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Genetics Blogs as a Public Health Tool: Assessing Credibility and Influence

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Abstract
The Internet is becoming an important source of information about genetics and holds promise for public health applications. However, the public has concerns about the credibility of online genetics information. We conducted a content analysis of genetics blogs (n = 94). Specifically, we assessed the prevalence of various genetics-related topics and perceived credibility indicators. The relationship between content indicators, credibility indicators, and blog influence, measured as links between blogs, was evaluated. Coverage of issues related to health or self-knowledge (31%) and life science (26%) was most common among genetics blogs. In terms of credibility indicators, most blogs disclosed authors' full names (81%) and biographical information (67%). Many blog authors reported having genetics (67%) or life science expertise (59%). However, only 7% of blogs were affiliated with educational or medical institutions. Overall, blogs that focused on ancestry, that had authors with life science expertise, and that posted more frequently tended to be more influential. Findings suggest that life scientists and those who blog frequently may figure more centrally in shaping the genetics information available to the public via blogs. There is room for institutions that are likely to be perceived as credible sources of genetics information to assume a greater presence through blogs.

Introduction

The Internet is expected to become a major medium for disseminating genomic information [1]. With 83% of Internet users already seeking health information online, a large segment of the population is accustomed to using the Internet to access this type of content [2]. In addition, a growing body of online genomic content is becoming accessible to the public, ranging from educational resources posted by government and nonprofit organizations to personalized genetic test results provided by direct-to-consumer genetic testing companies. Internet-based communication is the kind of low-cost, high-reach medium that will be needed to integrate genomic information into public health interventions and to improve genetic literacy in the population [3]. While Internet-based health and genetic information is becoming in-

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creasingly visible and available, concerns have been raised about the quality of that information [4]. Patients and consumers in particular have expressed concerns about the accuracy and credibility of the genetics information they encounter on the web [5].

One principle type of interactive Internet platform is the blog, which is a frequently updated website composed of dated entries organized in reverse chronological order [6] (see Miller et al. [7] for a detailed discussion of blogs in health contexts). Blogs have a great potential as a public health tool for relaying scientific news about topics like genomics. Blogs digest and provide critical commentary on complex concepts that can be unfamiliar to lay audiences [8]. Such critical analysis will be important for consumers because the information available from emerging genomic products, such as direct-to-consumer tests, will likely be difficult to understand [9]. However, few incentives exist for blogs to maintain the same editorial standards as medical literature published through more traditional media [10]. If blogs dedicated to genomics are to serve as effective resources for public health information, it is important to assess the type of information that is available and visible, the bloggers providing that information and the extent to which it will be deemed credible by patients and consumers.

Content of Genetics Blogs

Genetics blogs cover a diverse array of topics ranging in focus from basic science concerns, to news and commentary about genetic services, to legal or ethical issues. They can contain content written for the lay public or for topic experts. Whether and how a given genetics blog might be leveraged as a public health resource will likely depend upon these variations in content. At present, however, there is no research assessing the scope of genetics blogs available on the web.

Factors Related to Perceived Credibility

Concerns have been expressed over how credible or believable consumers will find the information conveyed by blogs. Judgments that people make about the credibility of information posted on a blog are not likely to be a simple function of objective accuracy [11, 12]. Characteristics of the information source influence individuals' perceptions of credibility [13] and ultimately whether the information is accepted as fact [14]. Credibility may be communicated through indicators that convey transparency, lack of bias, and expertise in the topic. For example, one can determine whether a blog's affiliations or sponsors suggest the appearance of bias or whether blog authors indicate in their profiles that they have expertise in the topic [15–17]. Web credibility standards, including the Stanford Guidelines for Web Credibility [18] and HONcode [19], provide information about the features that have been found to convey credibility for online information.

Influence of Genetics Blogs

Assessing the relationship between credibility indicators and influence can clarify whether the blogs that are most likely to be perceived as credible are also the blogs with the greatest potential reach. Blog influence can be thought about in terms of how often blogs link to and from each other [20, 21]. A link from one blog to another conveys attention, popularity and the spread of influence [22]. In many cases, a blogger who links to another blog implicitly recognizes or 'endorses' it as a reliable source of information [23]. Frequently cited blogs are more likely to be encountered by patients and consumers seeking genetics information.

