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Defining and measuring health literacy: how can we profit from other literacy domains?

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SUMMARY

When the antecedents of health-promoting behavior are explored, the concept of health literacy is deemed a factor of major influence. Originally defined as reading, writing and numeracy skills in the health domain, health literacy is now considered a multidimensional concept. The ongoing discussion on health literacy reveals that no agreement exists about which dimensions to include in the concept. To contribute to the development of a consistent and parsimonious concept of health literacy, we conducted a critical review of concepts in other literacy domains. Our review was guided by two research questions: (i) Which dimensions are included in the concepts of other literacy domains? (ii) How can health literacy research profit from other literacy domains? Based on articles collected from PubMed, PsycINFO, Communication & Mass Media Complete, CINAHL, SAGE Full-Text Collection, Cochrane Library and Google Scholar as well as selected monographs and editions, we identified seven distinct dimensions. Some of the dimensions recur across all reviewed literacy domains and first attempts have been made to operationalize the dimensions. Expanding upon these dimensions, the paper discusses how they can prove useful for elaborating a consistent and parsimonious concept of health literacy and foster the development of a more holistic measure.

Key words: health literacy; review; concept; measure

INTRODUCTION

The term 'health literacy' was first used in 1974 in the proceedings of a health education conference discussing health education as a social policy issue (Simonds, 1974). Since then interest in health literacy—its definition and measurement—has increased. A topic-specific query under the PubMed tools, for example, reveals the exponential growth of publications about health literacy with 129 references between 1986 and 1990, and 1576 between 2006 and May 2010 (Paasche-Orlow *et al.*, 2010). Special issues of the *Journal of General Internal Medicine* in 2006, *Patient Education and Counseling* in 2009 and the *Journal of Health Communication* in 2010 are additional examples of the exponential growth of work in this field. Numerous studies have proved the prevalence of limited health literacy in the population (Paasche-Orlow *et al.*, 2005). People with limited health literacy report poorer overall health, they are less likely to utilize preventive screenings, they use medical services in later stages of their diseases, they have a poorer understanding of treatment and a lower adherence to medical regimes and they are more likely to be hospitalized, causing a huge financial burden for the health-care system (Howard *et al.*, 2005; Wagner *et al.*, 2009; DeWalt *et al.*, 2004). Consequently, a better understanding of people's health literacy is crucial for adapting health-related information

and services and designing successful health education programs. This in turn requires identification of what constitutes health literacy. To date, no commonly accepted definition of health literacy exists (Berkman *et al.*, 2010). Whereas health literacy in its original sense has been defined and measured as the ability to read and comprehend prescription bottles, appointment slips and other essential health-related materials [Ad Hoc Committee on Health Literacy for the American Council on Scientific Affairs, American Medical Association (AMA), 1999], health literacy is now considered a multidimensional concept.

DEFINITIONS AND CONCEPTS OF HEALTH LITERACY

To define health literacy, the Ad Hoc Committee on Health Literacy for the Council on Scientific Affairs of the AMA (Ad Hoc Committee on Health Literacy for the Council on Scientific Affairs of the AMA, 1999) retains the original understanding of 'literacy' as the ability to read and write (The Oxford English Dictionary, 1989) and transfers these skills to the health-care environment. Other national institutions such as the U.S. Institute of Medicine (U.S. Institute of Medicine, 2004), the U.S. Department of Health and Human Services (U.S. Department of Health and Human Services, 2000) and the Joint Committee on National Health Education Standards (Joint Committee on National Health Education Standards, 1995) propose a broader definition of health literacy and highlight the importance of being able to obtain, process and understand health information and services needed to make appropriate health decisions and act in ways that enhance health. In line with this extended definition of health literacy, the World Health Organization (WHO) defines health literacy as the 'cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand and use information in ways which promote and maintain good health' [(WHO, 1998), p. 10].

