Tidsskriftet Arkiv

VOLUM 8-1 2017

DOI: http://dx.doi.org/10.7577/ta.2165
ISSN 1891-8107

PEER REVIEWED ARTICLE

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Students' Trust Formation and Credibility Judgements in Online Health Information – A Review Article

ABSTRACT
Health information is a frequent subject for online information seeking. Research on the phenomenon has to a certain extent included students. This review, based on an analysis of 61 articles, shows the current state of the art of research on students' trust in online health information. The review covers methodological approaches and findings of previous previous empirical studies: research design; trustworthy health information sources; credibility assessment; and factors impacting on trust formation. The analysis of research designs reveals that the survey method was most frequent, but small qualitative studies were also occurring. More than half of the studies were administered in the USA, while only a smaller part concerned 'non-Western' countries. Female subjects were more frequent than male.
The concept of trust was not always explicitly defined in the studies. The students' actual propensity to use internet was generally taken as an expression of trust. The antecedents of trust identified in the studies can be summarized as the perceived quality of the information, the perceived credibility of the source or source provider, the users' general inclination to trust, the actual use of information, and the perceived intelligibility of the information. The findings show that Internet was among the main sources for health information, but parents or other family members, friends, schools, health professionals were also frequent sources of health information, and students were not immediately accepting online information as trustworthy. The students' trust and credibility judgments were influenced by social and demographic, cultural, psychological, knowledge and skills-related, and source, system and content-related factors. Governmental and organizational websites were reported as the most trustful sources, although some issues regarding website features and presentation of content were reported as barriers. Easy access were of importance for using a particular resource, but there seemed to be a learning effect impacting on seeking behaviour and trust formation.

Key words: students, trust formation, credibility assessment, online health information

Introduction

A field of crucial importance for citizens' welfare is access to health information and services. Wangberg et al. (2009) reports a huge increase in internet use for health information in Norway during the first decade of the 21st century, and this is in line with international findings (e.g. Sillence et al., 2007). Health information is thus a frequent subject for online information seeking. An important consumer group is students. The students' population in the world is growing (Hammond, 2015), and students have high tendency to search for health-related information on the internet. Contemporary students are considered to be 'digital natives' (Prensky, 2001), i.e. tech-oriented and well-educated individuals, and established consumers of online services.

Still, even if students are habitual internet users, access to reliable online health information can be challenging. Online health information is provided by a variety of sources: public health providers, commercial enterprises, various communities and individuals. It is also of various and sometimes dubious quality, which may lead to severe consequences for health consumers. Assessing the credibility and trustworthiness of online health information is a complex process, and the trust formation of users is influenced by many factors. The lack of understanding of these factors will misguide the future practices and research in this domain. To what extent different sources are trusted, and *why* they are trusted is thus of relevance for policy makers, health system developers, and information providers.

Students have been main participants in studying online health information seeking (e.g. Gray et al., 2005; Percheski and Hargittai, 2011; Rowley et al., 2015), but few syntheses of the current research findings on the trust formation of this consumer group have been published. Thus, in order to have a general assessment of students' trust behaviour in the online health information context, this study tries to map the current state-of-the-art on international research of students' trust in online health information.

The review is centered around the following issues:

- notions of trust
- research designs and origins of study
- general findings concerning
  - health information sources
  - students' credibility assessments
  - factors impacting on trust formation

The result will give an overview of the current knowledge base, but also show gaps in existing empirical research, and provide suggestions for forthcoming research on trust in an online health information context.

Method and materials

The present study is based on a scoping review of empirical studies on students' trust in online health information. The review focused on studies related to research questions without limitations on research designs. In comparison with systematic reviews, this type of review provides much more complete picture of research in a specific domain because it does not limit the included publications to randomized controlled trials (Grant & Booth, 2009). Initially, four databases (*PubMed*, *Scopus*, *Web of Science*, and *Google Scholar*) were considered as a possible place to start the search for this review. Finally, Scopus was selected because of its comprehensive coverage (physical sciences, health sciences, life sciences, and social sciences). Scopus claims to be the largest abstract and citation database for research literature (Bar-Ilan, 2008), and it presents about 20 percent more coverage than Web of Science for citations, and it also includes all of the Medline articles (Falagas et al., 2008). In addition, because of the defined time interval of this review (publications > 1999), Scopus is a good choice for analyzing the research trends in this interval (Bar-Ilan, 2008; Falagas et al., 2008).

Based on the trust search terms identified by previous researchers (Pickard et al., 2010), the following query (Box 1) was sent to the Scopus database. The search resulted in 5431 records retrieved for screening. The search strategy was limited to English articles published after 1999, with search terms included in their title, abstract, or keywords.

