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Dutch health websites and their ability to inform people with low health literacy

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ABSTRACT

Objective: To evaluate whether Dutch online health information (OHI) generally reflects message elements that support information processing and understanding among people with low health literacy.
Methods: We content-analyzed one hundred Dutch webpages about Ebola, fibromyalgia, ALS, losing weight, borderline personality disorder, hemorrhoids, ADD, bladder infection, shingles, and chicken pox. The codebook covered the following domains: images and videos, readability level, Suitability Assessment of Materials (SAM), advertising, interactive features, and reliability cues.
Results: Thirty-seven webpages contained informative images that visualized the text. Twelve webpages incorporated videos, six of which were animations. Readability varied widely, but 79.2% of the texts exceeded the recommended B1 level. Half of the webpages had inadequate SAM scores; five were classified as superior. Interactive features were infrequently used. Many webpages included only a few elements that help users evaluate the reliability of OHI. Four presented a quality label.
Conclusion: Over a wide range of health-related topics, Dutch OHI does not generally contain message elements that improve information processing among people with low health literacy.
Practice implications: Communication professionals should make better use of digital message features. Videos, narration, and interactivity are scarcely used but can be valuable for people with low health literacy.

1. Introduction

Health-related information that people can use to make well-informed health decisions is widely available. Much of this information can be found online, and many people use the Internet to find health-related information [1]. Online health information (OHI) is used for many reasons, such as self-diagnosis, to prepare for a visit to a General Practitioner (GP) or to complement information provided by a GP [2]. However, using health information effectively is not easy; individuals need sufficient health-related knowledge and skills to understand and apply this information [3]. Approximately 25% of the Dutch population has inadequate health literacy [4], which means that, understanding and using health information is particularly difficult for them.

In recent decades, the concept of health literacy has evolved rapidly. It was initially defined as "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions" [5]. In subsequent years, the concept has expanded to encompass the wide variety of skills that people need to function in a modern health care system [3]. Currently, the definition by Berkman, Davis and McCormack is used often: "the degree to which individuals can obtain, process, understand, and communicate about health-related information needed to make informed health decisions" [6]. Although this development shows that using health information entails discussing it with others, adequately processing and understanding that information remains an important prerequisite. Furthermore, Nutbeam [7] argued that health literacy comprises not only reading and writing skills (i.e., functional health literacy) but also the ability to extract and critically analyze information. This final element, critical health literacy, is especially relevant for OHI. However, the Internet hosts an abundance of unverified and even unreliable health information [8]. To make OHI optimally accessible to people with low health literacy, attention should be paid to the message characteristics that make OHI easier to process and understand.

According to the health literacy skills framework [9], comprehension of health-related stimuli is the result of an interaction between the health literacy level of the receiver and the demands

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of the health-related stimulus. Health literacy demands are defined as "the complexity and difficulty of a stimulus" (p. 49) and can be based on the content of the message, the communication channel, and the message source. Theoretically, this cognitive perspective on health literacy and information processing is based on cognitive load theory [10] and the limited capacity model of mediated message processing [11]. According to these models, people can only process a limited amount of information in their working memory. If information is too complex, people are at risk of cognitive overload, leading to inadequate information processing and reduced information recall. Empirical research has supported this mediating role of cognitive load in the relationship between health literacy and information recall [12].

To improve information processing, the cognitive demands of health information should be reduced as much as possible [13]. Mayer and Moreno [14] distinguish different types of cognitive demands, and the total processing capacity required for learning consists of the sum of these processing types. Essential processing refers to the cognitive processes required to understand the material (e.g., a complex topic requires much essential processing), whereas incidental processing refers to cognitive processes that are not required for understanding (e.g., background music or layout elements). Based on the cognitive theory of multimedia learning (CTML [15]), strategies to reduce cognitive load present information using text and corresponding images or replace written text by narration [14]. Experimental research has indicated that these are effective strategies to improve information processing among people with low health literacy [16,17].

Other characteristics of OHI that could theoretically influence cognitive load and information processing are interactivity and advertising. Interaction with new information has shown to improve learning (e.g., in the form of knowledge tests) and is especially recommended for people with low health literacy [18]. In contrast, advertisements do not belong to the instructional content of OHI and therefore increase incidental processing, which should be reduced as much as possible to reduce cognitive load [14].

Prior studies have evaluated the content of OHI, including factors that influence understanding among populations with low health literacy. However, most content analyses have been conducted outside Europe and have evaluated websites on specific health topics, such as male infertility [19], colorectal cancer screening [20], H1N1 Flu [21], or cocaine addiction [22]. Because people turn to OHI for a variety of reasons, there is value in learning more about the current state of OHI on different health conditions that are regularly searched for by the general public. To the best of our knowledge, this paper is the first to evaluate a general sample of health-related webpages in relation to health literacy. The aim of this paper is to evaluate whether Dutch OHI generally reflects message elements that support information processing and understanding among people with low health literacy.

2. Methods

2.1. Sampling procedure

To create a selection of webpages that are regularly consulted by OHI consumers, we first identified the 10 health-related keywords that are most often used in the search engine Google.nl. We chose Google because it is the market leader in Western countries [23]. Using GoogleAdwords, which is a planning tool for advertisers, we analyzed the popularity of more than 800 health-related keywords over a two-year period (November 2012 to October 2014). The results showed that the following keywords were used most often: Ebola; fibromyalgia; ALS (amyotrophic lateral sclerosis); weight loss; borderline personality disorder; hemorrhoids; ADD (attention deficit disorder); bladder infection; shingles; and chicken pox.

Subsequently, every keyword was entered into the search-engine Google.nl using the web browser Firefox. The location of the IP address was Amsterdam, the Netherlands, and personalized search was deactivated. For each term, we selected the first 10 webpages that were listed in the search results while the following results were excluded: news results, live feeds, and multiple links to the same webpage. These exclusion criteria were also applied by McInnes and Haglund [24]. The final sample consisted of 100 Dutch webpages covering 10 different health conditions. A PDF file and an HTML file were saved for all pages. The full list of webpages is presented in the Appendix A.

2.2. Codebook

The codebook consisted of the following six categories: use of images and videos, readability level, Suitability Assessment of Materials (SAM), advertising, interactivity, and reliability cues. During codebook development, the authors organized multiple coding sessions to resolve disagreements and refine the codebook where it was unclear. Author CM coded the SAM and author AB coded the other categories. To ensure reliability of the data, a

Table 1
Summary of the interrater reliability scores (mean kappa) ($n = 18$).

Scale	Number of items	Mean k	Range k
Images and videos			
Images	6	0.702	0.607–0.760
Videos	5	1.000	
Font enlargement and narration			
Font enlargement	1	0.825	
Narration	1	1.000	
Interactivity	7	0.747	0.550–1.000
SAM			
Content	4	0.514	0.471–0.531
Graphics	4	0.629	0.438–1.000
Learning stimulation and motivation	3	0.529	0.449–0.609
Advertising	1	0.727	
Quality indicators			
Quality mark	2	1.000	
Accountability	6	0.670	0.526–0.852

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