The Current Study

The goal of this study was to describe and evaluate the body of blogs devoted to human genetics and genomics. We proposed 3 specific aims. Our first aim was to determine what topics are represented on genetics blogs and how these topics are associated with intended audience (e.g. laypeople, professionals). Our second aim was to assess how genetics blogs measure up to web credibility standards. Finally, we aimed to examine the relationship between credibility indicators and influence within the genetics blogging community. Through these analyses, we attempted to explore the potential opportunities for disseminating public health genomics information to web users through blogs and the gaps that may need to be addressed to facilitate these efforts.

Methods

Sampling

We identified blogs that were about general or human genetics or genomics by identifying blogs that contained at least 1 of the following keywords in the URL, title or description: 'gene(s),'

Table 1. Operational definition of blog credibility indicators

Credibility indicator	Measures	Definition
Affiliation	Affiliation type	Whether or not the blog claimed or appeared to be affiliated with an educational or medical institution, other not-for-profit organization, government institution, other for-profit company, or unaffiliated [19]. Educational, medical, or not-for-profit affiliation was considered more credible than no affiliation or for-profit affiliation.
Author identification[a]	Author first and last name	Whether or not at least one of the blog's authors provided his or her first and last name. Blogs that provided names were considered more credible than those that did not.
Author expertise	Author background disclosure	Whether or not any authors on the blog indicated having a background in the following categories: genetics, life science, technology, medicine, and/or industry. Blogs on which authors indicated relevant expertise were considered more credible than blogs on which they did not. Subcategories of expertise were not mutually exclusive.
Opportunity to contact	Online contact information provision	Whether or not an email address or social media profile was provided in an easily accessible location on the blog. Blogs that provided contact information were considered more credible than blogs that did not.
	Comments allowed	Whether or not readers could leave comments on the blog. Blogs that allowed comments were considered more credible than blogs that did not.
Information currency[a]	Posting rate	Posting rate (i.e. the number of posts per week) as calculated by the number of posts made during the study inclusion period divided by the age of the blog measured in days since the first post or days since the beginning of the inclusion period (i.e. June 15, 2007 to June 15, 2009), whichever was fewer. Blogs with a higher posting rate were considered more credible than blogs with a lower posting rate.
Citation of external sources[a]	Outbound links per post	Average number of outbound links (i.e. hyperlinks directed to an external website) per post. Blogs with more outbound links were considered more credible than blogs with fewer outbound links.

[a] We used a software-assisted data processing algorithm to aid in coding this item.

'genome(s),' 'genetic(s),' 'genomic(s),' or 'DNA.' Data were collected and coded in summer 2009. We archived blog content that was published between June 15, 2007 and June 15, 2009. We initiated keyword searches in search engines (i.e. Google, Yahoo, and Bing) and websites that aggregated science and genetics blogs. Then we used an iterative snowball sampling approach in which additional genetics blogs were identified by following links embedded in already-collected blogs [7]. The process was continued until no more eligible blogs were identified. We required each blog to be written in English, contain 2 or more posts and have been updated in the past 6 months. Ultimately, we arrived at a population of 94 blogs.

Coding

We developed a closed-ended codebook used by independent coders to assess several constructs. Blogs were coded using both manual coding and software-assisted data processing. We coded information contained in URLs, titles, headlines, 'about' pages, and linked author profile websites. Agreement testing and refinement of the codebook was an iterative process wherein, after an initial training, 2 independent coders reviewed a random sample of blogs. Final agreement statistics were computed for 20% of the blogs. Coder agreement on this subsample reached acceptable levels of intercoder reliability, with kappas ranging from 0.6–1.0. Coders met to reconcile any remaining differences.