Box 1. The search strategy for finding the related documents in Scopus

TITLE-ABS-KEY
(trust* OR credib* OR believab* OR benevolence OR integrity OR usage OR evaluat* OR judg* OR reliab* OR valid* OR authority OR authentic*)
AND
TITLE-ABS-KEY
(health information OR digital health OR ehealth OR electronic health OR internet health OR virtual health)
AND
TITLE-ABS-KEY
(student OR pupil OR undergraduate OR postgraduate OR novice OR trainee OR lear ner)
AND
DOCTYPE (ar)
AND
PUBYEAR > 1999
AND
(LIMIT-TO (LANGUAGE , "English")

Date: 23.10.2015

The scope of the present study limited the search to include studies that, 1) their participants or subjects were students, and 2) they (directly or indirectly) investigated the students' trust or credibility assessment concerning online health information. Therefore, conceptual studies, works that considered other participants such as general customers of online health, studies that had considered students' trust in online information in other contexts than health, and research that focused on trust in non-digital health information were excluded from this review. After screening of the title and abstract of retrieved records, 270 articles were selected for deep analysis. Next, reading the full text of those 270 articles, ended with 58 articles. Handy search of key journals and cross-checking the references resulted in a few more articles. After a final evaluation, 61 articles were included in this review. The data was extracted based on the author, population, research design, and major findings of each study. This approach was applied for all of articles included in the study. The publication pattern was fluctuating, but generally increasing over the period.

Findings

The general research approach

The following section describes the general research approach of the studies included in this review. This includes the researchers' basic notions of trust, methodologies and general research designs, and origin of the studies.

The conceptualizations of trust concerning online health information are summarized in table 1 below. It shows that the studies do not share a common notion of "trust", a uniform conceptualization.

Table 1. Researchers' notions of trust	
Trustworthiness, believability, and usefulness or usage of information source or provider.	Banas, 2008; Borzekowski & Rickert, 2001; Douglas et al., 2004; Ghaddar et al., 2012; Hong, 2006; Ivanitskaya et al., 2006; Jiménez-Pernett et al., 2010; Johnson et al., 2015; Jones et al., 2011;; S. H. Lim & Kim, 2012; McKinley & Ruppel, 2014; Mou & Cohen, 2014; Neal et al., 2011; Nustad et al., 2008; Oh & Kim, 2014; Payton et al., 2014; Percheski & Hargittai, 2011; Rowley et al., 2015; Scott et al., 2008; Selkie et al., 2011; Senkowski & Branscum, 2015; Skinner et al., 2003; Smart et al., 2012; Tsan & Day, 2007; Van Velsen et al., 2012
Credibility and reliability of information (content or message), information sources, information providers or websites.	Bansal & Gefen, 2010; Batten & Dutton, 2011; Catellier & Yang, 2012; Cho et al., 2015; Dutta-Bergman, 2004; Eastin, 2001; Escoffery et al., 2005; Freeman & Spyridakis, 2004; Gray et al., 2005; Hansen et al., 2003; Henderson et al., 2009; Horgan & Sweeney, 2010; Hu & Sundar, 2010; Johnson et al., 2015; Longman et al., 2012; Oh & Kim, 2014; Pariera, 2012;

	Rains & Karmikel, 2009; Rowley et al., 2015; Worthington et al., 2015; Ybarra et al., 2008; Yoon & Kim, 2014
Feelings, perceptions, and attitudes towards online health information.	Borzekowski et al., 2006; Brown et al., 2007; Buhi et al., 2009; Johnson et al., 2015; Kayhan, 2013; Liang et al., 2005; Rowley et al., 2015; Ybarra & Suman, 2008; Zahedi & Song, 2008
Intention to use, acceptance or rejection of information.	Allam et al., 2014; Jones & Biddlecom, 2011; Lim et al., 2011
Relying on or acting upon online information.	Ettel 3rd et al., 2012; Kim et al., 2011
Information and source quality, trust and risk beliefs, ease-of-use, and source reputation.	Gray et al., 2002; Song & Zahedi, 2007
Brand, credibility, content, ease of use, recommendation, style, usefulness, and verification.	Johnson et al., 2015; Rowley et al., 2015
Access to unbiased information.	Burger et al., 2015
Accuracy, currency, clarity, and ease of understanding.	Escoffery et al., 2005
Efficacy of online information or message.	Leffingwell et al., 2007
Confidence and privacy concerns toward online information.	Oh & Kim, 2014

Table 2 gives an overview of the overall research designs and national settings and demographics of the studies. The overview also shows that more than two thirds of the studies were administered in the USA. About 57 percent of the studies used a kind of survey (paper or online) to investigate the trust attitudes of students towards online health information. The number of participants in the surveys are varied, from 54 to 27 648 students (the latter a national survey), and the average rate was around 500 students per study. The second most common method was various experimental designs, ca 20 percent.

Table 2. Research design and origin of included studies (n=61)		
Research design	Survey	35
	Experiment	12
	Focus groups	6
	Mixed methods	2
	Interview	3
	Observation	2
	Diaries	1
Country of study	USA	42
	Europe incl. UK	8
	Australia & New Zealand	3
	Others	8

Considering the sampling of populations, female subjects constituted a majority of the total population of the studies. Four of the studies were directed towards all female target groups, among other the above mentioned national survey including 27 648 participants (Nustad et al., 2008), 11 had a fairly equal gender distribution or did not disclose the figures, four had an overweight of male participants, while the rest had an overweight of female participants.

Students' source preferences and information seeking strategies

This section gives an overview of students' source preferences and information seeking strategies concerning online health information.

