10 Navigational Health Literacy

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10.1 Background and development of instrument

10.1.1 Overview of the relevance, existing research, and measures of Navigational Health Literacy

Already in 2001, the Institute of Medicine stated in their report *Crossing the Quality Chasm: A New Health System for the 21st Century* that the situation in healthcare is "characterized by more to know, more to manage, more to watch, more to do, and more people involved in doing it than at any time in the nation's history" (Institute of Medicine Committee on Quality of Health Care in America 2001: 25). This description still holds true for many healthcare systems and in fact even more strongly today than 20 years ago. Generally, positive efforts in science and technology have led to a high degree of specialization in healthcare systems. At the same time, healthcare systems have become more complex, and increasingly fragmented structures have led to coordination and interaction challenges for health professionals and healthcare users alike. But especially for patients and users, these challenges can be demanding. Users are required to orientate themselves within a large service landscape, to maneuver between and within various healthcare organizations and to interact with a range of different health professions to plan and negotiate further health care. However, meeting such demands is not always easy, and if not achieved, the consequences for the individual (and for the healthcare system) are considerable. Fruitless searches, discontinuities in health care, and, subsequently, uncertainties and burdens for patients are just some of the consequences of failing healthcare navigation (Ørtenblad et al. 2018; Schaeffer 2017; Snelgrove/Liossi 2013; Dow et al. 2012). To deal with the numerous challenges posed to patients and users by healthcare systems as well as by their structures, norms, and functions, health literacy, or more concretely, specific HL for navigating healthcare systems is needed.

Whereas the increasing complexity, fragmentation, and resulting problems have long been discussed and investigated in different countries (e.g. Ellen et al. 2018; SVR Economy 2017; WHO 2016; Hofmarcher et al. 2007; SVR 2007; Schaeffer 2004), the difficulties encountered by patients and users when dealing with information on navigational issues in healthcare systems have rarely been systematically considered. One exception is the work of Rima Rudd and colleagues (Groene/Rudd 2011; Rudd/Anderson 2006; Rudd et al. 2004; Rudd 2004), which early drew attention to the importance of HL in the context of navigation. As early as 2004, in a qualitative exploratory study, Rudd showed how demanding navigation tasks within hospitals can be. According to Rudd (2004: 23), health organizations, i.e., hospitals, represent "literate environments" which require literacy skills, e.g., reading and understanding signs and maps but also interactional skills to receive assistance with directions to orientate oneself within and navigate these organizations. In quantitative research, to our knowledge, the topic of Navigational HL was first addressed in the study *Literacy and Health in America* (Rudd et al. 2004), which built on a synthesis of health-related data from the National Adult Literacy Survey (NALS) and the International Adult Literacy Survey (IALS). In this study, literacy tasks related to rights and responsibilities, insurance applications and other coverage plans, and informed consent for procedures and studies were classified as one of five HL activities – entitled "Systems Navigation" – in the underlying Health Activities Literacy Scale (HALS) (Rudd et al. 2004: 8).

In the following years, the topic was also addressed in further studies. These studies, however, focused less on the competences and abilities needed to deal with information but more on those directly required to navigate the healthcare system, also referred to as "navigation competencies" (Gui et al. 2018: 6), which are usually considered an outcome of HL (e.g., Paasche-Orlow/Wolf, (2007)). In this regard, there are quantitative studies relating HL to aspects which are linked to the topic of navigation topic, such as delays in or foregoing needed care, difficulties in finding a provider, or in navigating and coordinating care for the elderly (Fields et al. 2018; Levy/Janke 2016) but studies and measurements describing HL regarding the specific field of navigating healthcare systems are still extremely rare.

One exception is the work by Osborne and colleagues: the authors conceptualized "navigating the healthcare system" as one of nine subdimensions of HL (Osborne et al. 2013: 8) and developed a corresponding subscale in the Health Literacy Questionnaire (HLQ) outlining the ability to find out about services and support as well as to advocate in the healthcare system on one's own behalf. However, the navigation scale in the HLQ only partly reflects a complex definition of HL (especially the steps of information processing it defines) on which a comprehensive understanding of HL and the current study is based (HLS-EU Consortium 2012; Sørensen et al. 2012). To the best to our knowledge, apart from the small number of works mentioned, there are no studies and measurement tools on HL in the specific field of navigating healthcare systems.

10.1.2 Arguments for providing a new measure and the procedure for developing a measure for Navigational HL

Most findings connecting HL to navigation issues are based on a general assessment of health literacy as described above. Data on HL displaying the specific information challenges faced when navigating healthcare systems – conceptualized in this report as *Navigational Health Literacy (Navigational HL)* – are missing. Due to the limited amount of research as well as the few attempts at conceptualizing and operationalizing Navigational HL, the HLS_{19} aimed to develop and include a new definition and associated instrument: the HLS_{19}-NAV.[4]

With the objective of conceptualizing Navigational HL in this study against the background of a comprehensive understanding of HL, a definition of Navigational HL was developed during the preparations for the HLS_{19}. This definition was based on a scoping literature review of existing definitions, concepts, and instruments in the field of navigation with a special focus on HL. It was also related to the integrative definition of HL in the HLS-EU (HLS-EU Consortium 2012; Sørensen et al. 2012). As a result, Navigational HL is defined as *people's knowledge, motivation and skills to access, understand, appraise and apply the information and communication in various forms*

[4] This assumption is based on a scoping review of the literature. Its results and the subsequent steps in defining and conceptualizing Navigational HL as well as the process of instrument development can be found in detail in Griese et al. (2020).

necessary for navigating healthcare systems and services adequately to get the most suitable health care for oneself or related persons. (Griese et al. 2020: 6)

With reference to the underlying model of HL (Sørensen et al. 2012) – in which HL is conceptualized in the three domains of *Health Care*, *Disease Prevention*, and *Health Promotion* – in this study, Navigational HL primarily focuses on the domain of health care. Although Navigational HL is also required in the context of disease prevention and health promotion, and in other contexts as well, such as rehabilitation or nursing care, it can be assumed that a large proportion of the navigational requirements for patients will arise in the domain of health care.

In this regard Navigational HL is needed on three levels:

» **a macro, systemic level** (e.g., how is the health system organized, how does it function and work?),
» **a meso, organizational level** (e.g., which service organization functions in which way, who is the right contact person there, and what are the rules for using it?), and
» **a micro, interactional level** (e.g., how to interact with and communicate one's own problems to health professionals in such a way that a workable solution for making use of health services can be jointly discussed and agreed upon). [5]

At this point, it should also be emphasized that Navigational HL refers to the information requirements related to securing and shaping health care. Questions regarding aspects of treatment and therapy (cures) are not considered here.

Like HL, Navigational HL can be understood as a relational concept (Parker 2009), i.e., it is related to both personal abilities to access, understand, appraise, and apply information on navigational issues (individual or personal Navigational HL) as well as the social, systemic, and contextual circumstances (organizational Navigational HL or responsiveness) in which information on the healthcare system is provided and within which Navigational HL is acquired. Furthermore, the term navigation is defined in this chapter as regarding navigation within a more topographical area (the healthcare system, its organizations, and proceedings). However, the term has also been used in many other contexts in the meantime, e.g., the navigation of digital environments and information sources (Bittlingmayer et al. 2020; Levin-Zamir/Bertschi 2018). These aspects are further examined in the chapter on Digital HL (Chapter 12).

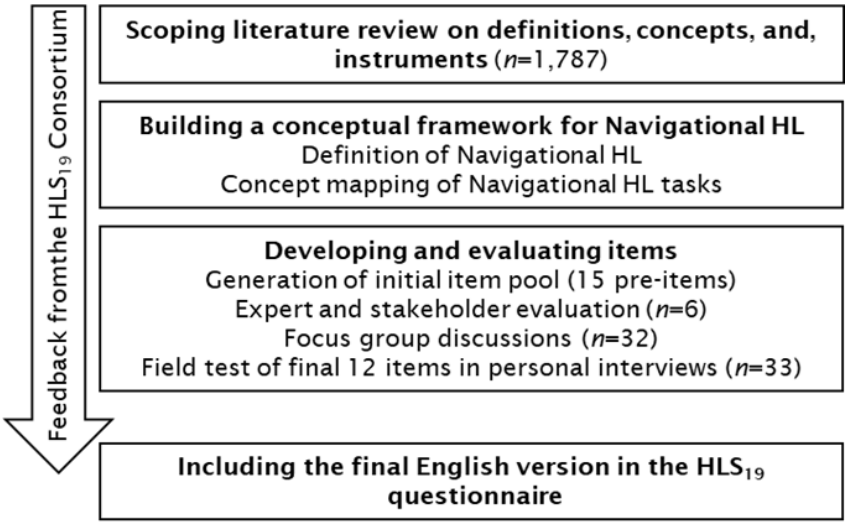
As for the development of the other optional packages, a working group on measuring Navigational HL was initiated, led by the first and second authors of this chapter. Representatives from the HLS_{19} countries interested in developing and using the package Navigational HL were invited to join the working group at an early stage of the preparations for the HLS_{19}. In the end, seven

[5] Since health literacy relating to communication with physicians in health care services (HL-COM) is treated as an autonomous concept and measure in this study (Chapter 11), it was decided to cover the interactive/communicative level of Navigational HL with just one item (HLS19-NAV12). Nevertheless, it is assumed that HL-COM is also important for patients to negotiate health care and healthcare paths and is therefore a prerequisite for navigating healthcare systems and Navigational HL.

experts from Germany, Austria, Switzerland, Norway, Portugal, and the Czech Republic were involved.

