



Psychological Perspectives in Interdisciplinary Research on Health Literacy

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Abstract: *Background:* Health literacy enables people to use health information to make self-determined, informed health decisions. Despite the high priority given to this concept in health research and practice, psychological standards and perspectives are not adequately taken into account in existing health literacy models and assessments. *Aims:* To identify how psychological concepts and theories may improve interdisciplinary comprehensive investigation and psychometric sound assessment of health literacy. *Methods:* Conceptual and empirical research articles, as well as expertise in network collaborations and in managing research projects on health literacy, are used to identify psychological research challenges. *Results:* Valid models and assessments of health literacy require integrated consideration of (i) personal literacy aspects (abilities, skills) as well as (ii) information and system features that empower individuals' health literate behavior. Objective performance indicators meeting psychometric standards for competence modeling provide a valuable supplement to established self-assessments in terms of construct validity and interpretability. Psychological models of information processing and health behavior can contribute to expanding the construct's utility in diagnostic and intervention contexts. *Limitations:* Conceptual analysis is conducted without a primary data set and requires subsequent empirical testing. *Conclusions:* Psychological research should specify the information-processing mechanisms underlying health literacy, as well as the interplay between personal (abilities, skills), informational, and systemic (enablers) factors, in accordance with models of health behavior. Performance-based assessments that are oriented toward real-life decision-making and action contexts can help to identify deficits in health literacy more specifically and define concrete intervention strategies aimed at promoting individuals' health literate behavior.

Keywords: health literacy, health behavior, competence assessment, competence modeling, social-cognitive models

“The term ‘health literacy’ has come to mean different things to various audiences and has become a source of confusion”

(Baker, 2006, p. 878)

Health literacy (HL) is considered a critical prerequisite for making informed health decisions (Jordan, 2023; Soellner & Rudinger, 2018). The concept of “literacy” implies that individuals must have knowledge, motivation, abilities, and skills to act in a self-organized, thoughtful, and responsible manner that is appropriate to solve problems in specific situations (Weinert, 2002). HL enables the targeted acquisition and appropriate use of health information and thus to support a healthy lifestyle and to improve health-related

quality of life in the long term (Wirtz & Soellner, 2022). In a salutogenic perspective, HL supports the maintenance and strengthening of health or promotes its recovery through informed disease prevention (Faltermaier, 2024).

Sørensen et al.'s (2012) internationally leading heuristic model of HL proposes that individuals should be able to search for and find (HL facet: *Access*), understand (HL facet: *Understand*), and critically evaluate health information with regard to their individual health and life situation (HL facet: *Appraise*). The HL facet *Apply* refers to the ability to communicate and use information to make informed health-related decisions that may positively affect health behavior and health status (Kickbusch et al., 2016). These four HL facets are operationalized through the European HL Survey self-assessment (HLS-EU;

Sørensen et al., 2013), which uses 47 items (or 16 or 12 items; Griebler et al., 2025) to determine an aggregated overall HL score. While the prevalence of limited HL according to the HLS-EU definition increased from 54.3% (HLS-GER 1) to 58.5% in 2021 (Schaeffer et al., 2021), most current findings from the HLS-GER 3 survey indicate that 55.7% of the German adult population show limited HL (Schaeffer et al., 2025). Kolpatzik et al. (2025) report that even three quarters (75.8%) of the German adult population exhibit limited HL. This increase in HL deficits documented in the scientific literature is surprising when compared to findings that indicate that only 11% of a national sample of British adults have marginal or inadequate functional HL (von Wagner et al., 2009) and about 30% of US adults have low personal HL (Paasche-Orlow & Wolf, 2025). We argue that without critical considerations, such findings do not provide reliable evidence that there has been a significant increase in HL deficits in Germany, nor do they indicate British superiority in HL. To adequately understand and contextualize the reported differences in the HL data, it is first and foremost necessary to examine specific issues regarding the validity, comparability, and fairness of the conceptual and empirical approaches.

Clarifying these basic aspects is particularly important, since based on such epidemiological findings on deficient HL in the general population, Public Health authorities initiated intensive efforts to strengthen population's HL. The WHO adopted the Global Action Plan on HL in 2016, and the UN has defined HL as a key to achieving the Sustainable Development Goals (WHO, 2025). In terms of health policy, coordinated efforts to strengthen HL in Germany are being implemented by, e.g., the German Alliance for HL and the HL Network Germany. In addition, Germany's National Action Plan for HL was published in 2018, which identifies the reduction of health inequalities and the promotion of participation as key implementation principles (Schaeffer et al., 2025). In detail, the action plan focuses on the areas of "everyday life," "health system," "living with chronic diseases," and "research." Especially, the section "living with chronic illnesses" serves as an example of how comprehensive the concept of HL is for the understanding and research of psychological topics within the interdisciplinary context of health sciences. Key areas such as self-efficacy, coping, self-management, and decision-making are primary subjects of health psychology (Kohlmann et al., 2018) or rehabilitation psychology (Bengel & Mittag, 2016).

By systematically incorporating the psychological perspective, this article aims to identify various research challenges which might be crucial to improve validity and usefulness of current interdisciplinary models and methods for research in the field of HL. To illustrate the manifold potential of psychological research, it is first

important to trace the lines of development that have shaped and influenced current HL research.