Another approach to defining health literacy identifies and ranks skills in a hierarchy according to the increasing demand on a person's cognitive efforts. Examples of this approach are present in Nutbeam's (Nutbeam, 2000) and Schulz and Nakamoto's (Schulz and Nakamoto, 2005) work. Nutbeam distinguishes between three types of health literacy: *functional health literacy* (basic reading and writing skills to be able to understand and use health information), *interactive health literacy* (more advanced cognitive and literacy skills to interact with health-care providers and the ability to interpret and apply information to changing circumstances) and *critical health literacy* (more advanced cognitive skills to critically analyze information to exert greater control over one's life) (Nutbeam, 2000). Nutbeam's three-tiered concept of health literacy implies that more advanced skills lead to greater autonomy and personal empowerment, which, ultimately, lead to decisions and behavior that enhance health. Schulz and Nakamoto also provide a three-tiered concept of health literacy (Schulz and Nakamoto, 2005). They conceptualize health literacy as *declarative knowledge* (factual knowledge related to health issues to be able to learn how to approach a health condition), *procedural knowledge* ('know-how' to apply factual knowledge and use health information in a specific context) and *judgment skills* (the ability to judge based on factual knowledge necessary to deal with novel situations).

An alternative to the theory-driven conceptualizations of health literacy is Jordan *et al.*'s explorative approach to defining health literacy from the patient perspective (Jordan *et al.*, 2010). The authors conducted qualitative interviews with laypeople by asking them which skills the participants think they should possess to actively participate in their health care. In addition to *functional literacy* (reading, writing and numeracy skills), the analysis of the responses produced six other key skills: *knowing when to seek health information* (critical self-examination and knowing when it is necessary to get help from health-care services), *knowing where to seek health information* (the ability to navigate health systems), *verbal communication skills* (being able to adequately describe one's health issues and understand the response and instructions from the health professional), *retain and process information skills* (the ability to comprehend and extract meaning from the information of health professionals), *assertiveness* (being determined to fully understand health professionals) and, finally, *application skills* (the ability to follow instructions and implement procedures in one's lifestyle to effectively address health issues). These skills are identified along a

typical course of disease. Related primarily to the health-care setting, they constitute what Peerson and Saunders call 'medical literacy' (Peerson and Saunders, 2009).

To sum up, current definitions of health literacy show that health literacy is more than functional literacy in the health domain. At the same time, no consensus exists about what to include in the concept of health literacy. This lack of consensus hinders the development of validated measures of health literacy reflecting its multidimensionality (Mancuso, 2009).

MEASURES OF HEALTH LITERACY

Two measures of health literacy are the Rapid Estimate of Adult Literacy in Medicine (REALM) test (Davis *et al.*, 1991) and the Test of Functional Health Literacy in Adults (TOFHLA) (Parker *et al.*, 1995). While the REALM measures word recognition and pronunciation skills, the TOFHLA measures reading comprehension and numeracy skills. Both tests are validated tools that have been used to assess patients' functional health literacy in medical settings. According to a systematic review, 58 of 85 studies used either the REALM or versions of the TOFHLA to examine the relationships among health literacy, knowledge, behavior and health outcomes (Paasche-Orlow *et al.*, 2005). However, these tests are not sufficient for measuring health literacy beyond the ability to read and comprehend medical information, fill out medical forms or calculate one's drug intake (U.S. Institute of Medicine, 2009).

One way to measure health literacy beyond word recognition, comprehension and numeracy skills in the health domain is with health knowledge tests. According to Schulz and Nakamoto, a health literate person is someone who has declarative and procedural knowledge regarding health issues (Schulz and Nakamoto, 2005). This knowledge can be assessed using content- and context-specific knowledge tests that have been developed and validated in medical settings mainly for chronic conditions. These tests are usually a set of true/false or multiple-choice questions that cover knowledge about symptoms of a disease, possible causes and its management, to name just a few. The Asthma Self-Management Questionnaire (Mancuso *et al.*, 2009), the Brief Diabetes Knowledge Test (Fitzgerald *et al.*, 1998) and the Low Back Pain Knowledge Questionnaire (Maciel *et al.*, 2009) are three examples. A study by Gazmararian *et al.* with patients with common chronic conditions such as asthma, diabetes, congestive health failure and hypertension showed a significant relationship between health literacy measured by the Short Test of Functional Health Literacy in Adults (S-TOFHLA) (Gazmararian *et al.*, 2003; Baker *et al.*, 1999) and knowledge of chronic diseases even after controlling for age, disease duration and prior attendance at a disease-specific education class. This result suggests that knowledge tests are a viable addition to measures of functional health literacy. However, the context-specificity of knowledge tests may complicate the comparability of studies set in different domains or addressing different health conditions.