Use of internet as a health information source

A number of studies have been performed, that reports the use of internet as a source for information concerning health related issues. The result of the present review shows the internet as a main health information source for students. However, the findings also demonstrated different levels of internet agreeableness, see table 3 below reporting the studies measuring the odds for on line health information seeking. The studies were also directed towards students of different age and different level of education, and the preferences seemed to vary between different groups of students.

Table 3. Previous or current odds for online health information seeking among students		
Study	**Number of students**	**Going online for health information / percent**
Banas (2008)	98	91.8
Borzekowski & Rickert (2001)	412	49
Borzekowski et al. (2006)	778	>30
Dutta-Bergman (2004)	246	77
Escoffery et al. (2005)	743	53
Ettel 3rd et al. (2012)	497	42
Ghaddar et al. (2012)	261	81

Henderson et al.(2009)	223	>70
Horgan & Sweeney (2010)	922	38
Jiménez-Pernett et al. (2010)	811	55.7
Neumark et al. (2013)	7028	50
Ybarra et al. (2008)	500	38

In a substantial study (n=7028) Neumark et al. (2013) showed that half of 7th-12th graders reported to have sought health information via internet during the past year. This confirmed the results of an older study (Borzekowski & Rickert, 2001), where about half of 10th-graders (n=412) had tried to get some type of health information from the internet. Ghaddar et al. (2012) reported that a majority of junior high and high school students reported internet as a venue to seek health information, and according to Ettel 3rd et al. (2012) more than 40 percent of high school students (n=497) used internet in school or at home. Internet was also an important, if not exclusive, medium for undergraduate students (Escoffery et al., 2005; Horgan & Sweeney, 2010). The main reasons for searching online health information were reported by students as 'ease of use', 'lots of information', 'speed' (Jiménez-Pernett et al., 2010), 'anonymity', 'vast amount of valuable information', 'easy access', 'easy to find', 'fast', 'cheap', and 'convenient' (Horgan & Sweeney, 2010). For those health issues that caused embarrassment with peers or conflict with parents or teachers, online venues were preferred (; Borzekowski et al., 2006; Gray et al., 2002; Skinner et al., 2003). Skinner et al. (2003) showed that adolescents living in 'small towns' were concerned about discussing health problems with health practitioners, thus preferring seeking information online.

Still, the findings were not conclusive. A smaller (n=11) qualitative study (Kim et al., 2011) showed that among different health sources like internet, family and doctors, the internet was the most popular primary source for health information among college students. In addition, students who used internet on a daily basis (Jiménez-Pernett et al., 2010), students with more access locations (Percheski & Hargittai, 2011), and students living out of school in comparison with in-school students (Borzekowski et al., 2006), had greater odds of using the internet for health information. However, first-year college students (n=1060) living with their parents were less likely to use online health information (Percheski & Hargittai, 2011). Some of the studies in the review show that authorities such as health professionals were preferred in comparison with searching internet for health information among 7th-12th graders (Neal et al., 2011; Neumark et al., 2013). In the view of most of high school students (n=58), the provided information by doctors were 'useful' and 'substantive', because of their 'expertise' (Jones & Biddlecom, 2011). Distrust' or 'lack of confidentiality' and 'prior bad experience' were stated reasons not surfing internet for health, however, many students reported that they previously used internet to access health information (Batten & Dutton, 2011). Schools, family members, and friends (peers) have been among the main sources of health information, see table 4 below, which covers the studies comparing source preferences.

Table 4. Sources of health information among students										
#	Sources									
Study	Schools	Family members	Friends or peers	Health Professionals	Internet (online sources)	Magazines	Newspapers	Books	TV	Social institutions
Batten & Dutton (2011)		√	√	√						
Borzekowski & Rickert (2001)					√	√				
Borzekowski et al. (2006)		√		√				√		
Brown et al. (2007)	√			√						
Jiménez-Pernett et al. (2010)		√	√	√	√					
Jones & Biddlecom (2011)	√	√	√							
Jones et al. (2011)	√	√	√							
Kim et al. (2011)					√					
Neal et al. (2011)				√	√					
Neumark et al. (2013)				√						
Payton et al. (2014)	√	√	√	√						√
Percheski & Hargittai (2011)		√	√	√	√	√	√		√	
Van Velsen et al. (2012)					√					

Traditional sources such as magazines and books were for instance regarded as providers of accurate factual information about sex for students (Jones & Biddlecom, 2011), while TV and friends were regarded as the sources with 'the most wrong information about health' (Brown et al. 2007). There were also indications that a perceived difference exists between the 'usual' and the 'best' sources among students. A study by Batten & Dutton (2011) counted parents (28.3%), a nurse or a doctor (24.1%), and friends (17.3%) as usual sources for health information reported by students (n=75), while they ranked professionals and parents as the best sources.

The studies presented above showed a propensity among students to use internet as a means to access information concerning health related issues. A certain variation in source selection and preferences could nevertheless be seen, thus internet was not the only option even among young people.

