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Meppelink, C.S.; van Weert, J.C.M.; Brosius, A.; Smit, E.G.

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

Corine S. Meppelink*, Julia C.M. van Weert, Anna Brosius, Edith G. Smit

Amsterdam School of Communication Research/ASCoR, University of Amsterdam, Amsterdam, The Netherlands

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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

* Corresponding author at: Amsterdam School of Communication Research, University of Amsterdam, P.O. Box 15793, 1001 NG Amsterdam, The Netherlands.
E-mail address: c.s.meppelink@uva.nl (C.S. Meppelink).

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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

random sample of 18 webpages (18%) was coded by a third coder who was not one of the authors. Interrater reliability was assessed using Cohen's kappa. Codes with an interrater reliability greater than 0.41 were considered to be reliable [25]. Inter-rater reliability appeared to be insufficient for the SAM elements evaluating literacy demands, the layout and typology of the health information, and the single item about captions used for graphics ($\kappa < 0.40$). Therefore, these items were not used in the analysis. The mean inter-rater reliability of the remaining 40 items was appropriate ($\kappa = 0.74$). An overview of the interrater reliability is presented in Table 1.

2.2.1. Images and videos

For each webpage, the presence of images and videos was coded. Images could be drawings or photographs. In the literature, (simple) drawings are usually recommended because they present fewer distractions [26]. When images depict body parts, it is recommended to show the entire body as a reference and to ensure that the accompanying text is clear [26]. We also coded whether the images and videos on the webpage were informative. Informative images (also known as cognitive images) and videos clearly depict the main content of the webpage and can therefore facilitate understanding of the material [27]. Furthermore, we coded whether the video was an animation or a narrative. Animations have been shown to be effective among people with low health literacy [17], and research has shown that video-based narratives using a conversational narration style (compared to a formal narration style) can optimize information processing [28]. A list of the items is presented in Table 2.

2.2.2. Narration and font size

As health literacy is related to literacy, it has been suggested that spoken information is easier for people with low health literacy to process compared to written information [17,29]. Therefore, the option to enlarge text could be helpful for people who have problems with reading. Therefore, we coded whether the webpages had the options to have the textual information narrated and to enlarge the font size.

2.2.3. Readability level and text length

We used the reference levels of the Common European Framework of Reference for Languages to assess the difficulty level of the textual information on the webpages [30]. This framework consists of six reading levels (i.e., A1, A2, B1, B2, C1, and C2), where A1 represents the easiest level and C2 the most difficult one. In the Netherlands, public information should ideally be written at the B1 level, meaning that 95% of the population can understand the information [31]. In addition, we determined the Flesh Kincaid (grade) score because this formula is often used to assess readability in international studies [20,24]. Consistent with these studies, the texts were prepared according to the following rules: all disease, procedure, and medication names were removed; headings, web links, captions, and URL's were removed; and decimals, colons, semi-colons, and periods used for abbreviations were removed. The texts were then analyzed using the following online tools: https://www.accessibility.nl/kennisbank/tools/leesniveau-tool for the European reference level and https://readability-score.com/for the for Flesh Kincaid grade. In addition, the total number of words was assessed using the word count function in Microsoft Office's Word.

2.2.4. Suitability assessment of materials

The Suitability Assessment of Materials (SAM) [18] was originally developed to provide health care providers with an instrument to quickly assess the suitability of written patient education materials. The instrument consists of 22 items assessing six different aspects of patient information (i.e., whether the content of the material is limited in scope and has a clear purpose, whether illustrations are used optimally, whether the material stimulates learning and motivates the reader, whether the layout and typology of the textual information are optimal, whether the literacy demand of the textual information is appropriate, and whether the information is culturally appropriate). In this study, cultural appropriateness was not evaluated, as the two items assessing this aspect of health information refer to a specific target population, which is difficult to determine for general online health information. Moreover, culture is crucial to the understanding of health information, but, as noted by Schyve [32] it is a separate factor from health literacy. A more detailed description of the remaining 11 items can be found in Table 3.

