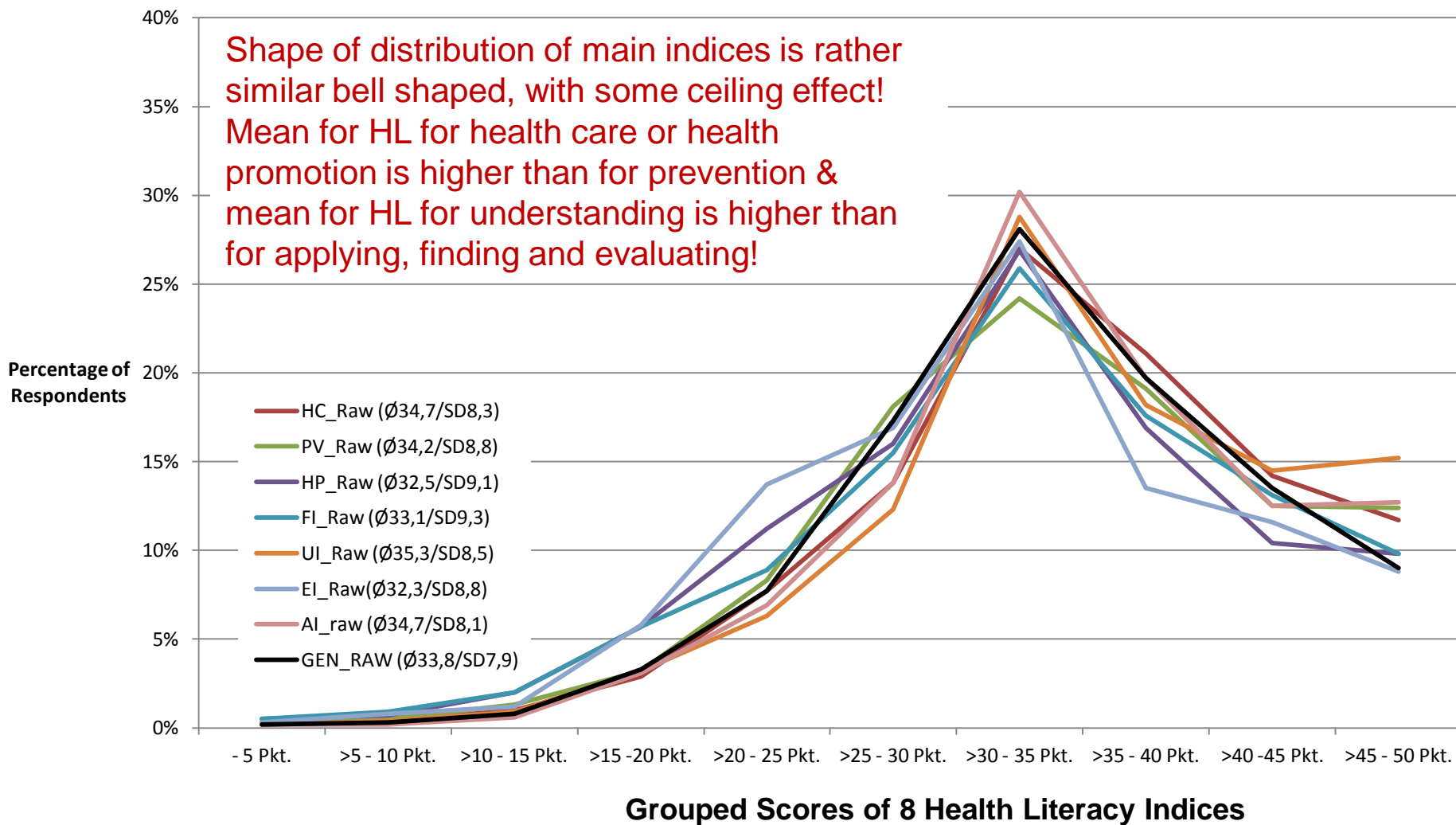
(Percentage Distributions, Means & S.D. for 8 Countries & Total Sample) (HLS-EU 2012)

> Bell shaped distribution with some ceiling effect for all countries!



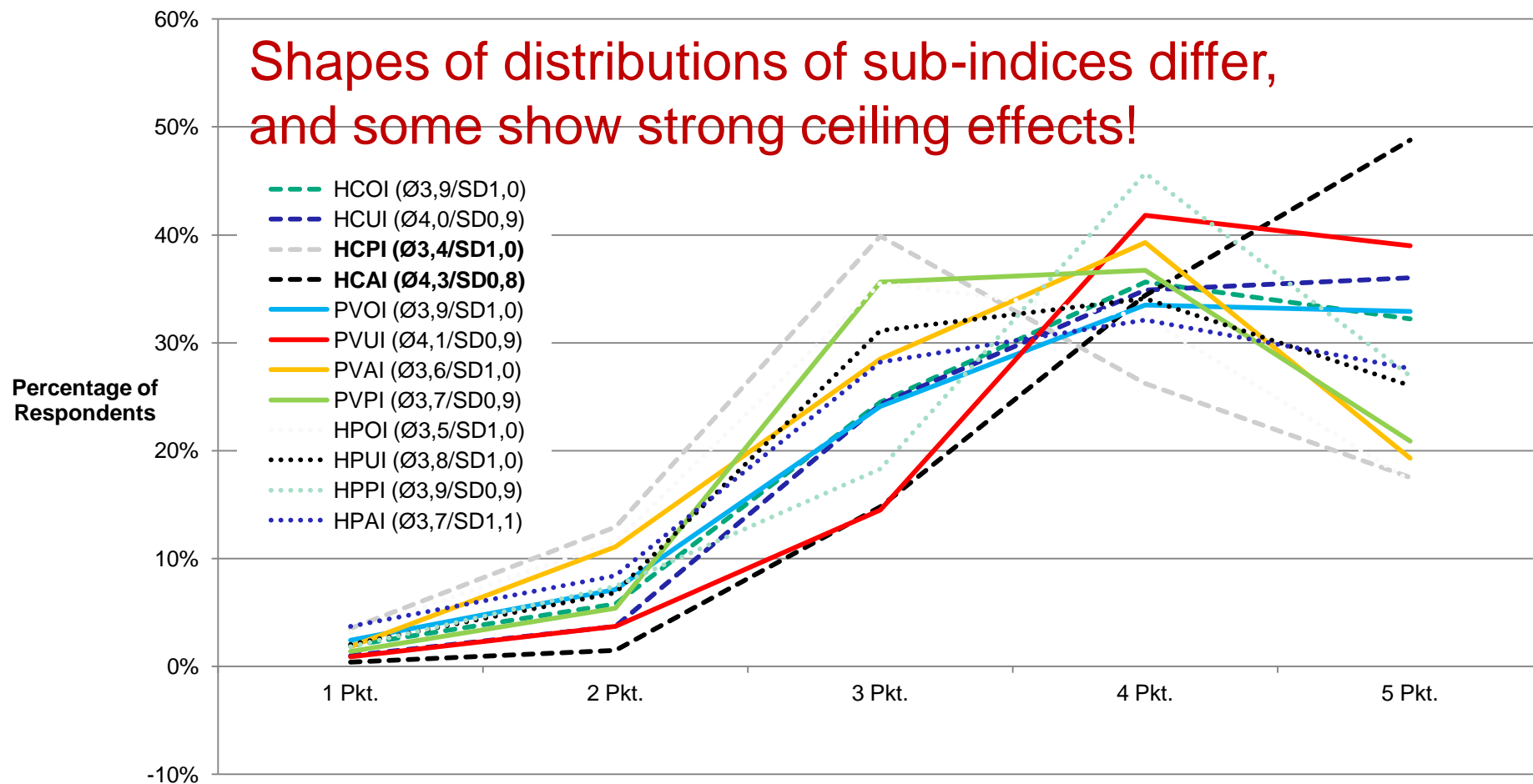
## 3.5 Distribution of 8 main HL-Indices

(Percentage Distributions, Means & S.D. for Total Sample) (HLS-EU 2012)



## 3.6 Distribution of 12 HL-Sub-Indices

(Percentage Distributions, Means & S.D. for Total Sample) (HLS-EU 2012)



**Grouped Scores of 12 Health Literacy Indices**



### 3.7 Pearson Correlation Coefficients for all HLS-EU Indices for Total

> Correlations of main indices are very strong, of sub-indices they are strong!