Information seeking strategies

Smart et al. (2012) found that the information seeking strategies of students were dependent to three variables: the features of online health content; the quality of communication between consumer and information provider; and, the favored learning style of students. Regular search

engines, particularly Google, were the most utilized tools or first options when searching online health information (Buhi et al., 2009; Escoffery et al., 2005; Hansen et al., 2003; Jiménez-Pernett et al., 2010; Neal et al., 2011; Scott et al., 2008; Senkowski & Branscum, 2015). According to a fairly comprehensive study by Jiménez-Pernett et al. (2010), about 98 percent of the participants (n=811) obtained their health information through a search engine, mainly Google. Using Google and suchlike might have been a usual, but not necessarily uncomplicated way of seeking information. Obstacles reported were for instance 'lack of knowledge of good health web pages', and 'lack of confidence or search skills', (Jiménez-Pernett et al., 2010). However, even in cases when students were aware of other online health information sources, they used Google to perform a majority (93.3%) of search scenarios (Senkowski & Branscum, 2015). Findings also showed a rather superficial search procedure; a majority of the subjects did just click on one of first 3 retrieved results and did not even browse the next google results page (Buhi et al., 2009; Senkowski & Branscum, 2015). Students used the search engine's site description as the key to identify the relevance of site to the required information about a health topic (Kim et al., 2011), and according to Hansen et al. (2003) little attention was paid to the source of provided information. In the study of Buhi et al. (2009), more than half (about 52%) of the participating students (n=34) never or hardly ever checked the 'last updated' section of health website. In addition, about 89 percent of students in Escoffery et al. (2005) more comprehensive study, did not always find the desired health information. Smart et al. (2012) showed the influence of age in the ability to express information needs, and consequently success in the search process, and that the older students had better presentation of their required health information. Hansen et al. (2003) found that the older adolescents (16-17 years old) were more successful than younger ones in finding the 'correct', 'complete' and 'useful' answer for their health questions through internet.

Evaluation strategies

Neal et al. (2011) reported that 'Google as a search provider for health information was regarded interesting, because it provided 'many options' to trace the problem, but also 'unreliable' or 'contradictory' due to the fact that it was not easy to make reliability assessments. A study of American marketing students showed that online health information seekers were not mindful of the 'misleading' or 'dangerous' online information about health (Allam et al., 2014). In another study, only half of students (n=308) were able to identify trustworthy websites and articles (Ivanitskaya et al., 2006). However, verification by other sources seemed to some extent to be used in assessing the credibility of online information, that is multiple checking of the same information or content from different sources or information providers. Many students reported cross-referencing as a method of assessing credibility online and stated "[i]f a content could be found in more than one website, it was more likely true" (Pariera, 2012). In the study of Payton et al. (2014), some students preferred to use Google or wikis, but finally they used to check credibility of the retrieved information from other well-renowned health information sources such as the National Institutes of Health. Jones & Biddlecom (2011) found that students' trust in retrieved online information was based on 'cross-check' or 'verification' of the information in other sources like 'friends' and 'family', or on comparison with 'prior knowledge'. Rowley et al. (2015), however, claimed that recommendations by others were the least important factor in trust judgments. Interestingly, a reversed approach was reported by Gray et al. (2005), in which, students used the

internet or other online well-known institutions to check the consistency or credibility of information received from personal sources.

Factors influencing students' trust formations and credibility judgements

The findings presented in the previous section might indicate that there was a variation in the inclination to trust online information. The following section will present findings of the research concerning factors that influenced students' trust in online health information. The factors influencing trust formation and credibility judgements can be summarized in six broad categories: health status, social and demographic factors, psychological factors, knowledge and skills-related factors, cultural factors, and source, system and content-related factors.

Health status

A factor influencing the choice of information sources might be the users' health status or the current health issue. Health status and the severity of health issue was regarded as predictors of online healthcare behaviour (Ha and Lee, 2011). Students regarded the type of health issue as a perquisite to their source selection. For example, Batten and Dutton (2011) showed that for informal problems, students preferred to discuss with friends or to search the internet. Kim et al. (2011) reported that knowledge and personal involvement with the health issue significantly affected students' search effort, quality of search, and success in online health information seeking. Furthermore, the health status was a predictor of visiting or re-visiting health websites. Students' mental health situation for instance, significantly predicted their visit to any health website to search for required information (McKinley and Ruppel, 2014). In a comparison of American and Korean students (Oh and Kim, 2014), American students considered themselves 'healthier' and were 'more concerned' about their health than Korean students. The study showed that among the American students, those with 'greater health concerns' had more 'privacy' worries regarding online health information. Both American and Korean students who perceived themselves as 'less healthy' reported social media 'more useful' than those who perceived themselves as 'healthy'.

Social and demographic factors

Several of the studies in this review addressed different social and demographic factors as influencing students' trust formation, such as age, gender, location and educational level.

Age was among the modifiers of students' trust in online health information. Catellier and Yang (2012) found that older students felt more positive affect about the risk information than the younger counterparts. Age was a significant predictor of students' visit to website to search for mental health information, and a significant negative predictor of trust in online support groups for mental health (McKinsley and Ruppel, 2014). Education was also identified as an influencing factor. Longer education period (advanced academic standing) was an accelerator of online health-related information seeking and credibility judgements (Johnson et al., 2015). Geographic living location also seemed to be a modifier of online health information seeking and trust formation among students. A study (n=687) by Montagni et al. (2014) showed that those living in 'middle-sized cities' had more trust in online health information (68.3%) versus those living in 'countryside' (16.5%) or 'big cities' (15.1%).