Development of Multidisciplinary and Interdisciplinary Research on HL

In the 1990s, an understanding of the HL concept was established that considered basic cognitive processing skills in terms of literacy (i.e., ability to read and understand text) and numeracy (i.e., ability to understand numbers) to be decisive. People were considered health literate if they had health knowledge, skills and abilities that enabled them to read, understand, and use health information (Soellner & Rudinger, 2018). The first HL assessments established in the 1990s (TOFHLA, REALM; Griebler et al., 2025) were objective test procedures in which, e.g., terms from medical care had to be correctly selected or spelled out. In 1998, the WHO promoted a new conceptualization that strengthened the active role of people as informed, critical, and self-responsible actors for their health (Nutbeam, 2008). The concept of health shifted its focus from disease-oriented aspects to general health-related life skills – both within and outside the healthcare system (Soellner & Rudinger, 2018).

The subsequent development of concepts and models has been taken forward in various scientific disciplines. This led to a heterogeneous understanding and multitude of operationalizations of HL, resulting in HL being used in research more as a "umbrella term." It brings to mind the metaphor of a tree with many delicate branches, which, due to its weak trunk, degenerates into scrub that tends to grow wildly. In 2015, Mackert, Champlin, Su, and Guadagno summarized this fragmentation under the heading "The many health literacies" as a considerable challenge for the productive use of the concept of HL. To trace the core lines of this development and justify the potential of psychology, disciplinary strands will first be outlined.

HL From an Educational Perspective

Nutbeam's (2008) model focuses on the acquisition and promotion of skills and abilities that determine individual and societal health. A distinction is made between three conceptual levels, of which *functional HL* is closest to the 1990s concept of "literacy." People are considered functionally health literate if they have basic cognitive skills such as reading, writing, and numeracy, which are decisive to understand health information. *Interactive HL*

enables newly acquired or existing health information to be applied in different contexts and social interactions (e.g., in dialogue with healthcare professionals) based on own needs and preferences. In addition to goal-oriented cognitive processing and use of information, health behavior-related (e.g., self-efficacy) and social-communicative skills and abilities (e.g., communication skills, empathy) are considered crucial. *Critical HL* enables individuals to question health information, evaluate it differentially according to their own life situation, adapt it if necessary, and make independent decisions. The educational orientation of Nutbeam's approach is reflected in the fact that, starting from basic skills acquired in primary school education, successive learning phases focus on pedagogically promotable abilities and skills that build on each other. The role of the learning, educating, and developing individual is at the center of this approach. In this sense, Paakkari and Paakkari (2012) refer to HL as learning outcome that can be achieved through health education in schools. In their concept, HL is defined more broadly containing five core components (theoretical knowledge, practical knowledge, critical thinking, self-awareness, and citizenship) that are taught through an independent and mandatory school subject in Finland.

HL From a Sociological Perspective

Individual health-literate thinking, decision-making, and behavior are assumed to be essentially determined by social, cultural, political, and economic conditions. Living conditions are postulated to be fundamentally influential, as HL and behavioral options are understood, interpreted, and negotiated against the backdrop of social living conditions (Samerski, 2019). In contrast to a cognitive-rationalistic view (health informed decision-making), it is emphasized that health decisions and health-related lifestyles are characterized by routines and socially influenced heuristics (Gigerenzer et al., 2011). Sociological models of HL pay particular attention to settings (e.g., school, workplace) to develop structures and services that strengthen individual decision-making and agency (Empowerment; Meierjürgen & Warnke, 2018). According to the *Capability approach*, it is not sufficient to have access to health information and services; moreover, people must also have realistic possibilities and opportunities to make use of them (Pithara, 2019). Social conditions and structural factors therefore determine the autonomy of individuals in health decisions. Equitable healthcare is to be achieved, in particular, by improving social and material living conditions. This is also considered crucial for the validity of HL models and the usefulness of the HL construct in research on migration or socially determined societal inequality (Mantwill et al., 2015).

HL From a Health Services Research Perspective

Healthcare organizations (e.g., GP practices, hospitals, nursing homes) are considered to be health literate if they adequately support and promote the HL of those receiving healthcare. The term *Organizational HL* emphasizes that structures, processes, and overall patient care should be designed, coordinated, and harmonized to strengthen patient's HL (Okan et al., 2024). HL of those receiving healthcare in organizations is a prerequisite (e.g., participatory treatment planning) as well as a process characteristic (e.g., active treatment design) and a goal characteristic (e.g., empowerment as a treatment outcome). According to Parker's (2009) relational understanding, enabling and empowering characteristics of the 'care organization' setting and individual patient characteristics (i.e., aspects of personal HL) must interact in a mutually complementary, compensatory, or synergistic manner. This is essential, e.g., to ensure patient-centered care (Trezona et al., 2017) and participatory decision-making processes (Muscat et al., 2021) in all phases of healthcare.

Furthermore, the term *Professional HL* represents a characteristic of healthcare professionals who coordinate and provide healthcare services. They should be motivated and have the knowledge, skills, and abilities that enable HL-oriented patient care (Schaeffer et al., 2023). First, this concerns their skills in managing, processing, using, and communicating health information. Second, it requires educational, interactive and social-communicative skills that promote active and informed behavior of those receiving healthcare in participatory decision-making processes. As part of the "National HL Action Plan Germany" intensive efforts are made to establish the concept of *organizational HL* in schools through structured curricula. Here, the *professional HL* of teachers is emphasized as an important determinant of students HL development (Dadaczynski et al., 2020).