Total

	GEN HL	HC HL	PREV HL	HP HL	OBTAIN HL	UNDERSTAND HL	PROCESS HL	APPLY HL	HC OBTAIN HL	HC UNDERSTAND HL	HC PROCESS HL	HC APPLY HL	PV OBTAIN HL	PV UNDERSTAND HL	PV PROCESS HL	PV APPLY HL	HP OBTAIN HL	HP UNDERSTAND HL	HP PROCESS HL	HP APPLY HL	Mean
GEN HL		,89	,93	,92	,92	,92	,92	,90	,75	,75	,78	,73	,82	,76	,82	,72	,82	,81	,72	,72	,82
HC HL	,89		,76	,70	,82	,86	,82	,79	,84	,87	,83	,81	,69	,63	,67	,57	,62	,66	,54	,54	,73
PREV HL	,93	,76		,80	,86	,84	,89	,82	,64	,63	,67	,64	,85	,82	,90	,78	,73	,71	,63	,61	,76
HP HL	,92	,70	,80		,86	,82	,83	,85	,59	,59	,63	,56	,72	,63	,70	,64	,89	,85	,79	,81	,75
OBTAIN HL	,92	,82	,86	,86		,81	,79	,76	,81	,66	,67	,61	,89	,68	,70	,60	,88	,72	,61	,63	,75
UNDERSTAND HL	,92	,86	,84	,82	,81		,80	,77	,67	,85	,67	,70	,73	,81	,70	,61	,69	,87	,64	,57	,75
PROCESS HL	,92	,82	,89	,83	,79	,80		,78	,61	,65	,85	,62	,70	,66	,89	,69	,71	,71	,77	,60	,75
APPLY HL	,90	,79	,82	,85	,76	,77	,78		,62	,63	,65	,77	,67	,64	,70	,77	,68	,69	,62	,85	,73
HC OBTAIN HL	,75	,84	,64	,59	,81	,67	,61	,62		,64	,59	,58	,62	,54	,53	,45	,54	,53	,43	,47	,60
HC UNDERSTAND HL	,75	,87	,63	,59	,66	,85	,65	,63	,64		,63	,66	,57	,54	,54	,46	,51	,58	,47	,42	,61
HC PROCESS HL	,78	,83	,67	,63	,67	,67	,85	,65	,59	,63		,55	,57	,47	,63	,57	,57	,59	,48	,48	,63
HC APPLY HL	,73	,81	,64	,56	,61	,70	,62	,77	,58	,66	,55		,56	,60	,55	,45	,45	,53	,46	,45	,59
PV OBTAIN HL	,82	,69	,85	,72	,89	,73	,70	,67	,62	,57	,57	,56		,67	,64	,51	,68	,63	,54	,54	,66
PV UNDERSTAND HL	,76	,63	,82	,63	,68	,81	,66	,64	,54	,54	,47	,60	,67		,66	,50	,55	,58	,53	,48	,62
PV PROCESS HL	,82	,67	,90	,70	,70	,70	,89	,70	,53	,54	,63	,55	,64	,66		,65	,63	,61	,56	,53	,66
PV APPLY HL	,72	,57	,78	,64	,60	,61	,69	,77	,45	,46	,57	,45	,51	,50	,65		,57	,59	,50	,48	,59
HP OBTAIN HL	,82	,62	,73	,89	,88	,69	,71	,68	,54	,51	,57	,45	,68	,55	,63	,57		,69	,61	,60	,65
HP UNDERSTAND HL	,81	,66	,71	,85	,72	,87	,71	,69	,53	,58	,59	,53	,63	,58	,61	,59	,69		,63	,55	,66
HP PROCESS HL	,72	,54	,63	,79	,61	,64	,77	,62	,43	,47	,48	,46	,54	,53	,56	,50	,61	,63		,53	,58
HP APPLY HL	,72	,54	,61	,81	,63	,57	,60	,85	,47	,42	,48	,45	,54	,48	,53	,48	,60	,55	,53		,57
Mean	,82	,73	,76	,75	,75	,75	,75	,73	,60	,61	,63	,59	,66	,62	,66	,59	,65	,66	,58	,57	,67



### 3.8 Pearson Correlations of all HLS-EU HL (Sub-)Indices with NVS Scores, for Countries and Total Sample (HLS-EU 2012) > Correlations with NVS are small to moderate!

NVS		AT	BG	DE (NRW)	EL	ES	IE	NL	PL	TOTAL
GEN HL	r	,208**	,381**	,151**	,347**	,214**	,242**	,088**	,302**	,266**
HC HL	r	,181**	,383**	,165**	,316**	,197**	,209**	,117**	,291**	,254**
PREV HL	r	,181**	,374**	,094**	,276**	,170**	,188**	0,057	,287**	,236**
HP HL	r	,191**	,338**	,159**	,373**	,213**	,250**	,079*	,293**	,252**
OBTAIN HL	r	,203**	,379**	,168**	,364**	,269**	,219**	,147**	,326**	,290**
UNDERSTAND HL	r	,216**	,392**	,235**	,365**	,212**	,265**	,186**	,305**	,293**
PROCESS HL	r	,124**	,339**	,067*	,263**	,150**	,201**	-0,005	,261**	,175**
APPLY HL	r	,208**	,317**	,075*	,281**	,138**	,222**	0,008	,264**	,219**
HC OBTAIN HL	r	,154**	,374**	,151**	,311**	,248**	,200**	,160**	,285**	,268**
HC UNDERSTAND HL	r	,173**	,356**	,204**	,311**	,161**	,192**	,156**	,262**	,238**
HC PROCESS HL	r	,115**	,289**	,075*	,225**	,117**	,158**	0,063	,227**	,142**
HC APPLY HL	r	,196**	,318**	,132**	,215**	,126**	,134**	0,02	,272**	,218**
PV OBTAIN HL	r	,193**	,342**	,108**	,340**	,228**	,187**	,139**	,328**	,273**
PV UNDERSTAND HL	r	,173**	,315**	,164**	,270**	,171**	,175**	,137**	,282**	,258**
PV PROCESS HL	r	,091**	,321**	0,031	,193**	,108**	,162**	-0,035	,218**	,153**
PV APPLY HL	r	,121**	,336**	0,03	,114**	0,042	,124**	0,002	,162**	,112**
HP OBTAIN HL	r	,146**	,317**	,159**	,333**	,223**	,184**	,083*	,274**	,229**
HP UNDERSTAND HL	r	,194**	,372**	,203**	,362**	,189**	,274**	,153**	,262**	,253**
HP PROCESS HL	r	,108**	,297**	,076*	,278**	,175**	,202**	-0,024	,253**	,161**
HP APPLY HL	r	,193**	,209**	0,048	,297**	,145**	,246**	0,031	,217**	,206**

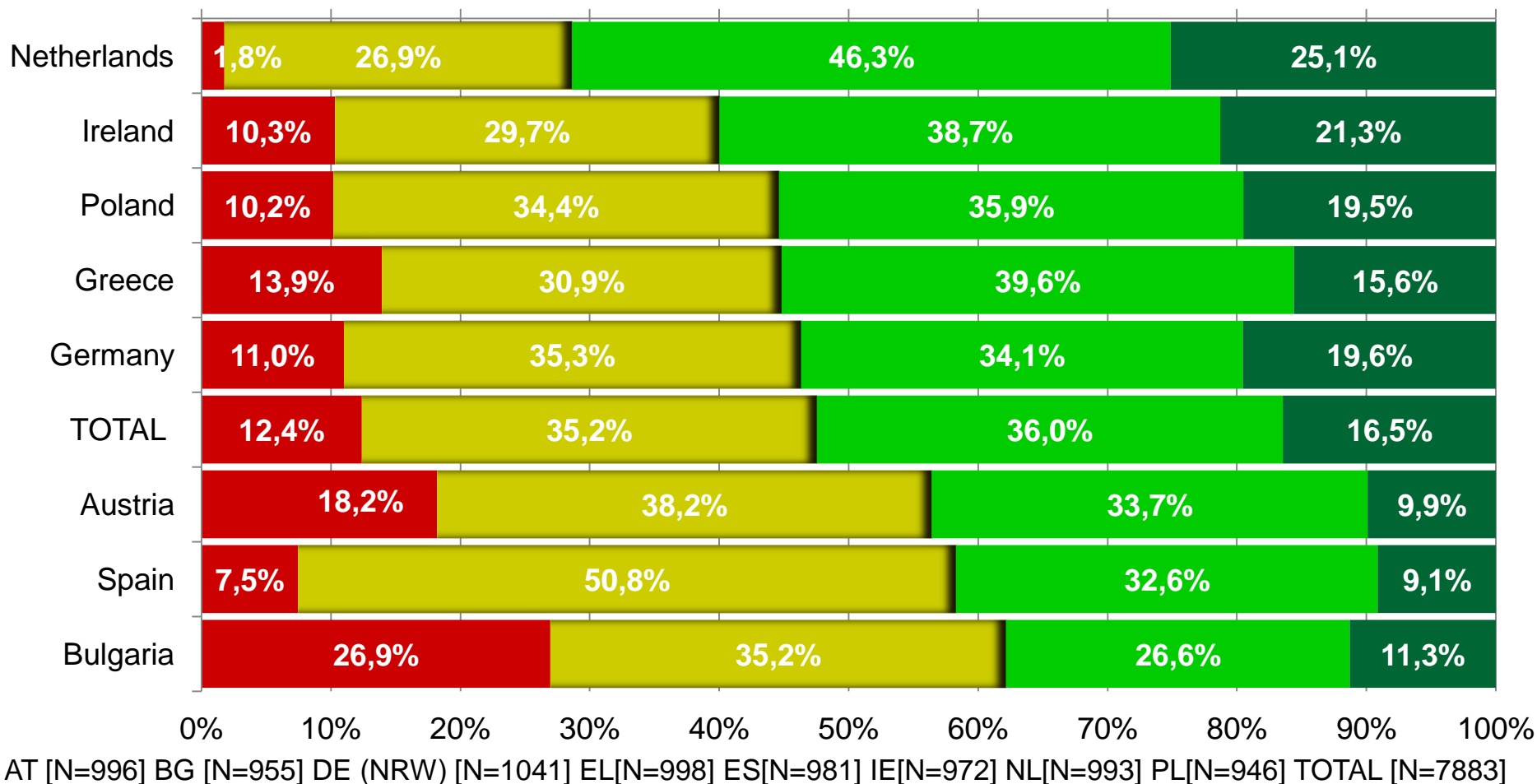
\*\* Correlation is significant at the 0.01 level (2-tailed). \* Correlation is significant at the 0.05 level (2-tailed).