Gender was further a modifying factor in online health information seeking of students. Several studies reported that female students were more willing to seek and use online health information, then male students were (Cho et al., 2015; Douglas et al., 2004; Escoffery et al., 2005; Gray et al., 2005; Neal et al., 2011; Percheski and Hargittai, 2011; Oh and Kim, 2014; Tsan and Day, 2007). Female students were also more likely to use health information in general than males were (Percheski and Hargittai, 2011). Still, Nustad et al. (2008) found that internet had a relatively low believability score among college females. Female users more often sensed 'negative affect' when thinking about the 'risky information' on internet (Catellier and Yang, 2012). According to Borzekowski and Rickert (2001) female students were less comfortable with using internet than male, but the findings of a deep interview study found no gender differences in trust in internet concerning sexual information or actual internet use by students (Jones and Biddlecom, 2011).

Psychological factors

Several of the studies also referred to psychological traits as impacting factors: confidence, personality traits, self-efficacy, uncertainty, feelings, and risk perceptions. In a study on Korean and American students (Oh and Kim, 2014), the degree of trustworthiness of social media as a source of health information was significantly associated with the degree of health concerns and the degree of confidence in online searching for health information. In both groups, the degree of usefulness of online health information was also significantly associated with the level of confidence in online searching for health information. The level of confidence in searching online health information among Korean students was significantly related to their privacy concerns, that is the more confidence, the less privacy concerns. Other findings also confirmed the role of confidence in online health information seeking and trust judgments in digital environments. For example, the lack of confidence and search skills were among the main problems while searching health information online according to Jiménez-Pernett et al. (2010). 'Perceived vulnerability' and 'self-efficacy' were positively associated with use of online mental health resources (Lim et al., 2011; McKinley and Ruppel, 2014). At low levels of self-efficacy, 'perceived vulnerability' was a significant and positive predictor of 'perceived usefulness' of online mental health information. At high levels of self-efficacy, 'perceived severity' of mental health issue was positively associated with trust in mental health online information (McKinley and Ruppel, 2014).

Generally, uncertainty perceptions or feelings decreased students' intention to use and trust health websites. Longman et al. (2012) showed that 'communication uncertainty' increased 'risk perceptions', and 'negatively' affected the 'issue understanding', and decreased the 'perceived credibility' of health information sources, and they found that 'reactions to uncertainty' was dependent on the level of uncertainty in the provided health information. The retrieved online health information influenced the feelings of health consumers and vice versa (Buhi et al., 2009; Ybarra and Suman, 2008). Feelings also influenced the credibility judgements of online health information. For example, students judged the credibility of online health information that were 'interesting' to them 'less critically' than other, and this interest was a predictor of their credibility judgements (Freeman and Spyridakis, 2004).

Knowledge and skills related factors

Prior knowledge composed of past experiences, familiarity, and expertise has been identified as a factor influencing the general online information behaviour of students. This influence was also noticeable concerning online health information. Those students that had past experience of online searching for health information were more aware of different information channels (Neal et al., 2011). Both positive and negative experiences of students towards online information were influential on their trust judgments. Students with previous positive experience of online health information increased their trust, and positive experience positively influenced their decision to disclose their health information online. Negative experience of students, e.g. previous privacy-related problems, increased their privacy concerns and perception of risk, something that in return decreased their trust in those sources (Bansal and Gefen, 2010). Familiarity with online health information and confidence in search strategies influenced search and evaluation behaviour, and influenced students' credibility judgments (Borzekowski et al., 2006; Kim et al., 2011; Lim et al., 2011; Payton et al., 2014; Yoon and Kim, 2014). For more difficult search tasks or for general search, students' prior knowledge had a significant role in predicting their trust. For both general and specific search tasks, students' reliance on online health information was significantly associated with their trust attitudes, and the expertise and good will of the source (Hong, 2006). Exposure to a credible source of online health information was also associated with higher levels of health information literacy. Students who had heard about trustworthy resources, e.g. MedlinePlus, reported higher levels of perceived skills and their health information literacy was positively associated with their self-efficacy (Ghaddar et al., 2012). A study of nursing students' uses of online information (Scott et al., 2008) reported bibliographical databases such as CINAHL, Blackwell-Synergy and EBSCO as the favorite online resources of those students, which could be explained by their prior knowledge and higher online information skills in relation to health issues. There were also evidence that information seeking in traditional sources such as printed materials, or through health professionals, was a predictor of online health information seeking. Students who used traditional media had much higher odds of using internet for medical content (Neumark et al. 2013; Percheski & Hargittai, 2011), and that previous internet use was associated with higher confidence in finding online health information (Borzekowski et al., 2006).

