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Trust between patients and health websites: a review of the literature and derived outcomes from empirical studies

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Abstract

With the exploding growth of the web, health websites have become a dominant force in the realm of health care. Technically savvy patients have been using the web not only to self inform but to self diagnose. In this paper we examine the trust relationship between humans and health websites by outlining the existing literature on trust in health websites. A total of forty-nine papers were examined using a meta-analytical framework. Using this framework, each paper was coded for the antecedents and facets that comprise user trust in health websites. Our findings show that there is little consensus regarding the defining characteristics of the construct of trust in health websites. Further research in this field should focus on collaboratively defining trust and what factors affect trust in health web sites.

Keywords

trust; empirical; e-health; website; internet; credibility; review; ontology

1. Introduction

Trust is foundational in relationships. In health care relationships, trust is critical: a patient trusts their care provider to give timely and appropriate care; a doctor trusts their patient to disclose correct information about their health status; and care professionals trust each other to work coherently in regards to patient health. The increasing use of the internet creates another dimension to these relationships. A recent survey by the Pew Internet & American Life Project found that 61% of Americans use the internet for health information (Fox and Jones, 2009). To try and take a first look at this phenomenon, researchers have examined prior work on trust in technical systems (Corbitt et al., 2003, Eysenbach, 2001, Sharp et al., 2007). While past research makes insightful steps towards exploring the relationship between trust and technologies, it lacks the specificity of exploring trust in e-health systems, particularly health websites.

As health information technologies become more widespread, attention is turning to the factors that determine successful adoption, acceptance, and appropriate use (Britto et al., 2009, Or and Karsh, 2009, Wilson and Lankton, 2004). Currently trust is gaining the attention of those who design websites that contain medical information (Murray et al., 2004, Baker et al., 2003, Eysenbach et al., 2002) for some obvious reasons. Health is highly personal; for a user to adopt or use health technologies there is a need to assess the technology in an intimate way, part of this assessment involves trust. However, assessing the credibility of an e-health site has proven difficult. In a review of website evaluation tools,

Breckons et al. (2008) concluded that such instruments, while attractive, are not a feasible option for measuring the reliability of health websites.

To address the growing study and need for research on trust and health websites, we propose in this paper to review prior work on user trust in health websites. Many definitions of trust interpret it by explaining what constructs trust encompasses. These encompassed constructs, or key elements of trust, are called facets. Examples of facets of trust include 'well-intentioned' (Theng and Soh, 2005), 'truthfulness' (Rains and Karmikel, 2009), and 'integrity' (Zahedi and Song, 2008). Another tool used to help explain trust is an antecedent. An antecedent of trust shows factors that may cause trust variation. Examples of antecedents include 'relevance', 'authority', or 'disposition' (Kelton et al., 2008). Together, antecedents and facets of trust can help to model and define a user's trust when interacting with a website by demonstrating what affects trust and what user trust incorporates. Thus, our first research question asks what facets and antecedents are used to explain trust in health websites.

Our second research question aims to identify how user trust in health websites has been defined in the empirical literature. We have defined a health website as any webpage available either through an inter- or intranet where health information is available. Health websites were selected for examination due to their qualitative difference in the types of stored information, the controversial application of aspects of trust being applied to trust in health websites, and the increased risk that is involved in using e-health information.

Finally, our last research question studies the dialect of research on trust and health websites. Prior work has found that the multidisciplinary nature of this field has lead to researchers not citing each other and found different empirical outcomes (Vega et al., 2010). The parlance of discussing trust in health websites reflects the constructs from the multitude of fields that are used to study it. In essence, it reflects the antecedents and facets that are valued by different areas. For this reason, we ask what dialect is used to discuss trust and health websites.

In this paper we couch the emerging research field of user trust in health websites within related broader work to present the value and need for this research. A review of all empirical studies of trust in health websites is presented in reference to the dialect, antecedents and facets, and definitions used. The findings discussed in this paper are then presented to represent a metaphorical "call to arms" for this research field.