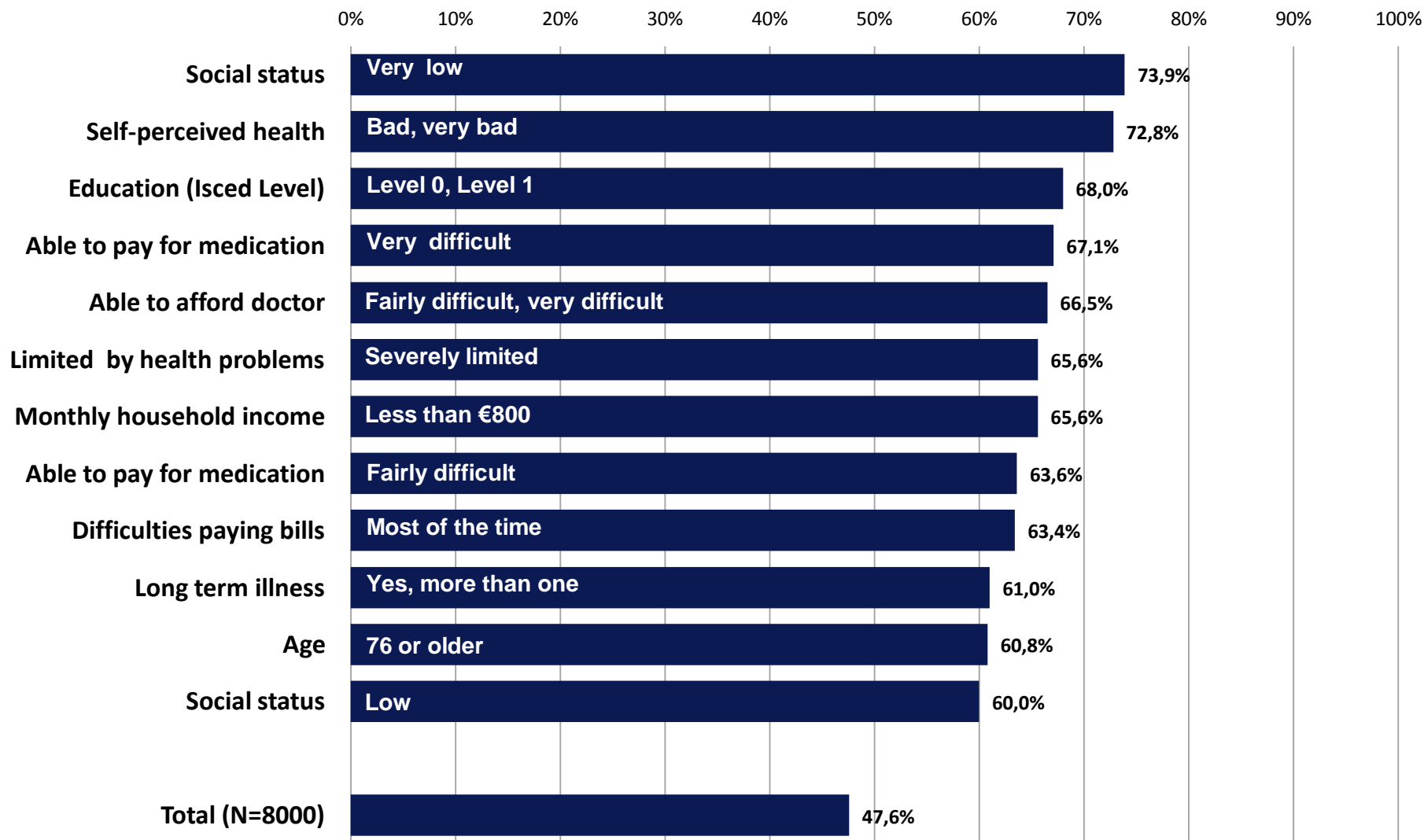


## 3.9 Percentage Distributions of Comprehensive HL-Index Levels, for Countries and Total (HLS-EU 2012)

■ inadequate comp.-HL   ■ problematic comp.-HL   ■ sufficient comp.-HL   ■ excellent comp.-HL



### 3.10 Percentages of Individuals with Limited Comprehensive HL-Index Levels in Specific Vulnerable Groups for Total (N=8000) (HLS-EU 2012)





# 4. CONSTRUCTING A SHORT SCALE (Q16) FOR HLS-EU-Q

## 4.1 Process of Item Selection for HLS-EU-Q16

1. Iterative item selection was based on **Rasch modeling** (1-parametric dichotomous model) and on content and face validity criteria (good representation of the 3 x 4 HLS-EU dimensions and relevance of items).
2. As **split criteria** for Rasch modeling were used: Median, gender and dichotomized education **within** every country sample.
3. Results of the initial analysis were also **cross-validated** for
  1. an independent quota sample of N=571 15 year old adolescents in the Austrian health literacy youth study (Österreichische Gesundheitskompetenz Jugendstudie, 2013).
  2. 2 independent probability samples for 300 residents with Turkish and 300 residents with Ex-Yugoslavian migration background in Austria (Österreichische MigrantInnenstudie 2014)



