



WHO Collaborating Centre
for Health Promotion
in Hospitals and Health Care

Gesundheit Österreich
GmbH ● ● ●

Determinant, mediator, moderator?

How does Health Literacy influence self-assessed health?

Results from the HLS–EU–study

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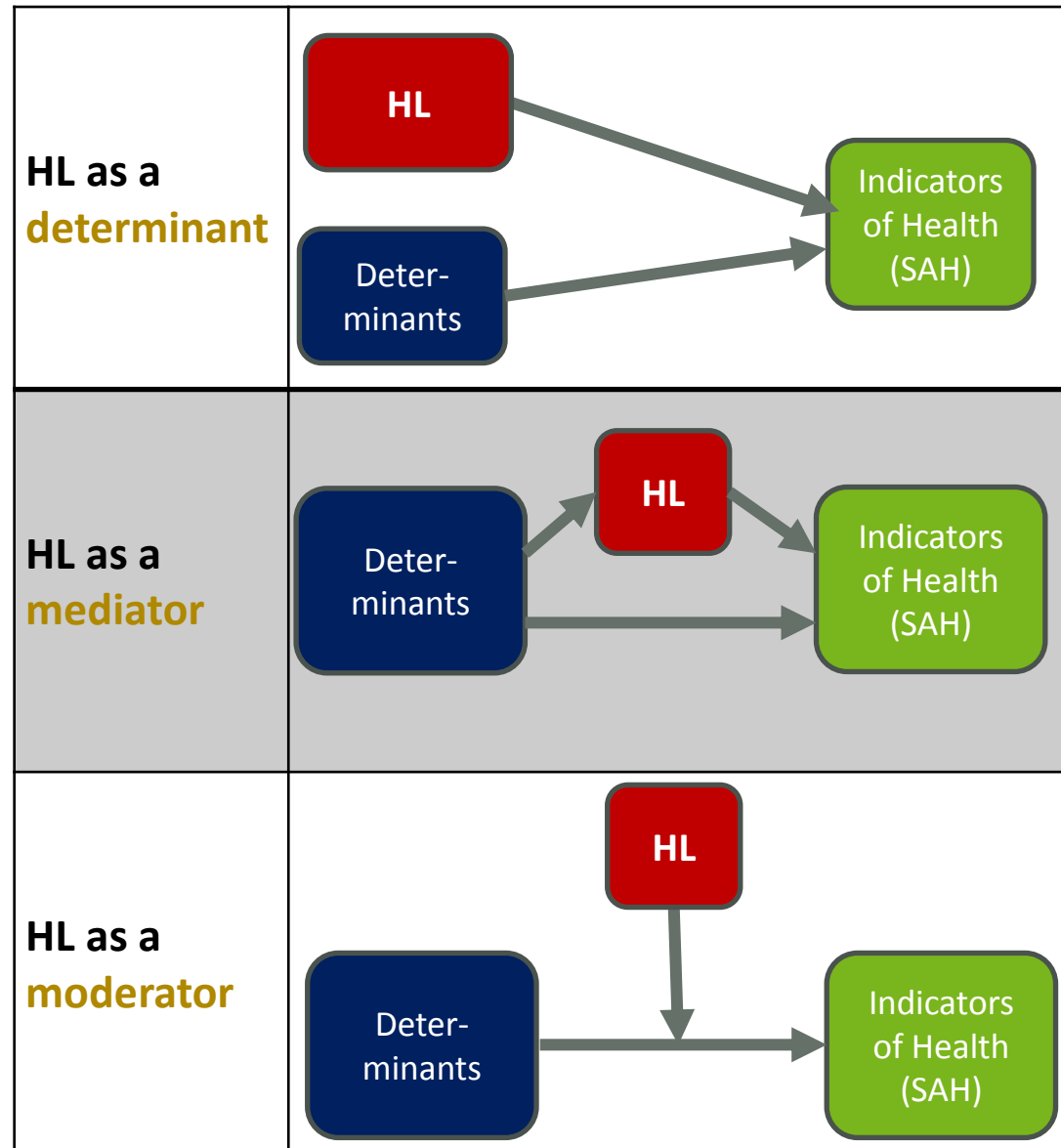
1. PROBLEM & RESEARCH QUESTION

There is growing **evidence** for the relevance of **health literacy** (HL) for **health**, but what are the **causal mechanisms** at work?

- » It has been demonstrated quite well that functional HL has relevant **effects** on health related indicators for patients and health/disease care related outcomes (cf. Berkman et al. 2011)
- » But there is much less research on these relationships in general populations and/or with a wider more comprehensive definition and measure of HL, e.g.
 - » For community samples of older citizens or patients & mortality (e.g. Baker et al. 2007, 2008, Bostock & Steptoe 2012, McNaughton et al 2015)
 - » For self-rated health status for aged US adults (Bennett et al. 2009, Sentell, et al. 2014), Taiwanese adults (Lee et al. 2010), for Japanese adults (Furuaya et al. 2015), for elderly Chinese (Liu et al. 2015), for immigrants in Canada (Omariba & Ng, 2011)
- » There are only a few studies looking explicitly at **mediating effects** of HL, e.g.
 - » between education & self-reported health for Dutch adults (van der Heide et al. 2013)
 - » between education & health behaviors for Danish adults (Friis, et al. 2016), or health-insured Belgians (van den Broucke & Renwart, 2014)
 - » between race & patient activation for elderly urban minority patients (Gwynn et al. 2016)
- » Even less on **moderating effects** of HL, e.g.
 - » between age & health related quality of life responses to chronic disease in Chinese rural women (Wang et al. 2015)
- » Data of the HLS-EU survey provide an excellent opportunity for testing the relationship of HL and health for general populations in different countries.

Research questions

1. In how far is functional or comprehensive health literacy (HL) **associated** with self-assessed health (SAH)?
2. How does HL **influence** SAH?
As a determinant,
or a mediator,
or a moderator of health,
or a combination of these mechanisms?