Measures

To assess blog content, coders recorded the main genetics-focused topic addressed by each blog using the blog elements described above and the 6 most recent posts. Each blog was coded as to whether its main (primary) topic was health or self-knowledge (e.g. personalized medicine, genetic testing), life science, technology (e.g. bioinformatics), product marketing (i.e. content promoting a genetic test), genealogy or ancestry, or legal or ethical issues. As measured, these main topics represent mutually exclusive categories. The intended audience for each blog was coded as either a professional audience (e.g. scientists, clinicians) or a lay audience (e.g. consumers, patients) by assessing the information presented in posts.

The credibility indicators assessed in this study were defined according to categories from established web credibility standards [18, 19]. These indicators included affiliations, author identification, author expertise, opportunity to contact, information currency (i.e. posting rate), and citation of external sources (see table 1 for definitions and criteria).

To measure influence, we counted inlinks, i.e. the number of times a link pointing to a given genetics blog was posted by another blog included in the study. To clarify, when Blog X posted a link to Blog A, A received an inlink from X [23]. Blog A, therefore, has influence over X because A served as a reference source for X, as shown in figure 1.

Statistical Analysis

SPSS for Windows Version 17.0 was used to conduct all analyses [24]. We conducted descriptive analyses on the coded variables including blog content, intended audience, credibility, and influence. We then explored bivariate and multivariate relationships between each credibility and content indicator and influence (i.e. the number of inlinks received). Because the distributions of inlink and information currency (i.e. posting rate) data were skewed, these variables were submitted to a log transformation prior to analysis. Measures that were derived from information about individual blog authors (e.g. disclosure of full name) were aggregated to produce an overall score for each blog based on whether at least 1 blog author fit the category. Therefore, all analyses were conducted at the blog level. A χ^2 test of independence was performed to determine whether the main topics covered by blogs differed by intended audience. Bivariate analyses of the relationship between credibility indicators and influence were conducted using one-way ANOVAs for categorical indicators and bivariate correlation analyses for continuous indicators. Subcategories of variables that were not mutually exclusive were coded as either having the feature described in the subcategory or not (e.g. at least 1 author with genetics expertise). Separate ANOVAs were conducted for each subcategory of these variables, comparing 2 groups apiece. We finally conducted a multivariate linear regression analysis to assess the relative contribution of all credibility and content indicators on influence. For all analyses, statistical significance was assessed as $p < 0.05$.

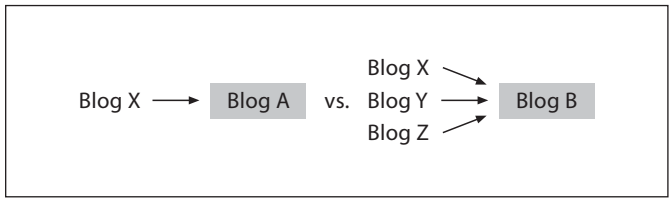

Fig. 1. Diagram showing how blogs relate to one another through inlinks. Arrows represent inlinks. In this diagram, the relationship on the left shows that Blog X *links to* Blog A; equivalently, Blog A *receives an inlink from* Blog X. Blog B has more inlinks than Blog A, and, as such, Blog B is presumed to be more influential than Blog A.

Table 2. Main topic of genetics blogs by intended audience

Main topic	Intended audience[a]		Total
	professional[b]	lay[c]	
Health or self-knowledge	7.4%	23.4%	30.8%
Life science	19.1%	6.4%	25.5%
Technology	14.9%	1.1%	16.0%
Product marketing	1.1%	9.6%	10.7%
Genealogy or ancestry	5.3%	3.2%	8.5%
Legal or ethical issues	1.1%	7.4%	8.5%
Total	48.9%	51.1%	100.0%

[a] n = 94. [b] n = 46. [c] n = 48.

Results

Blog Content Indicators

As shown in table 2, the most common main topic covered by the blogs in our sample was health or self-knowledge, which was discussed by 31% of blogs in this group. Other frequently observed main topics were life science (26%) and technology (16%). The intended audience of the blogs was split almost evenly between lay and professional audiences. Main topic was significantly associated with intended audience, χ^2 (5, n = 94) = 36.40, $p < 0.001$, V = 0.62. Blogs about health or self-knowledge, product marketing and legal or ethical issues were more often intended for lay audiences, whereas blogs on life science and technology tended to be geared toward professional audiences.