The detailed procedure for developing the instrument is shown in Figure 10.1. It is based on a scoping review of the literature on existing definitions, concepts, and instruments on navigation in healthcare systems with special regard to HL, developing a conceptual framework, formulating the first items formation and item evaluation.

Figure 10.1:
Steps in the development of the HLS_{19}-NAV (in accordance with Griese et al., 2020, p. 3)



Source: Griese et al., 2020, p. 3

The item formation step also included alignment with the HLS-Q47 items. Since item Q4 in the HLS_{19}-Q47 also refers to the navigation topic ("to find out where to get professional help when you are ill"), it was decided not to include this item in the HLS_{19}-NAV. Furthermore, the wording of item Q35 in the HLS-Q47 in the subdimension of HL for health promotion (HP-HL) is roughly reflected in item HLS_{19}-NAV4 ("to understand information on ongoing health care reforms that might affect your health care"). However, the wording was modified in such a way that it focuses on reforms in the field of health care and is thus much narrower than item Q35 in the HLS-Q47, which only refers to health in general. An overlap between these items can also be excluded because item Q35 in the HLS-Q47 is not part of the HLS_{19}-Q12 measure used in this study.

To evaluate the items, the initial item pool was tested in four focus groups in relation to the clarity and interpretation of the content. A panel of six experts/stakeholders was also asked how well each item reflected the concept of Navigational HL. The Content Validity Index for Items (I-CVI) and Scales (S-CVI) were applied to assess their content validity (Lynn 1986; Polit/Beck 2006). After revising the items, the final instrument was field tested in 33 personal interviews in the German pre-test, leading to slight adjustments based on the results and interviewers' feedback in the

introduction part of the instrument.[6] The item evaluation took place in Germany. To ensure transferability to and practicability in other country contexts, the items were constantly translated back and forth between German and English throughout the entire process to obtain feedback from the other international experts participating in M-POHL. The methodological approach and the status of the instrument were also presented and discussed at two M-POHL meetings. The agreed English version of the final instrument was included in the HLS_{19} questionnaire and was integrated in the national translation processes (Chapter 2).

The final instrument (HLS_{19}-NAV) consists of 12 items mapping specific Navigational HL information tasks on the system (macro), organization (meso), and interaction (micro) levels of the healthcare system. Thus, Navigational HL is operationalized by asking for difficulties experienced in relation to tasks on accessing, understanding, appraising, and applying information for navigating the healthcare system. Like the HLS_{19}-Q12, the HLS_{19}-NAV uses the 4-point rating scale response categories "very difficult" - "difficult" - "easy" - "very easy" (for detailed procedure see Griese et al. 2020).

10.1.3 Objectives and research questions on Navigational HL

The overall objective was to develop and validate a new instrument for measuring Navigational HL and to provide, for the first time, data on Navigational HL covering a set of different countries participating in the HLS_{19} and to examine whether the new HL measure of Navigational HL adds value to the existing measure of General HL.

It is hypothesized that Navigational HL is related to the amount of complexity involved in how health care is provided in different healthcare systems and the associated requirements in information processing. Furthermore, it was assumed that Navigational HL is distributed differently in the population and, as was already shown in previous research on HL, is subject to a social gradient. In addition, the aim was to prove to what extent Navigational HL is linked to different health outcomes, with the focus being on health care utilization and general health status outcomes.

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Germany was the first country that was able to conduct the national field test, so that its results on the Navigational HL measure could be included in the English version of the HLS19 questionnaire before other countries started their field testing.

The specific research questions are:

» To what extent does the newly developed instrument constitute a scale for measuring Navigational HL with acceptable psychometric properties?
» How is Navigational HL distributed over individual items and the score of its scale in the various countries participating in the HLS19?
» How is Navigational HL distributed in different subpopulations and which population groups are particularly disadvantaged regarding Navigational HL?
» Is there a social gradient for Navigational HL and how strong are selected socio-economic and socio-demographic predictors of Navigational HL?
» How does Navigational HL correlate with the other HL measures in the HLS19?
» Is there a significant association among Navigational HL, health care utilization, and general health outcomes?

10.1.4 Countries participating in Navigational HL

The topic of Navigational HL was included in the HLS19 as an optional package. The package was chosen and applied by eight countries: Austria (AT), Belgium (BE), Switzerland (CH), Czech Republic (CZ), Germany (DE), France (FR), Portugal (PT), and Slovenia (SI). A detailed overview of the countries using the optional package, including the type and period of data collection as well as the number of respondents can be found in Chapter 2 and Chapter 3 of this report.

10.2 Methods of analyses and results

To analyze and report on Navigational HL, the rated difficulties on the 12 HLS19-NAV items, their Average Percentage Response Patterns (APRP) and measures of the HL-NAV (score) were used. The calculation of these indicators is based on the same procedure described for the HLS19-Q12 (in Sections 4.2 & 4.4).

In the visualization of the perceived difficulties at item level, the response categories "very difficult" and "difficult" were combined for Figure 10.2. An overview of the results for all response categories can be found in Annex 10.1 (Table A 10.1 to Table A 10.12).

To calculate the APRP (for more detail, see Section 4.4), how often each respondent selected one of the four response categories was counted. Then, for each response category, it was calculated how often a category was selected on average before the mean values were scaled to the percentage of valid responses. The APRP indicate the distribution of average percentages for the four categories of all items in the HLS19-NAV.

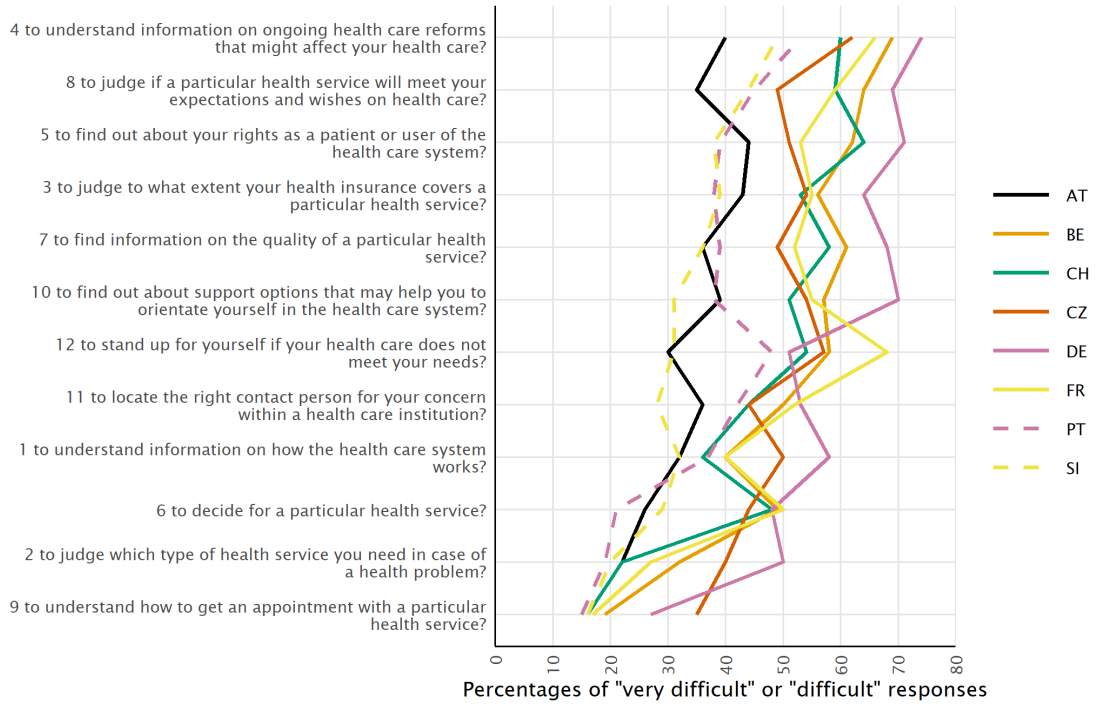
Following the HLS19 procedure for calculating General HL, Navigational HL is also based on a count of the dichotomized items by combining the categories “easy” and “very easy”. The resulting raw score was standardized to the range of 0 to 100 and so the score indicates the percentage of valid

items that were answered with either “easy” or “very easy” by an individual respondent or, on average, by a group of respondents. Scores were only computed for respondents who had answered at least 80% of the 12 HLS$_{19}$-NAV items.