HL Definitions Based on Types of Disorders and Illnesses or Target Groups

HL is considered essential for the health development of people with specific health conditions: Active and responsible health engagement requires specific knowledge about the health condition itself and about ways to influence and treat it (Meyer et al., 2022). The collective term "Specific Health Literacies" (Jordan, 2023; Mackert et al., 2015) encompasses variants of HL that relate to specific forms of disease or impairment. *Mental HL* is defined as the knowledge and beliefs that support the prevention, recognition, and management of mental disorders (Spiker & Hammer, 2019). *Diabetic HL* (Lee et al., 2018), *Cancer*

HL (Dumenci et al., 2014), *HIV-related HL* (Ownby et al., 2013), *Dementia Literacy* (Choi et al., 2018) and *HL on infectious diseases* (Castro-Sánchez et al., 2016) emphasize disease-specific knowledge, skills, and abilities that patients need to positively influence the course of their illness and to improve their quality of life. For scientific research, it is particularly challenging to clarify the relationship between disease-specific and generic HL aspects, both theoretically and empirically. To clarify the definition of the construct and the underlying theory, it would be particularly desirable to use a uniform term, e.g., *HL in diabetes* (Caruso et al., 2018), instead of *Diabetic HL* (Lee et al., 2018). From a terminological point of view alone, this would avoid giving the impression that fundamental aspects of HL change in different application domains.

For disease prevention, the focus is often given to conceptual and evidence-based knowledge, risk assessment, and information acquisition, as well as attitudes toward preventative or risk behaviors (e.g., *Alcohol HL*, Manthey et al., 2023; *Oral HL*, Baskaradoss, 2018; *HL in allergy prevention*; Schulz et al., 2022). *Specific HLs* are also designed and researched for individual target groups (e.g., *Child or Parental HL*; Dresch et al., 2021, Flügel et al., 2025; *HL in Health Professionals*; Gibson et al., 2022) and health topics (e.g., *COVID-19-related HL*; Moustafa & Kassem, 2023).

Finally, *digital, media* or *eHealth literacy* refer to the knowledge, skills, and abilities required to make use of online health information. In addition to literacy aspects mentioned above this also includes abilities to use digital devices (operational skills) or to navigate the internet (esp. search engines, apps, AI).

HL Form a Public Health Perspective

These specific perspectives highlight key aspects of the HL concept across various health science disciplines, healthcare settings, health domains, and contexts of application and use. Systematic integration of these lines of development is characteristic for the comprehensive understanding of HL established through Public Health research (Okan et al., 2024; Rathmann, Dadaczynski, Okan & Messer, 2023). According to the relational perspective (Parker, 2009), HL is viewed less as an individual responsibility. Rather, an individual's ability to process and use information is understood as being determined by their living conditions and the environment in which they spend their daily lives as well as characteristics of the health system and sources of information. Accordingly, Bitzer and Schaeffer (2022, p. 145; translated by the authors) characterize HL as the "[...] degree to which individuals are enabled by the education, social, and/or health system to find, process, and understand health information relevant to making

appropriate health-related decisions." The emphasis on the term "enabled" illustrates that the starting point for improving HL is considered to lie primarily beyond the individual and individual information processing. Bitzer and Schaeffer (2022, p. 145; translated by the authors) add: "Individual abilities should not be a prerequisite for coping in a complex healthcare system; rather, it is the system that must do justice to the complexity of human beings."

Challenges in Research on Psychological and Psychodiagnostic Standards of HL

Thus, in health research, the term HL has become established as an impactful umbrella term for a complex range of phenomena (Mackert et al., 2015). We emphasize, that through conceptual and diagnostic distinctions – guided by the standards of psychological competence research and corresponding underlying psychometric modeling – we can deepen our understanding of this complex concept and enhance its utility to promote HL. Furthermore, we believe that a more reflected understanding of psychological mechanisms of information-processing, as well as a clearer distinction between HL and health behavior, can further advance research in HL and its practical applications. This is consistent with earlier conceptual work from a psychological perspective (e.g., Von Wagner et al., 2009), which, however, has so far received little attention in established HL models and measurement instruments (Batterham et al., 2016; Paasche-Orlow & Wolf, 2025; Tian et al., 2020).

Research Challenge 1: Clarification and Modeling of the Levels and Components of HL

A major lack of clarity in the definition of HL gets evident in the operationalization of HL indicators in self-assessment instruments such as the HLS-EU questionnaire (Sørensen et al., 2013) or the HL Questionnaire (HLQ; Nolte et al., 2023). This will be illustrated by the operationalizations in the HLS-EU. Typical HLS-EU items ask:

"How easy or difficult is it for you to . . .

- find information on treatments of illnesses that concern you?" (facet: *Access*),

- understand your doctor's or pharmacist's instructions on how to take a prescribed medicine?" (facet: *Understand*),
- judge if the information on health risks in the media is reliable?" (facet: *Appraise*), or
- make decisions to improve your health?" (facet: *Apply*).

Both the individual's skills as well as characteristics that enable individual information acquisition and processing are essential in all matters (Batterham et al., 2016; Parker, 2009). Individuals must be able to search for and find relevant information (*Ability to access*). Correspondingly Accessing information is all the easier the more accessible and findable the information is (*Accessibility*). While the limited availability of health information was initially considered the most significant barrier to *Access*, the selection and evaluation of health information has proven particularly challenging in the context of the COVID-19 pandemic, given the massive media presence (infodemics; Abel & McQueen, 2021) of varying quality (e.g., fake news; Bin Naeem & Kamel Boulos, 2021). Accordingly, a valid statement about whether a person can successfully access information must be based on an integrated consideration of the levels of individual *Access* abilities or skills (*search literacy*; Heiberger et al., 2023) and information *Accessibility*.