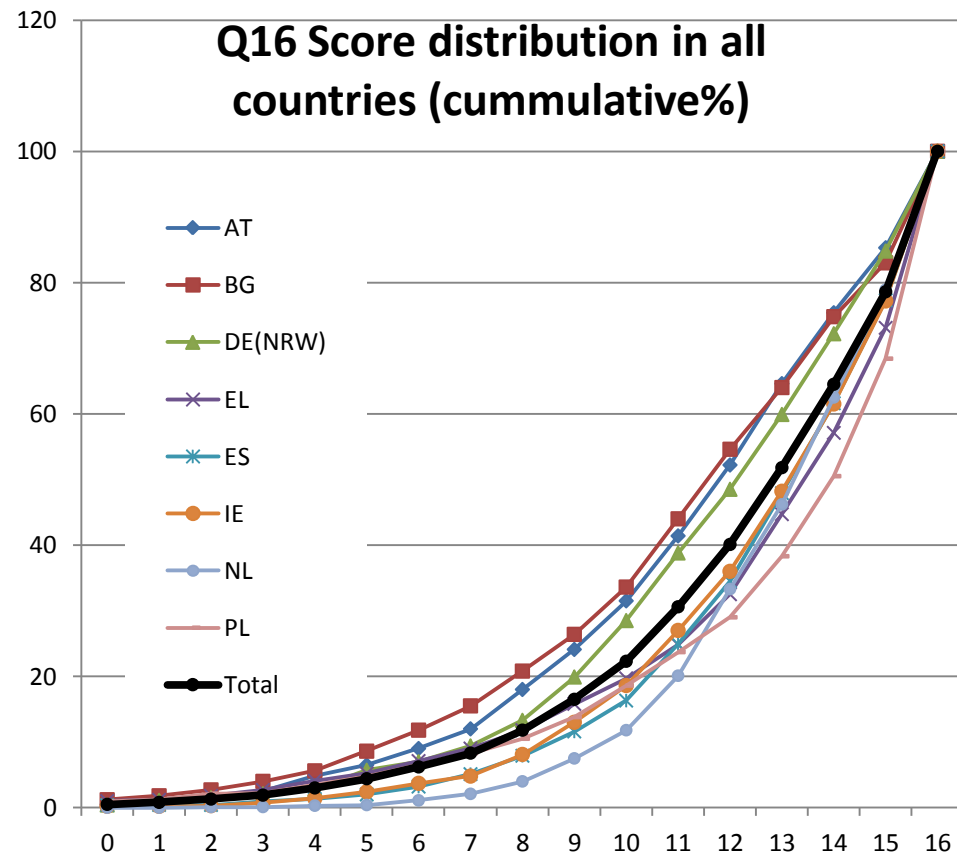
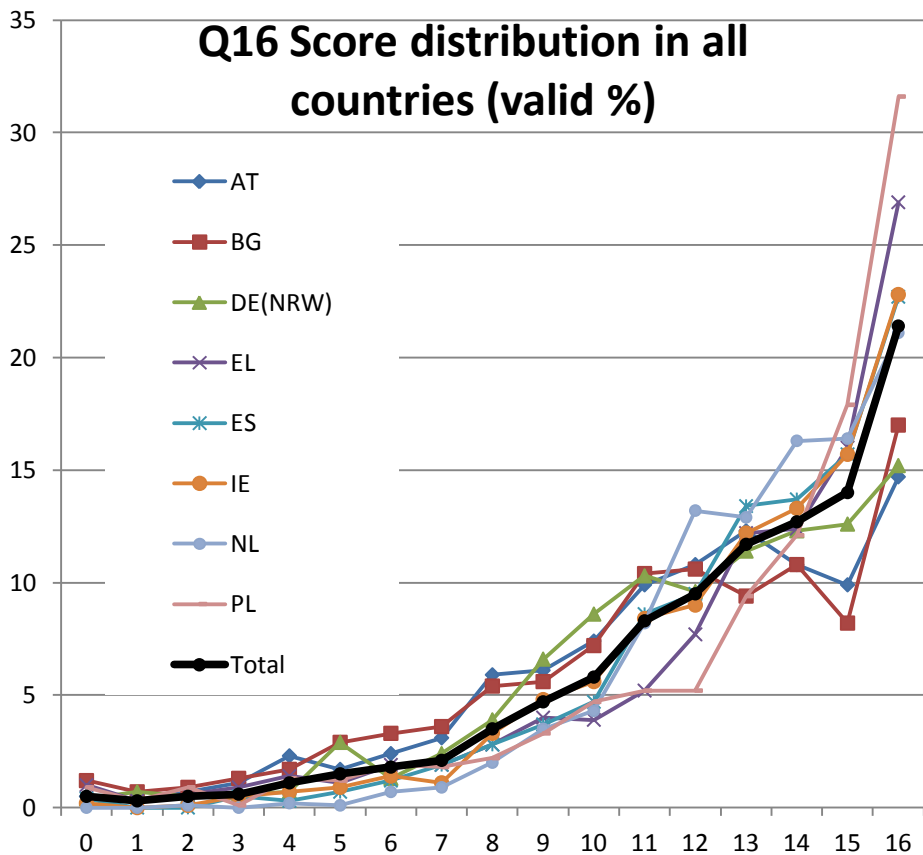
## 4.2 Resulting Items for Q 16 HLS-EU Short Scale

> Good representation of content of HL matrix!

Health Literacy (16 of 47)	Obtain/Access information (4 of 13)	Understand information (6 of 11)	Process/Appraise information (3 of 12)	Apply/use information (3 of 11)
Health Care (7 of 16)	Q1...find information on treatments of illnesses that concern you?  Q2...find out where to get professional help when you are ill? (2 of 4)	Q3...understand what your doctor says to you?  Q4...understand your doctor's or pharmacist's instruction on how to take a prescribed medicine? (2 of 4)	Q5...judge when you may need to get a second opinion from another doctor?  (1 of 4)	Q6...use information the doctor gives you to make decisions about your illness?  Q7...follow instructions from your doctor or pharmacist? (2 of 4)
Disease Prevention (5 of 15)	Q8...find information on how to manage mental health problems like stress or depression? (1 of 4)	Q9...understand warnings about behaviour such as smoking, low physical activity and drinking too much?  Q10...understand why you need health screenings? (2 of 3)	Q11...judge if the information on health risks in the media is reliable? (1 of 5)	Q12...decide how you can protect yourself from illness based on information in the media? (1 of 3)
Health Promotion (4 of 16)	Q13...find out about activities that are good for your mental well-being? (1 of 5)	Q14...understand advice on health from family members or friends?  Q15...understand information in the media on how to get healthier? (2 of 4)	Q16...judge which everyday behaviour is related to your health? (1 of 3)	<i>No adequate items identified!</i> (0 of 4)

## 4.3 Distributions of HLS-EU Q16 short scale for all countries

> Distributions J-shaped with clear ceiling effect for all countries!





## 4.4 Percentages of HLS-EU Q16 scale levels compared to corresponding HLS-EU Q47 index levels, and percentages of concurrent classifications (accuracy), for total and countries

> On average 75,8% concurrent classifications!

	(Likely) inadequate			(Likely) problematic			(Likely) sufficient*			% of concurrent Classifications
	Q16	Q47	diff.	Q16	Q47	diff.	Q16	Q47	diff.	
<b>Austria</b>	18.0	17.8	0.2	34.2	38.2	-4.0	47.8	44.0	3.7	74.8
<b>Bulgaria</b>	20.6	26.7	-6.1	33.5	34.7	-1.2	45.8	38.5	7.3	74.4
<b>Germany</b>	13.4	10.8	2.5	35.1	35.2	-0.1	51.6	54.0	-2.4	76.1
<b>Greece</b>	11.8	13.9	-2.1	20.7	30.8	-10.1	67.5	55.3	12.2	79.3
<b>Spain</b>	7.9	7.5	0.4	26.5	50.7	-24.1	65.6	41.8	23.7	67.5
<b>Ireland</b>	8.1	9.8	-1.7	27.8	29.5	-1.7	64.1	60.7	3.5	77.4
<b>Netherlands</b>	4.0	1.8	2.3	29.2	26.4	2.8	66.8	71.8	-5.1	78.3
<b>Poland</b>	10.4	10.3	0.1	18.5	33.1	-14.6	71.2	56.7	14.5	78.6
<b>TOTAL</b>	11.7	12.2	-0.5	28.3	34.8	-6.6	60.0	52.9	7.1	75.8

\*combination of the Q47 levels sufficient and excellent HL



## 4.5 Correlations of short scale HLS-EU-Q16 with HLS-EU (sub-)indices for countries and total > Correlations are high (moderate for NVS)!

HLS-EU-Q16 (Short Scale)	AT	BG	DE (NRW)	EL	ES	IE	NL	PL	TOTAL
NVS	,239**	,380**	,144**	,363**	,225**	,214**	,143**	,245**	,231**
GEN HL	,853**	,876**	,846**	,865**	,767**	,798**	,732**	,807**	,822**
HC HL	,795**	,807**	,788**	,804**	,710**	,703**	,624**	,738**	,754**
PREV HL	,786**	,844**	,766**	,810**	,715**	,741**	,678**	,783**	,767**
HP HL	,721**	,794**	,728**	,799**	,660**	,716**	,656**	,738**	,739**
OBTAIN HL	,779**	,814**	,788**	,814**	,732**	,758**	,658**	,780**	,770**
UNDERSTAND HL	,792**	,839**	,803**	,813**	,697**	,727**	,640**	,728**	,764**
PROCESS HL	,772**	,820**	,754**	,806**	,726**	,769**	,668**	,768**	,768**
APPLY HL	,763**	,787**	,707**	,774**	,602**	,692**	,604**	,725**	,705**
HC OBTAIN HL	,666**	,717**	,624**	,690**	,595**	,566**	,494**	,666**	,638**
HC UNDERSTAND HL	,673**	,686**	,678**	,702**	,570**	,582**	,450**	,584**	,628**
HC PROCESSHL	,671**	,721**	,676**	,720**	,648**	,680**	,647**	,695**	,687**
HC APPLY HL	,666**	,685**	,632**	,593**	,512**	,513**	,422**	,614**	,579**
PV OBTAIN HL	,665**	,761**	,689**	,753**	,633**	,661**	,536**	,707**	,684**
PV UNDERSTAND HL	,609**	,740**	,603**	,662**	,499**	,551**	,429**	,649**	,596**
PV PROCESS HL	,682**	,750**	,643**	,700**	,636**	,644**	,582**	,700**	,671**
PV APPLY HL	,602**	,724**	,605**	,625**	,540**	,631**	,561**	,639**	,620**
HP OBAIN HL	,642**	,683**	,643**	,729**	,607**	,663**	,587**	,697**	,671**
HP UNDERSTAND HL	,656**	,762**	,708**	,757**	,644**	,671**	,636**	,663**	,698**
HP PROCESS HL	,544**	,671**	,552**	,642**	,492**	,595**	,393**	,583**	,572**
HP APPLY HL	,535**	,593**	,463**	,621**	,425**	,547**	,420**	,605**	,528**
<b>MEAN (HLS-EU-Q16/ All HLS-EU Sub Indices)</b>	<b>,69</b>	<b>,75</b>	<b>,68</b>	<b>,73</b>	<b>,62</b>	<b>,66</b>	<b>,57</b>	<b>,69</b>	<b>,68</b>





## 4.6 Comparison of selected bi-variate correlations of HLS-EU-Q16 short scale with HLS-EU-Q47 index, for total > Differences are small, but some are statistically significant due to large sample size!