10.2.1 Distributions of individual HLS$_{19}$-NAV items by country

As Figure 10.2 demonstrates, there is some overlap in the ranking of the difficulty of Navigational HL tasks across countries, with some deviations.

Figure 10.2:
Percentages of respondents who responded with “very difficult” or “difficult” to the HLS$_{19}$-NAV items (ordered by the overall mean), for each country



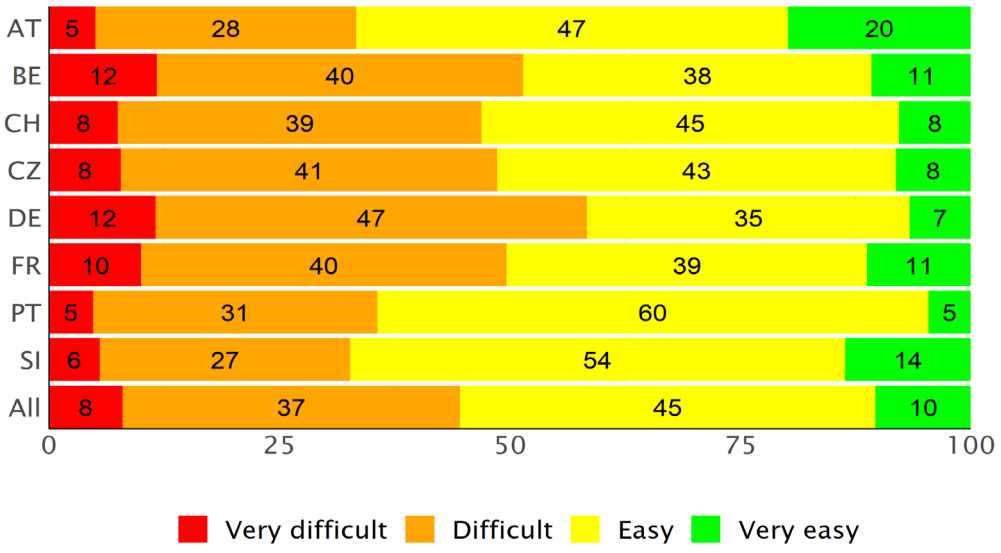
Source: HLS$_{19}$ Consortium

The percentages of the combined “difficult” or “very difficult” answers to the 12 HLS$_{19}$-NAV items range between 19.5% and 56.6% (cf. Annex 10.1, Table A 10.13). In all participant countries, item HLS$_{19}$-NAV9 “to understand how to get an appointment with a particular health service” was assessed as being the easiest task (on average, with the countries weighted equally, only 19.5% answered “difficult” or “very difficult”). On the other hand, on average, 56.6% answered “difficult” or “very difficult” to item HLS$_{19}$-NAV4 “to understand information on ongoing health care reforms that might affect health care”, which thus was the most difficult task. Item HLS$_{19}$-NAV8 “to judge if a particular health service will meet the expectations and wishes on health care” was not much

easier (52.0%). Likewise, item HLS$_{19}$-NAV5 “to find out about rights as a patient or user of the healthcare system” proved to be challenging (51.6%), as did item HLS$_{19}$-NAV3 “to judge to what extent the health insurance covers a particular health service” (49.2%). Furthermore, item HLS$_{19}$-NAV7 “to find information on the quality of a particular health service” was also rated “difficult” or “very difficult” by approximately half of all respondents (48.8%). In this regard it is striking that large parts of the population face problems in seeking help for such navigation requirements. Finally, 47.6% rated item HLS$_{19}$-NAV10 “to find out about support options that may help to orientate in the healthcare system” as being “difficult” or “very difficult”.

On average, 45% of the items were answered with "difficult" or "very "difficult" by all respondents (Figure 10.3). This percentage varied from 33% (AT, SI) to 59% (DE).

Figure 10.3:
Average Percentage Response Patterns (APRP) for the response categories “very difficult”-“difficult”-“easy”-“very easy” of the 12 HLS$_{19}$-NAV items, for each country and the mean of all countries (equally weighted)



Source: HLS$_{19}$ Consortium

10.2.2 Psychometric validity analyses

The newly developed HLS$_{19}$-NAV was validated using both classical and modern test theory.

To test for unidimensionality in Confirmatory Factor Analysis (CFA), the 12 items were set to *load on a single factor* using the lavaan package (Roussel 2012) for R (R Core Team 2020b). For details on the procedure, see Subsection 4.7.2 in this report. To estimate the internal consistency of the HLS$_{19}$-NAV, the Cronbach alpha coefficient was computed for each country (Subsection 4.7.1). To

increase the validity of the scale, the two aspects of navigating on a systemic level and organizational level (Griese et al. 2020) were measured.[7] The two-factor model CFA indicates very slightly improved model fit indices for some countries (Annex 10.2, Table A 10.14). The high latent correlation between the two factors (r=0.84–0.96) indicated poor discriminant validity and, hence, suggested a one-factor structure. When fitting the data against the unidimensional polytomous partial credit Rasch model (Masters 1982; Rasch 1960) by using the RUMM2030plus software (Andrich/Sheridan 2019), the available dependent t-test procedure revealed that the two aspects introduced some multidimensionality into the scale. However, it was decided to treat the Navigational HL scale as unidimensional.

The results show (Table 10.1) that it is reasonable to include all items in a common index, even though there are some limitations regarding the evaluation of the overall model. For three countries (BE, CH, and PT), the Root Mean Square Error of Approximation (RMSEA) was > 0.06. Nevertheless, RMSEA < 0.08 can be interpreted as acceptable (Browne/Cudeck 1993). Similar assumptions can be made for the Standardized Root Mean Square Residual (SRMR), where values of < 0.8 indicate an acceptable model fit. With a minimum of 0.97, the other fit indices indicate at least an acceptable fit across all countries. The reliability values of the HLS_{19}-NAV can be rated as good (Table 10.3).

[7] When testing for a multi-factor structure with an identical number of items in each scale, items HLS_{19}-NAV12 and HLS_{19}-NAV9 were excluded from analyses since they revealed limitations in the Rasch analyses for some countries: *System*: HLS_{19}-NAV1, 2, 3, 4, 5; *Organization*: HLS_{19}-NAV6, 7, 8, 10, 11.

Table 10.1:
Fit indices for the HLS_{19}-NAV single-factor CFA, for each country and the mean for all countries (equally weighted)

	AT	BE	CH	CZ	DE	FR	PT	SI	Mean
Standardized Root Mean Square Residual	0.05	0.06	0.07	0.03	0.07	0.05	0.06	0.05	0.06
Root Mean Square Error of Approximation	0.05	0.07	0.07	0.02	0.06	0.06	0.07	0.05	0.05
Root Mean Square Error of Approximation (CI lower bound)	0.05	0.06	0.06	0.01	0.06	0.05	0.06	0.05	0.06
Root Mean Square Error of Approximation (CI upper bound)	0.05	0.07	0.07	0.03	0.07	0.06	0.08	0.06	0.06
Root Mean Square Error of Approximation (p value)	0.48	0.00	0.00	1.00	0.00	0.01	0.00	0.06	0.19
Comparative Fit Index	0.99	0.99	0.99	1.00	0.98	1.00	1.00	0.99	0.99
Tucker-Lewis Index	0.99	0.99	0.98	1.00	0.97	0.99	0.99	0.99	0.99
Goodness of Fit Index	0.99	0.99	0.99	1.00	0.98	1.00	0.99	0.99	0.99
Adjusted Goodness of Fit Index	0.99	0.98	0.98	1.00	0.97	0.99	0.99	0.99	0.99

Source: HLS_{19} Consortium

Standardized parameter estimates are shown in Table 10.2. Loadings are close to or above 0.70 for most items, meaning the theorized factor explained most of the items well (Knekta et al. 2019). The loadings are highest between the factor and item HLS_{19}-NAV10 "to find out about support options that may help you to orientate yourself in the healthcare system" (mean: 0.86) and the lowest loadings between the factor and item HLS_{19}-NAV9 "to understand how to get an appointment with a particular health service" (mean: 0.68).