Some studies, however, indicated that students tended to over-estimate their information seeking skills, and that they were lacking proper credibility judgments during their information searches. Even though their self-perception of information seeking skills were considered as 'good', 'very good' or 'excellent', many of them were not able to assess the trustworthiness of health websites and articles (Ivanitskaya et al., 2006). Some interesting findings were related to the manipulation of search results. In an experimental study by Allam et al. (2014), a group of student received 'pro-vaccination information' based on the modified Google search experienced a positive change in their knowledge and attitudes towards vaccination, and showed lower levels of 'skepticism', while a group that were exposed to 'anti-vaccination information' became more concerned about the negative effects of vaccination. However, the students participating in the study were not able to tell 'good' from 'bad' sites. Senkowski and Branscum (2015) also found that students were eager to trust health information that confirmed their personal beliefs. However, Burger et al. (2015) found that training students on a health issue improved their credibility judgments.

Cultural factors

Based on the current review, cultural norms and values influence general information search, information source selection, and trust in online health information by students. The frequency of search for health information and the trusting behaviour of students were to some extent different among different cultural groups. In a comparison of Arab and Jewish students (Neumark et al., 2013), Arab students reported more frequently search for online health information, and Arab girls were more likely to report online health information seeking than Jewish students. In addition, Arab students reported lesser internet skills and trust in online health information and higher lack of privacy than Jewish students. Religiosity (secular vs religious) was also associated with online health information seeking and trust among the Jewish students (Neumark et al., 2013). In a study on Asian culture, Korean students reported the most popular sources for health information seeking as internet, family members or friends (Yoon and Kim, 2014). In addition, there was a significant relationship between English language proficiency of Korean students and their perceived usefulness of online health information. Another study (Oh and Kim, 2014) showed that American students spent more time and were more confident in searching for online health information than Korean students. Furthermore, the Korean students trusted all types of social media (podcasts, blogs, social question and answering sites, social networking sites) to search for online health information, while American students were more worried about privacy issues. Perceived usefulness of social media for health information was same in both groups, but American students perceived the degree of usefulness of social question and answering sites and blogs as significantly higher than Korean students did. Catellier and Yang (2012) found that minority students were more willing to seek information, and were more likely to sense negative affect when thinking about the risk information. The findings of a deep interview study in this category (Jones and Biddlecom, 2011) showed no differences in the degree of trust in internet sexual information by ethnicity, or actual internet use of students, but Payton et al. (2014) found that traditional and religious beliefs functioned as a barrier to share information about sex issues.

Source and content related factors

The students' trust in health websites was to certain extent based on reputation of the sources. As shown in Table 5 including the studies reporting on website preferences, governmental and organizational websites were identified as the most trustworthy health information providers.

Table 5. The most trusted top level domains

#	**Extension of websites**			
Study	**.gov**	**.edu**	**.com**	**.org**
Buhi et al. (2009)	√			√
Burger et al. (2015)	√			
Jones & Biddlecom (2011)	√	√		√
Jones et al. (2011)	√	√		√
Payton et al. (2014)	√			
Senkowski & Branscum (2015)	√		√	√

The students stated that governmental websites were more 'trustful' because these websites presented more 'accurate' information (Jones & Biddlecom, 2011), 'un-biased information' (Burger et al., 2015) 'routine updates' (Senkowski & Branscum, 2015), and they are more 'reliable' (Buhi et al., 2009; Payton et al., 2014). The correlation between institutional trust and information seeking intentions has also been confirmed by e.g. Catellier & Yang (2012) and by Worthington et al. (2015). However, the appearance or layout of governmental websites were less approved (Payton et al., 2014). Worthington et al. (2015) found that the most important predictors for perceptions of organizational credibility was perceptions of 'message quality', 'message effectiveness', and 'author credibility'. According to Hong (2006), the source providers' expertise and the trustworthiness of the provided information were the main predictors of intention to revisit a health website. Social media such as Facebook and Twitter, blogs and forums were reported as 'less reliable' for health information (Neal et al., 2011; Senkowski & Branscum, 2015; Van Velsen et al., 2012). In Oh & Kim's (2014) study, students who did not use social media for health information stated 'privacy concerns' and 'unreliable resources' as the main barriers, and these privacy concerns were more challenging in social networking sites than other social media. Students' trust attitudes about open source websites such as Wikipedia seemed complex. Wikipedia was apparently used frequently by students as a health information source, but there were concerns about trusting such open-source websites (Buhi et al., 2009; Jones et al., 2011).

The features of the medium, website design and functionality, such as clear organization statement, easy navigation of website, and accessibility, also played a significant role in the behavioural intentions of students and their trust judgments (Hong, 2006; Kim et al., 2011; Oh and Kim, 2014; Rains & Karmikel, 2009; Song & Zahedi, 2007). However, perceived information quality also seemed to be important. Rowley et al. (2015) showed that credibility of content, content structural features and style, usefulness of content, and brand of source were the most influential factors on trust formation of students towards online health information. Content features such as reliability, the fact-oriented information, accuracy, and believability had high influence on trust. Knowledge of content and source expertise (Eastin, 2001), message characteristics and the structural features of websites (Rains & Karmikel, 2009), and including the street address and links to external sites (Freeman & Spyridakis, 2004) influenced credibility assessment. The main barriers to search, access, use, and trust the online health information were reported as: features like pornographic content of web pages (Jones et al., 2011); exposure to sexual ads during online information seeking (Jones & Biddlecom, 2011); concerns about commercialism and the uncertainty about the author, reliability and relevance of information (Scott et al., 2008); or, the filtering (Gray et al., 2002). Other barriers reported by students were lacking source credibility, contradicting contents, and 'need for closure' (Van Velsen et al., 2012). Students also judged quality by the 'aesthetics and peripheral cues of source credibility and message credibility' (Kim et al., 2011), but the 'textual cues' were more important which was align with the findings of Escoffery et al. (2005). The 'completeness of information' was also an influencing factor on credibility judgements by student and they reported higher level of completeness of information in 'bulletin boards' and 'websites' than to 'blogs' and 'home pages' (Dutta-Bergman, 2004; Hu & Sundar, 2010). Payton et al. (2014) discovered in a focus group study on black female students, that the complexity of provided information about health negatively affected students' information use, while message understandability positively affected the use. In addition, students preferred short messages rather than long messages, and the

