

What do we know so far? The role of health knowledge within theories of health literacy

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Health knowledge has been linked to health literacy (HL) frequently, yet the role of health knowledge remains theoretically inconclusive and empirically understudied. A selective overview on the role of health knowledge within HL theories is presented. Three existing reviews of HL theories have been inspected with regard to the role of health knowledge within these reviews. Summarising the reviews, health knowledge is conceptualised either as an antecedence, a dimension HL, or a consequence of HL. The present paper argues that there is a need for disentangling health knowledge from HL and other sub-concepts to develop a clear and shared language on what is meant by HL and how these sub-concepts are interrelated. This might open a road to better conceptualise, measure, and ultimately alter health knowledge, HL, as well as health outcomes.

referred to as functional HL), broader definitions for instance by the WHO (1998) describe HL as “the cognitive and social skills which determine the motivation and ability of individuals to gain, to access, to understand, and to use information in ways which promote and maintain good health” (comprehensive HL). Part of this disaccord between the various definitions of HL concerns health knowledge in relation to HL. Though health knowledge has been typically treated as an outcome of functional HL (Berkman, Sheridan, Donahue, Halpern, & Crotty, 2011; Berkman, Sheridan, Donahue, Halpern, Viera, et al., 2011) in HL theories the position of health knowledge is mixed. Health knowledge serves either as an antecedence (e.g., von Wagner, Steptoe, Wolf, & Wardle, 2009), as an integral dimension of HL itself (e.g., Freedman et al., 2009), or as a consequence of HL (e.g., Speros, 2005).

What does health knowledge mean exactly? Health knowledge denotes facts, information, and skills acquired through experience or education, as well as the theoretical or practical understanding of a subject related to health and health-care (Chin et al., 2011). Schulz and Nakamoto (2005) further subdivide the concept into declarative health knowledge (factual knowledge related to health issues, e.g. to identify symptoms of an health condition), procedural health 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). In their model, the authors define

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There is a clear association of low HL with inefficient use of health-care services and adverse health outcomes (Berkman, Sheridan, Donahue, Halpern, & Crotty, 2011). Less clear is the definition of HL itself (Martensson & Hensing, 2012). While narrow definitions refer to HL as the ability of reading, writing, and numeracy in the health-care setting (usually

functional HL skills as a possible antecedence of the acquisition of health knowledge (Schulz & Nakamoto, 2005).

Empirical studies have examined the relation of health knowledge and HL. For instance, disease-specific health knowledge in relation to HL was reported on hypertension and diabetes (Williams, Baker, Ruth, & Nurss, 1998), chronic pain (Devraj, Herndon, & Griffin, 2013), oral health (Hom, Lee, Divaris, Baker, & Vann, 2012), and HIV (Ciampa et al., 2012).

Health knowledge within systemic reviews on HL theories

Three recent systematic reviews on HL theories (Frisch, Camerini, Diviani, & Schulz, 2012; Martensson & Hensing, 2012; Sørensen et al., 2012) are inspected on the role of health knowledge within HL theories.

Martensson and Hensing (2012) narratively reviewed 200 articles (including books, policy documents, and dissertation abstracts) on HL theories. Based on this narrative review we could not identify the role of health knowledge clearly, as descriptions of the single theories were presented without any detail. Authors solely classified the articles and documents into two broad categories that they labelled 'HL as a polarised phenomenon' (most similar to functional HL) and 'HL as a complex phenomenon' (most similar to comprehensive HL).

Sørensen et al. (2012) systematically studied and reported on twelve HL theories within seventeen articles on HL theories and generated an integrative model based on their theory review. Table 1 summarises the 12 theories and the role of health knowledge within these theories (based on the Sørensen et al. paper as well as on our re-reviewing of the original papers). Looking

into the role of health knowledge, four of the theories which have been reviewed conceptualised health knowledge as a dimension of HL. Eight theories named increased health knowledge as a consequence of increased HL. Although five theories named education as a predicting factor explicitly, only four of the models referred to health knowledge as an antecedent of HL. Sørensen et al. summarise the 12 theories by conceptualising health knowledge as a dimension of HL next to competencies and motivation.