Blog Credibility Indicators

Blogs were most commonly unaffiliated with organizations or companies (57%, n = 54). Of the blogs that had an affiliation, most were connected with a for-profit company (26%, n = 24). The remaining blogs were affiliated with not-for-profit organizations (10%, n = 9) or educational or medical organizations (7%, n = 7). No blogs had a government affiliation.

The majority of blogs provided author identification, with 81% (n = 76) giving the first and last name of at least 1 author. Thirty percent of blogs provided online contact information (n = 28). Readers had the opportunity to leave comments on almost all blogs (95%, n = 89). Blogs often disclosed the authors' expertise (76%, n = 71). The most common area of expertise mentioned was genetics, with 67% (n = 63) of blogs having at least 1 author who claimed a background in this area, followed by life science (59%, n = 55), technology (27%, n = 25), medicine (20%, n = 19), and industry (20%, n = 19).

Table 3. Multiple regression analysis predicting blog influence by topic and credibility indicators

Indicator	β	p
Main topic (ref: legal or ethical issues)		
Health or self-knowledge	0.325	0.051
Life science	0.272	0.090
Technology	0.048	0.737
Product marketing	0.156	0.264
Genealogy or ancestry	0.303	0.013*
Affiliation (ref: unaffiliated)		
Educational or medical	–0.169	0.080
Other not-for-profit	–0.048	0.602
Other for-profit	–0.009	0.934
Author first and last name	0.074	0.505
Author expertise[a]		
Genetics (ref: none)	–0.005	0.969
Life science (ref: none)	0.290	0.021*
Technology (ref: none)	–0.101	0.346
Medicine (ref: none)	–0.083	0.426
Industry (ref: none)	0.069	0.498
Opportunity to contact		
Online contact information (ref: no)	0.085	0.378
Comments allowed (ref: no)	0.039	0.663
Posting rate	0.492	0.000*
Outbound links per post	0.031	0.740

n = 94. ref = Reference category. A log-transformation of the influence variable was computed and used in these analyses.

[a] Subcategories within this indicator are not mutually exclusive. * $p < 0.05$.

Blogs varied widely in information currency, with posting rates that ranged from 3.65 *posts per year* to a maximum of 4.54 *posts per day*. The average posting rate was 2.6 posts per week (M = 1.1, SD = 4.55). Citation of external sources was fairly common, with an average of 5.5 outbound links per post (SD = 4.1).

Association between Topic and Credibility Indicators and Influence

The number of inlinks per blog ranged from 0 to 486 (M = 52.54, SD = 97.81). The association between information currency and influence was significant (r = 0.544, $p < 0.001$), such that blogs with a greater posting rate received more inlinks. Citation of external sources, however, was not significantly associated with influence (r = 0.049, p = 0.638, ns).

We separately assessed whether blog influence differed by main topic, affiliation, author identification, author expertise, or opportunity to contact. Of these, only 1 subcategory of author expertise, life science, was significantly associated with influence, $F(1, 92) = 4.80$, MSE = 3.06, p = 0.031, $\eta^2 = 0.05$. Blogs with at least 1 author who reported having a background in life science received more inlinks (M = 62.33 inlinks, SD = 101.792) than blogs without authors reporting this expertise (M = 36.42 inlinks, SD = 90.097).

We entered all topic and credibility variables into a multivariate linear regression model predicting the number of inlinks, our measure of influence (table 3). Overall, the model explained a significant portion of the variance in influence, $F(18, 75) = 4.01$, $p < 0.001$, $R^2 = 0.49$. Significant predictors of influence included whether a blog covered genealogy or ancestry as the main topic, whether it had authors that reported having a life science background and how frequently the blog was updated. Blogs that covered genealogy or ancestry as the main topic tended to have more inlinks. Likewise, blogs that had at least 1 author with a life science background had significantly greater influence than blogs whose authors did not. Finally, posting rate was positively associated with a blog's influence.