	HL determinants and consequences	Correlation with Q16	Correlation with Q47	Listwise valid N	Difference of corr. coefficient	t-Score of difference	P value of difference
Total	Gender	.044	.043	8039	-0.001	0.169	.866
	Age	-.134	-.123	8039	0.011	1.686	.092
	Migrational background	-.006	.005	8021	0.011	1.721	.085
	Education	.204	.241	8015	0.037	5.697	<.001**
	Financial deprivation	-.198	-.298	7717	-0.100	15.531	<.001**
	Social Status	.218	.289	7748	0.072	11.037	<.001**
	Employment Status	-.138	-.120	7972	0.018	2.720	.007**
	Household net income	.169	.224	5898	0.055	7.262	<.001**
	Global perceived health	-.234	-.275	8024	-0.041	6.451	<.001**
	Long standing health problems	.172	.157	8005	-0.015	2.312	.021*
	Limitations in daily living	.190	.171	2848	-0.019	1.715	.086
	Physical exercising	-.125	-.189	8014	-0.063	9.699	<.001**
	Alcohol consumption	.057	.063	7848	0.007	1.028	.304
	Smoking	.006	-.012	7987	-0.017	2.597	.009**
	Body-Mass-Index	-.056	-.065	7708	-0.010	1.450	.147
	Emergency service contacts	-.069	-.063	8009	0.006	0.899	.369
	Doctor contacts	-.117	-.115	8022	0.002	0.298	.766
	Hospital stays	-.079	-.066	8006	0.013	1.957	.050
Other health professionals contacts	.005	.063	8023	0.057	8.654	<.001**	



## 4.7 Summary of validity of HLS-EU-Q47 indices

- **Face validity** for a number of different national contexts was ensured by involving health experts with different national and professional backgrounds in the process of item construction.
- **Concurrent validity** is demonstrated by associations of expected direction and magnitude (medium size, around ,25) with functional HL (NVS-Test).
- **External validity** is demonstrated by associations with „determinants“ and „consequences“ of HL as identified in the literature, e.g. HL – score predicts health status (SF36 item).
- **Reliability** - measured by Cronbach´s alphas - for nearly all indices is high. But caveat: No clean factor simple-structure could be identified.
- → **Dimensionality** needs to be further tested and developed. (see also Q16 and Q6)



# 5. CONSTRUCTING A SHORT SCALE (Q16) FOR HLS-EU-Q



## 5.1 **Process** of item selection for short-short form Q6

1. The item battery Q6 was developed using **CFA modelling** (Estimator WLSMV) in a random subsample of N= 3411 observations of the HLS-EU sample and cross validated for the other subsample (same sample size). Cases with missing values were excluded listwise, due to Wlsmv.
2. Items were selected from **Q16 items** based on higher item difficulty, representation of the HL matrix.
3. Each domain is represented by 2 items. All 4 stages of the information cycle are represented at least by one item.

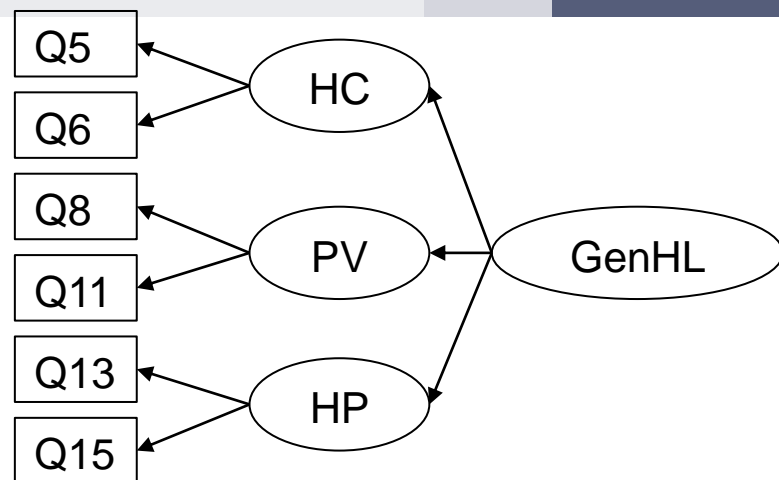
## 5.2 Resulting Items for HLS-Q Short-Short Form

> Minimal fulfillment of representation of content of long form!

<b>Health Literacy</b>	<b>Find/Access information relevant to health (2 of 13)</b>	<b>Understand Information relevant to health (1 of 11)</b>	<b>Evaluate/Appraise information relevant to health (2 of 12)</b>	<b>Apply/use information relevant to health (1 of 11)</b>
<b>Health Care (2 of 16)</b>			Q11... judge when you may need to get a second opinion from another doctor?	Q13... use information the doctor gives you to make decisions about your illness.
<b>Disease Prevention (2 of 15)</b>	Q18... find information on how to manage mental health problems like stress or depression.		Q28... judge if the information on health risks in the media is reliable.	
<b>Health Promotion (2 of 16)</b>	Q33.. find out about activities that are good for your mental well-being.	Q39... understand information in the media on how to get healthier.		

## 5.3 Model fit for CFA factor structure (estimated by WLSMV) of HLS-EU-Q6, for total and countries

> **Acceptable factor structure!**



Country	Chi2	DF	CFI/TLI	RMSEA	SRMR	N
AT	70.905	6	0.963/ 0.956	0.110	0.039	888
BG	84.871	5	0.962/ 0.962	0.143	0.038	776
DE	17.780	5	0.995/ 0.993	0.053	0.018	919
EL	45.869	6	0.988/ 0.988	0.083	0.026	972
ES	50.844	5	0.968/ 0.955	0.103	0.038	863
IE	27.715	6	0.989/ 0.987	0.067	0.023	805
NL	49.607	6	0.970/ 0.960	0.095	0.037	801
PL	21.323	6	0.994/ 0.996	0.058	0.014	770
<b>TOTAL</b>	315.445	6	0.981/ 0.981	0.087	0.025	6794