Consistent with the official coding instructions, each item could receive a score ranging from 0 (inadequate) to 2 (superior). Because not every item was applicable to each webpage, the code not applicable (NA) was also used. The scores were summed and a percentage score was calculated for each webpage ((actual score/possible score)*100). Webpages with a percentage score of 70–100% were labeled 'superior', 40–69% 'adequate', and 0–39% 'inadequate', based on the SAM guidelines [18].

2.2.5. Advertisements

For each webpage, the presence of advertisements was coded (0 = absent, 1 = present). Content was coded as advertising when it promoted a product or service that needed to be purchased.

Table 2
Descriptive statistics of the images and video items ($n = 100$).

	yes	no
	n	*n*
Images on the webpage	71	29
Informative images on the webpage	37	
Photographs on the webpage	57	
Images that are explained with words on the webpage	23	
Images depicting body parts on the webpage	19	
Images also depicting the whole body as a reference on the webpage	5	
Video on the webpage	12	88
Informative videos	12	
Animations	6	
Narratives: doctor tells about condition	5	
Narratives: patient tells about condition	1	
Narration of the text possible	7	93
Enlargement of font size possible	15	85

Note: As the total number of webpages (*N*) is 100, the *n* and the percentages are similar. Therefore no percentages are reported.

Table 3
Descriptive statistics of SAM items ($n = 98$).

	inadequate	adequate	superior	N/A
	n (%)	*n* (%)	*n* (%)	*n* (%)
Content				
Purpose of the material is clear.	2 (2.0)	65 (66.3)	31 (31.6)	
Content is about behavior to help solve the problem.	69 (70.4)	19 (19.4)	10 (10.2)	
The material is limited in scope and can be learnt in limited time.	23 (23.5)	60 (61.2)	15 (15.3)	
A summary is provided.	73 (74.5)	17 (17.3)	8 (8.2)	
Graphics				
Cover graphic attracts attention and portrays the purpose of the material.	11 (11.2)	30 (30.6)	11 (11.2)	46 (47.0)
Use of simple appropriate drawings that are familiar to the reader.	50 (51.0)	41 (41.8)	7 (7.1)	
Illustrations present key messages without distractions.	53 (54.1)	24 (24.5)	21 (21.4)	
Graphics: lists, tables, graphs and charts are carefully explained.	3 (3.1)	4 (4.1)	0 (0.0)	91 (92.8)
Learning stimulation and motivation				
Interaction is included in the material.	57 (58.2)	15 (15.3)	26 (26.5)	
Desired behavior patterns are modeled.	44 (44.9)	17 (17.3)	37 (37.8)	
Topics are subdivided in to small parts to enhance self-efficacy.	6 (6.1)	20 (20.4)	72 (73.5)	

2.2.6. Interactivity features

We used the items applied by Khazaal et al. [22] to assess interactivity. These items evaluate the availability of knowledge questionnaires and supporting tools such as forums and discussion rooms. In addition, we evaluated whether users could rate the webpage and share it on social media, as these features are quite common. We also added two items evaluating the presence of entertainment education and tailored information, as these formats can be assumed to support information processing by making the material more engaging and personally relevant [33,34]. All items are presented in Table 4.

2.2.7. Reliability cues

To evaluate the ease with which users could evaluate the reliability of the webpage, we coded the presence of a quality label, and if present, which label was used. We also coded each webpage based on the items measuring a website's accountability as applied by Khazaal et al. [22]. The items address, for example, the crediting of authors, presence of references, website ownership disclosure, and whether the date on which the webpage was created or last modified is specified. In addition, we coded whether the webpage was modified within the last six months. An overview of the items is provided in Table 4.

3. Results

3.1. Images and videos

The results showed that 71% of the webpages contained at least one image. However, in only 37% of the cases were the images informative. These images were most often found on pages about shingles ($n = 8$), hemorrhoids ($n = 8$), Ebola ($n = 6$), chicken pox ($n = 5$), and bladder infection ($n = 4$). Twenty-three webpages explained the images with text, helping the reader understand

Table 4
Descriptive statistics of the items assessing interactivity, advertising, and quality indicators ($n = 100$).