Table 10.2:
Standardized Parameter Estimates, for each country and the mean for all countries (equally weighted)

	AT	BE	CH	CZ	DE	FR	PT	SI	Mean
HLS_{19}-NAV1	0.74	0.80	0.74	0.78	0.73	0.79	0.85	0.80	0.78
HLS_{19}-NAV2	0.76	0.82	0.77	0.81	0.70	0.72	0.83	0.84	0.78
HLS_{19}-NAV3	0.72	0.75	0.73	0.76	0.61	0.84	0.80	0.84	0.76
HLS_{19}-NAV4	0.78	0.87	0.82	0.80	0.81	0.90	0.93	0.85	0.84
HLS_{19}-NAV5	0.85	0.86	0.87	0.84	0.80	0.85	0.87	0.86	0.85
HLS_{19}-NAV6	0.76	0.79	0.79	0.76	0.58	0.86	0.86	0.80	0.78
HLS_{19}-NAV7	0.81	0.88	0.83	0.77	0.70	0.89	0.93	0.87	0.84
HLS_{19}-NAV8	0.83	0.90	0.85	0.82	0.65	0.93	0.94	0.85	0.85
HLS_{19}-NAV9	0.58	0.61	0.62	0.82	0.65	0.57	0.82	0.77	0.68
HLS_{19}-NAV10	0.84	0.84	0.83	0.85	0.83	0.89	0.89	0.87	0.86
HLS_{19}-NAV11	0.77	0.79	0.75	0.79	0.65	0.85	0.89	0.79	0.78
HLS_{19}-NAV12	0.71	0.77	0.78	0.72	0.61	0.91	0.88	0.71	0.76

Source: HLS_{19} Consortium

Rasch analyses were administered to provide information on the overall data-model fit, targeting, reliability, individual item data-model fit, the ordering of response categories, response dependency, and the presence of differential item functioning (DIF).

Testing data against the unidimensional polytomous Rasch Partial Credit Model (PCM) (Masters 1982; Rasch 1960) for country-wise samples with 20 persons per threshold, good overall data-model fit for the HLS_{19}-NAV is observed in Austria ($\chi 2$: n=720, $p > 0.05$). In Switzerland, the Czech Republic, and Germany, analyses display sufficient overall data-model fit ($\chi 2$: n=720, $p > 0.01$). Reducing the sample size to n=360 or ten persons per threshold resulted in data collected in Belgium, Portugal, and Slovenia displaying sufficient/good overall data-model fit, but not France. For a well-targeted scale, the mean person location should be around zero, indicating that the measure is neither too easy nor too hard (Tennant/Conaghan 2007). The mean person location ranged between -0.31(DE PAPI) and 0.96 (SI CAWI). The scale was well-targeted for the following populations: Belgium (CAWI mean=-0.07), the Czech Republic (CAWI mean=-0.15), France (CAWI mean=0.11), Germany (PAPI mean=-0.31), Portugal (CATI mean=0.21), and Switzerland (CAWI mean=0.04). In Austria (CATI mean=0.91) and Slovenia (CAWI mean=0.96), targeting could have been somewhat better. Regarding the data-model fit at the item level, Infit (MNSQ) indicated poor fit and under-discrimination for item HLS_{19}-NAV9 in the Belgian (MNSQ=1.39) and French data (MNSQ=1.54) as well as for item HLS_{19}-NAV12 in the Czech (MNSQ=1.35) and Slovenian (MNSQ=1.44) data (MNSQ >1.3 and significant $\chi 2$) (Yan/Mok 2012). As DIF analyses are sensitive to sample size, only significant DIFs at a Bonferroni-adjusted 5% and amended sample size of n=720 are reported. Item HLS_{19}-NAV3 displayed DIF for employment status in data from Belgium and Switzerland as well as for age in data from Switzerland and France. Furthermore, item HLS_{19}-NAV4 displayed DIF for age and item HLS_{19}-NAV6 displayed DIF for difficulty with paying bills in Portugal. Item HLS_{19}-NAV7 displayed DIF for gender and age in the Czech Republic, for age in France, and for education level and difficulties with paying bills in Switzerland. For item HLS_{19}-

NAV8, the French data indicated DIF for age. Item HLS_{19}-NAV9 displayed DIF for age and employment status in Austria. In Belgium, DIF was observed for item HLS_{19}-NAV12 regarding paying bills. It is striking that with the sample size of n=720, no items displayed DIF in the German and Slovenian data. Response dependency was observed between items HLS_{19}-NAV7 and HLS_{19}-NAV8 in the Belgian (r=0.37), Portuguese (r=0.43), and Swiss (r=0.38) data. No signs of unordered response categories were found, indicating that the 4-point response scale worked well.

In line with the reported Cronbach's alpha (Tennant/Conaghan 2007), the Person Separation Index (PSI) indicated high reliability.

Table 10.3:
Cronbach's alpha and the Person Separation Index (PSI) for HLS_{19}-NAV, for each country and the mean of all countries (equally weighted)

	AT	BE	CH	CZ	DE	FR	PT	SI	Mean
Alpha	0.87	0.89	0.88	0.90	0.83	0.91	0.92	0.90	0.89
PSI	0.90	0.92	0.91	0.92	0.88	0.93	0.88	0.92	0.91

Source: HLS_{19} Consortium

In all countries, the correlation between the Navigational HL score (HL-NAV) and the General HL (GEN-HL) score was positive and at, on average, r=0.56 (varying from r=0.41 (BE) to r=0.63 (FR)) also of considerable size (Table 10.4).

Regarding the other specific HL measures used in the HLS_{19}, a positive correlation was shown for the HL-NAV and the long and short forms of the "HL relating to communication with physicians in health care services measure" (HL-COM) in each country (r=0.47/r=0.43 on average, ranging from 0.49 (AT) to 0.36 (BE)). The same applies to HL-NAV and Digital HL (HL-DIGI) (r=0.55 on average, ranging from 0.67 (FR) to 0.36 (BE)). A positive correlation was also observed between HL-NAV and Vaccination HL (HL-VAC) with, on average, r=0.40, ranging from r=0.49 (SI) to r=0.26 (BE).

Therefore, it can be argued that the HL-NAV overlaps with the other HL measures used in the HLS_{19}, showing that it belongs to this family of HL measures, but that its use in the HLS_{19} is independent enough from these to make a specific contribution to measuring HL.

Table 10.4:
Pearson correlation between HL-NAV and other HL scores used in the HLS_{19}, for each country and the mean for all countries (equally weighted)

HL-NAV and	AT	BE	CH	CZ	DE	FR	PT	SI	Mean
GEN-HL	0.56	0.41	0.56	0.55	0.6	0.63	0.53	0.61	0.56
HL-COM-Q11	0.49	-	-	-	0.48	-	-	0.45	0.47
HL-COM-Q6	0.46	0.36	-	0.45	0.45	0.44	-	0.44	0.43
HL-DIGI	0.57	0.36	0.52	0.57	0.59	0.67	0.54	-	0.55
HL-VAC	0.38	0.26	-	0.47	0.38	-	0.42	0.49	0.4

Source: HLS_{19} Consortium

10.2.3 Distribution of the Navigational HL scores by country

Like the GEN-HL score, the HL-NAV score was also defined to range from 0-100, where 0 indicates the lowest and 100 the highest possible level of Navigational HL. The mean score (Table 10.5) indicates the percentage of valid items that were answered with either "easy" or "very easy" on average by the respondents in individual countries or by selected subpopulation groups.

On average the mean score is 55.3, varying considerably from 41.6 (DE) to 67.4 (SI). The standard deviation (SD) on average is 31.8 (varying from 28.2 (DE) to 34.1 (FR)). The distribution of the HL-NAV does not indicate normal distribution but rather differing distribution patterns across countries and a strong ceiling effect for all countries, apart from DE, where the distribution is rather right-skewed (Annex 10.4, Figure A 10.1).