Frisch et al. (2012) took an explicit focus on health knowledge within their review of literacy theories. They reviewed 863 articles on other literacy domains (e.g. media literacy and information literacy) on the existence of sub-concepts of literacy to inform HL theories, detecting functional literacy, factual knowledge, and procedural knowledge among the most frequently named sub-dimensions of literacy.

Process models of social cognitions in relation to HL and health knowledge

HL and health knowledge have also been incorporated into process-oriented social-cognition models – see Nutbeam (2008), von Wagner et al. (2009), and Baker et al. (2006).

Nutbeam's (2008) model of HL is one of the most cited as well as one of the most comprehensive ones. HL was defined as a person's ability to access, understand, and use health information (comprehensive HL). Three hierarchical HL-levels (functional, interactive, and critical) were introduced on an individual, social, and societal level. Prior knowledge was established as an antecedence of HL (Nutbeam, 2008). Improved knowledge of health risks and health services and compliance with prescribed

Table 1
Health knowledge within health literacy theories

Reference	Brief Description of Theoretical Concept of HL	Role of Health Knowledge
<i>Review article</i>		
0 Sørensen et al., 2012	Integrated model of comprehensive HL incorporates the definitions of models 1 to 12. Knowledge, motivation, and competencies to access, understand, appraise, and apply health information within the domains of healthcare, disease prevention and health promotion. Additionally the models provides pathways linking HL to health outcomes.	(D): Next to competence and motivation, knowledge a key dimension within the theory
<i>Separate articles reviewed in Sørensen et al. 2012</i>		
1 Nutbeam, 2000, 2008 ^a	Conceptual model of HL. Functional, interactive, and critical HL. Personal, social, and societal levels and bi-directional relations between individual and society were outlined. Intervention strategies and causal pathways were integrated into the model.	A: Prior and developed knowledge and capabilities. D: Functional and critical HL are on the transmission of functional and on provision of knowledge on social and economic determinants of health. C: Improved health-related knowledge and knowledge of health determinants and of health risks.
2 Lee, Arozullah, & Cho 2004 ^a	A simplified model of mechanisms linking HL to health outcomes, incorporating intermediate factors	C: Disease and self-care knowledge.
3 Institute of Medicine (IOM), 2001 ^a	The degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions. IOM-model: Education system, culture and society influence HL, whereas health system and individual HL interact with each other. HL is related to health outcomes and costs.	(A): Education and ability of the health care system to provide health information appropriately. D: HL includes reading, writing, numeracy, listening, and speaking; but also cultural and conceptual knowledge in health-related domains. C: Associations of HL with health knowledge, behaviour, and outcomes were described in the article, but health knowledge is not explicitly mentioned in the model description. Patients with limited health literacy and chronic illness have less knowledge of illness management than those with higher health literacy.

(continued)

Table 1 (continued)
Health knowledge within health literacy theories

Reference	Brief Description of Theoretical Concept of HL	Role of Health Knowledge
<i>Separate articles reviewed in Sørensen et al. 2012 (continued)</i>		
4 Zaracadoolas, Pleasant, & Greer, 2005 ^a	An expanded model of HL and the constituent domains of fundamental literacy, science literacy, civic literacy, and cultural literacy.	D: HL was defined as the ability to apply health information to novel situations. Ability to participate in public and private dialogues on health knowledge. Next to skills and awareness, knowledge is a dimension of each HL domain within the model.
5 Speros, 2005 ^a	With means of concept analysis, themes were derived from the literature. Dimensions of HL: Reading skills, numeracy skills, comprehension, capacity to use health information in decision-making, successful functioning in the patient role. Antecedents of HL: Literacy, ability to read, ability to comprehend written words, numeracy skills, health related experience, exposure to medical vernacular, logical context within cognitive framework. Consequences of HL: Improved self-reported health status, lower health care costs, increased health knowledge, shorter hospitalizations, decreased use of health services.	C: Increased health knowledge.
6 Baker, 2006 ^a	Conceptual path model of the relationship between individual capacities, health-related print, and oral literacy influenced by complexity and difficulty of content, and health outcomes (+ other factors such as culture and norms).	A: Prior knowledge related to vocabulary. Conceptual knowledge of health and healthcare is a resource of HL but does not in itself constitute HL. C: attitudes, self-efficacy, health behaviour, acquisition of knowledge are outcomes of improved HL, which in turn affect health outcomes.
7 Paasche-Orlow & Wolf, 2007 ^a	Causal pathways between limited HL and health outcomes.	(A): Education. C: Within provider-patient interaction and self care, knowledge is one of the key patient factors influenced by HL.