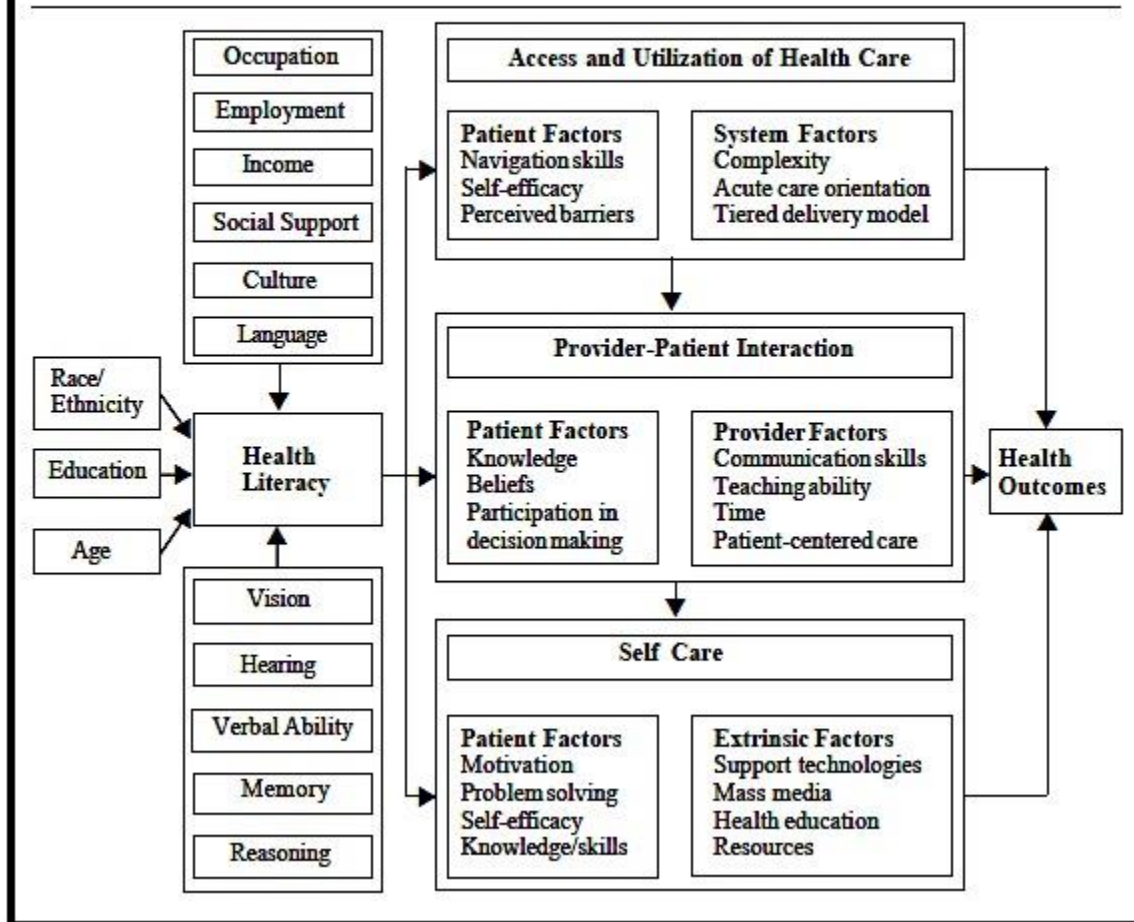




2. CAUSAL MODEL & MEASURES OF VARIABLES

A causal model of limited HL for patients in health care

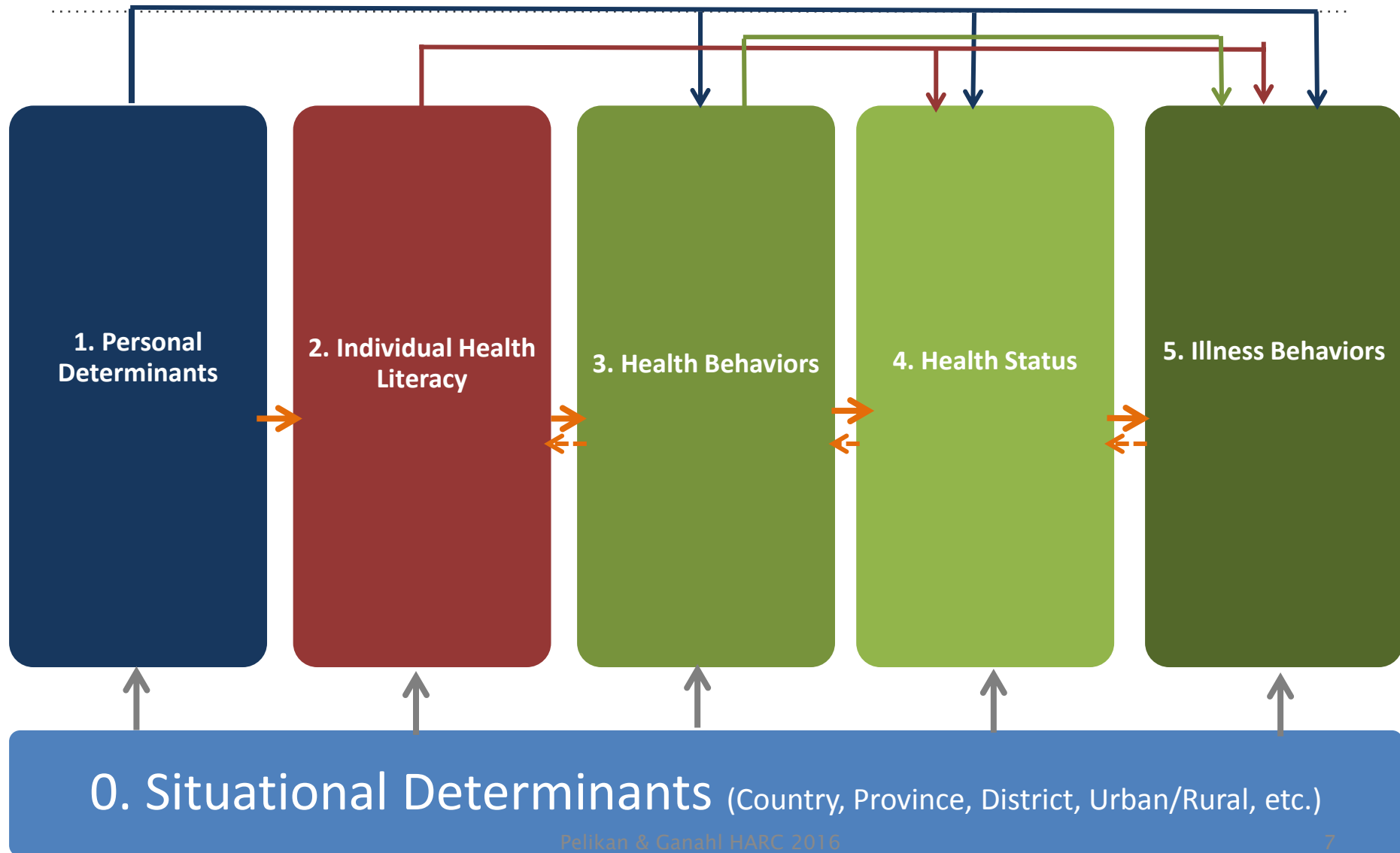
Figure 1
Causal Pathways between Limited Health Literacy and Health Outcomes



Paasche-Orlow, M.K., Wolf, M.S.
(2007): The Causal Pathways Linking
Health Literacy to Health Outcomes.
Am J Health Behav; 31 (Subbl 1):s19-
s26.