	yes	no
	n	*n*
Advertising on the webpage	35	65
Interactivity		
Within site search engine	15	85
Satisfaction or knowledge evaluation questionnaires	5	95
Supporting bodies (e.g., forums or opportunity to react to the content)	16	84
Entertainment education (e.g., quiz or game supporting comprehension)	1	99
Tailored information (information personalized after assessment)	15	85
Possible to rate the webpage	11	89
Possible to share webpage on social media	59	41
Quality label	4	96
Health on the Net (HoN)	3	
Pharma checker	1	
Quality indicators		
Authors credited	26	74
Authors affiliations	20	80
References given/hyperlinked	34	66
Website ownership disclosed	88	12
Webpage modified in the last 6 months	29	71
Date created/last modified specified	52	48

Note: As the total number of webpages (N) is 100, the n and the percentages are similar. Therefore no percentages are reported.

the image. Pictures displaying body parts were mainly found on webpages about hemorrhoids ($n = 6$); however, only two of these webpages also showed a picture of a full body as a reference. Two webpages about ALS and one about bladder infection showed images of body parts together with an image of the full body to make the picture clearer to the user.

Although images were found on the majority of webpages, only 12 webpages contained a video, and all videos were informative. Videos were most often found on webpages about hemorrhoids ($n = 3$), whereas none of the webpages about Ebola, losing weight, or borderline personality disorder contained a video. In 50% of the cases ($n = 6$), a narrative format was used, wherein doctors ($n = 5$) or patients ($n = 1$) were talking about the health condition. Six videos were animations. Five out of the 12 videos (42%) were on webpages belonging to a large commercial Dutch health website.

3.2. Narration and font size

In addition to incorporating videos into health education materials, digital information offers the possibility to have the text read aloud by a narrator or to increase the font size of the text. The results showed that only a minority of the webpages used these options. Only seven webpages offered the opportunity to have the text narrated, and all of these webpages belonged to non-profit medical institutions. None of the other webpages offered this option to their users. In 15% of the cases, the text of the webpage could be enlarged.

3.3. Readability

The average number of words on the webpages was 841, but large differences among pages were observed ($SD = 618$). The webpage with the least text contained 63 words and was about borderline personality disorder, whereas the most words (3929) were counted on a webpage about losing weight. On average, webpages about chicken pox contained the fewest words ($M = 543.40$, $SD = 203.20$) and webpages about losing weight the most ($M = 1251.67$, $SD = 1080.91$). No significant differences with respect to text length were observed among health conditions $F(9, 95) = 0.36$, $p = 0.237$. The readability of the webpages also varied widely. As shown in Fig. 1, only 7 webpages were written at a B1 level. The majority of webpages ($n = 54$) were written at a B2 level, and 21 webpages had even more difficult text. Information about losing weight appeared to be easiest to read, as none of the webpages exceeded the B2 level. Four webpages could not be analyzed because they lacked a body of text ($n = 2$) or prevented copy-pasting, which was required for readability analysis ($n = 2$).

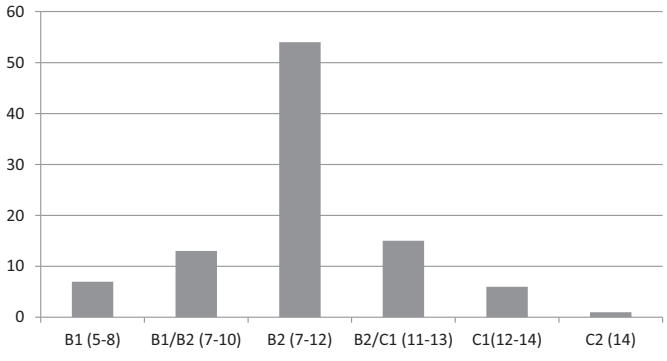

Fig. 1. Number of websites per European Reading level. Flesh Kincaid grade level between brackets.

3.4. Suitability assessment of materials (SAM)

The SAM could not be applied to two webpages (one about losing weight and one about ADD) because they contained only buttons leading to other webpages and there was no text that could be evaluated on the main page. Of the remaining 98 webpages, 48 (49%) were found to be inadequate, 45 (46%) adequate, and 5 (5%) superior. All superior webpages were hosted by non-profit medical institutions. The mean SAM score was 41.64% ($SD = 17.56$). Webpages about losing weight were found to have the highest scores ($M = 52.17\%$, $SD = 14.60$) and pages about borderline personality disorder the lowest scores ($M = 28.00\%$, $SD = 7.68$). Post-hoc tests, however, revealed no significant differences between the 10 health conditions.