(continued)

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Health knowledge within health literacy theories

Reference	Brief Description of Theoretical Concept of HL	Role of Health Knowledge
<i>Separate articles reviewed in Sørensen et al. 2012 (continued)</i>		
8 Kickbusch & Maag, 2008 ^a	Functional, interactive, and critical HL as competency to make health decisions in the domains home, community, workplace, health-care system, in the market place, and politics. It is related to empowerment to people's control over their health, their ability to seek out information. The model takes an explicit perspective of a health-literate society.	A: Educational system. Good health information and the understanding of this information are essential for the development of HL.
9 Mancuso, 2008 ^a	A concept model of HL where HL consists of communication, capacity and comprehension and interacts with a set of competencies, i.e., contextual, informal, autonomous, operational, cultural, and interactive competency.	(A): Inadequate HL was described to be related to less knowledge of their diseases and treatments, but is not explicitly highlighted in the model. C: HL is related to patient's health-care experience and the knowledge gained from health information.
10 Manganello, 2008 ^a	A HL framework where individual traits, family and peer influences, and educational and health care system were assumed to influence HL (functional, interactive, critical, media). HL was directly related to health outcomes.	Knowledge was not mentioned directly in the model.
11 Freedman et al. 2009 ^a	Public HL model explicitly takes an individual and a public perspective on HL. HL means obtaining, processing and understanding health information by individuals and by groups.	D: Public HL consists of various types of knowledge and skills. The conceptual foundations dimension includes the basic knowledge and information needed to understand and take action on public health concerns.
12 von Wagner, Steptoe, Wolf, Wardle, 2009 ^a	A framework of HL and health action that uses established constructs from social cognition models of health to integrate HL into a wider framework of health actions.	A: Knowledge as one of different cognition-related individual influences on HL. C: Knowledge and understanding within the motivational phase of social-cognitive predictors of health-related actions.

(continued)

actions were consequences of improved functional HL. Next to others, improved capacity to act independently on knowledge was a consequence of improved interactive HL.

Baker (2006) assumed prior knowledge (vocabulary and conception of health and health-care) to be influential on functional HL, which creates new knowledge, positive attitudes, greater self-efficacy, and behaviour change. Von Wagner et al. (2009) – similarly to von Wagner et al. – conceptualised health knowledge as an antecedence of functional HL, which again is an antecedent of subsequent knowledge and understanding as a part of the motivational phase of their model. Thereby, knowledge and understanding create beliefs and attitudes, which further – beside system factors and volition –

influence health-related actions. Both theories describe a circular function of health knowledge in relation to HL and beliefs.

Knowledge and beliefs about consequences

According to von Wagner (2009), knowledge will create beliefs about consequences of acting on certain health information, which in turn will form an intention to act on that health information. Baker (2006) and Nutbeam (2008) mention knowledge and attitudes next to each other without making the type of interrelation explicit, e.g. whether they influence each other directly, whether they work in parallel, or

Table 1 (continued)
Health knowledge within health literacy theories

Reference	Brief Description of Theoretical Concept of HL	Role of Health Knowledge
<i>Articles with specific theories on HL and health knowledge (not listed in Sørensen et al., 2012/ added from Frisch et al., 2012):</i>		
13 Schulz & Yamamoto, 2005	Functional HL was conceptualised as a basis for developing increasingly complex types of health knowledge that are declarative knowledge (understanding), procedural knowledge (implications and decisions), coherent knowledge (based on theory), and expert knowledge (by health care professionals).	(D): Knowledge is conceptualised in corresponding to Nutbeam's functional (declarative knowledge), interactive (procedural knowledge), and critical (coherent knowledge or judgement skills) HL.
14 Chin et al., 2011	Process-knowledge model of HL. Processing capacity, general verbal knowledge, and specific health knowledge influence functional HL, which in turn influences self care. Education and illness experience influence general verbal knowledge and specific health knowledge.	(A): Two facets of knowledge are general verbal knowledge and specific health knowledge, which influence functional HL.