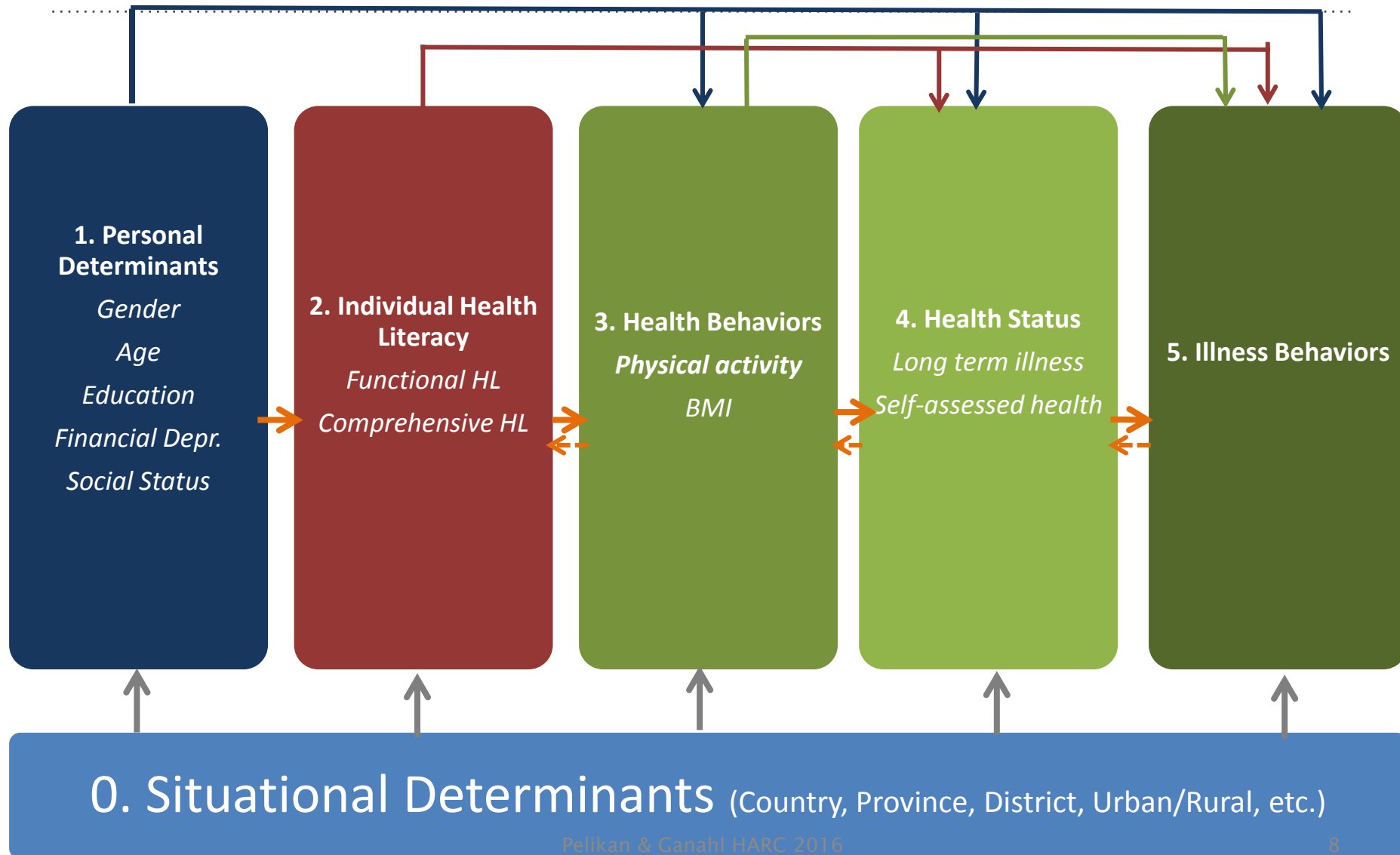


The **Vienna Model** of determinants & consequences of HL in **general populations** based on the HLS-EU model (Pelikan et al 2014)





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Causal ordering & measures of variables used

1. **Gender** (0 = male, 1 = female)
2. **Age** (years of age, or grouped)
3. **Education** (ISCED: from 0= lowest to 6=highest level)
4. **Financial deprivation** (Factor score based on 3 questions from low deprivation to high)
5. **Self-assessed social status** (from 1=lowest to 10=highest place in society)
6. **NVS** (6 questions on ice crème label, 0–6 points (6= best), 3 levels)
7. **Comprehensive HL** (HLS-EU-Q47, Index 0–50 = highest HL, 4 levels)
8. **Physical Activity** (1=almost every day to 4=no physical activity)
9. **BMI** (Index of weight-for-height; kg/m²; Low to high BMI Index)
10. **Long-term illness** (Minimum European Health Modul, from 1=No long-term illnesses, 2=Yes, one, 3=Yes, more than one)
11. **Self-assessed health** (SF36 item, from 1=very good to 5=very bad)

HLS–EU Survey Overview: Sampling, Data collection

Countries	Austria (AT), Bulgaria (BG), Germany (DE) (only NRW), Greece (EL) (only Athens +), Spain (ES), Ireland (IE), Netherlands (NL), Poland (PL)
Survey Institut	TNS Opinion on behalf of the HLS-EU Consortium
Survey Periode	Summer 2011
Target Population, Population Coverage	EU citizens (!) aged 15 years and over (Euro-barometer Methodology)
HL Instrument	HLS-EU-Q86 (including HLS-EU-Q47 and NVS Test)
Data collection	by computer-assisted personal interviewing technique (CAPI) (BG, IE = PAPI)
Sampling design	Euro-barometer Methodology Stratified probability sampling (multistage random sample): National sampling points selected randomly (applying random-walk procedure) after stratification for population size and population density (metropolitan, urban and rural areas).
Response Rates	Austria (67%), Bulgaria (75%), Germany (DE) (53%), Greece (65%), Spain (62%), Ireland (69%), Netherlands (36%), Poland (67%)
Sample Sizes	Austria (1015), Bulgaria (1002), Germany (DE) (1057), Greece (1000), Spain (1000), Ireland (1005), Netherlands (1023), Poland (1000)
Weights	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. RESULTS