2. Background & Related Work

Research on user trust and health websites represents one part of the growing change in the health community as technology use and patient agency evolve. To evaluate how research on user trust in health websites is situated, we present prior research of user trust in technology and e-health as they related to user trust in health websites.

2.1 Human-technology trust relationships

At a basic level, it can be argued that the study of trust in e-health is really a study of the relationship between humans and technology. For example, in one set of research, user trust was explored in automation technology by examining how a particular automated system could influence subjects to trust or distrust the resultant automation (Lee and Moray, 1994, Muir, 1994, Parasuraman and Riley, 1997, Sheridan, 2002). This scholarship, however, does not successfully represent the processes that patients as users undergo when forming trusting relationships with e-health technologies. Specifically, the user values placed on the automation - such as 'reliable' or 'consistent' - are not necessarily the pertinent ones that a user may value in an e-health system - such as 'dynamic' or 'personalized'.

In another group of trust in technology research, investigators examined a user's trust in web-based technologies, with a large portion of scholarship focusing on e-commerce and whether users would provide websites with personal information (Gefen and W., 2000, Daignault et al., 2002, Corbitt et al., 2003, McKnight et al., 2002, Grabner-Krauter and Kaluscha, 2003, Corritore et al., 2003). The scholarship involving trust between people and websites may serve as a useful model for patient and physician users of e-health technology, but it fails to account for the effects of technologies on the interpersonal patient-provider relationship – where trust in the provider has been linked to important quality indicators such as adherence, satisfaction, and improved health outcomes (Pearson and Raeke, 2000, Anderson and Dedrick, 1990). Research on trust in technology represented an encompassing research area, but one that lacks important specificity.

2.2 Patient Trust in e-Health

Health websites represent one kind of e-health technology in an increasingly dispersed and complex network of health technologies that can have additionally varied effects on user trust. This is because health-related technology has become an important aspect of health consumerism that has branched into different aspects of patient life. Health information and services in an electronic format were primarily “informational” in the past; now patients can engage in many health-related activities electronically (Wilson et al., 2008). For example, patients can: view their health records online, view health information for family, interact with others with similar health concerns, communicate with care providers online, communicate with other non-providers about their health electronically, and search for information about their health symptoms and diagnoses, through a health website (Figure 1).

The added complexity of technology in health care adds new dimensions of risk, communication, and privacy. At the root of these constructs trust must be considered. In an e-health model the patient holds a great deal of power in their health care, which also gives them more entities to trust or distrust. Indeed, given the high value that is increasingly being placed on patient-centered care, understanding the relationship to trust as a quality barrier to reaching these aims is paramount (Relman, 2001). Future research must address how patients negotiate information from different sources, how their decisions affect the patient-provider relationship and important outcome variables such as patients adhering to advice, completing treatment plans, and seeking care when they need it rather than self diagnosis. A user's trust in health websites is only one part of this interaction. In order to understand the broader need to evaluate user trust and e-health technologies, focusing on one domain is necessary.

2.3 Patient Trust in Health Websites

Research on user trust in health websites, as an instantiation of research on trust in technology and e-Health, has demonstrated important patient outcomes. With this fact in mind, we recognize that there are several definitions of what qualifies as a health website; we adopt the definition from Sillence et al. (2006) who identified 10 different types of health websites: web portal sites, support groups, charity sites, government sites, pharmaceutical sites, sales sites, personal sites, medical databases, media sites and clinician sites. Given the breadth of what qualifies as a health website, there is also a myriad of factors affecting a user's trust, and how trust affects the use of health websites. For instance, understanding the effects of the use of health technologies on patients' perceptions of the quality of the care they receive and the effects on the doctor-patient relationship are important considerations for the design, implementation, and integration. Several studies show that, despite having access, some people choose not to use the internet for health information (Cotten and Gupta, 2004, Dolan et al., 2004). Trust has been identified as a key factor in determining which

users will use the internet for health information and which will not (Dutta-Bergman, 2003, Rains, 2007).