This integrated view of levels is crucial for all facets of HL. On the one hand, individuals must be able to *understand* health information (*Ability to understand*) and on the other hand, information must also be presented in a comprehensible and user-friendly manner (*Understandability*). HL research should focus on both: How can individuals be empowered to understand information appropriately and, for example, recognize incorrect information? How must information be designed so that the risk of misunderstanding can be minimized for recipients? In order for individuals to be able to classify and appraise information appropriately for their own health situation, they must have the ability to make valid assessments (*Ability to appraise*). Simultaneously, information should explicitly take into account that appropriate appraisal can be facilitated by transparently presenting all aspects relevant to assessment (e.g., reference to trustworthy sources, modes of action, side effects, moderating contextual conditions; *Appraisability*). The "Apply" facet requires individuals to have skills that promote decisions on the use and implementation of new information in everyday life: e.g., how can modified behavior be reliably organized and routinized in everyday life? (*Ability to apply*). However, this also requires the design of health information and its translation into practical use, for example through practical advices, behavioral recommendations, or examples of good practice (*Applicability*). These considerations are

consistent with the Person-Environment Fit approach, which emphasizes the compatibility of a person's characteristics (e.g., abilities) with the characteristics of the environment as a prerequisite for positive health and wellbeing outcomes (Caplan & Van Harrison, 1993). Based on that, the person-information-environment model in Figure 1 shows the systematic separation of *individual abilities* (bottom) and *enabling characteristics* with regard to the health information (middle) and the healthcare environment (top).

Previous conceptualizations of HL have substantially advanced the field by focusing either on individual competencies or on system-level characteristics, such as HL-responsive organizations. Although authors emphasize the relational nature of HL and acknowledge the interaction between individuals and their environments (e.g., Frisch et al., 2012), this interaction has rarely been conceptualized within an integrated framework that distinguishes individual competencies, characteristics of health information, and organizational or systemic conditions. The proposed model in Figure 1 seeks to address this gap by providing a multilevel perspective enabling a more differentiated understanding of how individual abilities are shaped, supported, or constrained by information and system-level factors.

According to this model, HL research and practice should focus on how health information and communication processes should be designed so that they are appropriately aligned with the knowledge, information processing, and options for action of individuals in everyday life. Three particular aspects need to be taken into account:

1. Which cognitive information processing skills are necessary for individuals to process health-related information? (*personal literacy perspective; personal health-related problem-solving skills*)
2. Which characteristics of information sources and the healthcare system support or hinder the individual in utilizing their abilities? (*enabling perspective*)
3. How can information sources and the healthcare system be appropriately tailored to the individual's ability potential? (*interaction between personal competence perspective and enabling perspective*)

Accordingly, HL assessments should explicitly allow for clarifying the extent to which (i) individual abilities and (ii) enabling characteristics determine HL (Parker, 2009). This is directly linked to the problems outlined below regarding the application of HL assessment methods: subjective self-assessments versus objective performance assessments systematically map different layers considered in the model (Research challenge 2). Furthermore, psychometrically sound competence modeling requires a