3.5. Advertising

More than one-third of the webpages contained advertising (35%). Advertisements were most common on pages about bladder infection and shingles, as half of those pages incorporated advertising ($n = 5$). Commercial content was lowest on pages about ALS, borderline personality disorder, and ADD ($n = 2$).

3.6. Interactivity

The results showed that 94% of the webpages included at least one of the interactive features that were evaluated in this study. One webpage, about losing weight, included six elements. On average, the webpages contained 1.92 interactive features ($SD = 1.11$); the most were found on webpages about weight loss ($M = 2.30$, $SD = 0.82$) and the least on webpages about ALS ($M = 1.04$, $SD = 1.07$). Tailored information was present on 15 webpages, whereas entertainment education was only present on 1 webpage. No significant differences were found among the health conditions with respect to interactivity, $F(9, 99) = 0.59$, $p = 0.802$. See Table 4 for frequencies.

3.7. Reliability cues

Only four webpages presented a quality label; there were three instances of the Health on the Net label and one of the Pharma Checker. Ninety webpages included at least one indicator of webpage reliability. In most cases, website ownership was disclosed ($n = 88$), but the author's affiliations were not often given ($n = 20$). The webpages contained, on average, 2.49 features that could be used to evaluate reliability ($SD = 1.56$). The most indicators could be found on webpages about bladder infection ($M = 3.40$, $SD = 1.71$), whereas webpages about ADD contained the fewest reliability cues ($M = 1.70$, $SD = 1.49$). The health conditions did not significantly differ in relation to the presence of reliability cues, $F(9, 99) = 0.083$, $p = 0.589$. The frequencies per item are presented in Table 4.

4. Discussion and conclusion

4.1. Discussion

The aim of this paper was to evaluate whether Dutch OHI generally reflects message elements that support information processing and understanding among people with low health literacy. First, our content analysis of 100 webpages showed that, with respect to readability, the results of other studies also apply to the Netherlands. Despite the fact that there has been a call for easy-to-read health education materials for decades [35], OHI is still written on a reading level that is too difficult for many people to understand, particularly those with low health literacy. Research

has shown that clear and simple information not only increases understanding of health materials among groups with low health literacy, but also is appreciated by people with high health literacy [36].

Only a few interactivity features were found on the webpages. Features that were added because of their positive influence on information processing (according to the literature, e.g., tailored information after online assessment), were rarely used in Dutch OHI. Some webpages offered the opportunity to respond to the information. Such user-generated content could be valuable to people seeking social support or ways to share their experiences. However, it also entails the risk that people will act based on inaccurate information because people with low health literacy sometimes perceive this as an indicator of information quality [2]. Research is needed to identify the features that truly improve understanding among people with low health literacy and those that might be less useful.

Furthermore, our study showed that most webpages presented images, but only a third of the webpages contained informative images that supported understanding. Images that are not informative, however, may serve other purposes such as increasing satisfaction with the website [27]. In general, images and videos were often used for health conditions that are easy to visualize; however, people with low health literacy particularly need visual aids to understand difficult information [16]. The design of appropriate images for people with low health literacy is complex; pictures that visualize abstract concepts can easily be misunderstood [37], and people with low health literacy tend to prefer images with little context (presenting an isolated organ instead of the full body) [38]. Because we did not assess the quality of the pictures, it is possible that poorly designed informative illustrations make information more difficult – rather than easier – to understand. Therefore, it is recommended that images for OHI be developed in close collaboration with the target population.

This study has some limitations. First, we only evaluated a sample of 100 webpages, 10 per health condition. Because it was our aim to provide an overview of how general Dutch OHI reflects elements that support understanding among people with low health literacy, we decided to include multiple health conditions that people regularly search for. However, it remains unclear how our results apply to other health conditions or websites that are specifically designed for certain patient populations.

Our study aimed to generate a sample of webpages that are frequently consulted by many OHI consumers. We based this decision on our analysis of keyword popularity in the search engine Google.nl and used a computer on which the search history was disabled. However, with the increase in personalized search engine results based on previous online activities, it can be questioned whether 'general OHI' still exists. People are increasingly exposed to information that matches their other online activities. Moreover, people also tend to consider information more reliable when it matches their ideas and expectations [2]. Future research should further investigate the effects of personalized searches and selective exposure in OHI among people with different health literacy levels.