Table 10.5:
Means, standard deviations, quartiles, for HL-NAV, for each country and the mean for all countries (equally weighted)

HL-NAV	AT	BE	CH	CZ	DE	FR	PT	SI	Mean
Mean	66.8	48.6	52.9	50.7	41.6	50.4	64.2	67.4	55.3
SD	30.1	32.8	31.5	33.8	28.2	34.1	32.4	31.7	31.8
Median	75.0	41.7	50.0	50.0	41.7	41.7	66.7	75.0	
25th percentile	41.7	16.7	25.0	20.0	16.7	16.7	64.2	41.7	
75th percentile	100.0	75.0	83.3	83.3	58.3	83.3	100.0	100.0	

Source: HLS_{19} Consortium

10.2.4 Identification of specific vulnerable/disadvantaged subpopulations

Like for General HL, it is also of interest to explore what disadvantaged or vulnerable subpopulations have lower Navigational HL than the average population. The same eight subgroups were investigated as for General HL (Table 10.6). The strongest deviations from general population means were found for bad or very bad self-perceived health (on average -11.6, varying from -4.4 (CZ) to -20.4 (PT)), followed by considerable or severe financial deprivation (on average -9.9, varying from -1.5 (BE) to -14.4 (PT)), level in society/social status (less than or equal to 4) (on average -9.0, varying from -1.9 (AT) to -15.9 (PT)), education (ISCED 0,1) (on average -5.6, varying from 7.1 (CZ) to -14.2 (SI)), and limited by health problems (on average -5.4, varying from -2.8 (CZ) to -13.4 (PT)), while the average deviations were lowest for age (76 or older) yet inconsistent (on average -1.7, varying from +6.3 (CZ) to -14.5 (SI)), long-term illnesses/health problems (one or more) (on average -3.4, varying from -0.4 (BE) to -8.6 (PT)), and utilization of GPs/family doctors (6 or more contacts) (on average -3.4, varying from -1.0 (CZ) to -6.5 (DE)).

Table 10.6:
Deviation of Navigational HL mean scores for potentially vulnerable subpopulations relative to the total mean score of the country, for each country and the mean for all countries (equally weighted)

	AT	BE	CH	CZ	DE	FR	PT	SI	All
HL-NAV country mean	66.8	48.6	52.9	50.7	41.6	50.4	64.2	67.4	55.3
Aged 76 or older	4	-	4.2	6.3	-8.7	-	-	-14.5	-1.7
Education at ISCED levels 0 or 1	-	-	-4.5	7.1	-	-	-10.6	-14.2	-5.6
Level in society less than or equal to 4	-1.9	-11.7	-7.5	-6.5	-9.5	-7.7	-15.9	-11.6	-9
Considerable or severe financial deprivation	-12	-1.5	-8.2	-13.9	-10.3	-8.7	-14.4	-10.5	-9.9
Bad or very bad self-perceived health	-6.3	-10.6	-10.2	-4.4	-14.8	-6.3	-20.4	-19.6	-11.6
One or more long-term illnesses or health problems	-2.9	-0.4	-2.9	-0.6	-3.1	-3.3	-8.6	-5.5	-3.4
Limited by health problems	-6.2	-3.5	-4.6	-2.8	-3.9	-1.1	-13.4	-7.7	-5.4
6 or more contacts with a GP/family doctor	-3	-2.2	-3.9	-1	-6.5	-3.3	-	-4.2	-3.4

- Cells with less than 30 respondents were not reported, as was the case in some countries for old age, low education, and contacts with a GP/family doctor, were not reported.

Source: HLS_{19} Consortium

10.2.5 Determinants of Navigational HL

Like in the HLS_{19} generally, a social gradient and core social determinants were also investigated for Navigational HL. As hypothesized, core socio-demographic and socio-economic determinants like gender, age, education, level in society, financial deprivation, and, additionally, migration status and training in a health profession were investigated. Migration background was not included in the regression analyses due to extremely low Spearman correlations with Navigational HL across all countries. Training in a health profession, which is not a common social predictor of HL, was just included as a Spearman correlation in Table 10.7.

In all countries, the correlations between Navigational HL and the hypothesized determinants are rather weak, being highest on average for financial deprivation (ρ=-0.19, varying from ρ=-0.05 (BE) to ρ=-0.35 (PT)), level in society (ρ=0.15; varying from ρ=-0.01 (AT) to ρ=0.28 (PT)), and for no training in a health profession (ρ=-0.09, varying from ρ=0.03 (AT) to ρ=-0.15 (DE). The correlations with gender, education, age, and migration status are rather low, in contrast, partly due to very different and inconsistent forms of associations of these potential determinants with Navigational HL (see Figures A 10.2 to A 10.7 in Annex 10.7).

Table 10.7:
Spearman correlations between Navigational HL and selected determinants, for each country and for all countries (equally weighted)

	AT	BE	CH	CZ	DE	FR	PT	SI	All
Gender female	-0.03	-0.05	-0.04	-0.01	-0.03	-0.08	-0.02	-0.01	-0.04
Age in years	-0.07	0	0.04	0	-0.09	-0.1	-0.13	-0.13	-0.06
Education	0	0.03	-0.03	-0.09	0.2	0	0.11	0.15	-0.02
Level in society	-0.01	0.22	0.17	0.16	0.25	0.17	0.28	0.23	0.15
Financial deprivation	-0.18	-0.05	-0.21	-0.27	-0.22	-0.16	-0.35	-0.3	-0.19
Migration background	0.07	0.05	0.02	0	0	0	0.01	0.02	0.03
No training in a health profession	0.03	-0.08	-0.07	-0.13	-0.15	-0.11	-0.1	-0.14	-0.09

Education by 9 ISCED levels, from 0 (lowest) to 8 (highest level).
Level in society from 1=lowest level to 10=highest level in society.
Financial deprivation: 4 categories, from no deprivation (0) to severe deprivation (100).
Migration background: 0=none, 1=one parent born abroad, 2=both parents born abroad, 3=born abroad.

Source: HLS_{19} Consortium

A multivariable linear regression model with the five socio-demographic and socio-economic variables explained on average 6% of the variance (varying from 4% (AT) to 13% (PT)) (Table 10.8). The strongest predictor is financial deprivation (β=-0.15, varying from -0.01 (BE) to -0.25 (CZ)), followed by level in society (β=0.14, varying from 0 (AT) to 0.22 (BE)), age (β=-0.08, varying from

0.01 (CH) to −0.13 (FR)), education (β=−0.11, varying from 0.10 (DE) to −0.14 (CZ)), and gender female (β=−0.02, varying inconsistently from +0.02 (CZ) to −0.07 (FR)). Thus, it can be concluded that there is a social gradient for Navigational HL, differing considerably across countries.

Table 10.8:
Multivariable linear regression models of Navigational HL by five core social determinants (standardized coefficients (β) and R^2), for each country and for all countries (equally weighted)

	AT	BE	CH	CZ	DE	FR	PT	SI	All
Gender female	−0.02	−0.05	−0.04	0.02	−0.01	**−0.07**	0	0.01	**−0.02**
Age in years	**−0.07**	−0.02	0.01	−0.02	**−0.09**	**−0.13**	**−0.10**	**−0.09**	**−0.08**
Education	**−0.06**	−0.03	**−0.13**	**−0.14**	**0.10**	**−0.10**	**−0.08**	−0.02	**−0.11**
Level in society	0	**0.22**	**0.14**	**0.12**	**0.15**	**0.17**	**0.18**	**0.12**	**0.14**
Financial deprivation	**−0.18**	−0.01	**−0.17**	**−0.25**	**−0.11**	**−0.09**	**−0.23**	**−0.23**	**−0.15**
R^2	0.04	0.05	0.07	0.1	0.09	0.06	0.13	0.11	0.06
Valid count	2587	988	1983	1523	1845	2003	1012	3160	
Total count	2967	1000	2502	1599	2143	2003	1247	3360	

Coefficients with p-values lower than 0.01 in bold.
Due to rounding the numbers to two significant decimals, zeros may represent a value in the range of −0.005 to +0.005.
Education by 9 ISCED levels, from 0 (lowest) to 8 (highest level).
Level in society from 1=lowest level to 10=highest level in society.
Financial deprivation: 4 categories, from no deprivation (0) to severe deprivation (100).

Source: HLS_{19} Consortium

With the inclusion of General HL in the model, the explained variance, on average, rises considerably to 35% (varying from 19% (BE) to 43% (FR)) (Table 10-9). Now General HL is by far the strongest predictor of Navigational HL (β=0.53, varying from 0.38 (BE) to 0.62 (FR)), which could be expected due to the considerable correlation of the two measures. By adding General HL, the other predictors are reduced, but level in society (β=0.09) and financial deprivation (β=−0.07) are still somewhat stronger on the overall level than education (β=−0.06), age (β=−0.05), and being female (β=−0.04).