Discussion

This analysis was a first step towards evaluating genetics blogs as a public health tool for engaging audiences and helping them better understand genetics issues. Our analysis revealed how the topics covered by genetics blogs related to their intended audience, how blogs fared on credibility standards and how those factors determined influence.

The body of genetics blogs currently available on the web focuses on a wide range of topics, some of which are particularly germane to public health. Most notably, we found that blogs discussing health or self-knowledge applications of genetics and genomics were geared largely toward lay audiences. In addition, these blogs tended to be more influential among genetics blogs and, as such, are likely to have greater reach. Blogs that appeal to lay audiences may be promising platforms for conveying and engaging consumers with public health genomics content. Public health practitioners might work with existing blogs or establish new blogs through which genetics news and information can be discussed. Our analysis suggests that focusing on health and self-knowledge topics may be a way to enhance the appeal of these blogs for lay audiences. Additionally, blogs may be a valuable resource for gauging community reactions to emerging genomics issues and technologies (e.g. opinions about direct-to-consumer genetic tests that provide information about health

or individual traits). Blog readers do not passively receive information, but actively influence content by responding and contributing new information [25]. In this sense, blogs may provide a rich, dynamic source of data for tracking beliefs and attitudes about genomics.

Genetics blogs are likely to be more successful in communicating public health information if readers perceive these blogs to be a credible resource. We found that genetics blogs fared well on some credibility indicators but were weak with respect to others. Dimensions of credibility in which blogs excelled were author expertise, author identification and citation of external sources. Bloggers frequently identified themselves by full name, which conveyed that they are 'real people' who take personal responsibility for blog content. In comparison, a study of general health and medical blogs found much lower rates of author identification by full name (i.e. 33% of medical blogs in that study [10] vs. 81% of genetics blogs in the current study). This might be because genetics bloggers are more motivated to blog for professional reasons and have fewer concerns related to privacy or patient confidentiality than medical bloggers.

The current analysis identified potential credibility gaps with respect to affiliation and contact information. Genetics blogs were largely authored by unaffiliated individuals and for-profit companies. Genetics blogs with for-profit affiliations may be viewed as having conflicts of interest related to promoting genetic tools or products with limited or unknown utility. Indeed, conflicts of interest, sponsorship and commercial advertising have been cited as an area of concern for health blogs in general [7]. Anecdotally, we also noted that it was unclear in some cases whether a blog received sponsorship or was otherwise affiliated with an organization or company. Few of the blogs we analyzed were affiliated with educational, medical or nonprofit organizations. There may be barriers that prevent nonprofit organizations from being better represented among genetics blogs. For example, blogs are still frequently seen as 'alternative' media outlets, and authoring blogs in an official capacity may be considered risky from an organizational standpoint [26]. Sources affiliated with nonprofit organizations are often considered by lay audiences to be highly credible [5]. Therefore, the limited representation of universities, medical facilities and government agencies may be a missed opportunity for these organizations to play an active role in informing the public's understanding of genetics and genomics through blogs.

Another credibility indicator on which genetics blogs were weak was the provision of contact information. By failing to disclose an email address or other contact information, bloggers may inhibit perceptions that they are willing to be held accountable for the information they post. On the other hand, a unique feature of blogs is communication tools like self-published comments and links to social networking sites that enable other forms of audience engagement. Comment tools were virtually ubiquitous suggesting that bloggers value interacting with readers in public channels. Leveraging all of these features more consistently on genetics blogs may improve their credibility and interactivity.

The current analysis provides insight into the characteristics associated with a genetics blog's influence. In all, few of the credibility indicators assessed in this study were related to blog influence. Having at least 1 author who reported a life science background was significantly associated with greater influence. This implies that life scientists may currently play a stronger role in shaping how genetics is discussed online than bloggers with other expertise. The genetics blogging community is also sensitive to information currency; blogs that posted more often were more influential. This makes sense in light of a survey of healthcare bloggers that found that one of the perceived benefits of healthcare blogs is that they are forums for distributing timely information [27]. Therefore, provision of timely content may be a key way for genomics blogs that disseminate public health information to increase their reach. Finally, blogs on topics that capture public attention (genealogy and family history in particular) have higher reach, so leveraging blogs that intersect with lay interests may be a particularly promising strategy.