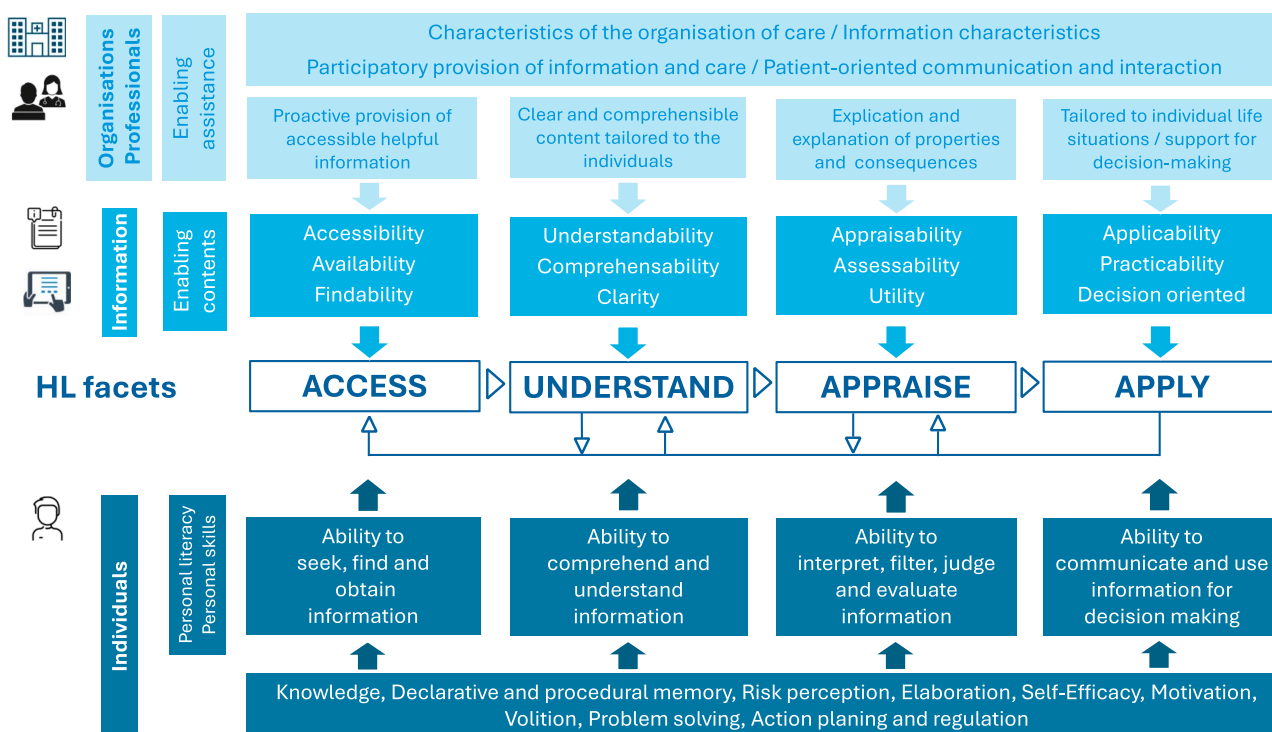


Figure 1. Person-Information-System stratification model of components and determinants of Health literacy (HL).

fundamental specification and separation of all the sources of information that determine the respondents' answers (Research Challenge 3).

Research Challenge 2: Strengthening Complementary Assessment Approaches to Subjective Self-Assessments

Subjective self-assessments, which are collected in a standardized manner using, e.g., the HLS-EU or the HLQ, have become the standard for measuring HL (Griebler et al., 2025). However, it must be critically considered that self-assessment may be distorted by self-concept, as this represents a cognitive representation of one's own abilities, characteristics, and values, which form the basis for assessing one's own performance. According to self-esteem theory (Baumeister, 1993), people tend to protect their self-concept by overemphasizing successes and downplaying failures. This leads, e.g., to systematic differences between assessments of healthcare professionals and the self-assessments of patients (Stock et al., 2021). Distortions arise in particular from information processing based on motivated cognitions (Kunda, 1990), such as confirmation bias, wishful thinking, and dissonance reduction. Due to such systematic biases, people

who are objectively equally capable of processing information would achieve different levels of HL in self-assessments.

Furthermore, it is particularly important to bear in mind that individuals with low competence tend to systematically overestimate their abilities due to limited metacognitive knowledge (Dunning-Kruger effect, "incompetence ignorance," Dunning et al., 2003). Critical awareness of one's own deficiencies in health issues is essential for the validity of HL self-assessments. Strong opponents of vaccination or people who share conspiracy theories usually claim to be particularly well-informed and to take a consciously critical approach to health information. They tend to view people who are willing to be vaccinated as uninformed, naïve, and easily influenced, and may even accuse them of "blindly complying with the measures imposed by politicians and the pharmaceutical industry" (Imhoff & Lamberty, 2020). Consequently, the self-attribution of higher HL is encouraged, even though it is implausible that higher HL should be associated with reduced willingness to get vaccinated. When people consciously decide against preventive health measures despite evidence-based recommendations (e.g., check-ups, drug prevention) because they consider them unnecessary, this does not necessarily correspond to subjective awareness of potentially insufficient HL. Accordingly, Gigerenzer and Schäfer (2018) refer to subjective HL assessments as indicators of "feeling of HL." Considerable discrepancies between this "feeling of HL" and empirical data on actual health knowledge point to a serious problem in

terms of the population's awareness of health issues and thus their HL.

Moreover, individual awareness of problems, perceived threats, risk perception, and information needs influence subjective HL perception (Heiberger et al., 2023). The more demanding the individual health problem is (e.g., in people with multiple chronic conditions), the more comprehensive, well-founded, and high-quality health information they consider necessary. Hence, a more demanding need for information tends to correspond to a feeling of being insufficiently informed. The demand for information thus moderates the relationship between available information and perceived information according to expectation-value models (Rheinberg, 2012). Given this context, the headline "Germans understand less about health than ever" in a major German weekly newspaper (*Die Zeit*, April 10, 2025; translated by the authors) is misleading, as it is based on the results of subjective self-assessments using the HLS-EU. Even a more self-critical or demanding attitude toward helpful health information could be responsible for the trend in "perceived HL." A headline based on the same logic could read: "People willing to be vaccinated understand less about health than vaccine sceptics." Despite similar empirical foundations, this "factual claim" would certainly not have been published, as the fallacy caused by operationalization through self-assessment would be obvious.

Although, in the case of self-assessment, it can generally be assumed that individuals overestimate their own abilities – particularly due to motivated cognition – the effects of individual expectations, given the health-related nature of the topic and the quality of the information, or the effects of metacognitive knowledge, should be regarded as varying across individuals. The importance of making an educated decision between subjective and objective indicators of HL is highlighted by the low correlation between the two measurement approaches (Seifert et al., 2022). Schulz et al. (2021) show that objective measures provide an indication of whether people are susceptible to misinformation about health, whereas no significant associations could be found for self-assessed measures.

