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# The impact of recommendations and warnings on the quality evaluation of health websites: An online experiment

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ABSTRACT

With the increase in availability of online health information (OHI), consumers need to be able to properly evaluate the quality of health websites. Although several established evaluation criteria for OHI are available, these are rarely used by consumers. To improve people's ability and motivation to critically evaluate OHI, insights into how these criteria can optimally be communicated are needed. This study aims to investigate whether educational messages recommending the use of quality criteria can improve consumers' ability to evaluate OHI credibility, especially among people with low health literacy. We also test whether these messages can yield a stronger effect when combined with information warning consumers against using non-established criteria. In an online experiment, we randomly assigned 403 participants to one of four conditions and asked them to evaluate two websites of different quality. The conditions consisted of recommendations promoting the use of established evaluation criteria, warnings against using commonly adopted non-established criteria, a combination of the two, and a control group. Participants exposed to messages recommending established criteria evaluated the credibility of the lower quality website as poorer, and were better able to discriminate between high and low quality information compared to those in the control group. A combination of recommendations and warnings also improved people's ability to evaluate, but did not yield a stronger effect than the recommendations alone. Subgroup analysis, however, showed that these effects existed only for those with high health literacy. We conclude that providing consumers with criteria to evaluate OHI might be a viable way to improve people's evaluation skills of online health materials. Further research is needed to identify efficient ways to communicate these criteria to low health literate audiences.



## 1. Introduction

During the last decades, the amount of online health information (OHI) has dramatically increased and more and more people turn to the Internet to find information about health-related issues (Fox & Duggan, 2013). Despite the widespread availability of health information, large differences in the quality of OHI on different topics exist (Eysenbach, Powell, Kuss, & Sa, 2002; Zhang, Sun, & Xie, 2015). Consequently, the quality of the information that consumers encounter during their web searches has been a reason of concern (Berland et al., 2001; Bernstam et al., 2008; Eysenbach et al., 2002; Hardey, 2001; Stvilia, Mon, & Yi, 2009). OHI- seeking thus poses several major challenges to the users of health information. This particularly applies to those with limited health literacy, who are less likely than people with adequate health literacy to possess the skills required to evaluate of the quality and credibility of the vast amount of often unverified health information that can be found on the Internet (Flanagin & Metzger, 2008; Jiang & Beaudoin, 2016).

To distinguish between reliable and unreliable health information, knowledge about established quality criteria for OHI could be extremely helpful to consumers. Such criteria exist in form of checklists and have shown to be useful tools for web designers, providers of health information, and researchers (for a summary view, see Kim, Eng, Deering, & Maxfield, 1999; Zhang et al., 2015). However, research has also shown that these criteria are hardly used by consumers in their assessment of OHI quality (Eysenbach & Kohler, 2002; Flanagin & Metzger, 2000; Fogg et al., 2003; Rieh,

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2002; Scholz-Crane, 1998). Instead, people often rely on unreliable subjective feelings or heuristics such as the ranking of a website in the search results or its layout (Diviani, van den Putte, Giani, & van Weert, 2015; Diviani, van den Putte, Meppelink, & van Weert, 2016; Feufel & Stahl, 2012; Gauld & Williams, 2009; Mackert, Kahlor, Tyler, & Gustafson, 2009). The explanation for this could be twofold. First, it has been suggested that existing quality guidelines are usually very detailed and complex and therefore difficult for consumers to apply in their regular searches for OHI (Meola, 2004; Metzger, 2007). Educating people about these criteria using an easy-to-use format could therefore be useful to improve consumers' ability to evaluate OHI. Second, many OHI consumers lack awareness of the issue of health information quality, which means that they do not recognize the need to systematically apply evaluation criteria (see, e.g., Diviani et al., 2016). In these situations, a different message strategy is possibly needed, in which people are not only informed about established evaluation criteria, but also warned against using non-established ones.

This study responds to a call for attention to the issue of the quality of online health information and for successful strategies to improve people's ability to evaluate OHI (Berland et al., 2001; Bernstam et al., 2008; Car, Lang, Colledge, Ung, & Majeed, 2011; Eysenbach et al., 2002; Hardey, 2001; Stvilia et al., 2009). If people are better able and more motivated to evaluate OHI credibility and quality, adverse health outcomes such as low participation in screening programs or low adherence to treatments caused by wrong or incomplete information, could be prevented (Cline & Haynes, 2001). As it has been suggested that the evaluation of OHI is mainly problematic among people with low levels of health literacy (Diviani et al., 2015), it could be assumed that the findings of this study are particularly important for this group. Our study addresses the following research question: Do educational messages recommending the use of established evaluation criteria improve consumers' ability to evaluate OHI credibility, especially among people with low health literacy, and can these messages yield stronger effects when combined with information warning consumers against using non-established criteria?