Another way to measure health literacy as a multidimensional concept involves screening questions that ask people to rate their perceived ability to understand health-related materials (Williams *et al.*, 1995; Chew *et al.*, 2004; Wallace *et al.*, 2006) or to collect, communicate and evaluate health information (Ishikawa *et al.*, 2008a,b). Screening questions are based on self-report, reducing the likelihood of people feeling ashamed and embarrassed when directly tested for health literacy abilities (Parikh *et al.*, 1996). The major disadvantage of these questions is that they risk assessing self-efficacy or behavior instead of health literacy (Ishikawa and Yano, 2008). This affects their validity. The item '*How confident are you filling out medical forms by yourself?*,' for example, asks people to rate their perceived competence (self-efficacy) and not their actual competence in understanding and filling out medical forms by themselves. When Chew *et al.* checked the external validity of this item, they failed to detect 20% of adults with inadequate health literacy as measured by the S-TOFHLA because of their high self-efficacy, which is not necessarily related to health literacy (Chew *et al.*, 2004). Similarly, the item '*Since being diagnosed with diabetes, you have collected information from various sources*' (Ishikawa *et al.*, 2008a, b) assesses people's past behavior and not their actual competence in collecting information. Studies on information-seeking behavior showed that some people who have the skills to look for information from various sources are active information avoiders when information is distressing or when they

completely trust their physicians (Brashers *et al.*, 2002; Ramanadhan and Viswanath, 2006). Thus, these subjects' actual competence in collecting information would not be assessed using Ishikawa *et al.*'s item.

To conclude, although knowledge tests and screening questions are a promising addition or even an alternative to measures of functional health literacy, the lack of generalizability (as is the case for knowledge tests) and external validity (as is the case for screening questions) prevents them from being considered 'gold standard' measures for assessing more advanced skills.

A LOOK AT OTHER LITERACY DOMAINS

One explanation for the lack of a more comprehensive measure of health literacy that reflects its multidimensionality lies in the missing clarification of which dimensions to include in the concept of health literacy. Considering health literacy as a multidimensional concept means that it consists of multiple dimensions such as functional literacy or health knowledge. Nutbeam's (Nutbeam, 2000) three-tiered concept or Schulz and Nakamoto's (Schulz and Nakamoto, 2005) distinction between declarative knowledge, procedural knowledge and judgment skills are two examples of a health literacy concept composed of multiple dimensions. However, these concepts have not been translated into measures that fully encompass their theoretical richness.

To identify which dimensions are important for the concept of health literacy and how they can be operationalized, health literacy research may profit from other literacy domains that emerged during the last decades. Therefore, we conducted a critical review of concepts in other literacy domains. Our review was guided by two research questions:

RQ1: Which dimensions are included in the concepts of other literacy domains?
RQ2: How can health literacy research profit from other literacy domains?

Identification and selection of literacy domains

Before we decided which literacy domains to include in the critical review, we collected a list of domains by searching for 'literacy' within the first 1000 entries of Google Scholar on 14 January 2010. The search resulted in 30 different literacy domains presented in Table 1.

Table 1: List of literacy domains (*selected for review)

Biological literacy	Environmental literacy	Multimedia literacy
Civic literacy*	Family literacy	New media literacy*
Climate literacy	Financial literacy	Network literacy
Computer literacy	Health literacy	Organizational literacy
Consumer literacy	Information literacy*	Political literacy*
Cultural literacy*	Internet literacy	Religious literacy
Dance literacy	Legal literacy	Science/scientific literacy*
Digital literacy	Linguistic literacy	Statistical literacy
Ecological literacy	Media literacy*	Technological literacy
Economic literacy	Multicultural literacy	Television literacy

From the list in Table 1, we selected seven different literacy domains. Our selection was guided by Zarcadoolas *et al.*, who propose a multidimensional concept of health literacy built around four central domains (Zarcadoolas *et al.*, 2003, 2005, 2006): functional (they call it fundamental) literacy, science/scientific literacy (Shen, 1975; Durant, 1994; Laugksch, 2000; Roth and Calabrese Barton, 2004), civic literacy (Milner, 2002; Wilson, 2002; Hoskins *et al.*, 2008) and cultural literacy (Hirsch *et al.*, 1987; Brach and Fraserirector, 2000; Suh, 2004). As part of civic literacy, the authors mention media literacy (Potter, 2004; Rosenbaum *et al.*, 2008; Leaning, 2009), because 'civic literacy refers to abilities that enable citizens to become aware of health issues through civic and social channels' [(Zarcadoolas *et al.*, 2006), p. 61]. Before we started with the critical review, we made four modifications to Zarcadoolas *et al.*'s proposition. First, to extend the review on civic literacy, we also looked at political literacy (Crick and Lister, 1978; Osler, 1999; Maitles, 2000). Second, considering the variety of domains that refer to media literacy (e.g. computer literacy, digital literacy or television literacy), we kept media literacy as a separate domain and decided to review media and new media literacy altogether. Third, we included information literacy (Doyle, 1994; Mutch, 1997; Virkus, 2003),