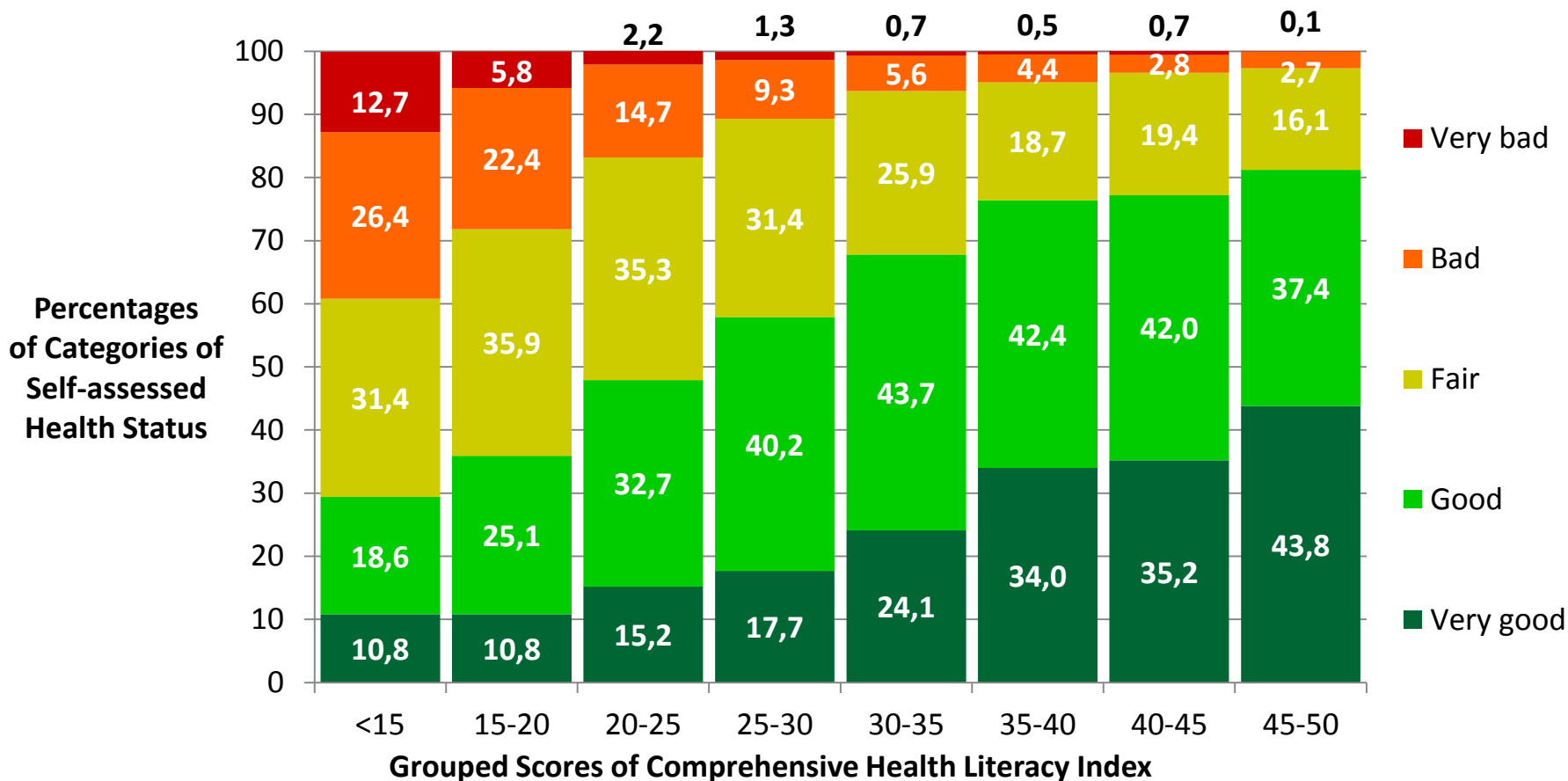
Spearman Correlations for all used variables

(for Total, N=8000, HLS-EU 2012)

	Gender	Age	Education	Social Status	Fin. Dep.	NVS	Comp. HL	Physical Activity	BMI	Long-Term Illness	SAHS
Gender	1										
Age	,066**	1									
Education	-,018	-,204**	1								
Social Status	-,007	-,137**	,336**	1							
Fin. Dep.	,050**	,036**	-,200**	-,422**	1						
NVS	,011	-,290**	,347**	,296**	-,196**	1					
Comp. HL	,046**	-,121**	,239**	,291**	-,300**	,245**	1				
Physical Activity	,030**	,110**	-,151**	-,205**	,196**	-,170**	-,189**	1			
BMI	-,149**	,336**	-,103**	-,113**	,092**	-,113**	-,066**	,121**	1		
Long-Term Illness	-,073**	-,425**	,152**	,129**	-,120**	,165**	,156**	-,109**	-,205**	1	
SAHS	,062**	,443**	-,213**	-,254**	,188**	-,231**	-,274**	,200**	,256**	-,589**	1

There are significant correlations between HL indicators & health related outcome indicators, between different health related indicators, but also with socio-demographic & socio-economic confounders!