Table 10.9:
Multivariable linear regression models of Navigational HL by five core social determinants and GEN-HL (standardized coefficients (β) and R^2), for each country and for all countries (equally weighted)

	AT	BE	CH	CZ	DE	FR	PT	SI	All
GEN-HL	**0.54**	**0.38**	**0.52**	**0.51**	**0.56**	**0.62**	**0.48**	**0.56**	**0.53**
Gender female	**-0.06**	-0.06	-0.05	-0.02	-0.05	**-0.09**	0.02	-0.01	**-0.04**
Age in years	-0.03	-0.03	0.01	**-0.07**	-0.03	**-0.13**	-0.05	-0.02	**-0.05**
Education	-0.04	-0.01	**-0.12**	**-0.07**	0.03	**-0.07**	**-0.13**	-0.04	**-0.06**
Level in society	0	**0.15**	**0.09**	**0.06**	**0.1**	**0.08**	**0.14**	**0.07**	**0.09**
Financial deprivation	**-0.07**	-0.03	**-0.1**	**-0.14**	-0.02	0	**-0.13**	**-0.12**	**-0.07**
R^2	0.32	0.19	0.32	0.34	0.39	0.43	0.33	0.39	0.35
Valid count	2587	988	1983	1523	1845	2003	1012	3160	
Total count	2967	1000	2502	1599	2143	2003	1247	3360	

Coefficients with p-values lower than 0.01 in bold.
Due to rounding the numbers to two significant decimals, zeros may represent a value in the range of -0.005 to +0.005.
GEN-HL score: from 0=minimal HL to 100=maximal HL.
Education by 9 ISCED levels, from 0 (lowest) to 8 (highest level).
Level in society from 1=lowest level to 10=highest level in society.
Financial deprivation: 4 categories, from no deprivation (0) to severe deprivation (100).

Source: HLS_{19} Consortium

10.2.6 Consequences of Navigational HL

No specific potential consequences for Navigational HL were included in the HLS_{19}. Therefore, to test the relevance of Navigational HL for health-related outcomes, a few indicators were selected for consequences which had mostly already been included in the HLS-EU and which had partly been changed and added to as part of the HLS_{19}. This was done by investigating Spearman correlations (Table 10.10 and Table 10.13) and bi-variate associations (Annex 10.6, Figures A 10.8 to A 10.16). Multiple linear regression models were used to test whether there is an independent, direct effect of Navigational HL on selected indicators for health care utilization (Table 10.11 and Table 10.12) and indicators for health status (Table 10.14 to Table 10.15) when potentially confounding factors are controlled for.

Health care utilization

Spearman correlations show a slight negative relationship between Navigational HL and different indicators for health care utilization, i.e., with higher Navigational HL, somewhat less use is made of health care services (Table 10.10). The correlation is strongest for GPs/family doctors (ρ=-0.12, varying from ρ=0 (CZ) to ρ=-0.14 (DE)) and for medical or surgical specialists (ρ=-0.08, varying from ρ=-0.01 (BE) to ρ=-0.10 (DE)), while the correlations are weaker for inpatient hospital services (ρ=-0.01, varying from ρ=-0.01 (CH) to ρ=0.09 (FR)), day patient hospital services (ρ=-

0.01, varying from ρ=0 (CH, DE) to ρ=−0.05 (AT, CH)), and emergency services (ρ=−0.02, varying from ρ=−0.01 (CH) to ρ=−0.05 (AT, DE, PT, and SI)).

Table 10.10:
Spearman correlations (ρ) of Navigational HL with five indicators for health care utilization, for each country and for all countries (equally weighted)

HL-NAV and...	AT	BE	CH	CZ	DE	FR	PT	SI	All
Emergency services	−0.05	−0.04	−0.01	0.03	−0.05	0.01	−0.05	−0.05	−0.02
GPs/family doctors	−0.12	−0.04	−0.04	0	−0.14	−0.08	−0.04	−0.08	−0.12
Medical or surgical specialists	−0.07	−0.01	−0.06	−0.03	−0.1	−0.07	−0.06	−0.02	−0.08
Hospital as an inpatient	0.01	0.01	−0.01	0.04	−0.06	0.09	0.04	−0.03	−0.01
Hospital as a day patient	−0.03	−0.02	0	−0.02	0	−0.01	0.06	−0.03	−0.01

Utilization of emergency services: number of contacts in the last 24 months, from 0 to 6 or more contacts.
Utilization of GPs/family doctors: number of contacts in the last 12 months, from 0 to 6 or more contacts.
Utilization of medical or surgical specialists: number of contacts in the last 12 months, from 0 to 6 or more contacts.
Utilization of inpatient hospital services: number of contacts in the last 12 months, from 0 to 6 or more contacts.
Utilization of day patient hospital services: number of contacts in the last 12 months, from 0 to 6 or more contacts.

Source: HLS_{19} Consortium

Multivariable linear regression models were calculated for the utilization of all five health services as dependent variables and the Navigational HL score and five socio-demographic and socio-economic determinants as independent variables. Only the regression models for the use of GPs/family doctors and medical or surgical specialists are reported here since the models for the other three indicators of health care utilization just explain 1% to 2% of the variance in total. The multivariable regression models for the use of GPs/family doctors explain 7% of the variance (varying from 5% (FR) to 15% (DE)) (Table 10.11) and for medical or surgical specialists 5% (varying from 4% (FR) to 12% (DE)) (Table 10.12).

The values of β coefficients for Navigational HL in the models are the second strongest, but with a slight β=−0.09 for GPs/family doctors (varying from β=0.03 (CZ) to −0.09 (DE), significant only for two countries), and the fourth strongest with β=−0.06 for medical or surgical specialists (varying from 0.01 (BE, SI) to −0.07 (DE), significant only for one country). Thus, when confounding variables are controlled for, Navigational HL is only relevant for two indicators of health services utilization and is only significant for two and one country respectively.

Table 10.11:
Multivariable linear regression models of utilization of GPs/family doctors by Navigational HL and five social determinants (standardized coefficients (β) and R^2), for each country and for all countries (equally weighted)

	AT	BE	CH	CZ	DE	FR	PT	SI	All
HL-NAV	**-0.07**	-0.02	-0.04	0.03	**-0.09**	-0.05	0.02	-0.03	**-0.09**
Gender female	**0.1**	**0.08**	0.03	0	**0.07**	**0.08**	**0.16**	**0.08**	**0.07**
Age in years	**0.23**	**0.16**	**0.18**	**0.17**	**0.31**	**0.18**	**0.16**	**0.17**	**0.21**
Education	-0.01	**-0.18**	-0.03	**-0.09**	-0.02	0	-0.03	0	**0.04**
Level in society	0.03	-0.06	**-0.08**	-0.02	-0.04	-0.01	0	0.01	0
Financial deprivation	**0.09**	-0.01	**0.08**	**0.12**	**0.09**	**0.09**	0.08	**0.11**	**0.06**
R^2	0.1	0.09	0.06	0.06	0.15	0.05	0.07	0.06	0.07
Valid count	2543	981	1982	1503	1792	2003	1012	3151	
Total count	2967	1000	2502	1599	2143	2003	1247	3360	

Coefficients with p-values lower than 0.01 in bold.
Due to rounding the numbers to two significant decimals, zeros may represent a value in the range of -0.005 to +0.005.
Utilization of GPs/family doctors: number of contacts in the last 12 months, from 0 to 6 or more contacts.
NAV-HL score: from 0=minimal HL to 100=maximal HL.
Education by 9 ISCED levels, from 0 (lowest) to 8 (highest level).
Level in society from 1=lowest level to 10=highest level in society.
Financial deprivation: 4 categories, from no deprivation (0) to severe deprivation (100).

Source: HLS_{19} Consortium

Table 10.12:
Multivariable linear regression models of utilization of medical or surgical specialists by Navigational HL and five social determinants (standardized coefficients (β) and R^2), for each country and for all countries (equally weighted)

	AT	BE	CH	CZ	DE	FR	PT	SI	All
HL-NAV	−0.04	0.01	−0.04	−0.01	**−0.07**	−0.03	−0.05	0.01	**−0.06**
Gender female	**0.21**	**0.14**	**0.08**	**0.13**	**0.09**	**0.13**	**0.14**	**0.06**	**0.12**
Age in years	**0.11**	**0.16**	**0.11**	**0.17**	**0.28**	**0.12**	**0.1**	**0.16**	**0.15**
Education	**0.1**	−0.04	**0.11**	0.06	0.06	**0.1**	**0.18**	**0.08**	**0.07**
Level in society	0	**−0.09**	−0.06	−0.03	−0.04	0.04	0.06	−0.01	0
Financial depri-vation	**0.05**	0.06	**0.13**	0.06	**0.09**	**0.1**	0.06	**0.07**	**0.03**
R^2	0.07	0.06	0.05	0.04	0.12	0.05	0.05	0.04	0.05
Valid count	2554	971	1980	1503	1815	2003	1012	3146	
Total count	2967	1000	2502	1599	2143	2003	1247	3360	

Coefficients with p-values lower than 0.01 in bold.
Due to rounding the numbers to two significant decimals, zeros may represent a value in the range of −0.005 to +0.005.
HL-NAV score: from 0=minimal HL to 100=maximal HL.
Utilization of medical or surgical specialists: number of contacts in the last 12 months, from 0 to 6 or more contacts.
Education by 9 ISCED levels, from 0 (lowest) to 8 (highest level).
Level in society from 1=lowest level to 10=highest level in society.
Financial deprivation: 4 categories, from no deprivation (0) to severe deprivation (100).