Research Challenge 3: Application of Competence Modeling Standards

The concept of and the assessment standards for *competence* in psychological or educational research differs

fundamentally from the concept *literacy* or *competence* used in Public Health.¹ Psychological and educational standards require competence assessments to be based on individual's performance in standardized tasks, particularly in school-based and vocational education research (AERA, APA, & NCME, 2014; Hernández-Torrano & Courtney, 2021; Klieme & Hartig, 2008; international comparative large-scale assessments: PISA, TIMSS study). Such assessments are characterized as "objective" because they are based on observable performance, which is scored according to standardized rules, in terms of a correct versus incorrect solution to problems. Accordingly, the results do not depend on the respondent's personal opinions or self-concept-based interpretations. The definition by Weinert (2002) is fundamental here, according to which *competencies* are understood as an individual disposition to make decisions and behave in a certain way. *Competence* includes knowledge, abilities, and skills and enables successful problem solving. Whether and how this disposition to act is realized depends on the situational requirements of the context of application. This definition ties in very well with the lower layer in Figure 1 (*personal literacy*), which refers to the abilities of the individual – regardless of the enabling characteristics in the upper layers.

To develop valid objective indicators for assessing personal HL, systematic steps for item development and validation should be followed, as is the case in educational psychological research (Dresch et al., 2021; Messick, 1995):

- i. Definition of the respective dimension(s) of HL: Distinct latent competence dimensions which are necessary for successful item completion must be substantiated theoretically. These should be based on assumptions about underlying cognitive information processing (Von Wagner et al., 2009).
- ii. Identification of valid indicators for the respective dimensions of HL: Typical situations and health challenges from the target population's field of experience and action must be identified. These need to be translated into task sets (e.g., problem scenarios) requiring a response based on the assumed information processing (Martinez, 1999). Indicators of correct versus incorrect task processing are formulated in a closed response format or collected using a standardized, evaluable open format.
- iii. Modeling dimensionality and item-dimension fit using item response theory techniques (IRT; van der

¹ Note that the largely synonymous meaning of competence and literacy in the HL discourse is exemplified by the fact that in German, "Gesundheitskompetenz" (i.e., "health competency") is the established term for HL.

Linden, 2021, Wilson, 2005): Once the items have been completed by a sufficiently large sample, IRT models are used to check whether the probability of correct answers for each item can be modelled by the assumed latent dimension(s). The increase in the probability of solving a particular task with increasing levels of latent competence or latent trait is modeled using a logistic response model. Items with an appropriate model fit can be considered as valid indicators of the corresponding HL dimension of if, in addition, a suitable global model fit ensures that the entire data structure is in accordance with model assumptions. Model compatibility indicates that all data information can be sufficiently explained by the underlying competence dimension(s).

- iv. Cognitive diagnostic models (Kunina-Habenicht et al., 2010) enable a detailed evaluation of whether the theoretically assumed cognitive information processing procedures adequately predict the structural properties of the individual's response patterns.

The application of IRT models provides an excellent basis for psychometric validation analyses of personal HL (Klieme & Hartig, 2008; Nguyen et al., 2015). *Competence structure modeling* aims to analyze the dimensional structure of the subdimensions of HL. This allows, e.g., moderating effects of the application setting (e.g., forms or phases of chronic diseases) on HL properties to be evaluated in a well-founded manner (AERA, APA, & NCME, 2014). Furthermore, IRT-based analyses of construct validity enable more differentiated insights into stable and variable construct aspects. *Competence level modeling* is used to estimate the characteristics or temporal changes in competence characteristics. The particular advantages of IRT modeling are strictly one-dimensional, metrically scaled competence estimates, and their measurement accuracy can be calculated for specific levels (Van der Linden, 2021).

For the HLS-EU, ad hoc interpretations are made for each level (e.g., "30.4% have problematic HL and 28.4% have inadequate HL," Schaeffer et al., 2021). However, such interpretations are often not sufficiently substantiated by solid psychometric criteria, as they are based solely on the labels assigned to the manifest ordinal response levels. *Competence-level modeling* is considered an indispensable prerequisite for making such statements on a sound basis (AERA, APA, & NCME, 2014; van der Linden, 2021). *Competence development models* focus on changes in competences over time. Advanced statistical methods, such as mixed distribution models or growth curve models, are used to determine time-dependent systematic changes in levels.

Consequently, an elaborated set of analytical tools would be available to conduct a feature analysis in relation to the Person-Information-System Stratification Model shown in Figure 1. Considerable diagnostic and conceptual added value would result by analyzing whether individual items (i) measure several information components simultaneously (within-item multidimensionality), or (ii) measure only one of the information components (between-item multidimensionality) (Reckase, 2009). Furthermore, it should be clarified whether deficits in individual HL facets can be compensated for by other facets or not. For example, hypotheses regarding compensatory and noncompensatory sources of information could be tested (Wang, 2015). To better understand HL, it would be particularly informative to examine whether enabling characteristics at the level (i) of information design (e.g., didactic design, presentation of evidence-based information) or (ii) organizational HL characteristics (e.g., aspects of health care; Farmanova et al., 2018; Wirtz et al., 2024) can compensate for deficits in personal HL (e.g., in finding or appraising health information, 2015).