information relevancy was among the main reasons to stay in a website and to use the provided information. Furthermore, the narration of the online health message (positive or negative) was a reason for accepting or rejecting the provided information.

Discussion

Students have been the core of many trust studies in online health information. The logic behind this approach is rooted in these facts that students are frequent users of internet and also uses internet as a main source of health related information (e.g. Gray et al., 2005; Percheski and Hargittai, 2011; Rowley et al., 2015). An overall result of the present review is that research on this issue has set out from different premises. The studies are of different size, used different designs, and they directed towards different target groups, even though 'students' were the common denominator. A majority were of American origin. When it comes to research design, there was a spread of methods used, but surveys were by large the dominating data collection method. More than 50% of the studies used a survey method, followed by experimental designs, ca 20% of the studies. Female subjects constituted a majority of the studied populations. In a few cases female subjects were targeted as study population, but if the result otherwise reflected a higher propensity for women to use online health information or depended on sampling procedures cannot be concluded. Noticeable is that the conceptualizations of 'trust' were not uniform, or even always explicitly defined in studies. The students' actual propensity to use internet was generally taken as an expression of trust.

The present analysis shows that internet is among the main sources for health information among students. However, the studies that analyzed source preferences showed parents or other family members, friends, schools, health professionals were also frequently used sources for health information. That is, internet did not seem as such predominant choice as could be expected, and students were neither immediately accepting online information as trustworthy. During the period the present review is covering, new forms of internet resources, social media and not the least e-services have emerged, and new generations of students with different experiences and values have appeared. A change in behaviour and attitudes towards internet and online information sources would thus seem reasonable. However, no historical trend can be concluded from the analysis. Internet is still one source (or perhaps more correct, one channel) among others, but more than half of students in the studies included in the review went online for health information.

When it comes to information seeking strategies, student preferred Google or similar search engines and performed rather simple searches. Feature that where of importance for using a particular resource were easy access, simple use, and understandability. However, prior knowledge of and exposure to other resources seem to affect information seeking behaviour. Acquaintance with other search options resulted in a more varied seeking behaviour and search performance. That is, there is a learning effect on source preferences. Students further often tried to verify information with other sources. This seem indicate a certain awareness and critical approach to online information. On the other hand, some studies showed that users preferred sources that confirmed previous beliefs.

The review showed that research on factors influencing students' trust and credibility judgments in an online health context was situated around the categories health status, social and demographic factors like age, gender and location, cultural factors, psychological factors, knowledge and skills-related factors, and source, system and content-related factors. Age and educational level appeared to be positively correlated with trust, or at least with the assumed ability to make credibility judgements. Gender was also identified as a modifier of trust, however, the different studies present no unequivocal result. Place of living – rural areas, smaller or larger cities – also appeared to have some significance, as did cultural background. From the perspective of trust formation, the antecedents of trust, i.e. the factors causing trust (or distrust) could be divided into two main categories: the characteristics of the *trustors,* those who trust; and, the characteristics of the *trustees*, the objects to be trusted. A third category, different from the two other categories of antecedents, is recommendation by others, which could be regarded as an external factor more related to the social context.

Concerning the first category, the users of health information on the internet themselves, it seemed that personality traits correlated with a propensity to trust online health information sources in general, either negatively or positively. Low risk perception had a positive impact on trust, as well as self-efficacy and s higher degree of confidence. Privacy concerns (which might be related to personality traits like risk perception, but also could be a socio-cultural phenomenon) had a negative impact on the propensity to trust online health information and on its perceived usefulness. Negative feelings contributed to a decreased credibility of the information, as did uncertainty perceptions. Individual traits not related to personality, such as knowledge, experience and perceived skills, also showed a positive correlation with perceived usefulness of and trust in online health information sources. So did severity of the actual health issue. This might be that the more urgent need for information, the higher readiness to trust the information. A higher estimation of knowledge and skills, might also affect the perceived ability to make credibility assessments, resulting in a higher degree of trust. However, certain studies showed a tendency by students to overestimate this ability, but also here a positive learning effect could be established. It is also possible to talk about a form of 'transitional credibility'. It means that the perceived credibility of other sources such as traditional media was transferable to news sources of information, such as online information providers. That is, students exposed to different media sources, transferred these experiences to an online environment. This might be an indicator of the level of information literacy, that is the students' general knowledge of and confidence in information seeking and use varied.