Source: HLS_{19} Consortium

Indicators for health status

In comparison with the indicators for health care utilization, the correlations of Navigational HL with indicators for health status are considerably stronger, being strongest on average for self-perceived health (ρ=−0.19, varying from ρ=−0.13 (CZ, PT) to ρ=−0.24 (SI)), followed by limited in activities due to health problems (ρ=0.16, varying from ρ=0.08 (CZ) to ρ=0.21 (PT)), and long-term illnesses/health problems (ρ=−0.11, varying from ρ=−0.01 (BE) to ρ=−0.19 (PT)). On average, associations are rather linear and continuous, but somewhat less consistent for individual countries (Annex 10, Figures A 10.14 to A 10.16).

Table 10.13:
Spearman correlations (ρ) of Navigational HL with three indicators for health status, for each country and for all countries (equally weighted)

HL-NAV and...	AT	BE	CH	CZ	DE	FR	PT	SI	ALL
Health in general	-0.19	-0.16	-0.14	-0.13	-0.21	-0.15	-0.13	-0.24	-0.19
Long-term illnesses/ health problems	-0.08	-0.01	-0.07	-0.02	-0.11	-0.08	-0.19	-0.15	-0.11
Limited in activities due to health problems	0.11	0.14	0.12	0.08	0.15	0.01	0.21	0.19	0.16

Self-perceived health: from very good (1) to very bad (5).

Long-term illness: 3 categories: (1) none, (2) one, (3) more than one, except for SI where 2 categories were used (1) none, (2) one or more.

Limitations due to health problems: from severely limited (1) to not limited at all (3).

Source: HLS_{19} Consortium

The linear multivariable regression models testing the potential effects of Navigational HL on selected indicators for health status explain on average much more variance in comparison with the models for health care utilization. On average, the highest R^2 is observed for self-perceived health (the model explains 18% of the variance (varying from 12% (BE) to 32% (PT)) (Table 10.14), followed by long-term illnesses/health problems with 12 % (variation from 8 % (CH) to 17 % (PT)) (Table 10-15), and limited in activities due long-term illnesses/health problems with 9 % (variation from 4 % (FR) to 18 % (DE)) (10.16).

The β values for Navigational HL are also comparably higher for self-perceived health (β=-0.13, varying from -0.01 (PT) to -0.13 (AT, DE), significant for seven out of the eight countries), for limitations due to health problems with an overall β of 0.11 (varying from -0.04 (FR) to 0.10 (BE, PT), significant for five out of the eight countries), and less distinct for long-term illnesses/health problems with an overall β of -0.07 (varying from +0.01 (BE, CZ) to -0,06 (SI), significant for only two countries). Thus, Navigational HL has slight but significant potential effects on at least two indicators of health status.

Table 10.14:
Multivariable linear regression models of self-perceived health (standardized coefficients (β) and R^2) by Navigational HL and five core social determinants, for each country and for all countries (equally weighted)

	AT	BE	CH	CZ	DE	FR	PT	SI	All
HL-NAV	**-0.13**	**-0.1**	**-0.1**	**-0.07**	**-0.13**	**-0.06**	-0.01	**-0.12**	**-0.13**
Gender female	-0.02	0.04	-0.05	-0.03	-0.03	-0.02	**0.09**	0.02	0
Age in years	**0.24**	0.07	**0.22**	**0.35**	**0.41**	**0.23**	**0.33**	**0.37**	**0.27**
Education	**-0.06**	-0.08	-0.04	**-0.11**	-0.03	0.02	**-0.13**	**-0.08**	**-0.04**
Level in society	**-0.11**	**-0.28**	**-0.18**	**-0.13**	**-0.08**	**-0.23**	**-0.11**	**-0.07**	**-0.16**
Financial deprivation	**0.16**	-0.04	**0.16**	**0.15**	**0.13**	**0.12**	**0.18**	**0.19**	**0.13**
R^2	0.15	0.12	0.15	0.25	0.26	0.15	0.32	0.3	0.18
Valid count	2584	988	1982	1523	1843	2003	1012	3157	
Total count	2967	1000	2502	1599	2143	2003	1247	3360	

Coefficients with p-values lower than 0.01 in bold.
Due to rounding the numbers to two significant decimals, zeros may represent a value in the range of -0.005 to +0.005.
HL-NAV score: from 0=minimal HL to 100=maximal HL.
Self-perceived health: from very good (1) to very bad (5).
Education by 9 ISCED levels, from 0 (lowest) to 8 (highest level).
Level in society from 1=lowest level to 10=highest level in society.
Financial deprivation: 4 categories, from no deprivation (0) to severe deprivation (100).

Source: HLS_{19} Consortium

Table 10.15:
Multivariable linear regression models of long-term illnesses/health problems by Navigational HL and five core social determinants (standardized coefficients (β) and R^2), for each country and for all countries (equally weighted).

	AT	BE	CH	CZ	DE	FR	PT	SI	All
HL-NAV	-0.04	0.01	-0.04	0.01	-0.05	-0.04	**-0.1**	**-0.06**	**-0.07**
Gender female	0.03	0.06	-0.01	0.02	0.04	-0.01	0.04	**0.05**	**0.03**
Age in years	**0.24**	**0.23**	**0.26**	**0.27**	**0.41**	**0.29**	**0.31**	**0.3**	**0.29**
Education	**-0.08**	-0.08	0.01	-0.02	0.03	0.01	0	-0.04	**-0.02**
Level in society	**-0.07**	**-0.1**	**-0.08**	-0.05	-0.06	-0.02	-0.01	-0.01	**-0.04**
Financial deprivation	**0.13**	0.07	0.05	**0.11**	**0.08**	**0.11**	**0.16**	**0.11**	**0.09**
R^2	0.12	0.09	0.08	0.1	0.2	0.1	0.17	0.15	0.12
Valid count	2579	988	1980	1523	1819	2003	1008	3156	
Total count	2967	1000	2502	1599	2143	2003	1247	3360	

Coefficients with p-values lower than 0.01 in bold.
Due to rounding the numbers to two significant decimals, zeros may represent a value in the range of -0.005 to +0.005.
Long-term illness: 3 categories: (1) none, (2) one, (3) more than one, except for SI, where 2 categories were used (1) none, (2) one or more.
HL-NAV score: from 0=minimal HL to 100=maximal HL.
Education by 9 ISCED levels, from 0 (lowest) to 8 (highest level).
Level in society from 1=lowest level to 10=highest level in society.
Financial deprivation: 4 categories, from no deprivation (0) to severe deprivation (100).

Source: HLS_{19} Consortium

Table 10.16:
Multivariable linear regression models of limited in activities due health problems (by Navigational HL and five core social determinants standardized coefficients (β) and R^2), for each country and for all countries (equally weighted)

	AT	BE	CH	CZ	DE	FR	PT	SI	All
HL-NAV	**0.07**	0.1	**0.09**	0.03	**0.08**	-0.04	**0.1**	**0.09**	**0.11**
Gender female	0	**-0.12**	-0.04	-0.03	-0.03	0.03	**-0.13**	**-0.04**	**-0.04**
Age in years	**-0.13**	0.03	**-0.15**	**-0.19**	**-0.35**	**-0.11**	**-0.17**	**-0.26**	**-0.2**
Education	**0.09**	**0.13**	-0.01	**0.1**	0	-0.03	0.05	**0.05**	**0.03**
Level in society	**0.13**	**0.14**	**0.14**	0.04	0.07	0.03	0.03	**0.06**	**0.05**
Financial deprivation	**-0.16**	0.1	**-0.11**	**-0.15**	**-0.13**	**-0.16**	**-0.2**	**-0.13**	**-0.12**
R^2	0.1	0.09	0.08	0.09	0.18	0.04	0.16	0.16	0.09
Valid count	1996	472	1977	1520	1724	2003	806	3157	
Total count	2967	1000	2502	1599	2143	2003	1247	3360	

Coefficients with p-values lower than 0.01 in bold.
Due to rounding the numbers to two significant decimals, zeros may represent a value in the range of -0.005 to +0.005.
Limitations due to health problems: from severely limited (1) to not limited at all (3).
HL-NAV score: from 0=minimal HL to 100=maximal HL.
Education by 9 ISCED levels, from 0 (lowest) to 8 (highest level).
Level in society from 1=lowest level to 10=highest level in society.
Financial deprivation: 4 categories, from no deprivation (0) to severe deprivation (100).