Limitations

This study had some limitations that are important to consider. This study was a first attempt to explore blogs that address genetics and genomics topics and was therefore limited in scope. We did not study how genetics content is represented on blogs that focus on general science or health and that may reach a wider or different audience. Furthermore, we were not able to assess how many people read or encounter genetics blogs in web searches. Future research in this area would provide a more comprehensive measure of blog influence.

Our analysis drew upon content features that have been shown in prior research to be associated with perceived credibility. This analysis did not directly assess the objective accuracy of information contained in genetics blogs. We intended to explore the subjective assessments of believability and trustworthiness that the public is

likely to make about genetics blogs. We did not attempt to verify the accuracy of the blog authors' claims (e.g. about expertise). We took bloggers' claims at face value based on the assumption that the appearance of a credential, rather than the reality, is what shapes audience judgments about credibility. Accordingly, the features we assessed in this analysis drew upon the same information that was available to blog readership. While it was beyond the scope of the present study, we recognize that assessing the accuracy or factualness of genetics blog content would be an important area for further research.

Although our measures and coding procedure were informed by existing web credibility standards, alternative ways to operationalize these constructs are possible. We recognize that different measures may have resulted in different outcomes. We only measured a subset of credibility indicators included among the current standards. Some constructs that we did not measure may also be important to credibility and influence.

Conclusions

Because there is great potential for social media to reach audiences seeking genetics and health information, we aimed to shed light on how and whether genetics blogs might be effective for the advancement of public health genomics objectives. Through our analysis, we can conclude that some existing categories of genetics blogs (e.g. health or self-knowledge) could be suitably leveraged for these purposes. For these blogs to maintain or improve their reach, genetics bloggers should consider updating content often and providing information about their expertise. Although providing other credibility-enhancing information may not lead to better reach, this should not discourage bloggers from adhering to credibility standards. Indeed, credibility is important in its own right. As we noted, there are gaps in transparency and potential conflicts of interest. The growth of genetics blogs associated with nonprofit organizations could increase the availability of credible platforms for advancing public health-oriented community engagement with genomics.

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References

1 McBride CM, Bowen D, Brody LC, Condit CM, Croyle RT, Gwinn M, Khoury MJ, Koehly LM, Korf BR, Marteau TM, McLeroy K, Patrick K, Valente TW: Future health applications for genomics: priorities for communication, behavioral, and social sciences research. Am J Prev Med 2010;38:556–561.

2 Pew Research Center's Internet and American Life Project: What Internet users do online. Washington (DC), September 2010. http://www.pewinternet.org/Trend-Data/Online-Activites-Total.aspx.

3 Lea DH, Kaphingst KA, Bowen D, Lipkus I, Hadley DW: Communicating genetic and genomic information: health literacy and numeracy considerations. Public Health Genomics 2011;14:279–289.

4 O'Leary L, Collins DL: Using the Internet to disseminate genetics information for public health; in Khoury MJ, Burke W, Thomson EJ (eds): Genetics and Public Health in the 21st Century: Using Genetic Information to Improve Health and Prevent Disease. Oxford, Oxford University Press, 2000, pp 603–613.

5 Bernhardt JM, Lariscy RA, Parrott RL, Silk KJ, Felter EM: Perceived barriers to Internet-based health communication on human genetics. J Health Commun 2002;7:325–340.

6 Herring SC, Scheidt LA, Bonus S, Wright E: Bridging the gap: a genre analysis of weblogs; in Sprague RH Jr (ed): Proceedings of the 37th Annual Hawaii International Conference on System Sciences 5–8, Big Island, January 2004, Los Alamitos, IEEE Computer Society Press, c2004. http://ieeexplore.ieee.org/xpl/freeabs_all.jsp?arnumber=1265271 (subscription required to view).