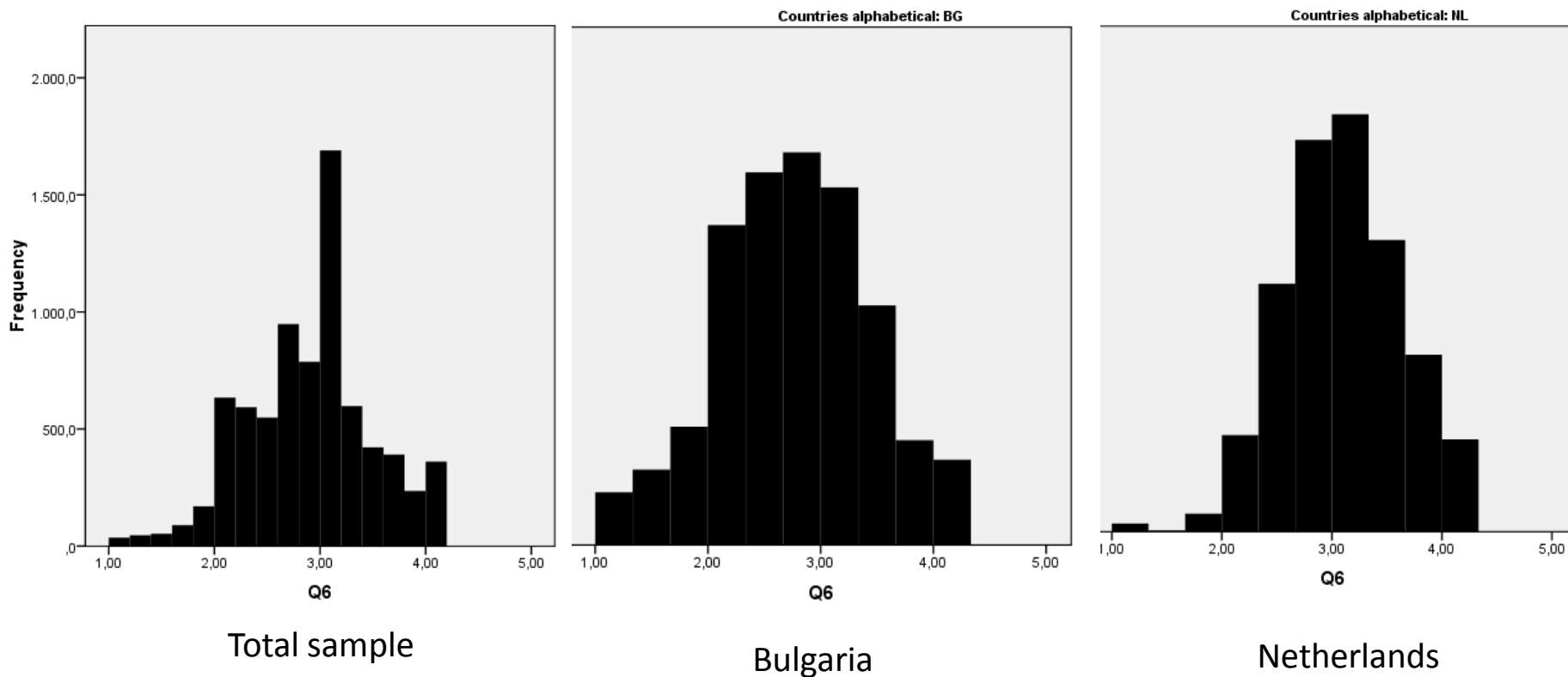


## 5.4 Scoring of HLS-EU-Q6-short-short-scale

1. **Coding** of answer categories.
  1. Very difficult = 1 to very easy = 4 (better HL gets higher scores)
  2. Don't know answers (that were optional in the personal interviews) are coded as missing values.
2. Score is a mean score that is calculated, if at least 5 of the 6 items are completed. (SUM of Answers/Number of Items)
  1. The Q6 **ranges** from 1 to 4
3. Three **levels** for the scale have been defined. Criterion was correct classification, as far as possible, compared to Q47 levels.
  1. (Likely) inadequate HL [1-2]
  2. (Likely) problematic HL (2-3)
  3. (Likely) sufficient HL [3-4]



# 6.5 Distributions Short-short Scale HLS-EU-Q6 for Total and two Countries > Bell shaped distributions!







## 6.6 Correlations of HLS-EU-Q6 scale with HLS-EU-Q16 scale & HLS-EU-Q47 index

> Correlations are very strong for main indices, strong for sub-indices & moderate for NVS!

HLS-EU-Q6 (Short-Short Scale)	AT	BG	DE (NRW)	EL	ES	IE	NL	PL	TOTAL
NVS	,187**	,367**	,105**	,210**	,210**	,200**	,092**	,286**	,222**
HLS-EU-Q16	,824**	,859**	,834**	,803**	,803**	,824**	,803**	,794**	,826**
GEN HL-HLS-EU-Q47	,874**	,918**	,892**	,886**	,886**	,890**	,875**	,924**	,896**
HC HL	,756**	,815**	,783**	,781**	,781**	,762**	,764**	,826**	,793**
PREV HL	,810**	,887**	,814**	,829**	,829**	,835**	,803**	,889**	,842**
HP HL	,788**	,863**	,811**	,802**	,802**	,814**	,776**	,878**	,828**
OBTAIN HL	,820**	,890**	,833**	,830**	,830**	,846**	,799**	,894**	,848**
UNDERSTAND HL	,753**	,840**	,781**	,793**	,793**	,801**	,735**	,818**	,799**
PROCESS HL	,841**	,868**	,858**	,852**	,852**	,877**	,815**	,897**	,867**
APPLY HL	,760**	,815**	,728**	,719**	,719**	,767**	,705**	,834**	,760**
HC OBTAIN HL	,584**	,693**	,560**	,580**	,580**	,554**	,560**	,705**	,624**
HC UNDERSTAND HL	,584**	,654**	,630**	,622**	,622**	,611**	,536**	,623**	,627**
HC PROCESS HL	,773**	,824**	,774**	,771**	,771**	,796**	,768**	,828**	,795**
HC APPLY HL	,599**	,671**	,612**	,597**	,597**	,594**	,574**	,724**	,617**
PV OBTAIN HL	,726**	,849**	,747**	,743**	,743**	,764**	,718**	,826**	,779**
PV UNDERSTAND HL	,532**	,701**	,552**	,578**	,578**	,590**	,485**	,715**	,603**
PV PROCESS HL	,733**	,799**	,733**	,748**	,748**	,745**	,708**	,806**	,761**
PV APPLY HL	,638**	,751**	,621**	,607**	,607**	,688**	,555**	,716**	,658**
HP OBTAIN HL	,741**	,803**	,742**	,745**	,745**	,773**	,704**	,842**	,778**
HP UNDERSTAND HL	,718**	,829**	,746**	,756**	,756**	,774**	,721**	,794**	,777**
HP PROCESS HL	,562**	,635**	,614**	,572**	,572**	,659**	,482**	,689**	,618**
HP APPLY HL	,569**	,644**	,521**	,549**	,549**	,605**	,495**	,690**	,582**
MEAN (HLS-EU-Q16/ All HLS-EU Sub Indices)	0,71	0,79	0,72	0,72	0,72	0,74	0,68	0,80	0,74



## 6.7 Comparison of selected bi-variate associations HL short-short scale (Q6) with comprehensive HL index (Q47), for total > Differences are small, but some are statistically significant due to large sample size!

	HL determinants and consequences	Correlation with Q6	Correlation with Q47	Listwise valid N	Difference of corr. coefficient	t-Score of difference	P value of difference
Total	Gender	.048	.042	7961	-0.006	1.257	.209
	Age	-.132	-.121	7961	0.011	2.130	.033*
	Migrational background	-.002	.005	7943	0.007	1.365	.172
	Education	.215	.240	7936	0.025	5.092	<.001**
	Financial deprivation	-.219	-.300	7646	-0.081	16.328	<.001**
	Social Status	.243	.289	7680	0.046	9.259	<.001**
	Employment Status	-.131	-.121	7892	0.010	1.926	.054
	Household net income	.188	.224	5856	0.036	6.187	<.001**
	Global perceived health	-.247	-.276	7948	-0.029	5.873	<.001**
	Long standing health problems	.149	.157	7928	0.008	1.599	.110
	Limitations in daily living	.176	.172	2823	-0.004	0.454	.650
	Physical exercising	-.141	-.191	7936	-0.050	9.948	<.001**
	Alcohol consumption	.042	.063	7771	0.021	4.058	<.001**
	Smoking	.017	-.013	7909	-0.030	5.809	<.001**
	Body-Mass-Index	-.064	-.063	7632	0.001	0.151	.880
	Emergency service contacts	-.058	-.063	7932	-0.005	0.903	.366
	Doctor contacts	-.115	-.112	7944	0.002	0.438	.662
	Hospital stays	-.072	-.067	7928	0.005	0.931	.352
Other health professionals contacts	.026	.060	7946	0.033	6.506	<.001**	



## 6.8 Percentages of HLS-EU Q6 scale levels compared to corresponding HLS-EU Q47 index levels, and percentages of concurrent classifications (accuracy) for total and countries

> On average 76,6% concurrent classifications!

	(Likely) inadequate			(Likely) problematic			(Likely) sufficient*			% of concurrent Classifications
	Q6	Q47	diff.	Q6	Q47	diff.	Q6	Q47	diff.	
<b>Austria</b>	11.6	17.8	-6.2	49.6	38.0	11.6	38.8	44.2	-5.4	73.6
<b>Bulgaria</b>	19.4	27.3	-7.9	43.2	34.3	8.9	37.4	38.4	-1.0	73.5
<b>Germany</b>	9.9	10.9	-1.0	47.5	35.2	12.3	42.6	53.9	-11.3	73.1
<b>Greece</b>	8.3	13.8	-5.5	34.7	30.8	3.9	57.0	55.4	1.6	80.3
<b>Spain</b>	4.2	7.7	-3.5	51.5	50.4	1.1	44.3	41.9	2.4	78.5
<b>Ireland</b>	9.2	9.9	-0.7	38.8	29.7	9.1	52.0	60.4	-8.4	77.6
<b>Netherlands</b>	3.8	1.7	2.2	40.1	26.7	13.4	56.1	71.4	-15.3	76.8
<b>Poland</b>	5.7	10.7	-5.0	31.5	32.9	-1.4	62.8	56.4	6.4	79.6
<b>TOTAL</b>	9.0	12.4	-3.4	42.2	34.8	7.4	48.8	52.8	-4.0	76.6