### 1.1. Established criteria to evaluate credibility

With the rise of the Internet, the amount of information that is available to the public has become virtually unlimited (Viswanath, 2005). However, as the production of online content is not restricted to authorities, this has reasonably raised concerns regarding the credibility and quality of online information (Metzger, 2007). In contrast to traditional public information, online information is usually not filtered by professional gatekeepers, resulting in large amounts of inaccurate information online (Zhang et al., 2015). On the Internet, inaccurate information is not only equally accessible as accurate information, but is also presented in the same format (e.g., a website). Consequently, this could induce a 'leveling effect', which suggests that consumers perceive both accurate and inaccurate information as equally credible (Burbules, 1998). As consumers do not (and are not expected to) possess the expertise to assess the actual accuracy of online information, to accurately differentiate between accurate and inaccurate information, consumers need to pay attention to specific indicators of information credibility and quality that are often beyond the first impression. According to Metzger (2007), careful credibility evaluation of online information incorporates assessment of the following five domains: accuracy, authority, objectivity, currency, and coverage or scope. These indicators of information quality are based on extensive research, and are the ones most commonly included in recommended criteria to evaluate OHI (Zhang et al., 2015). We will therefore refer to these as 'established criteria'.

### 1.2. Informing OHI consumers about established criteria

Over the years, multiple instruments to assess OHI quality have been developed. In a recent review, Zhang et al. (2015) were able to identify 29 different established instruments (i.e., used in more than one study). In their paper, the authors showed that some of them (e.g., DISCERN, HONcode, and JAMA benchmarks) have been used more often than others in research settings. Although the separate instruments include different specific indicators (sometimes context-dependent), and some also assess additional aspects such as accessibility, aesthetics, or navigability, all of them cover at least to a certain extent the basic credibility criteria outlined by Metzger (2007). To be considered accurate, for instance, information presented on a website should be error-free; to be considered authoritative, a website should present the name of its authors, their credentials, and their contact details; to be considered objective, a website has to be open about its purpose, has to clearly distinguish between editorial and commercial contents, and has to disclose commercial intent and/or conflicts of interest; to be considered current, a website should include a publication date and the time when the information was last updated; last, coverage or scope is assessed by establishing whether information on a website adequately covers all the relevant aspects of a given topic (e.g., presents all available treatment options with pro and contra).

Because of these checklists, we are now able to create websites fulfilling established quality criteria (i.e., high quality health websites), which are in turn perceived as more accurate (see e.g, Allam, Sak, Diviani, & Schulz, 2017), as well as to conduct large scale quality assessments of OHI in different health domains (see, e.g., Grewal & Alagaratnam, 2013 for websites about colorectal cancer or Kaicker, Debono, Dang, Buckley, & Thabane, 2010 for websites about chronic pain). Research on consumer OHI seeking, however, has shown that these criteria are rarely used by consumers to assess OHI quality (Eysenbach & Kohler, 2002; Flanagin & Metzger, 2000; Fogg et al., 2003; Rieh, 2002; Scholz-Crane, 1998). There are at least two plausible reasons for this, both related to the nature of the checklists themselves. First, checklists have originally been developed for online health information providers (e.g., web designers or content managers) or for researchers, and have therefore not been designed to be particularly consumer-friendly. They are usually very detailed, verifying all the relevant aspects of such checklists requires time, and applying them requires advanced web browsing skills. It is therefore not surprising that consumers of OHI do not apply them in their everyday searches for OHI (Meola, 2004; Metzger, 2007). Second, no efforts have been devoted to their dissemination. As a result, as suggested among others by Diviani et al. (2016), many OHI consumers do not question health information quality, which means that they do not even recognize the need to apply evaluation criteria. Our first hypothesis therefore states the following: *Providing easy-to-use information recommending the use of established evaluation criteria improves people's ability to evaluate the credibility of OHI* (*H1a*) *and to distinguish between high and low quality health information* (*H1b*).

### 1.3. Warnings against using non-established criteria

Metzger (2007) notes that merely informing people about how to evaluate the credibility of online information is probably not sufficient. Motivation to carefully evaluate the credibility of online sources is often lacking, and people rarely check the accuracy of information by using established criteria (Flanagin & Metzger, 2000; Scholz-Crane, 1998). In line with other processing models, Metzger (2007) therefore introduces the 'dual processing model of Web site credibility assessment' which proposes that thorough credibility judgment of online information only takes place when