Although readability formulas are easily applied to assess the difficulty level of a text, it should be noted that these instruments only assess the total number of words or syllables in a text. They do not evaluate the presence of complex words, for example. Because readability and comprehensibility are not always related [39], we should not rely on these tests exclusively. To reduce text difficulty and optimize health information, other recommendations should be followed, such as the use of short sentences made of common words and written in the active voice [40]. As the inter-rater reliability appeared to be insufficient for the SAM items concerning literacy demand, our evaluation does not incorporate this indicator of health information suitability.

4.2. Conclusion

Dutch OHI frequently lacks message elements that improve information processing among people with low health literacy. Almost 80% of the webpages were written on a reading level that is too difficult for many people. About one-third of the webpages used informative images, and one out of eight webpages contained an explanatory video or animation. Almost half of the webpages were inadequate in terms of SAM scores. There was a lack of interactivity, particularly for those features that improve learning, such as tailoring. Most quality indicators were infrequently used.

4.3. Practice implications

There are multiple ways in which OHI can be improved to maximize the opportunities of e-health for people with low health literacy. Use of animation, narration, and interactivity can support information processing. Especially when a health condition is less concrete, effort should be put into the design of relevant images. Furthermore, more attention should be paid to indicators of webpage reliability. Both producers and consumers of OHI should be aware of the importance of OHI reliability, and research should identify ways to improve OHI evaluation among people with low health literacy.

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Conflict of interest

None declared.

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Appendix A. URL's of the 100 webpages included in the sample.

URL's of the 100 webpages included in the sample.

Ebola

http://nl.wikipedia.org/wiki/Ebola.
http://www.rivm.nl/Onderwerpen/E/Ebola.
https://www.artsenzondergrenzen.nl/projecten/ebola.
http://mens-en-gezondheid.infonu.nl/ziekten/130034-ebola-virus-symptomen-oorzaak-uitbraak-en-behandeling.html.
http://www.ggd.amsterdam.nl/infectieziekten/reizigersvaccinatie/nieuws-reizen/ebola/.
https://www.thuisarts.nl/ebola/ik-wil-meer-weten-over-ebola.
http://www.gezondheidsplein.nl/aandoeningen/ebola/item112917.
http://ebolaziekte.nl.
http://www.ggdkennemerland.nl/ebola.aspx.

http://www.dienstgezondheidjeugd.nl/publiek-thema/wat-is-ebola.

Fibromyalgia

http://www.fibromyalgie.nl.
http://www.reumafonds.nl/informatie-voor-doelgroepen/patienten/vormen-van-reuma/fibromyalgie.
http://nl.wikipedia.org/wiki/Fibromyalgie.
http://www.optimalegezondheid.com/beter-leven-met-fibromyalgie-tips-om-de-klachten-te-verminderen/.
http://www.gezondheidsplein.nl/aandoeningen/fibromyalgie/item40506.
http://www.avogel.nl/Indicaties/Fibromyalgie/Fibromyalgie-symptomen-behandeling.php.
https://www.thuisarts.nl/fibromyalgie/ik-heb-fibromyalgie.
http://www.fesinfo.nl.
http://fibromyalgie.pilliewillie.nl.
http://www.allesoverfibromyalgie.com.

ALS

http://nl.wikipedia.org/wiki/Amyotrofe_laterale_sclerose.
http://www.als.nl/wat-is-als/.
http://www.spierziekten.nl/overzicht/amyotrofische-laterale-sclerose/diagnose-en-verschijnselen-als/.
http://www.alsziekte.nl.
http://www.vsn.nl/spierziekten/diagnose.php?diagnose_id=13.
https://www.prinsesbeatrixspierfonds.nl/spierziekten/als/.
http://www.erfelijkheid.nl/content/als-amyotrofische-lateraal-sclerose.
http://www.als.nl/wat-is-als/de-ziekte/.
http://www.gezondheidsplein.nl/aandoeningen/amyotrofische-laterale-sclerose/item34332.
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