Given the important factors that are affected by a user's trust in a health website, the number of things that a patient was using health websites for has been found to be limited. A research study that sought to classify patient health information relationships found that the greater part of health related web searches performed by patients were for specific medical conditions (McMullan, 2006). The searches were either: 1) before the clinical visit to determine whether they needed to seek a health care provider or to find information to handle their health care autonomously, or 2) after the clinical visit for assurance or because of dissatisfaction with the health care providers information (McMullan, 2006). Another study about patients' use of health information technology surveyed a sample of US citizens and found that of 3,209 participants, 31% had searched for health information online in the past 12 months, 16% were able to successfully find information that was relevant to themselves, and 8% took the information they found on the internet to their care providers. Of the 8% who showed their information to a provider 71% wanted the provider's opinion rather than an intervention, 30% of the participants stated that the relationship improved; 66% said it remained the same, and 4% said the relationship deteriorated. The researchers found evidence to support the notion of a digital divide, where members of minority groups were less likely to use the internet to find health information (Murray et al., 2003). These motivations for using health information technology have the potential to challenge the patient-physician trust relationship as the patient uses health websites as a source for trusted information in variance to consulting with their physician.

With research in this area demonstrating important patient outcomes and uses of the technology, forty-nine papers have empirically studied trust in health websites. Starting in 2001, these papers represent an emergent field that situates itself from multiple disciplines such as decision making, computer science, medicine, and psychology. The multidisciplinary nature of the work has benefits and downsides. As a benefit, the multitude of different areas can provide a comprehensive voice to explain the phenomenon of trust in health websites. However, in a related review of the same data presented in this paper, the authors found that the different disciplines valued different facets of trust, reported different outcomes, and did not cite each other (Vega et al., 2010). In this paper we continue to explore the body of work on trust and health websites examining the dialect, antecedents and facets, and definitions in an effort to create a common language that can be built upon.

3. Method

3.1 Data Sources

A list of published articles dealing with trust between users and health websites was created through a comprehensive search of 13 databases (e.g., ScienceDirect) under search phrases related to trust, health, and websites (e.g., search terms from ScienceDirect *trust*, website*, webpage*, online*, internet*, web site*, web page*, health*, medic*). The initial search produced over 2,000 articles, which were then evaluated individually by two reviewers based on pre-established criteria of being peer-reviewed, empirical, and including trust as a variable. Using this method the authors explicitly did not specify a definition, as part of the research question was asking how trust in health websites was being defined. Disagreements were discussed and a final set of papers were agreed upon. Supplementary computer searches were conducted from papers that appeared in the reference sections of the set of articles. Forty-nine relevant publications were identified and examined by the authors for the purposes of this paper. Included papers represented both experimental and theoretical peer-reviewed conference proceedings and journal papers. Excluded from the set were publications unrelated to the topic, those not peer-reviewed, and those yet to be published.

3.2 Analysis Method

Articles were analyzed using a meta-analysis framework, which is appropriate because the topic has not been explored in this context and this method has been used to explore similar topics (see (Eysenbach et al., 2002) for example).

We addressed the research question of how trust in health websites was defined and the question of what antecedents and facets were defined by using the standard qualitative data analysis approach of content analysis (Krippendorff). This involved collecting the definitions, antecedents, and facets by paper. The researchers then coded these definitions and antecedents for whether trust was a stand-alone construct or was defined as part of a different construct. For example, trust is frequently defined as part of the construct of credibility.

To answer the question of how dialect affects the discussion of trust and health websites a frequency method was used to extract terms used to describe or define trust from each article (Ebert, 2007). Three hundred and ninety-six keywords were compiled from a thesaurus, Jian et al. (2000), and Montague et al. (2009) who used empirical methods to develop lists of terms related to user trust in technologies. Terms were combined to form 108 meta-terms; for example, the words 'difficult' and 'difficulty' were combined into the meta-term of 'difficulty'. There were seven words that were removed from the list: 'available', 'care', 'independent', 'positive', 'positively', 'control', and 'certain'. While these words were identified as being part of some meta-term, their usage was often outside of the context of explaining trust (e.g., "Independent sample t-tests were employed..."). If any such word failed to reference trust in the majority of its occurrences then it was removed from the list of meta-terms. Each meta-term was counted a maximum of one time per paper.