7 Miller EA, Pole A, Bateman C: Variation in health blog features and elements by gender, occupation, and perspective. J Health Commun 2011;16:726–749.

8 Buis LR, Carpenter S: Health and medical blog content and its relationship with blogger credentials and blog host. Health Commun 2009;24:703–710.

9 Lachance CR, Erby LA, Ford BM, Allen VC Jr, Kaphingst KA: Informational content, literacy demands, and usability of websites offering health-related genetic tests directly to consumers. Genet Med 2010;12:304–312.

10 Lagu T, Kaufman EJ, Asch DA, Armstrong K: Content of weblogs written by health professionals. J Gen Intern Med 2008;23:1642–1646.

11 Dutta-Bergman MJ: The impact of completeness and web use motivation on the credibility of e-health information. J Commun 2004;54:253–269.

12 Eysenbach G, Powell J, Kuss O, Sa E: Empirical studies assessing the quality of health information for consumers on the world wide web. JAMA 2002;287:2691–2700.

13 Kruglanski AW, Thompson EP: Elaboration by a single route: a view from the unimodel. Psychol Inq 1999;10:83–109.

14 Hovland CI, Janis IL, Kelley HH: Communication and Persuasion. New Haven, Yale University Press, 1953, p 315.

15 Fogg BJ, Kameda T, Boyd J, Marshall J, Sethi R, Sockol M, Trowbridge T: Stanford-Makovsky web credibility study 2002: investigating what makes web sites credible today. Stanford, Stanford University, Stanford Persuasive Technology Lab, Spring 2002, p 16. Joint publication of Makovsky and Company, New York. http://www.webstrat.fr/sites/www.webstrat.fr/files/Stanford-MakovskyWebCredStudy2002-prelim.pdf.
16 Flanagin AJ, Metzger MJ: The role of site features, user attributes, and information verification behaviors on the perceived credibility of web-based information. New Media Soc 2007;9:319–342.
17 Freeman KS, Spyridakis JH: An examination of factors that affect the credibility of online health information. Tech Commun 2004;51:239–263.
18 Fogg BJ: Stanford guidelines for web credibility. Stanford, Stanford University, Stanford Persuasive Technology Lab, May 2002. http://credibility.stanford.edu/guidelines/index.html.
19 Health on the Net Foundation: The HON code of conduct for medical and health web sites (HONcode). Geneva, April 2011. http://www.hon.ch/HONcode/Patients/Conduct.html.
20 Agarwal N, Liu N, Tang L, Yu PS: Identifying the influential bloggers in a community; in Nojork M, Broder A, Chakrabarti S (eds): WSDM'08 Proceedings of the International Conference on Web Search and Web Data Mining, Palo Alto, February 2008, pp 207–217. New York, Association for Computing Machinery, c2008. http://www.public.asu.edu/~ltang9/papers/WSDM08-influential.pdf.
21 Ulicny B, Baclawski: New metrics for newsblog credibility. Paper presented at: Proceedings of the International Conference on Weblogs and Social Media, Boulder, March 2007, p 2. http://icwsm.org/papers/4-Ulicny-Baclawski.pdf.
22 Schmidt J: Blogging practices: an analytical framework. J Comput Mediat Commun 2007;12:1409–1427.
23 Kumar R, Raghavan P, Rajagopalan S, Tomkins A: The web and social networks. Computer 2002;35:32–36.
24 SPSS Inc., Chicago, IL. http://www-01.ibm.com/software/analytics/spss/.
25 Sundar S, Edwards HH, Hu Y, Stavrositu C: Blogging for better health: putting the 'public' back in public health; in Tremayne M (ed): Blogging, Citizenship, and the Future of Media. New York, Routledge, 2007, pp 83–102.
26 Kenix LJ: Blogs as alternative. J Comput Mediat Commun 2009;14:790–822.
27 Envision Solutions, LCC and the Medical Blog Network: Results of a global online survey of healthcare bloggers: taking the pulse of the healthcare blogosphere December 2006. http://formersite.enspektos.com/pdf/Studies/Healthcare_Blogger_Survey_Report.pdf.