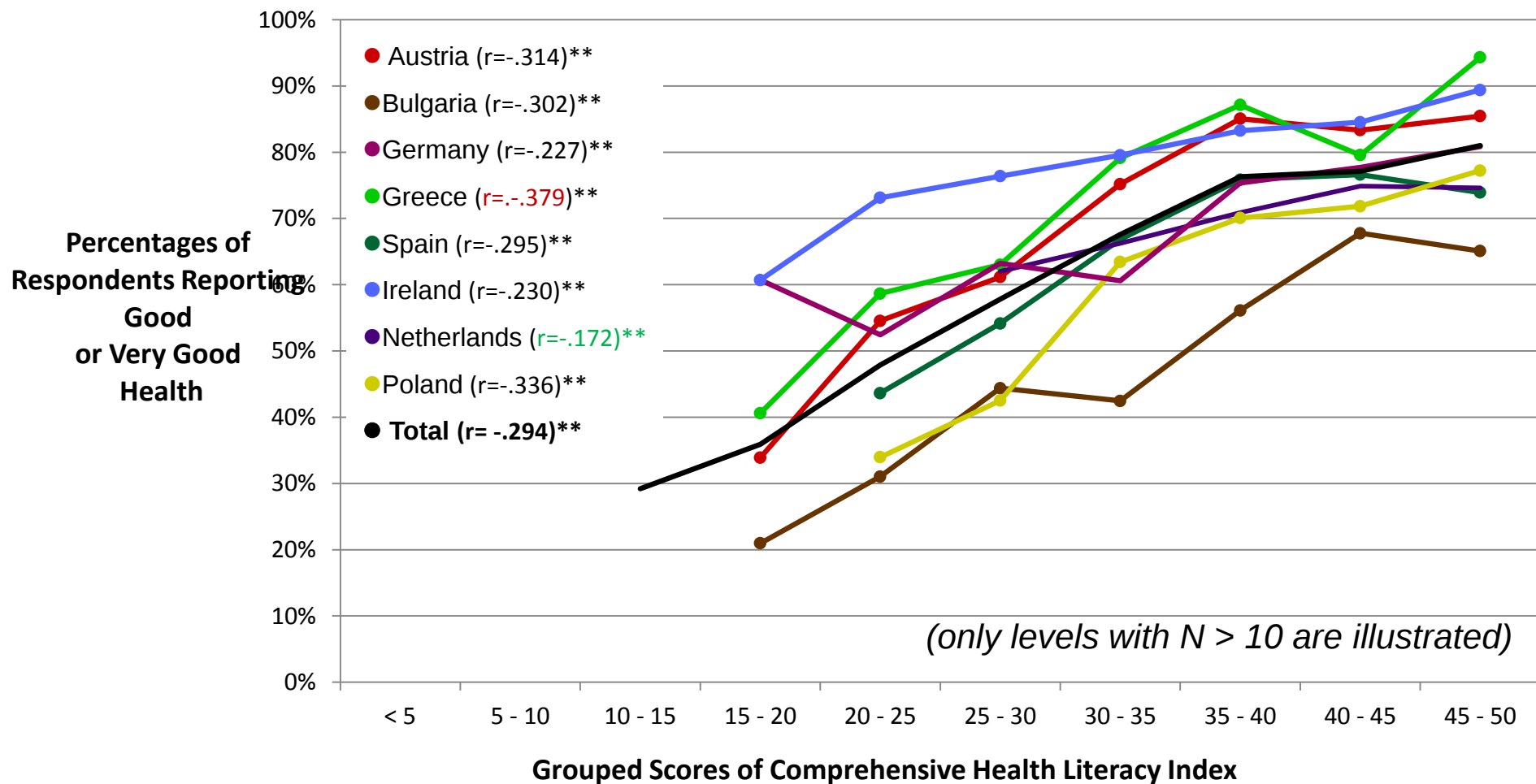
There is a gradient: The better health literacy, the better Self-Assessed Health (SF-36) (for Total Sample) (HLS-EU 2012)



<15[N=102] | 15-20[N=259] | 20-25[N=600] | 25-30[N=1348] | 30-35[N=2185] | 35-40[N=1531] | 40-45[N=1048] | 45-50[N=704] | TOTAL[N=7777]



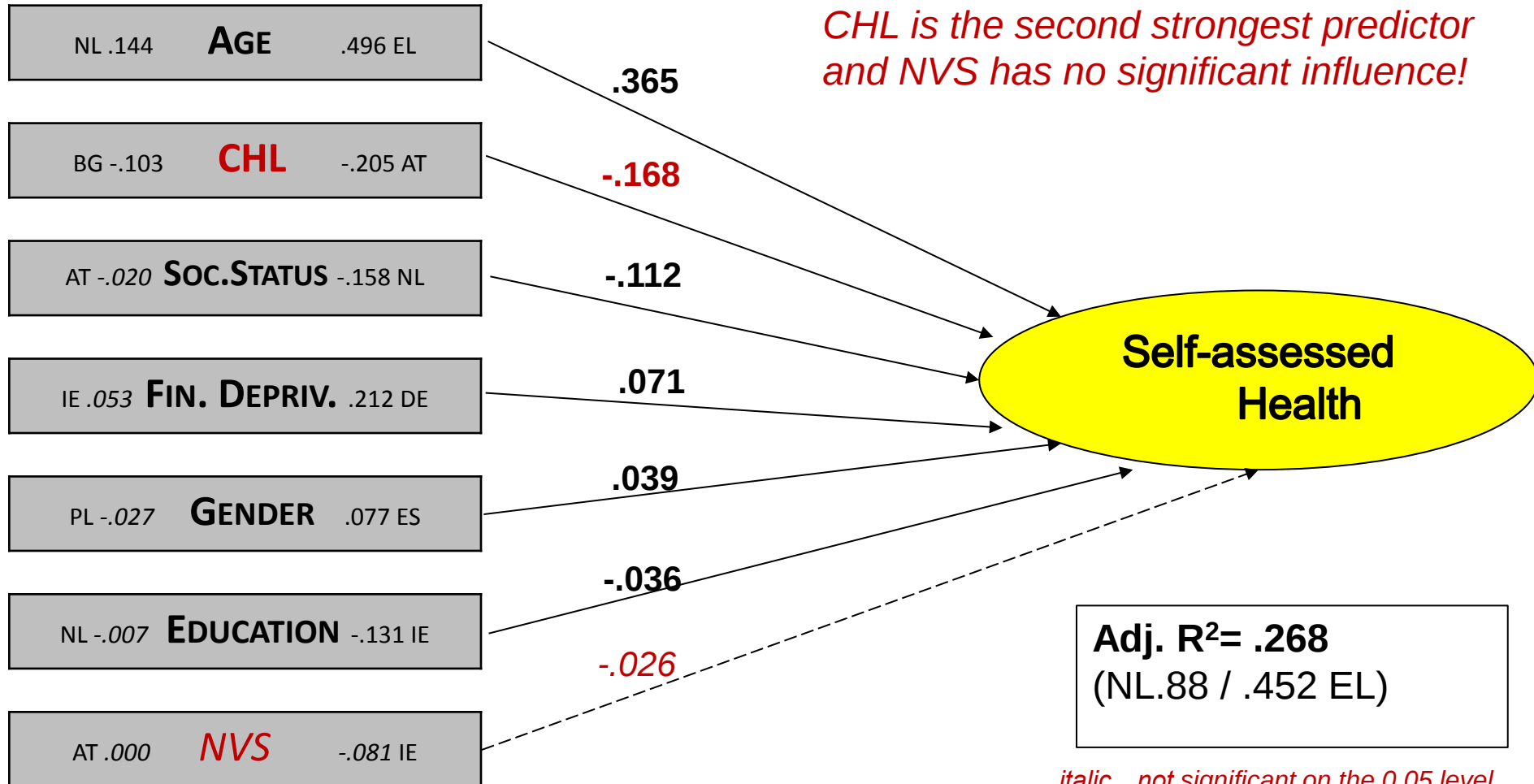
The gradient for self-assessed health holds true for each country, but on a different level and differing correlation, (for 8 Countries & Total Sample (HLS-EU 2012))