4. Results

4.1 Antecedents and Facets of Trust

Eleven papers listed antecedents of trust; the remaining papers did not list any antecedents. Nine papers proposed models of trust in health websites, six of which were unique, and antecedents may be inferred from these models.

4.2 Definitions of Trust

Thirteen out of the forty-nine papers defined or cited another's definition of trust. Eight papers cited the definition of trust used by others. Of these, three of the eight definitions used trust as the central construct; five used trust as part of the construct of credibility. The remaining five of the thirteen papers used novel definitions of trust. Four of these original definitions used trust as the central construct; one paper defined trust as part of the construct of reliability. Table 2 lists the definitions.

4.3 Dialect of the Construct Trust

To discuss the dialect, we use the label "term" to designate the individual words. The top five terms used in the parlance of trust research in e-health are the following: *quality*, n=47, e.g., "detailed assessments of the quality of health information" (Sillence et al., 2004); *understanding*, n=44, e.g., "familiarity allows consumers to have a better understanding of the procedures" (Zahedi and Song, 2008); *reliability*, n=43, e.g., "reliance is an extremely important factor in credibility judgments" (Flanagin and Metzger, 2007); *communication*, n=41, e.g., "patients may also benefit from instruction in communication skills..." (Benotsch et al., 2004); and, *experience*, n=40, e.g., "greater training and experience in managing digital health information" (Menon et al., 2002). All meta-constructs with a frequency of thirteen or higher were used to create a visual representation. Out of the 108 meta-

constructs, the top fifty meta-constructs were used at least thirteen times. Table 3 is a list of all meta-constructs with at least thirteen uses.

5. Discussion

A question that arises in reference to these findings presented in the previous section is that perhaps trust is more of a gestalt in that it is a concept that can be represented in a variety of ways. That by using terms such as “reliability” or “credibility” interchangeably with the term “trust”, really what is being conveyed is a sense of larger construct that either taken separately. Or, that by not defining what trust means, the researchers are relying on a common established shared definition of trust. However, these reasons are precisely why we argue for questioning the precision of dialect, definitions, antecedents, and facets.

A common citation was not used, and when definitions, antecedents, and facets were used, they were not shared. Last, there was not a single term that was used across all papers. Given the limited definitions, antecedents, and facets that were presented, we have shown that researchers are not necessarily discussing trust. This means that their findings, while presented as being on trust in health websites, might actually be in conflict. This is perhaps why researchers such as Halkias et al (Halkias et al., 2008), Lemire et al. (2008), and Hesse et al. (2005) all found that women were more trusting, where as Huntington et al (Huntington et al., 2004) found that men were more likely to believe health information that they found online. The lack of a clear definition, antecedents and facets, and dialect can lead to conflicting outcomes that cannot be built off of. This section is divided by relevant findings in reference to what they mean for future research of trust in health websites.

5.1 Definitions of Trust in Health Websites

Definitions of trust are important given that they can outline the facets that make up trust as a construct, antecedents that are going to influence the fluctuation of trust, and also how trust might be measured. Our results reveal two major themes in defining trust between people and health websites. The first theme is that there is no uniform definition of trust in health websites. Some researchers develop their own definition of trust as a single construct while others develop a conflated definition.

The second theme is that trust is rarely defined as specific to health systems, but is often an extension of trust definitions in other non-health contexts. As explained by Montague et al. (2009), the construct of trust can be domain specific. Therefore, the trust placed in health websites might be fundamentally different from the trust placed in e-commerce websites. Only three of the definitions used in the reviewed body of work were made specific to trust in websites, with two definitions specific to trust in health websites (Rains, 2009, Bliemel and Hassanein, 2007, Fisher, 2008). (See Table 2 for definitions.) The lack of an agreed upon definition of trust in health systems indicates not only a lack of agreed meaning or understanding of what affects the construct of trust, but it is a deeper indicator that researchers in this field are not building upon each other's work.