It has been extensively demonstrated, particularly in the field of educational sciences, that these IRT standards hold considerable theoretical and practical potential for the development of competency models and assessments. In the field of *Educational Research Literacy*, e.g., a multidimensional IRT-based competency assessment has been developed and validated based on a competency structure very similar to the HLS-EU conceptual model: *Educational Research Literacy* is defined as the ability to Access, Understand, and Reflect or Evaluate scientific information in a targeted manner, and to Apply conclusions in practical decisions (Groß Ophoff et al., 2017). Unlike in HL research, separable and psychometrically scalable competence dimensions were defined on the basis of information processing models informed by cognitive psychology and operationalized in an objective performance assessment:

- (1) *Information literacy*: The ability to find, evaluate, use, and correctly apply relevant information;
- (2) *Statistical literacy*: The ability to understand statistical information, critically question it, and make informed decisions based on data;
- (3) *Critical thinking literacy*: The ability to think logically, reflectively, and independently, analyze arguments and recognize biased or flawed conclusions (Groß Ophoff et al., 2017).

This multidimensional modeling enables profile diagnostics that, based on the unidimensional subcomponents, allow for unambiguous competency-based scaling of HL-related performance dispositions at the item level. This approach offers a conceptually sound solution to the

problem of ambiguous and inconclusive diagnostic information in the form of aggregated total scores from, e.g., the HLS-EU (Sørensen et al., 2012; for Nutbeam model: Chinn & McCarthy, 2013). Such a total HL-score merely provides integrated information across all facets, indicating unspecific deficits for improvement, but without reflecting a differentiated picture of model-based sub-facets of information use and processing (e.g., competence profiles or types).

The 82-item IRT-based Health LiTT item bank (Hahn et al., 2011) can serve as a promising basis for relevant new developments, although it is founded on a more functional understanding of HL: correct comprehension of text, documents, and numbers is operationalized as an indicator of HL and assessed on the basis of performance. Schulz et al. (2022) developed an IRT-based item pool for the HL facet *Understand*. Respondents are shown information materials covering health-related information in everyday life situations. The multiple-choice response format assesses whether this information is understood appropriately in terms of everyday decisions and behavior. It is important to develop and calibrate similar item pools in future for the HL facets *Access*, *Appraise*, and *Apply* to assess personal HL comprehensively. By using items with everyday life content, specific deficits in health literate comprehension can be identified and approaches to foster literacy can be derived by means of embedded assessment (Wilson, 2005).

Research Challenge 4: Consideration of Heuristic and Elaborated Information Processing

Whether people are able to process and use health information appropriately depends not only on their level of HL but also on depth of elaboration. Cognitive elaboration is a complex, argument-based, and knowledge-integrating examination of information that requires sufficient cognitive resources, personal involvement, and motivation on the part of the individual. Information should be designed to attract attention, be emotionally appealing, understandable, and well-structured to promote deep elaboration (Rimer & Kreuter, 2006). Since Public Health approaches in particular postulate the optimal design of health information as central to HL research (Bitzer & Schaeffer, 2022; Schaeffer et al., 2025), consideration must also be given to how sufficiently deep and valid information elaboration can be promoted effectively.

According to Petty and Cacioppo's (1986) *Elaboration Likelihood Model*, peripheral information processing differs

from central information processing in terms of the degree of cognitive processing depth or elaboration. Central processing involves a systematic, analytical examination of information, with the quality of argumentation and relevance of content being considered decisive. The peripheral route, on the other hand, is based on heuristic or emotional stimuli such as the attractiveness of the source or frequency of repetition, without in-depth cognitive processing (Gigerenzer et al., 2011). While centrally processed information generates stable and enduring attitudes in the long term, peripherally processed attitudes are often less stable and more easily suggestible. Which route is chosen depends primarily on motivation, relevance, and ability to process information systematically, as well as on mental load (Sweller & Chandler, 1994).

Accordingly, if HL is to be promoted, the conditions for strengthening elements of information processing via the central route and, where necessary, avoiding distorting heuristic processing should be kept in mind (Chiang & Jackson, 2013; Heiberger et al., 2023). However, heuristic processes should also be considered in a targeted manner, in particular by stimulating attention and interest through, e.g., salience, emotionality, variety, degree of stimulation, or repetition (Rimer & Kreuter, 2006). Tversky and Kahneman (2000) illustrate how cognitive "shortcuts" and intuitive heuristic decision-making processes (e.g., availability or representativeness heuristics) become particularly active when in-depth, central processing is lacking. These findings are important for modeling health information processing, as they explain why peripheral stimuli can often have a disproportionate effect, leading to distorted impressions and judgments when motivation or ability is low or when information processing is overly demanding. Elaboration depth and the orientation toward reliable, content-rich information must therefore be considered essential features of health literate processing at the individual level (Rimer & Kreuter, 2006).

Research Challenge 5: Examining the Relationship Between HL and Health Behavior

HL has been established as an important construct, as it is considered a key determinant of health behavior (Soellner & Rudinger, 2018). Empirically, the relationship between HL and health behavior is usually examined using correlation with specific behavior (e.g., physical activity, fruit and vegetable consumption, alcohol; Jordan et al., 2025). Since only weak to moderate correlations can be observed here, there is a literacy-behavior gap — similar to the

frequently studied attitude-behavior gap in social-psychological contexts (Kim et al., 2023). In health psychology, however, health behavior is viewed in a much more differentiated way, with determinants, information processing, and action planning and regulation processes being taken into account in health behavior models (Faltermaier, 2024). Processes are specified that underlie the health-literate, behavior-oriented use of health information in the sense of a preventive lifestyle. The question “How is health-promoting behavior motivated, planned, and effectively translated into action?” is central in health behavior models. Models of HL, on the other hand, address the question “What affective, cognitive, and conative potentials and resources (in terms of knowledge, skills, and abilities) should people have to be able to make health-promoting decisions?”