Note. Role of knowledge, summarized from Sørensen (2012) and from the original articles cited in Sørensen (2012). HL = Health literacy, A = Antecedence of HL, D = Dimension of the HL concept, C = Consequence of HL. (D) = Letters in brackets were not counted as antecedence, dimension or consequence in the respective chapter. ^aFor full references, see Sørensen et al., 2012.

whether they interact in a certain way. Although not mentioned explicitly an assumed sequence from knowledge to attitudes might be most likely in their models.

In some cases, knowledge may work in parallel next to beliefs about consequences. Certain knowledge domains, e.g. correct identification of disease symptoms or knowing the number of the emergency medical service correctly, might be related to behaviour not via beliefs about consequences or attitudes but more directly (Dombrowski et al., 2015). In contrast, general health knowledge such as knowledge on the link between regular physical exercise and improved health outcomes might work indirectly by formation of beliefs about consequences of exercising regularly which in turn creates behavioural intentions.

Measures of health knowledge

Perceived knowledge is the belief about capacities to have acquired, to get access to, to understand or to apply health information. Actual knowledge is the capability to recognise or recall correct health information. While the first one is merely a belief about one's own capability, the second is a capability itself. Perceived and actual knowledge are interrelated concepts, but it is important to distinguish them on a conceptual level as well as in terms of measurement. Measures of actual knowledge test the knowledge based on false and correct answers. They are context- and disease-specific and therefore hard to compare across studies and diseases. Although there are few measures of disease-specific health knowledge tests available (Schulz & Nakamoto, 2005), there is a clear lack of studies examining the relation of actual health knowledge, comprehensive HL, and social cognitions. Measures of perceived knowledge refer to the self-reported perceived capability to understand

or act on health information (e.g. HLS-EU-questionnaire). They are easier to administer and more context- and disease-general. Perceived health knowledge measures a person's beliefs about to act on knowledge and not knowledge itself. Therefore, it might be worth measuring both perceived and actual knowledge as they refer to different entities and might predict health and health-care independently of each other.

The attempt of the present article to disentangle health beliefs and health knowledge, as well as different measures of health knowledge, aimed at contributing to the clarification of the conceptual overlap between health knowledge and HL.

Outlook and implications

The provision of health information to increase health is an integral part and often the very starting point of most interventions followed by fostering motivation, self-regulation, and skills, which are critical components to promote health behaviour change. Nevertheless, the provision of information as part of intervention packages should be guided by health knowledge theories and should be tailored to a patient's needs accordingly. Provision may be considered an interactive act, including an active recipient. Both sides – the individual and the individual's environment – but also the features and skills of health-care professionals and the health-care system in providing health literate information should be taken into account. In this context, it may be assumed that particularly health literate systems and care providers reduce pressure on the individual health-care seekers to increase health-related knowledge for improved health outcomes, and vice versa.

Conclusion

The aim of the present paper was to shed light

on the interrelation of HL and health knowledge. Summarising the views of the role of health knowledge from systematic reviews of HL theories, most of the theories include health knowledge and HL as related concepts. Theories that conceptualise HL in a narrow way, i.e. functional HL, mostly refer to health knowledge as a consequence of HL. This is in line with systematic reviews focusing on the effects of low levels of functional HL which has been linked to low health knowledge. Theories of HL that follow a broader, more comprehensive approach of HL conceptualize health knowledge mostly as a dimension of HL although there is more variability between theories in their use of health knowledge. For instance, the integrated model of Sørensen et al. (2012) states knowledge, motivation, and competencies as key components of comprehensive HL. Process models of HL mainly refer to health knowledge as antecedence as well as consequence of (functional) HL. Nutbeam (2008), Baker et al. (2006) and von Wagner et al. (2009) for instance establish a causal chain from prior knowledge via HL and via acquired knowledge to beliefs and attitudes. To conclude, health knowledge plays an important role within theories of HL, though its exact position varies across models and definitions. This largely reflects the inconsistency between different theories and definitions of HL. Clarifying the role of health knowledge might be a step to structuring the diversity of HL theories and help us to better understand HL in order to improve HL and health outcomes.

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