5.2 Conflating Trust in Health Websites

There were seven papers in the body of reviewed papers that conflated trust in health with another term. Either the term 'trust' was used interchangeably or the authors explained that, for their purposes, the terms were synonymous. For our purposes we include examples from the text with the list of conflated terms: credibility, e.g., to explain the term credibility the researchers ask the question: "is it trustworthy?" (Rosenbaum et al., 2008, Lemire et al., 2008, Menon et al., 2002); reliability, e.g. "This study found that the NHS and specialist charities were felt to be reliable while commercial sources were less trusted." (Larsson,

2009, Marshall and Williams, 2006); in one paper both credibility and quality (Ivanitskaya et al., 2006), and in another paper both quality and reliability, when asking their participants to "evaluate the quality" of health websites, the corresponding question was "Which of these websites is the most trustworthy?" (Ayantunde et al., 2007). When terms are conflated it can indicate that there is an unclear understanding of what is being examined and further indicates a need for a clear definition of trust in health websites.

5.3 Antecedents of Trust in Health Websites

One of this study's goals was to identify the proposed or evaluated antecedents of trust between users and health websites. Antecedents are factors that influence, increase or decrease trust. In the reviewed articles, antecedents were only identified explicitly in nine papers (18.3%), listed in Table 4. The lack of antecedents for any amorphous construct like trust indicates an unclear understanding of the system of interaction between the user and their environment. For instance, if a researcher believes trust to impact the use of health websites, then knowing the antecedents that impact trust will better model users, trust, and the use of health websites. The lack of antecedents in the area of trust and health websites further signifies that the construct of trust in this area is ill defined and lacks validation.

However, antecedents were represented in six reviewed models that describe trust in health websites. These models are summarized and corresponding antecedents are listed in Table 4.

A model proposed by Fruhling and Lee (2006) demonstrated that the system's usability could be an antecedent of trust. The trustworthiness of the health medium along with the health provider trustworthiness, contextual factors, and other factors (e.g., perceived severity of health problems) all influenced the consumer's perception of trust in electronic health services.

Two models of trust within the reviewed literature demonstrated how time and continuous assessment affected trust. Zahedi and Song (2008) proposed a two-stage model depicting factors that influenced trust with factors such as satisfaction and information use. Sillence et al (2004, 2006, 2007a, 2007b) proposed a staged model of trust in four of their papers. In the first stage, the user rapidly screens websites based upon content evaluation heuristics. This evaluation is then affected by: 1) the information integration across multiple websites and sources, and 2) a longer-term consultation and self-disclosure process. Two other reviewed models demonstrated what factors can affect credibility, and through credibility, trust. Rosenbaum et al used a honeycomb model to visually demonstrate the different facets of user experience (2008). Credibility was one of these facets. Rains and Karmikel (2009) proposed a two-part model of how perceptions of persuasion and social influences impact credibility. The last model by Fisher et al. (2008) is similar to that of Rains and Karmikel in that it evaluated design elements that impacted trust. Their model demonstrated that retrieving relevant information and ease of use contributes to quality and trust perceptions.

5.4 Dialect of Trust in Health Websites

Another goal of this study was to identify concepts of trust to provide guidance towards understanding factors that may comprise the construct trust in health websites. Table 3 shows that the top fourteen trust meta-constructs have been used consistently among all forty-nine reviewed papers. There are many words that have seen a shift of frequency. These trends can be interpreted in a variety of ways and some may reflect the degree of importance a certain word had in an earlier year compared to current use. As can be seen in the graphs in Figure 3, 'concern' was found in every paper published from 2001 to 2002 and is down to a 33% frequency in 2009. Words like 'belief', 'accuracy', and 'usefulness' have seen an upward shift. Other words such as 'concern' and 'behavior' have seen a downward shift.

There are also words that have seen little to no shift; 'quality' and 'reliability' have been stable. At the same time, words like 'knowledge', 'experience', and 'control' have no discernible trend with frequencies as low as thirty-three percent one year and as high as one-hundred percent the next. These trends punctuate the high degree of fluctuation in what the construct of trust has come to mean.