\*combination of the Q47 levels sufficient and excellent HL



# **6. COMPARISON OF INDICES & SCALES, SUMMARY AND CONCLUSIONS**



# 6.1 Comparison HLS-EU-Q 47, Q16, Q6

	HLS-EU –Q47	HLS-EU-Q16	HLS-EU-Q6
<b>No. of items</b>	47	Reduction to 16 out of 47 ➢ loss of info, and of representativeness of theoretical scope ➢ loss of reliability	Reduction to 6 out of 16 > strong loss of info, and of representativeness of theoretical scope,
<b>Economy</b>	long > time consuming (about 10)	short > less time (3 min)	very short > (1 minute)
<b>Type</b>	One Index, up to 19 Sub-Indices following the theoretical concept	1 Rasch scale	1 scale consisting of 3 highly correlated sub-dimensions.
<b>Scope &amp; representation of concept</b>	full	limited	very limited
<b>Use of number of categories of single items</b>	4	Dichotomized to 2 > Loss of information	4
<b>Distribution of indices, scale*</b>	bell-shaped; 1,2% reach maximum	strong negative skew (21,4% reach maximum=mode, mean=12,5)	bell-shaped, weak negative skew 4,7% reach maximum
<b>Difficulty*</b>	high	low	medium/high
<b>Correlation with full instrument*</b>		0,822	0,896
<b>Reliability*</b>	high	Cronbach alpha not computable	Alpha=0,803
<b>Levels</b>	4	3	3
<b>Dimensionality</b>	No clean factor simple structure	one	1 main 3 sub (but no scales for sub dimensions, due to high correlations with main index)
<b>Recommendation</b>	For fully HL focused surveys	For partly HL focused surveys or for giving space for additional context or vulnerable sub-group specific HL items (e.g. GKM, AOK).	Good compact HL measure for studies with other main focus

\* Computations based on HLS-EU total sample



## 6.2 Summary & Conclusions 1

The HLS-EU consortium (2009-2012)

1. developed - based on existing models & definitions – an *expanded and integrated*
  1. conceptual & generic *model* &
  2. *definition* for *comprehensive* HL in *general* populations (Sorensen et al 2012)
2. developed to measure this comprehensive concept an *instrument*
  1. based on a 3 x 4 (health domains x literacy (information processing stages)) matrix
  2. containing 47 standardized questions, to be answered by a Likert scale of 4 categories
  3. using a subjective self-assessment approach (in the tradition of e.g. Chew (2004)) to measure the fit of personal competencies to situational demands for concrete health relevant tasks (in the tradition e.g. of HALS) (Sorensen et al 2013)
3. collected in 2011 *data* with this instrument and a set of further indicators for co-variates of HL (HLS-EU-Q86)
  1. in 8 member states of the EU (Austria, Bulgaria, Germany, Greece, Ireland, Netherlands, Poland, Spain) for multi-stage clustered probability samples of N=1000 for residing EU citizens aged 15+
  2. by CAPI or PAPI personal interview methodology.
4. constructed and validated, based on the 47 items, one general and 19 different more specific HL *indices* following the HLS-EU matrix, and defined 4 *levels* for the 8 main indices



## 6.3 Summary & Conclusions 2

The HLS-EU consortium (2009-2012)

5. analyzed data, showing as main *results*
  1. that limited HL is not just a problem of minorities, but of nearly every second citizen
  2. that there is a moderate *social gradient* for HL
  3. that HL is related differently with relevant health status & health behavior *consequences*
  4. And, that there is considerable *variation* between countries concerning *distributions and associations* of HL (HLS-EU Consortium 2012, WHO 2013)
6. constructed and validated short scales with better psychometric properties, but more limited conceptual representation
  1. a short (HLS-EU-Q16) scale and
  2. a short-short (HLS-EU-Q6) scale.

In the meantime these instruments have been used in further HL studies

- in the 8 original countries ( e.g. Austria, Germany, Netherlands) and
- in other European countries (e.g. Belgium, Denmark, Israel, Portugal, Sweden, Switzerland)
- in Asian countries (e.g. Indonesia, Kazakhstan, Laos, Malaysia, Myanmar, Pakistan, Taiwan, Vietnam).

The HLS-EU Consortium is trying to institutionalize, supported by EC and WHO

- joint regular *monitoring* of population HL and
- joint further *development* of the HLS-EU *instruments*



## 7.1 References

- Brach, C.** (2013): Becoming a Health Literate Organization: Tools for Community Health Centers. Presentation 3.April 2013 at the Center for Delivery, Organization and Markets
- Sørensen K, Van den Broucke S, Fullam J, Doyle G, Pelikan JM, Slonska Z, Brand H, (HLS-EU) Consortium** (2012): Health literacy and public health: A systematic review and integration of definitions and models. *BMC Public Health*, 12 (80).
- Sørensen K, Pelikan JM, Röthlin F, Ganahl K, Slonska Z, Doyle G, Fullam J, Kondilis B, Agrafiotis D, Uiters E, Falcon M, Mensing M, Tchamov K, Van den Broucke S, Brand H** : Health literacy in Europe: comparative results of the European health literacy survey (HLS-EU). *Eur J Public Health*. in review
- Sørensen K, Van den Broucke S, Pelikan JM, Fullam J, Doyle G, Slonska Z, Kondilis B, Stoffels V, Osborne RH, Brand H** (2013) : Measuring health literacy in populations: illuminating the design and development process of the European Health Literacy Survey Questionnaire (HLS-EU-Q). *BMC Public Health* 13(1).
- HLS-EU Consortium** (2012): Comparative report on health literacy in eight EU member states. The European Health Literacy Project 2009–2012. (Second Extended and Revised Version) Maastricht (<http://www.health-literacy.eu>). Report can be downloaded here: [http://lbihpr.lbg.ac.at.w8.netz-werk.com/sites/files/lbihpr/attachments/neu\\_rev\\_hls-eu\\_report\\_2014\\_07\\_22\\_lit\\_0.pdf](http://lbihpr.lbg.ac.at.w8.netz-werk.com/sites/files/lbihpr/attachments/neu_rev_hls-eu_report_2014_07_22_lit_0.pdf)
- Parker, R.** in World Health Communication Association (2009): Health Literacy, Part 1 „The Basics“. WHCA Action Guide.
- Pelikan, JM, Röthlin, F, Ganahl K** (2012): Die Gesundheitskompetenz der Österreichischen Bevölkerung– nach Bundesländern im internationalen Vergleich. Abschlussbericht der Österreichischen Gesundheitskompetenz (Health Literacy) Bundesländer-Studie. LBIHPR Forschungsbericht. (undisclosed)
- Röthlin, F, Pelikan JM, Ganahl, K** (2013): Die Gesundheitskompetenz der 15-jährigen Jugendlichen in Österreich. Abschlussbericht der österreichischen Gesundheitskompetenz Jugendstudie im Auftrag des Hauptverbands der österreichischen Sozialversicherungsträger (HVSV)



## 7.2 References (HL-Measures)

- REALM 1991: Davis, T.C. et al (1991): Rapid assessment of literacy levels of adult primary care patients, *Fam. Med.* 23(6): 433-435
- TOFHLA 1995: Parker, R.M. et al (1995): The test of functional health literacy in adults: A new instrument for measuring patients' literacy skills. *J. Gen. Intern. Med.* 10: 537-541.
- MART 1997: Hanson-Divers, E.C. (1997): Developing a medical achievement reading test to evaluate patient literacy skills: a preliminary study. *J. Health Care Poor Underserved.* 8(1): 56-69
- WRAT 1993: Wilkinson, G.S. (1993). *Wide Range Achievement Test: WRAT3*. Lutz, FL: Wide Range, Incorporated.
- FHLT (2009): Zhang, X.H. et al (2009): Development and validation of a functional health literacy test. *Patient.* 2(3): 168-78.
- METER (2010): Rawson, K.A. et al (2010): The METER. A Brief, Self-Administered Measure of Health Literacy. *J. Gen. Intern. Med.* 25(1): 67-71.
- HLTS (2010): Ko, et al. (2012): Development and validation of a general health literacy test in Singapore. *Health Promotion Intern.* 27(1), 45-51.
- SILS (2006): Morris N.S., et al. (2006): The Single Item Literacy Screener: Evaluation of a brief instrument to identify limited reading ability. *BMC Fam. Practice.* 7(21).
- BRIEF 2008: Chew L.D., et al (2008) Validation of Screening Questions for Limited Health Literacy in a large VA Outpatient Population. *J. Gen. Intern. Med.* 23(5):561-6.
- SOS Mnemon (2009): Jeppesen, KM., et al (2009): Screening Questions to Predict Limited Health Literacy: A Cross-Sectional Study of Patients with Diabetes Mellitus. *Ann. Fam. Med.* 7(1): 24-31.
- DAHL (2008): Hanchate, A.D. et al (2008): The demographic assessment for health literacy (DAHL): A new tool for estimating associations between health literacy and outcomes in national surveys. *J. Gen. Intern. Med.* 23(10):1561-6.
- Health LiTT (2011): Hahn, E.A. et al (2011): Health Literacy Assessment Using Talking Touchscreen Technology (Health LiTT): A New Items Response Theory-based Measure of Health Literacy. *J. Health Communication* 16 (Suppl 3): 150-162.