HEALTH LITERACY AS A DETERMINANT OF SELF-ASSESSED HEALTH, WHEN RELEVANT CONFOUNDERS ARE CONTROLLED FOR

Self-assessed health by 5 social and 2 HL determinants

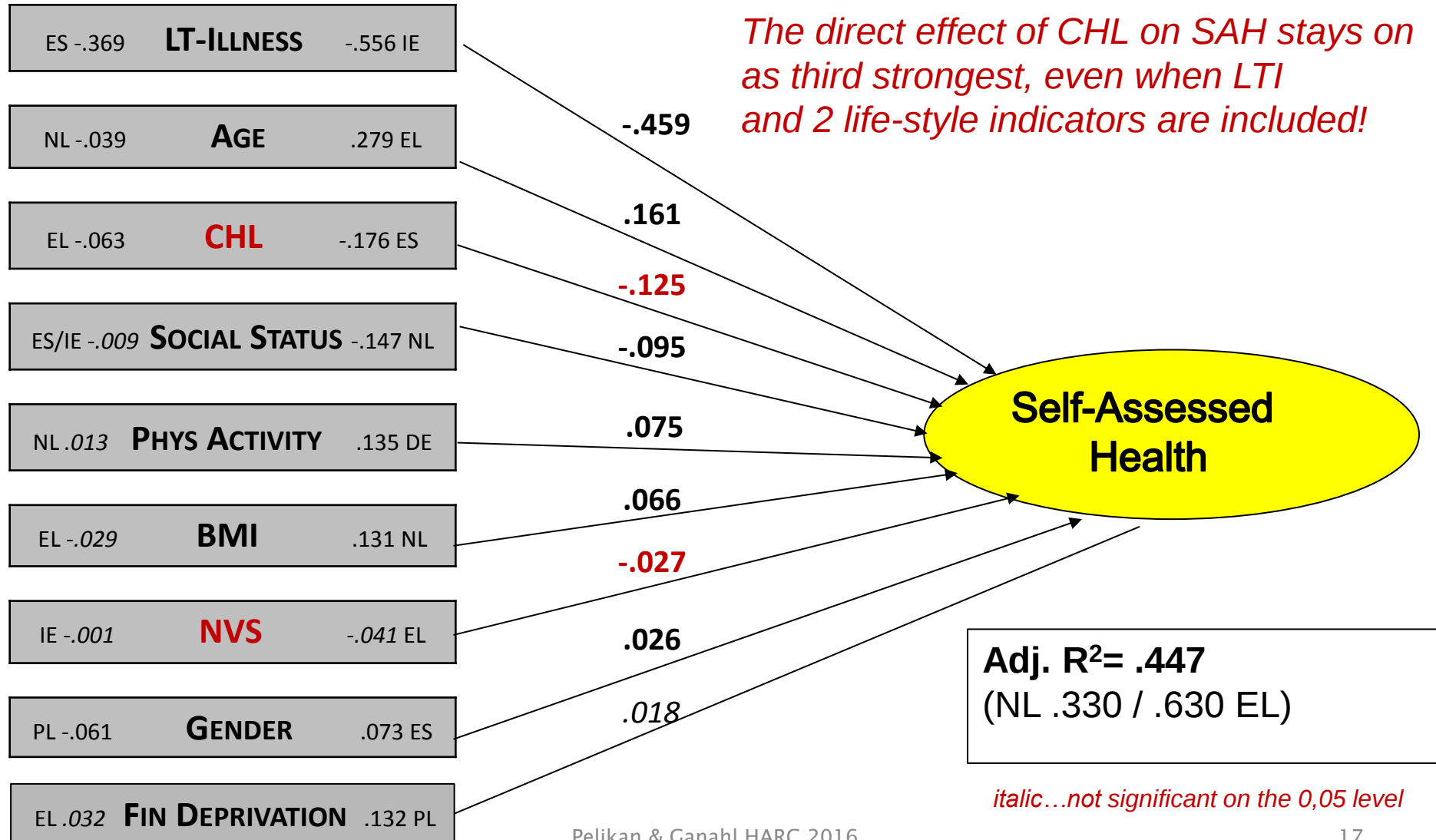
(Beta Weights and Adjusted R-Square for Total Sample and Countries) (HLS-EU 2012)



italic...not significant on the 0,05 level

Self-assessed health by 5 social, 2 HL determinants and 3 risk factors

(Beta Weights and Adjusted R-Square) (NVS were not significant!), for Countries and Total Sample (HLS-EU 2012)