because some definitions of health literacy (e.g. U.S. Institute of Medicine, 2004) are in line with the definition of information literacy suggested by the American Library Association (ALA, 1989). The ALA states that to be information literate, a person must be able to recognize when information is needed and have the ability to locate, evaluate and use this information effectively. Fourth, we excluded functional literacy from our selection of domains, because—contrary to Zarcadoolas *et al.*—we do not regard functional literacy as a literacy domain (Zarcadoolas *et al.*, 2003, 2005, 2006). Instead, we think that the ability to read, write and do calculations is fundamental for all literacy domains. Thus, functional literacy is a dimension present in different literacy domains rather than a domain itself.

Once we finished selecting literacy domains, we assigned them to five groups based on the domains' contextual similarity: civic/political literacy, cultural literacy, information literacy, (new) media literacy and science/scientific literacy. For each of the seven literacy domains, we searched the databases PubMed, PsycINFO, Communication & Mass Media Complete, CINAHL, SAGE Full-Text Collection, Cochrane Library and Google Scholar. The keywords were '*kind of* literacy' together with 'theory' or 'measurement' or 'model' or 'review,' where *kind of* was replaced by the selected literacy domains. We used wildcards to cover singular, plural and composite terms. We searched all fields such as title, abstract or text of the article. We included only articles in the English language up to February 2010, the month before the literature review. We also included monographs and editions listed on Google Scholar and Google Books.

After finalizing the collection of articles, we realized that work on (new) media literacy and information literacy has been published considerably more often than work on the other selected literacy domains. As shown in Figure 1, we extracted 320 unique articles for (new) media literacy, 290 for information literacy and only 253 for science, cultural and civic/political literacy combined. These numbers are yielded by the databases selected and thus are not exhaustive. However, the numbers give an idea of the interest researchers have in different literacy domains.

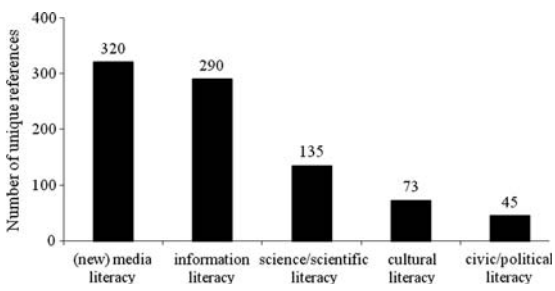

Fig. 1: Number of unique references (excluded are results from Google Scholar and Google Books).

Which dimensions are included in the concepts of other literacy domains?

Guided by the first of our two research questions, we went through the extracted articles, monographs and editions to collect all dimensions mentioned as part of definitions, concepts, theories and models of each of the seven literacy domains. To be conclusive, we collected dimensions independently from eventual discussions about the dimensions' usefulness for the respective literacy domains. We then compared the lists of dimensions obtained and merged them into a single list by grouping those that are equivalent or have similar descriptions. We retained seven distinct dimensions listed in Table 2.

Functional literacy

Functional literacy is composed of reading, writing and numeracy skills also subsumed under the umbrella term 'formal skills' (Hirsch *et al.*, 1987) or 'fundamental literacy' (Zarcadoolas *et al.*, 2003, 2005, 2006). According to United Nations Educational, Scientific and Cultural Organization (UNESCO), functional literacy is the 'ability to identify, understand, interpret, create, communicate, compute and use printed and written materials associated with varying contexts' [(UNESCO, 2004), p. 13]. As such, functional literacy is the basic dimension of literacy concepts in all reviewed domains.