Source: HLS_{19} Consortium

With the inclusion of General HL in the regression models (Annex 10.8, Table A 10.16 to Table A 10.18), the explained variance for all countries rises only marginally from 18% to 20% (varying from 13% (BE) to 33% (PT)) for general health and from 9% to 11% (varying from 5% (FR) to 19% (PT)) for limited in activities due to health problems. No changes are observed for long-term illnesses/health problems, with explained variance still at 12% (varying from 8% (CH) to 19% (PT)).

The values of β for Navigational HL are drastically reduced, showing that General HL is a much stronger predictor than Navigational HL for the health status indicators under consideration. Now, higher Navigational HL is linked to better self-perceived health with β increasing to -0.08 but significant for only two countries, long-term illnesses/health problems but not significant for any country, and limitations in activities due to health problems with β=-0.11 but significant for only one country. Thus, Navigational HL only has small extra direct effects on indicators of health status, in addition to the potential effects of General HL.

10.3 Discussion and Conclusion

The HLS_{19} introduced a new measurement instrument for Navigational HL based on an explicit model and definition of Navigational HL (Griese et al. 2020) which is related to the model and definition of the HLS-EU Consortium (Sørensen et al. 2012) and its somewhat revised operationalization in the HLS_{19}. The instrument was applied in eight countries participating in the HLS_{19}, with a total of over 16,000 respondents. For these countries, the distributions of individual items

and the Navigational HL scores as well as the social gradients, determinants, and selected consequences of Navigational HL were analyzed and demonstrated for the first time.

The newly developed HLS_{19}-NAV instrument was extensively investigated psychometrically. The results of analyses used (Cronbach's alpha, CFA, and Rasch) indicate that the instrument mostly proved to be satisfactory across the countries included in the survey. This demonstrates that the HLS_{19}-NAV is a suitable instrument to measure Navigational HL in different countries, languages, and using different survey methods. Nevertheless, there is also room for some improvements regarding the under-discrimination of individual items and DIF in some countries.

The Navigational HL topic was included as an optional package in the HLS_{19} because many healthcare systems – as the literature suggests – are extremely complex and suffer from a high level of disintegration, which in turn places great demands on users in terms of orientation, navigation, and use that cannot be managed easily. This also applies to dealing with navigation-related information. The findings confirm this and show that Navigational HL is low in adult resident populations and that dealing with the healthcare system and with information essential to navigating it is difficult for a large proportion of potential users. This also becomes evident when the findings are compared to those on General HL (and other specific health literacies in the HLS_{19}), showing Navigational HL to be lower than the other measured health literacies in the HLS_{19}.

Regarding the different information tasks, the results of the survey show that information *especially on the systemic level* is experienced as being (very) difficult in many countries and that basic knowledge and skills are therefore required to utilize information about the healthcare system, its organization, and how it functions. Processing information on (political) changes, reforms within the healthcare system, and patient rights, the latter being particularly important to enable more autonomy and co-production, is also seen as being (very) difficult. In addition, there seems to be a lack of sufficient support to overcome such challenges. All of this should be considered when developing interventions to facilitate navigation of the healthcare system and improve the information needed to do so.

This also applies to results on the *organizational level* where many experience it as being (very) difficult to find information on quality-related issues. Orientation and navigation within healthcare facilities are also experienced as being difficult, a finding that underscores the importance of organizational HL (Pelikan 2019; Farmanova et al. 2018; Brach et al. 2012) and demonstrates the need to make the healthcare system concerned more user-friendly and easily navigable, including the immediate (literal and interactive) environments in which health care is sought (Rudd/Anderson 2006; Rudd 2004).

On the interactive level[8] almost half of all respondents (46.5%) found it (very) difficult "to stand up for yourself if your health care does not meet your needs". The answers varied greatly among countries, but the results indicate that changes in the patient's role on the interactive level towards more collaboration, informed decision making, and negotiation of health care based on one's own

[8] Only one item is included here, see Subsection 10.1.2.

preferences still pose difficulties that cannot be met adequately by patients and healthcare professionals. As a result, communication with healthcare professionals is often one-sided. Thus, replacing traditional (paternalistic) patterns of interaction with new ones remains a challenge across countries, as was also demonstrated by the survey results on HL relating to communication with physicians in health care services which show that respondents considered it particularly important to be given more time to process information (HLS_{19}-COM4) in a simplified language that they could understand easily (HLS_{19}-COM7) (see Chapter 11).

In addition, the findings reveal country-specific characteristics that are presumably based on the structure of the healthcare system concerned. Therefore, improving Navigational HL also means to including and further investigating country or context-specific challenges when developing interventions to strengthen Navigational HL.

Furthermore, the results show that Navigational HL is distributed differently among various subpopulation groups. People with limited financial resources and low level in society/poor social status have lower Navigational HL. Thus, a social gradient for Navigational HL has been demonstrated that is more pronounced in some countries than in others. Less pronounced but also worth mentioning is the fact that in some countries, an age gradient was shown that should be specifically considered in the production of navigation-related information. These results on Navigational HL, like those on General HL, underscore the importance of identifying disadvantaged groups when developing interventions. Healthcare systems must become easier to use, especially for these disadvantaged groups, through simple, transparent, clear, and user-friendly structures and service models as well as through more targeted, group-specific information.

The HLS_{19} also shows that General HL can be interpreted as the strongest predictor of Navigational HL, which suggests an overlap in basic competencies that are significant for both General HL and Navigational HL. This is an important result since investments in General HL could also be beneficial for Navigational HL and vice versa. Similar assumptions can be made for other health literacies that have been examined, especially Communicative HL with physicians (Chapter 11) and Digital HL (Chapter 12). On the one hand, the positive relationship between Navigational HL and other HL measures was expected, since the measurement instruments were developed against the background of a common understanding, definition, and operationalization of HL and the HLS_{19}-NAV is therefore part of a 'family' of new HL measurement tools; on the other hand, this points to common interfaces between the concepts. Good communication skills in patients but also the general circumstances created by physicians (e.g., enough time, opportunities for queries) obviously lead to a better understanding of information relevant for navigating healthcare systems. Furthermore, much of the navigation-related information is available for users online. Such information may be used for initial orientation in the healthcare system or when searching for a suitable health service, access to it, and its modalities of utilization but also to clarify open questions on navigational issues after consultations with health professionals. A hypothesis derived from the results is that this is more successful when Digital HL is also high. Examining the relationship between Navigational HL, Communicative HL with physicians, and Digital HL should be a topic of further research.

Another important finding is that, like for General HL (Pelikan et al. 2018; Sørensen et al. 2015), low Navigational HL is associated with implications for health status. The inclusion of General HL

in the regression models significantly reduced this effect, but some effect persists regarding self-perceived health. Surprisingly, Navigational HL is less clearly associated with the use of health care. On the basis of previous trends in HL research (Berens et al. 2018; Ownby et al. 2014; Berkman et al. 2011), it was assumed that higher Navigational HL would be associated with lower health care utilization. This was only partly true in a multivariable linear regression model for two indicators of primary care utilization. In the future, however, more specific potential outcome measures should be investigated for Navigational HL (e.g., indicators of misuse of the healthcare system, problems with access or navigation).

Limitations

A comparative analysis of Navigational HL among participating countries is only possible to a limited extent due to differences in the survey methods used. For example, in contrast to the other countries, data collection in Germany took place before the Covid-19 pandemic; indications that Navigational HL in Germany tended to improve slightly during the Covid-19 pandemic are provided in a complementary survey conducted as part of the national HL survey (Schaeffer et al. 2021).

The interactive level of Navigational HL is underrepresented in this Chapter because Communication with physicians in health services HL (part of the micro level of Navigational HL) was measured separately in the HLS_{19}. To enable the instrument to be used and tested as a stand-alone instrument in the future, it would be desirable to elaborate on this level in an extended version.

Conclusions

The HLS_{19}-NAV was developed, tested, and used for the first time in the HLS_{19} in eight different countries. This added valuable information about dealing with information in the specific context of navigating healthcare systems, but it also needs refining and testing. Regarding future measurements of Navigational HL in an international context, it will be important to carefully review the quality of translations into the national language(s) concerned to ensure comprehensibility for the various population groups. In addition, it would be desirable to pay equal attention to the interactive or communicative level (micro level) in the future, which was underrepresented in this study. A starting point here could be the items of the HLS_{19}-COM. Further expansion and research are required to test more specific potential consequences of Navigational HL.

Overall, the results confirm that navigating healthcare systems represents an "unfamiliar context" for many respondents (Nutbeam 2009: 304), namely one that requires special knowledge and special HL. In future, it will therefore be important to strengthen Navigational HL and General HL at all levels of healthcare systems. The results provide a number of suggestions on how this can be done (see Chapter 15 for recommendations). Implementation is of major importance since Navigational HL is very low for considerable proportions of adult resident populations in many countries.

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