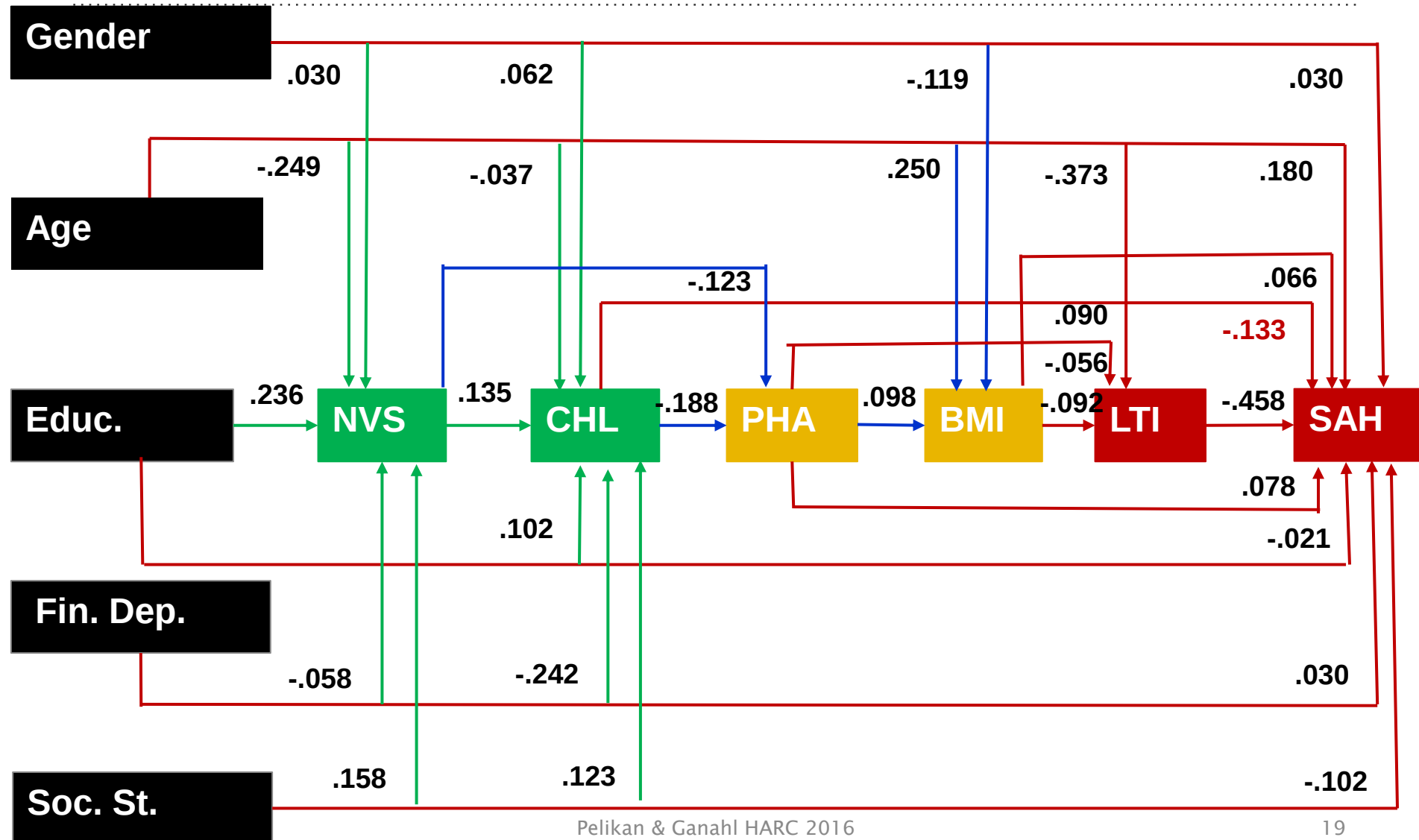


HEALTH LITERACY AS A DETERMINANT & MEDIATOR OF HEALTH RELATED INDICATORS – DIRECT AND INDIRECT EFFECTS OF HEALTH LITERACY



Path Model for all variables explaining variation of self-assessed health

(Beta weights for TOTAL, HLS-EU 2012) Explained Variance of SAH by CHL: direct .133, indirect .63, total .196



Direct & indirect effects of CHL on SAH and explained variance of dependent health related indicators in path models

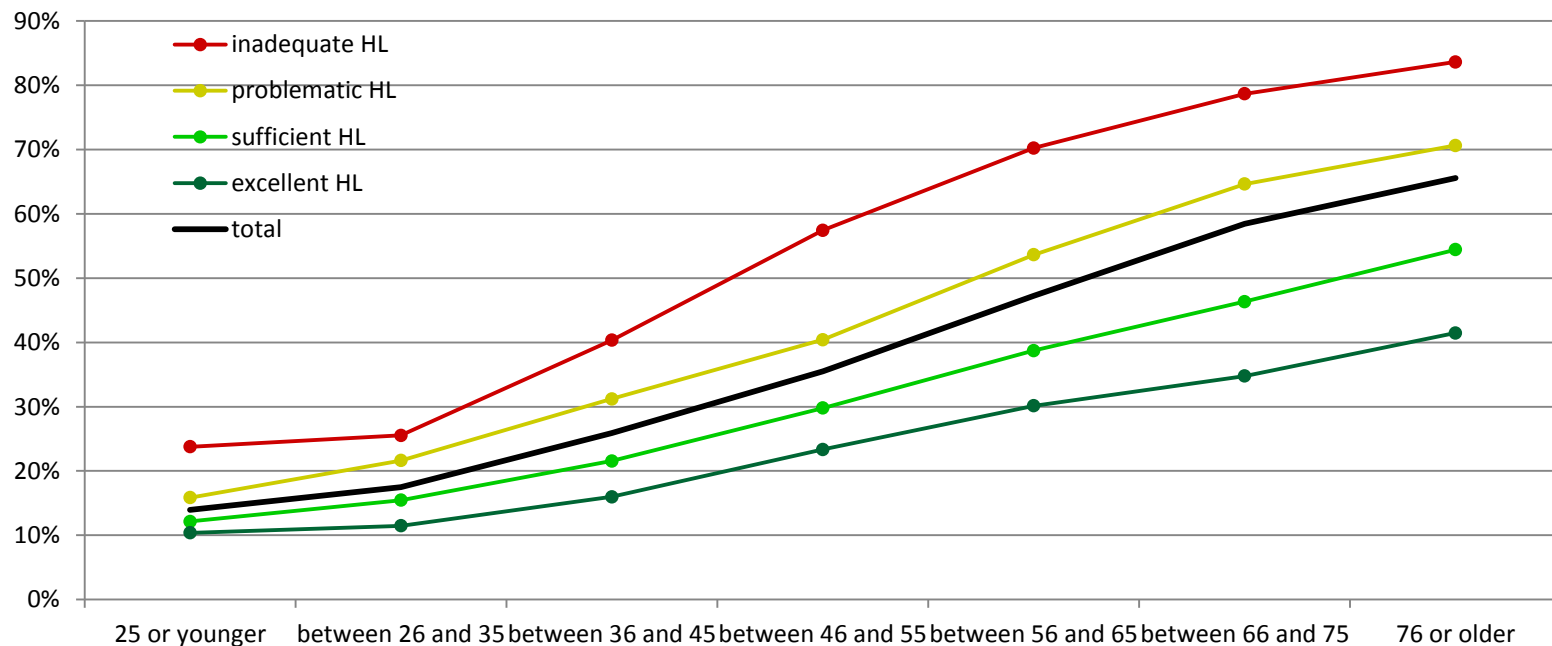
(Beta weights and adjusted R², Total & 4 countries, HLS-EU 2012)