5.5 Future Definition and Model of Trust

The work reviewed in this paper represents first strides at an attempt in a dispersed research community (Vega et al., 2010) to establish and define user trust in an health website. While the purpose of much of the work that was reviewed here was not to model user trust in e-health websites, but instead to understand if trust has an affect at all, we do not criticize or want to devalue the work presented in our review. Our argument is not that all research on trust in health websites should propose and evaluate models of trust in health websites, but instead to point at the clear lack of similar terminology, and use of similar models of trust that could be of value to future researchers.

Given that our work points to a lack of a definition of user trust in health websites, our future work is currently evaluating a new model of trust that stems from the review presented in this paper with a validated definition of user trust, its antecedents, and its facets. To propose an unvalidated definition and model of user trust here would be to devalue the work necessary to create one or the work to validate it (see (Fruhling and Lee, 2006, Sillence et al., 2006, Zahedi and Song, 2008) for examples within the set of reviewed papers). Instead, we propose this as a constructive area for future work that could engage the research community. We have identified many antecedents and facets that the research community has found useful so far, and also propose to juxtapose those against antecedents and facets from other areas (e.g., trust in eCommerce websites). We also suggest that future models of trust should further assess the type of health website being used (e.g., health portal versus pharmaceutical website), and the different mediums that these websites are being used on (e.g., smart phone, kiosk, home computer).

In other future work in regards to the definition of trust and health websites, studies have shown that health consumers are beginning to broaden the domain of websites they use to find health information to include sites such as Wikipedia (Laurent and Vickers, 2009). This expansion further encourages a need to clearly understand how health consumers are making decisions, in order to design systems that afford good decision-making; however, this cannot be accomplished without adequate metrics. The goal of understanding user trust in health websites is to design systems that allow users to trust sites enough to use but to not over-trust and fail to see the care of a physician when needed. Future research in this area should consider the differences between user-trust in health systems as opposed to other areas where trust in technological systems has been explored. Future scholars in this area should build greater theoretical and experimental based models to understand what it means to trust health information technology. Scholars should also work together to discuss differences and similarities in defining trust to move towards a unified definition of the construct. There is also a need for validated measures of user trust in health information technology to inform the empirical study of the construct.

6. Conclusion

Our results show that more work is needed in the area of user trust in health websites. Our review of forty-nine papers has revealed that definitions of trust are varied, generally lack validation and specification, have little or no listed antecedents or facets of trust, and are sometimes conflated. At the most basic level these findings indicate that researchers are talking past each other by using the same term, *trust*, but not using the same meanings and

definitions. In an emerging field, there is a need to create consensus on validated terms if for no other reason than to enable research to build upon that of others.

The limitations of this review is that it does not take account for valuable questions as to whether the health information consumer is trusting the website or the website creator(s) and the distinction between trust in websites versus technology acceptance. The issue of assessing a consumer's trust versus the trustworthiness of a website is also not addressed. What this review seeks to highlight is that these distinctions are currently not accounted for in a comprehensive way within the current trust models. Yet, understanding these nuances will deeply reflect not only what aspects of trust are empirically studied (e.g., what questions will be asked of participants), but also how trust is understood in the broader research community.

Our review found that within 108 trust constructs there was not one construct that was used in all reviewed papers. This divergence in parlance and terminology reflects noise in the common meaning of trust and thus decreases the ability for trust research on health to grow. Additionally, discussion and analysis of antecedents and facets of trust within the reviewed literature, which has been the foundational within the body of research on empirical factors of trust (see (Grabner-Krauter and Kaluscha, 2003, Muir, 1994)) for examples), were only used in six of the forty-nine papers. The lack of consensus about terms even within a relatively small set of papers and within a fairly focused domain is an important and valuable finding for trust research.