Factual and procedural knowledge

Knowledge is also part of the literacy concepts in all reviewed domains. According to the literature, factual knowledge can be distinguished from procedural knowledge. Factual knowledge is context-specific knowledge that can be declared explicitly. Thus, Schulz and Nakamoto use the term 'declarative knowledge' (Schulz

Table 2: Distinct dimensions retained from literacy domains

	(New) Media literacy	Information literacy	Cultural literacy	Science/ scientific literacy	Civic/ political literacy
Functional literacy	×	×	×	×	×
Factual knowledge	×	×	×	×	×
Procedural knowledge	×	×		×	×
Awareness	×	×	×	×	×
Critical dimension	×	×			
Affective dimension		×	×		
Attitudes		×		×	×

and Nakamoto, 2005). In a definition of cultural literacy, Hirsch *et al*. call this kind of knowledge 'contextual knowledge', which is the knowledge of historical events that have formed today's societies and that are part of people's cultural background (Hirsch *et al*., 1987). Since any type of information (written, oral or visual) is embedded in a context, contextual knowledge enables people to understand and process that information. Procedural knowledge differs from factual knowledge as procedural knowledge refers to the 'know how' to use factual knowledge (Ryle, 1949). In science literacy, for example, procedural knowledge is defined as the capacity to use scientific knowledge [Organisation for Economic Co-operation and Development, (OECD, 2003)]. In information literacy, procedural knowledge is the ability to assess, explain, organize and synthesize information (Wen and Shih, 2008). Procedural knowledge is explicitly mentioned as part of health literacy in Schulz and Nakamoto's (Schulz and Nakamoto, 2005) concept. Procedural knowledge is also implied in other health literacy definitions (e.g. WHO, 1998) that refer to the ability to obtain health-related information and to use it.

Awareness

Similar to functional literacy and knowledge, awareness is a central dimension in the concepts of all reviewed literacy domains. Zaller, for example, includes political awareness in his concept of political literacy, which he defines as the extent to which an individual pays attention to politics and understands what he or she has encountered (Zaller, 1992). Potter includes awareness, using the term 'mindfulness' in his conceptualization of media literacy (Potter, 2004). The dimension is also present in definitions of cultural literacy as the awareness of cultural similarity and diversity (Brach and Fraserirector, 2000; Suh, 2004), and in definitions of science literacy as the awareness of the impact of science and technology on society (Miller, 1997, 2000). Doyle considers awareness as part of information literacy, which she defines as the ability to recognize that accurate and complete information is the basis for intelligent decision-making (Doyle, 1992). In a discussion on what constitutes health literacy, Zarcadoolas *et al*. borrow the dimension from the civic literacy domain and refer to being aware that individual health decisions can affect public health (Zarcadoolas *et al*., 2006).

Critical dimension

A critical dimension appears in definitions and concepts of information and media literacy. Potter, for example, uses two sub-dimensions to describe what can be called 'critical media literacy': meaning matching and meaning construction (Potter, 2004). While meaning matching is the capacity to find the meaning of information hosted by the media, meaning construction is more challenging as it is the capacity to transform information from the media and create meaning for oneself. The two sub-dimensions are intertwined, and people need both capacities to become more media literate. Although meaning matching and meaning construction are two well-defined sub-dimensions of critical media literacy, they have not been operationalized yet. In health literacy, Nutbeam (Nutbeam, 2000) explicitly mentions a critical dimension, and Schulz and Nakamoto refer to this dimension, using the term 'judgment skills' (Schulz and Nakamoto, 2005).

Affective dimension and attitudes

Only a few domains offer literacy concepts that include an affective dimension or attitudes. Both dimensions are mentioned in multidimensional concepts of information literacy (e.g. Bruce, 1995; Kong, 2007). An affective dimension can also be found in Suh's concept of cultural literacy (Suh, 2004) and Hoskins *et al*'s concept of civic/political literacy (Hoskins *et al.*, 2008). However, in the domain of (new) media literacy, neither an affective dimension nor attitudes are mentioned.

How can health literacy research profit from other literacy domains?

The critical review of concepts from other literacy domains revealed that literacy is considered a multidimensional concept. Looking at the dimensions mentioned in the concepts of other literacy domains, functional literacy, factual and procedural knowledge as well as awareness appear in all domains. Thus, integrating these three dimensions in a multidimensional concept of health literacy is sound. Some concepts of health literacy, which have been summarized previously in the paper, already include the three dimensions. However, no single concept of health literacy exists that explicitly mentions all of them and provides a clear description of each dimension.

Functional literacy is the best established dimension of health literacy. To date, 'gold standard' measures of health literacy concentrate on this dimension, measuring word recognition, comprehension and numeracy skills in the medical setting.