	Total	NL	ES	PL	EL
<u>Effects of CHL on SAH</u>					
- direct	-,133	-0.113	-0.188	-0.123	-0.054
- indirect	-,063	-0.040	-0.010	-0.053	-0.069
- total	-,196	-0.153	-0.197	-0.176	-0.124
<u>R-Square</u>					
- SAH	.454	0.315	0.412	0.555	0.616
- CHI	.196	0.119	0.187	0.291	0.281
- BMI	.087	0.059	0.146	0.110	0.117
- PHA	.063	0.019	0.016	0.035	0.083
- CHL	.189	0.081	0.102	0.258	0.293
- NVS	.220	0.366	0.229	0.211	0.348

HEALTH LITERACY AS A MODERATOR OF HEALTH RELATED INDICATORS

Probability of having fair, bad or very bad self-assessed health for age groups moderated by HL levels (for Total Sample, N= 6923, HLS-EU 2012)

> *With older age the probability of having fair, bad or very bad self-assessed health is rising steadily, but much less, when one has better HL!*

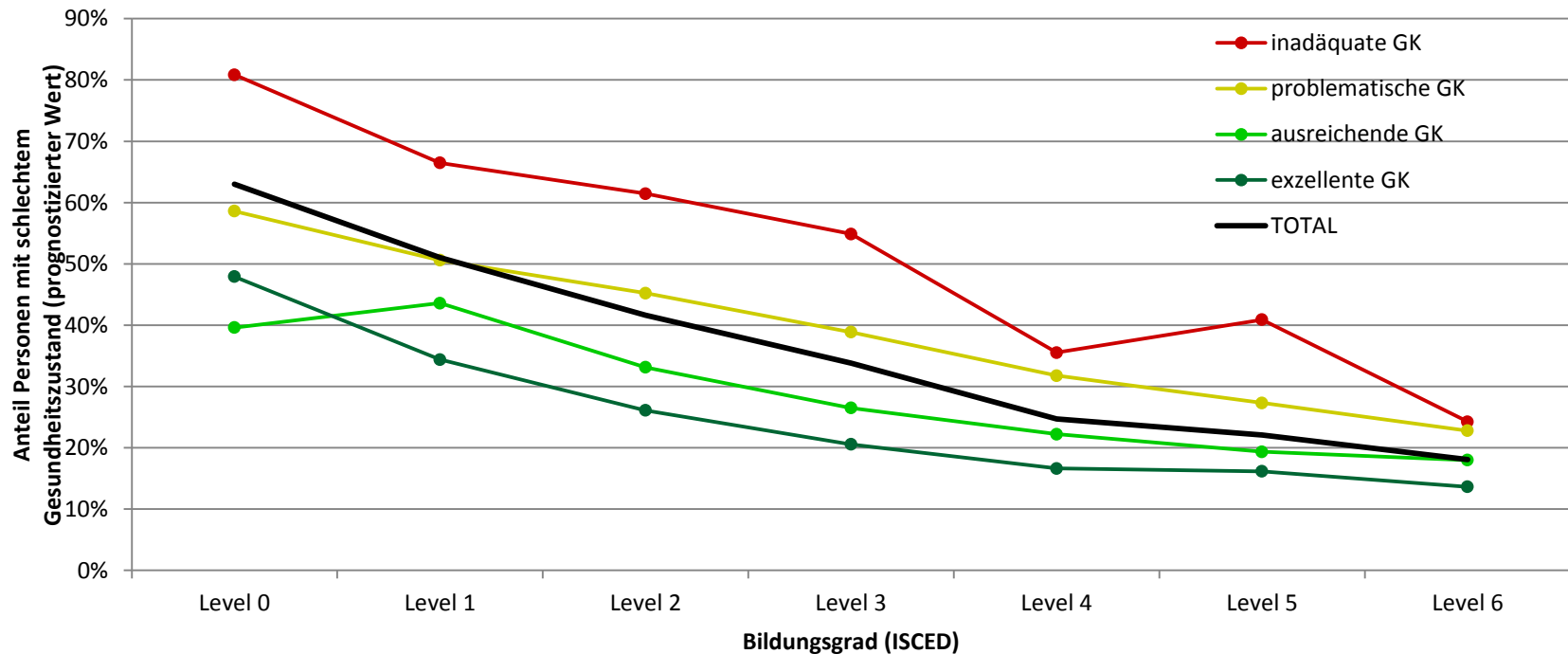


Logistic Regression controlled for: long-term illness (*), social status (*), exercising (*), BMI (*), Gen-HL-Raw (ns), age (*), gender (female ↑) (*), financial deprivation (*), demographic standard weights (ns,) – means by HL-levels and age groups

Nagelkerke/pseudo $R^2=0,46$

Probability of having fair, bad or very bad self-assessed health, for education (ISCED-Levels) moderated by HL levels (for Total Sample, N= 6903, HLS-EU 2012)

> *With better education the probability of having fair, bad or very bad self-assessed health is decreasing steadily, but much less when one has better health literacy!*



Logistic Regression controlled for: long-term illness (*), social status (*), exercising (*), BMI (*), Gen-HL-Raw (*), Education (ns), Gender (female ↑) (*), financial Deprivation(*)
– means by HL-Levels and Education-Levels

Nagelkerke/pseudo $R^2=0,44$

Summary & discussion

» Summary

- » For a **comprehensive** measure of HL (CHL) and for **general populations** in 8 European countries it could be demonstrated
 - » That CHL is a relevant social **determinant** of health (SDH) in multivariate models
 - » That CHL & NVS are **mediating** social determinants on health and their impact on health is also **mediated** by health behavior indicators or LTI
 - » That CHL is **moderating** the relationship of age and education on self-assessed health
 - » Explained variances & coefficients of effects **vary** by country.

» Limitations

- » Cross-sectional study!
- » Limited number of variables included
- » No model combining mediating & moderating effects
- » Our results partly depend on the model we have chosen for analysis!

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