We propose that the publications reviewed in this paper are a valuable and important contribution to the initial body of work on trust and health websites. However, there is more work to be done. We propose that trust in health be a multi-disciplinary construct based on the dialect of trust research and also what empirical findings demonstrate are relevant for trust in health websites. Based on the review we conclude that this definition should be one focusing on the quality of the information, how the user understands and evaluates the information, the reliability of the website in terms of the information but also the functionality, and the experience that the user has had and is currently having while interacting with it.

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Figure 1.
Patient e-health relationships

Figure 2.
How the concept of trust has changed since 2001.

Table 2

Cited and unique definitions of trust by author and date.

		Paper	Who Cited	Definition
Cited Definitions	Stand alone construct	Menon 2002	Moorman 1993; Das 1998	Trust is a willingness to rely upon and have confidence in an entity and trust is also an expectation about another entity that is positive and involves some degree of risk.
		Huh 2005	Menon 2002	
		Fisher 2008	Bliemel 2007	The trustor is an information consumer and their trust is based on the information accuracy and the confidence level when evaluating the websites credibility & intentions.
		Theng 2005	Fogg 1999	Trustworthiness was defined by its relations to the constructs well-intentioned', 'unbiased', 'morality', and 'perceived goodness'. Trust is part of the construct of credibility.
		Walther 2004	Hovland 1953	Trustworthiness is a judgment of the motivations of the communicator to be truthful and without bias. Trust is part of the construct of credibility.
		Hong 2006	Hovland 1953	Trust is part of the construct of credibility.
		Rains 2009	O'Keefe 2002	Trustworthiness is a judgment on whether a website is truthful & unbiased. Trust is part of the construct of credibility.
		Flanagin 2007	Hovland 1953	Trustworthiness is part of the construct of credibility.
Part of Another Construct				
Based on				
Original Definition	Stand alone construct	Song & Zahedi 2007	McKnight 2002; Wang 2005; Jarvenpaa 1998; Mayer 1995	Trust the belief in ability- knowledge, skills, and competence for information and referrals; benevolence- reliable and provide useful information while acting in the web-user's best interest; and, integrity- ethical and unbiased in providing comprehensive information.
		Zahedi 2008	Komiak 2004	Trust is a belief and an attitude. Trusting beliefs are defined as cognitive; they are the rational expectation that the entity being relied upon is competent, benevolent, and has integrity. Trusting attitudes are feelings of security, comfort, and reliance upon an entity.
		Fruhling 2006	NA	Trust is defined by risk and uncertainty.
		Rosenvinge 2003	NA	Trust is a heuristic based evaluating the validity and credibility of information.
	Part of	Marshall	NA	Trust is part of the construct of reliability along with an assessment of if the information is based on the latest, safest, and most accurate information source

Table 3

Frequency of trust terms

quality	47	involvement	37	effectiveness	26	reciprocity	20	intention	16
understanding	44	belief	37	negativity	25	expectation	20	careful	16
reliability	43	usefulness	36	error	25	desire	20	independence	15
communication	41	opinion	35	distrust	24	anonymity	20	benevolence	15
experience	40	difficulty	33	accessibility	24	satisfaction	19	sincerity	14
knowledge	39	determination	32	familiarity	22	respect	19	sensitive	14
accuracy	39	completeness	31	consequence	22	reputation	18	security	13
credibility	38	risk	30	confidence	22	authority	17	faith	13
concern	38	sense	28	complexity	22	responsibility	16	competence	13
behavior	38	validity	26	availability	21	motivation	16	ambiguity	13

Table 4

A list of the all antecedents of trust demonstrated in the six individual models of trust.

Papers Grouped by Model	Antecedents of Trust for Model
<i>Trust as a stand-alone construct</i>	
Furhling and Lee 2006	Usability: system usefulness or quality
Zahedi and Song 2008a	Beliefs: ability, benevolence, integrity; previous interaction & trust
Fisher et al 2008	Design elements: retrieving relevant information and ease of use
Sillence et al 2004, 2006a, 2007a, 2007b	Continuous assessment of websites involving application of heuristics
<i>Trust as part of credibility</i>	
Rosenbaum et al 2008	Brand name & ownership
Rains and Karmikel 2009	Persuasion & social influences