## 7.2 References (HL-Measures)

- HLQ (2013): Osborne, R.H. et al. (2013): The grounded psychometric development and initial validation of the Health Literacy Questionnaire (HLQ), *BMC Public Health*. 16.
- HeLMs (2013): Jordan, J.E. et al (2013): The Health Literacy Management Scale (HeLMS): A measure of an individual's capacity to seek, understand and use health information within the healthcare setting. *Patient Educ. Couns.* 91(2):228-235
- NVS (2005): Weiss B.D., et al (2005): Quick assessment of literacy in primary care: the Newest Vital Sign. *Ann Fam Med*; 3(6): 514–22.
- NAAL (HL-Scale) (2006): Kutner, M., Greenberg, E., Jin, Y., & Paulsen, C. (2006, September 6). The health literacy of America's adults: Results from the 2003 National Assessment of Adult Literacy. *Health*
- HALS (Health Literacy Activities Scale) (2004): Rudd, R., Kirsch, I., & Yomamoto, K. (2004, April). Literacy and health in America. Educational Testing Service.
- HLS-14 (CCHL (2008/2013): Suka, M. et al (2013): The 14-item health literacy scale for Japanese adults (HLS-14). *Environ Health Prev. Med.* 18: 407-415.
- Ishikawa, H. et al (2008): Developing a measure of communicative and critical health literacy: a pilot study of Japanese office workers. *Health Promot. Int.* 23 (3): 269-74.
- HLSI (2010): McCormack et al (2010): Measuring Health Literacy: A Pilot Study of a New Skills-Based Instrument, *J. Health Commun.* 15:S2, 52-71
- AAHLS (2013): Chinn et al. (2013): All Aspects of Health Literacy Scale (AAHLS): Developing a tool to measure functional, communicative and critical health literacy in primary healthcare settings, *Patient Educ. Couns.* 90(2): 247-253.



## 7.3 References (HL-Measures)

- 3 Items Numeracy Test (1997) – Schwartz, et al (1997): The role numeracy in understanding the benefit of screening mammography. *Annals of Internal Medicine*, 127, 966-972.
- Numeracy Scale (2001) – Lipkus et al (2001): General Performance on a Numeracy Scale among Highly Educated Samples. *Medical Decision Making: An International Journal of the Society for Medical Decision Making*, 21, 37-44
- Medical Data Interpretation Test (2005) – Schwartz, et al (2005): Can patients interpret health information? An assessment of the medical data interpretation test. *Medical Decision Making*, 25, 290-300
- Subjective Numeracy Scale (2012) : Schapira et al. (2012): The numeracy understanding in medicine instrument: a measure of health numeracy developed using item response theory. *Medical Decision Making*, 32, 851-865
- Numeracy Scale (2007):  
Fagerlin, et al. (2007): Measuring numeracy without a math test: Development of the Subjective Numeracy Scale. *Medical Decision Making*. 27, 672-680.
- General Health Numeracy Test (2013): Osborn et al. (2013): Development and validation of the General Health Numeracy Test (GHNT). *Patient Education and Counseling*, 91, 350-356.
- TOFHLA iD (2007): Gong, DA. Et al. (2007): Development and testing of the Test of Functional Health Literacy in Dentistry (TOFHLiD). *J. Public Health Dent*. 67(2):105-12
- LAD (2001): Nath CR, Sylvester ST, Yasek V, Gunel E. Development and validation of a literacy assessment tool for persons with diabetes. *Diabetes Educator*. 2001; 27(6):857-64.
- ANQ (2006): Apter, et al (2006): Astma numeracy skill and health literacy. *Journal of Astma: Official Journal of the Association of the Care of Asthma*, 43, 1026-1033
- BEHKA-HIV (2010); Osborn, CY. et al (2010): Health Literacy in the Context of HIV Treatment: Producing the Brief Estimate of Health Knowledge and Action (BEHKA)-HIV Version
- HBP-Health Literacy Scale: (2012): Kim K.T, et al. (2012): Development and Validation of the High Blood Pressure Focused Health Literacy Scale. *Patient Edu Couns* 87(2): 165-170

## 7.4 References (HL-Measures)

- CHLCC (Chinese Health Literacy Scale for Chronic Care) (Leung, et al. 2013: Development and validation of the Chinese Health Literacy Scale for Chronic Care. *Journal of Health Communication*, 18 (Suppl. 1), 205-222.
- CHLSD (2013): Chinese Health Literacy Scale for Diabetes. Leung, AYM., (2013): Development and validation of Chinese Health Literacy Scale for Diabetes. *Journal of Clinical Nursing*, 22,2090-2099.
- Nutrition Literacy Assessment Instrument (NLAI) (2013): Gibbs, H.; Chapman-Novakofski, K. (2013): Establishing content validity for the Nutrition Literacy Assessment Instrument. *Preventing Chronic Disease*, 10. E109
- HHLT (2007): Baron-Epel O, Balin L, Daniely Z, Eidelman S. Validation of a Hebrew health literacy test. *Patient Education & Counseling*. 2007; 67(1-2):235-9. – based on the S-TOFHLA
- KHLS (2009): Lee, et al. (2009): Lee, TW et al. (2009): Testing health literacy skills in older Korean adults. *Patient Education and Counseling*, 75, 302-307.
- THLS (2010): Pan, F. & Che-Long Su et al. (2010): Development of a Health Literacy Scale for Chinese-Speaking Adults in Tawain.
- SAHLSA (2006): Lee, SY et al. (2006): Development of an easy-to-use Spanish Health Literacy test. *Health Serv Res.*;41(4 Pt 1):1392-412.
- Instrument for Measuring Health Literacy for Canadian High School Students (2010); Wu et al. (2010): Developing and evaluating a relevant and feasible instrument for measuring health literacy of Canadian high school students. *Health Promotion International*. 25, 444-452
- PHLAT (2010): Kumar, D. et al (2010): Parental Understanding of Infant Health Information: Health Literacy, Numeracy and the Parental Health Literacy Activities Test (PHLAT). *Acad. Pediatr* 10(5): 309-316
- MHLS (2011): Tsai, et al. (2011): Methodology and Validation of Health Literacy Scale Development in Tawain. *Journal of Health Communication*, 16:50-61
- CMLT (2012): Mazor, et al (2012): Health literacy and cancer prevention: Two new instruments to assess comprehension. *Patient Education and Counseling*, 88, 54-60.



# Thank you for your attention!

Contact:

[juergen.pelikan@lbihr.lbg.ac.at](mailto:juergen.pelikan@lbihr.lbg.ac.at)

<http://www.lbihr.lbg.ac.at>

<http://www.health-literacy.eu>

LBIHR: A-1020 Vienna, Untere Donaustraße 47, Austria | [office@lbihr.lbg.ac.at](mailto:office@lbihr.lbg.ac.at) | [www.lbihr.lbg.ac.at](http://www.lbihr.lbg.ac.at) | +43 1 2121493 -10 | FAX - 50

in cooperation with:



Co-funded by:



## 2.1 In which discourses has HL been taken up so far?

1. As a specific target in **school (*Health-education*)** (Simmonds, 1974)
  1. 1985: First publication linking literacy and patient education: „Teaching Patients with Low Literacy Skills“ (Doak, Doak & Root, 1985)
2. **Improvements in safety, quality, convenience / user friendliness of health care & reduction of costs by patient enablement / empowerment (> up to HLO)**
  1. Development of (short) tests for patient HL (REALM, Davis et al. 1991; TOFHLA, Parker et al. 1995; NVS, Weiss et al. 2005; Chew's 3, Chew et al. 2004).
  2. National US strategy „Healthy People 2010“ (2000) defines HL for the first time as **product of individual abilities and system demands** and the strengthening of HL as national target and subsequent uptake in publications and concept papers, e.g. by IOM (Brach et al. 2012)
3. **Determinant, mediator, moderator** of health gap, social *inequalities in health* (discrimination of vulnerable / disadvantaged groups)
  1. Marmot M (2010). Fair society, healthy lives: strategic review of health inequalities in England post-2010
4. Strengthen / empower **citizens** for more health-related self responsibility, healthy living and better health & wellbeing
  1. EU's Together for Health 2008-2013, 3<sup>rd</sup> health programme of the European Union 2014-2020
  2. WHO Europe's Health 2020
5. **Monitoring** of health and health determinants for health reporting and identifying problems as a basis for planning and evaluating health promotion / public health interventions
  1. WHO Health Literacy – Solid Facts (2013)