A mutually complementary view of health behavior and HL models could be achieved by defining clear competence bases for constructs that are assumed to be decisive for health behavior. According to Paasche-Orlow and Wolf (2025) HL influences health outcomes through three mediating processes: (1) access to and understanding of health information, (2) navigation of the healthcare system, and (3) the quality of physician-patient communication and decision-making. Knowledge of health and illness, personal attitudes, beliefs, and values, alongside habits shaped by individual and social factors, play a decisive role in how people interpret health information, evaluate its relevance, and decide whether to adopt health-promoting behaviors (Von Wagner et al., 2009). Models of health behavior such as the *Health Action Process Approach*, the *Transtheoretical Model* or the *Health Belief Model* (Kohlmann et al., 2018) consider it essential, e.g., that people should be aware of risks or perceive threats, have self-efficacy, outcome expectations, or action control. From a HL perspective, this brings the following questions into focus:

- *What skills do people need to adequately assess health risks or the benefits of behavior?* Gigerenzer et al. (2007), e.g., emphasize the importance of *statistical literacy* and the cognitively informed processing of health information, which avoids cognitive biases. The constructs of *Information literacy* and *Critical thinking literacy* (see above; Groß Ophoff et al., 2017), which are well-established in competence research, also represent defined and objectively operationalized competence dimensions. These dimensions are closely related to the HL facets *Access*, *Understand*, *Appraise*, and *Apply* in the Sørensen model and provide empirically grounded conceptualizations and operationalizations of the cognitive processes that underlie or constitute HL. This would allow for systematically identifying similarities and key differences

at the dimensional and item levels between these competency modeling domains.

- *What skills are required for people to have adequate self-efficacy, outcome expectancy, or action control?* In psychological research, the competencies underlying self-efficacy, outcome expectancy, or action control are usually addressed indirectly through intervention measures. Bandura (1997) considers mastery learning, vicarious experience, social conviction, and physiological and affective states to be crucial for self-efficacy beliefs. Interventions focus, e.g., on mastery experiences, in which individuals are gradually introduced to health-promoting behaviors through evidence-based methods and strategy selection (Kleppang et al., 2023). This promotes skills which enhance structured information processing, attention control, clear goal setting, self-observation, and metacognitive control. Such if-then plans link contextual conditions to planned responses, thereby increasing the likelihood of behavior initiation and maintenance. In particular, barrier management and the targeted activation of resources (e.g., social networks, empowerment) can contribute to positive behavioral change (Faltermaier, 2024). It is challenging for research to appropriately define and operationalize skills and their significance for the goal-oriented processing of health information and their application in everyday life.

To take into account behavior-oriented personal psychological HL aspects together with enabling information aspects, the interdisciplinary approach of *Behavioral and Cultural Insights (BCI)* has been developed (Michie et al., 2011). The COM-B model assumes that capabilities (C), structural and social factors (O), and motivation (M) are decisive for health behavior (B). Capabilities in particular have close links to the psychological concept of *competence* and offer a promising starting point for discussions to conceptually clarify and further elucidate the links and differences between HL and health behavior.

Conclusion

HL research is currently based on a rather epidemiological oriented assessment that focuses on the extent to which people feel able to find, process, and use health-related information. Underlying structures and elaborated processes but also (ir-)rational motives and attitudes remain hidden in a black box in terms of empirical diagnostics. Psychology can make a valuable contribution to better understand the competence/literacy construct and its significance for the promotion of health behavior by (i) investigating the relevance of HL subcomponents, personal, informational, and

systemic model levels (Figure 1), and (ii) information processing and behavior-determining mechanisms.

The National Action Plan for HL Germany is an important initiative to counteract deficits in the health-literate use of information, support, and care services (Schaeffer et al., 2025). This article emphasizes that HL facets should be examined in a more differentiated manner, rather than treating HL as a single diagnostic entity, as is mostly the case in Public Health (De Gani et al., 2025). Measurement approaches should not only postulate HL facets and levels as underlying (Griebler et al., 2025; Sørensen et al., 2013), but must also measure them separately to empirically analyze elements and determinants, as well as corresponding interactions between HL levels. Assessing objective HL indicators should be considered crucial according to the psychological concept of competence to enhance HL-related information collected by subjective self-assessments (Wirtz & Soellner, 2022).

Methods of competence modeling (Klieme & Hartig, 2008; Nguyen et al., 2015), which are particularly well-established in the field of educational science, enable empirical findings and measurement approaches regarding theoretically separable and scalable construct facets on a much more solid basis. The linkage of HL research and general competence research enables a significant expansion of knowledge and competence diagnostics by orienting it toward psychometric research and modeling standards. This also applies to the more explicitly modeling of information, decision-making, and action regulation processes underlying health-literate behavior (Heiberger et al., 2023): Innovative perspectives for thinking and research emerge when HL is understood as the result of structured information processing that is dependent on prior knowledge and needs, but is also error-prone and subject to varying degrees of control and elaboration. Although these processes should not be understood as core elements of the HL concept from a psychological perspective, they represent important determinants, moderators, and mediators that are essential to the broader concept of HL in Public Health (Bitzer & Schaeffer, 2022; Schaeffer et al. 2025). Consequently, established cognitive, social, and health psychology models and findings can promote valuable complementary and more comprehensive research opportunities in an interdisciplinary context by strengthening the psychological perspective in the HL discourse

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