The second category consists of source, content- or systems-related factors, which could be divided into three sub-categories: characteristics of the information content, e.g. availability, perceived quality, and relevance; physical characteristics - e.g. structure and design features of the web sites; and, finally the characteristics of the source provider. The credibility, reliability and believability of the information content had a positive correlation with trust in online sources of health information. There were also indications of a reciprocal relationship between information source or provider and the information content. That is the credibility of the content had an impact on the trust of the source, and vice versa. Then follows what actually makes information credible,

reliable and believable. The relevance of the information and online health information sources, obviously were of importance. The information's relevance, quality, adequacy, and usefulness contributed to the students' general trust in online health information sources. That is, the more need for information, the higher propensity to trust. If the information contributes to solve the particular problem that is of issue, the user might chose to trust it. Other, perhaps more objective properties as information accuracy, comprehensiveness, currency, objectivity and readability had a positive impact on trust in online health information, but also the understandability of content. Complexity, on the other hand, had a negative impact on trust. Website features such as degree of interactivity and ease of access and use, were correlated with a trust in online health information. The result is that convenience seems to play an important role, and the analysis showed that availability, accessibility, intelligibility and swiftness are crucial in the selection of health information sources. Finally, the credibility of the source, the brand, had an impact on trust in online sources and the trustworthiness of the information. Interestingly enough, the most trusted online sources for students were governmental and organizational websites. The top level domain ('.gov', '.org', '.edu') was a predictor of website credibility perceptions of students during their general search for health-related information. This indicated a rather high level of institutional trust, i.e. trust in the organization or agency providing information.

Conclusions and suggestions for future research

This review, based on an analysis of 61 articles, shows the current state of the art of research on students' trust in online health information. It is worth mentioning that this review has some limitations. First, it is focused on the English publications to have a better ground for comparing and synthesizing the findings of previous studies by the authors. Second, it included just the articles and the grey literature such as dissertations, proceedings, books, etc. is not analyzed in this review. The studies have different premises, why a conclusive synthesis of the results is not possible, but the analysis gives an overview of the different approaches and designs used in research on students' trust in online health information.

Quantitative designs were most frequent, but some smaller qualitative studies were also included in the sample. More than two thirds of the studies were administered in USA, while only a few concerned 'non-Western' countries. One reason behind this concentration might be that the search was limited to English-language publications. It is thus not possible to draw any unequivocal conclusions about the extent of this kind of research in a global perspective. However, it indicates that there is a gap in the knowledge available for a larger international audience and a need for further studies to make international comparisons and syntheses. The included articles in this review illustrate the leading role of USA, UK, and relatively European countries in studying trust issues in online health information. Paying attention to this issue in developing countries with different cultures, or including more diverse groups of students, for instance international students in a county or multiple comparison of students' trust behavior in different countries, students of different disciplines, will help to understand the role of cultural variables in online health information seeking and trust formation of students in different contexts.

The concept of trust was mostly rather pragmatically used, as an outcome of the interaction with health resources, and it was not always explicitly defined. This is concordant with the findings of Rowley and Johnson (2013), who found that researchers on trust in digital environment have not been able to reach consensus on focal concepts or on the operationalizing of trust. In several of the studies the observed behaviour of the students, the actual use of online health information, was regarded as a proxy for trust. The different approaches and the different apprehensions of trust might explain some of the different and in some occasions contradictive results of the studies. Given this, there are some tendencies that could be identified. The antecedents of trust identified in the studies can be summarized as the users' health status, their cognitive, emotional or psychological status, and personality traits impacting on their general inclination to trust, modified by social and demographic factors as age, gender and location. Further, the perceived quality of the information, perceived intelligibility of the information and the access and availability of information correlated with trust. Those aspects were either manifested in the presentation of content, or in the design features of the sources. Finally, the perceived credibility of the source or source provider was impacting on the trust formation. That is trust formation was dependent on characteristics of either the trusting subject, the trustor, or on characteristics of the trusted (or distrusted) object, the trustee. As we see, the trust formation in the online health information is very complex, and it is dependent on many factors on both individual and social level. However, there seem to be an emphasis on individual and intra-personal characteristics, rather than on social and cultural influences on trust formation. However, the review shows that cultural factors impacted on for instance on the frequency of online information seeking, previous skills and knowledge, source preferences, and concerns about privacy and inappropriate content. Given the fact that prior knowledge and experiences, beliefs and confirmation by other sources that might be regarded as authoritative, are important factors behind credibility assessment and trust formation according to many of the studies in the review, cultural or socio-cultural properties might have a significant influence on trust formation.

One of the findings of the present review worth mentioning was the apparent importance of institutional trust, i.e. the reliance on institutions and organizations as source providers. Governmental and organizational websites were reported as the most trustful websites in connection with online health information seeking, although some issues regarding the website features and presentation of content were reported as barriers to use and trust. Relevance for the actual problem that has to be solved, convenience and habit appear to have a large impact on trust formation. A better understanding of how users experience online resources and how the learning process impacts on their preferences, would contribute to an enrichment of these websites with quality design and instructive interfaces. To provide generalizable results an explicit conceptualization of trust and a deeper analysis of the potential correlation between the characteristics of the trustors and the characteristics of trustees identified in this review would be necessary.

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