A knowledge dimension is mentioned explicitly in the concept of health literacy by Schulz and Nakamoto (Schulz and Nakamoto, 2005) and implicitly by Nutbeam (Nutbeam, 2000) and Jordan *et al*. (Jordan *et al*., 2010). Even when we talk about domain-specific knowledge such as health knowledge, this dimension is still too broad to be captured in a single measure. Abel points out that health literacy has very different meanings depending on the context, and measuring health literacy will be best achieved where content and context are well defined (Abel, 2008; Nutbeam, 2009). In this respect, a distinction between factual and procedural knowledge is fruitful to allow a valid assessment of both sub-dimensions. For example, some people may not know the medical term for a disease (e.g. dorsalgia) but they know how to treat or cope with it (e.g. sleeping on one side).

With the exception of Zarcadoolas *et al*., awareness is not explicitly mentioned as part of health literacy (Zarcadoolas *et al*., 2006). However, we think that it is crucial for the concept of health literacy as awareness refers to a variety of skills necessary for maintaining or regaining good health. Awareness is important for the individual as it involves the ability to engage in an act of self-examination (Rubinelli *et al.*, 2009), recognize a problem and be aware of the need for help. At the same time, awareness is important for society as awareness involves the ability to recognize that individual health decisions can affect public health (Zarcadoolas *et al.*, 2006). Awareness is closely related to health knowledge, because the knowledge of symptoms, threats and so forth (factual knowledge) as well as knowing when and where to seek professional help (procedural knowledge) are necessary to become aware of problems and act accordingly. While health knowledge can be assessed using, for example, disease-specific knowledge tests, awareness is difficult to measure independently from the situation in which it is required and may become apparent. This is probably why the review of other literacy domains did not reveal a validated measure of awareness from which research on health literacy could profit.

The review of literacy concepts from other literacy domains also suggests including a critical dimension of health literacy. According to Nutbeam, it represents more advanced skills that enable people to exert greater control over their health (Nutbeam, 2000). Critical literacy is intertwined with functional skills, health knowledge and awareness, and, therefore, difficult to assess outside a specific context. Before developing measures of critical literacy, further efforts are needed to refine its definition at the theoretical level. In this direction, health literacy research can profit from Potter's work on media literacy, first, by elaborating on the idea that critical literacy is multidimensional, second, by reprising the distinction between meaning matching and meaning construction as two sub-dimensions (Potter, 2004). While meaning matching refers to information comprehension, meaning construction relates to individual judgments on the relevance of the information in one's personal experience. As such, both sub-dimensions are sound conceptual elaborations

of Nutbeam's (Nutbeam, 2000) critical health literacy and Schulz and Nakomoto's judgment skills, and they constitute a promising starting point toward the development of a measure of critical literacy (Schulz and Nakamoto, 2005).

An affective dimension as well as attitudes is less frequent in literacy concepts of other domains. Both dimensions are closely related to motivation (Ajzen and Fishbein, 1980), which is often reported in the discussions on health literacy concepts. For example, Peerson and Saunders (Peerson and Saunders, 2009) recognize that current health literacy concepts implicitly include motivation as a vital part of health literacy [e.g. (Kickbusch *et al.*, 2005; Nutbeam, 2008)]. However, they also claim that the motivational dimension should be regarded separate from health literacy in order to explain discrepancies between the ability to engage in health-promoting behavior and behavior that is actually observed. In line with this consideration, attitudes and emotions should be treated as standalone dimensions rather than considered implicit parts of health literacy.

CONCLUSION

The concept of health literacy has changed significantly over the last 25 years. Originally defined as reading, writing and numeracy skills in the health domain, health literacy is now considered a multidimensional concept. This complicates the development of validated measures to reflect the multidimensionality of the concept. To contribute to the ongoing discussion on health literacy (its conceptualization and operationalization), we conducted a critical review of concepts in other literacy domains. We looked at (new) media literacy, information literacy, science/scientific literacy, cultural literacy and civic/political literacy to retrieve dimensions included in the concepts of these domains and to understand how health literacy research can profit from the dimensions. Our review revealed seven distinct dimensions: functional literacy, factual and procedural knowledge, awareness, a critical dimension, an affective dimension and attitudes. Based on the discussion of the dimensions in the literature, health literacy research can profit from a selection of them by elaborating a consistent and parsimonious concept of health literacy and thereby fostering the development of a more holistic measure.

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