

# **National Culture and Trust in Online Health Information**

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**OSLOMET**

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This dissertation investigates the role of the cultural background of individuals in their trust formations towards public information sources and online health information. The dissertation encompasses five articles, that is, three reviews (Articles 1-3) and two empirical studies (Articles 4-5). The reviews illustrate the boundaries of trust concepts in the literature, the theoretical studies of trust in the online health environment, and the-state-of-the-art of empirical findings around the topic. The empirical studies reveal the similarities and differences of societies in using different information sources and trusting in online health information. In particular, the findings show that our cultural values could be an important factor influencing our information-related activities and our preferences towards general information sources and certain characteristics of online health information. The findings were discussed in light of national culture theories.

In summary, this dissertation contributes to the literature on national culture, information source use, and trust in online health information as follows. First, it developed a typology of trust concepts that may serve as a ground for trust researchers. Second, it illustrated the cultural patterns of information source use among nationalities. Third, it revised a previously designed questionnaire (i.e. TOHI) and examined it in a more diverse sample, which may be used by future researchers in the online health field. Finally, it showed the differences in trust formations of people based on their cultural background. The findings of this dissertation may be fruitful for triggering information delivery to different cultural groups.

The dissertation is article-based, three of which were published in academic journals, and two are accepted for publication (with revisions).

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## Abstrakt (Norsk)

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Denne avhandlingen undersøker betydningen av individers kulturelle bakgrunn for deres tillit til offentlige informasjonskilder og online helseinformasjon. Avhandlingen omfatter fem artikler, det vil si tre oversiktsartikler (Artikler 1-3) og to empiriske studier (Artikler 4-5). Oversiktsartiklene illustrerer ulike tillitsbegreper i litteraturen, teoretiske studier av tillit i nettbaserte helsesfærer, samt kunnskapsstatus på feltet. De empiriske funnene peker på likheter og forskjeller i ulike samfunn i bruk av ulike informasjonskilder, og i tillit til elektronisk helseinformasjon. Spesielt viser funnene at kulturelle verdier kan være en viktig faktor i å påvirke informasjonsrelaterte aktiviteter, graden av bruk av informasjonskilder, samt hvordan man vurderer bestemte egenskaper ved elektronisk helseinformasjon. Funnene blir diskutert i lys av nasjonale kulturteorier.

Funnene bidrar til litteraturen om nasjonal kultur, bruk av informasjonskilder og tillit til nettbasert helseinformasjon. Først utviklet avhandlingen en typologi av tillitskonsepter som kan tjene som grunnlag for tillitforskere. For det andre illustrerte avhandlingen kulturelle mønstre for bruk av informasjonskilder mellom nasjonaliteter. For det tredje revidert avhandlingen et tidligere utformet spørreskjema (TOHI) og undersøkte det i et mer mangfoldig utvalg, som kan brukes av fremtidige forskere på nettbaserte helsefelt. Til slutt viste avhandlingen forskjeller i tillitsformasjoner basert på kulturell bakgrunn.

Resultatene av denne avhandlingen kan være fruktbare for å forbedre måten informasjon utformes til ulike kulturelle grupper.

Avhandlingen er artikkel-basert, hvorav tre artikler er publisert i akademiske tidsskrifter, og to er akseptert (med revisjoner).



Table of Contents	
List of Tables.....	4
List of Figures .....	4
Abbreviations .....	5
<b>Chapter 1: Introduction .....</b>	<b>6</b>
Background.....	7
The rationale for the topic of the dissertation .....	8
The current research.....	9
Aim and research questions.....	10
The position of this dissertation in the LIS .....	11
Original publications in this dissertation and their relationships .....	12
Structure of the dissertation.....	14
<b>Chapter 2: Research Overview and Theoretical Point of Departure .....</b>	<b>15</b>
Introduction.....	16
What is culture? .....	16
National culture theories.....	17
Hofstede’s national culture dimensions (HNCD).....	18
High context versus low context cultures.....	20
Criticisms of applied theories in this dissertation.....	21
Criticisms of Hofstede’s national culture dimensions.....	21
Criticisms of Hall’s theory of HC versus LC cultures .....	22
The conceptions of culture in information science .....	23
National culture and information behavior: what we know .....	24
Trust in online health information .....	26
<b>Chapter 3: Research Design and Methods.....</b>	<b>34</b>
Introduction.....	35
Research Design.....	35
The reviews .....	36
Secondary data analysis.....	37

Practical considerations of using SDA in this dissertation .....	38
Survey method.....	40
Practical considerations of survey method in this dissertation.....	41
The rationale for sample selection.....	41
Improving response rate .....	42
The research setting .....	42
Instrument.....	43
Ethical considerations .....	43
<b>Chapter 4: Summary of Included Articles.....</b>	<b>45</b>
Summary of Article 1 .....	46
Aim(s).....	46
Design .....	46
Major findings.....	46
Contribution to my research project.....	46
Summary of Article 2 .....	47
Aim(s).....	47
Design .....	47
Major findings.....	47
Contribution to my research project.....	47
Summary of Article 3 .....	48
Aim(s).....	48
Design .....	48
Major findings.....	48
Contribution to the general research project .....	48
Summary of Article 4 .....	49
Aim(s).....	49
Design .....	49
Major findings.....	49
Contribution to my research project.....	49
Summary of Article 5 .....	50
Aim(s).....	50
Design .....	50
Major findings.....	50
Contribution to my research project.....	50



<b>Chapter 5: Conclusions and Future Research Agenda .....</b>	<b>51</b>
Conclusions.....	52
The contribution of the dissertation .....	55
Implications for practice.....	57
<b>Bibliography .....</b>	<b>63</b>
<b>Appendices.....</b>	<b>80</b>
Appendix 1: Consent form – UCLA participants .....	81
Appendix 2: Consent form – HiOA participants.....	82
Appendix 3: Questionnaire .....	83
Appendix 4: Permission for the inclusion of Article 1 in the dissertation .....	86
Appendix 5: Permission for the inclusion of Article 3 in the dissertation .....	87
Appendix 6: The NSD approval letter.....	88
Appendix 7: The Ph.D. project revision - confirmation of the NSD .....	89
Appendix 8: The UCLA Institutional Review Board (IRB) approval.....	90

**Article 1**

Khosrowjerdi, M. (2016). Trust in People, Organizations, and Government: A Generic Model. *International Journal of Electronic Government Research*, 12(3): 55-70. doi:[10.4018/IJEGR.2016070104](https://doi.org/10.4018/IJEGR.2016070104)

**Article 2**

Khosrowjerdi, M., & Sundqvist, A. (2017). Students’ Trust Formation and Credibility Judgements in Online Health Information–A Review Article. *Tidsskriftet Arkiv*, 8(1). doi:[10.7577/ta.2165](https://doi.org/10.7577/ta.2165)

**Article 3**

Khosrowjerdi, M. (2016). A review of theory-driven models of trust in the online health context. *IFLA Journal*, 42, pp. 189-206. doi:[10.1177/0340035216659299](https://doi.org/10.1177/0340035216659299)

**Article 4**

Khosrowjerdi, M., Sundqvist, A., & Byström, K. Cultural patterns of information source use: A global study of 47 countries. *The Journal of the Association for Information Science and Technology (JASIST)*. Accepted with revisions.  
Doi: <http://dx.doi.org/10.1002/asi.24292>

**Article 5**

Khosrowjerdi, M. National culture and trust in online health information. *Journal of Librarianship and Information Science (JOLIS)*. Accepted with revisions. Doi: <http://dx.doi.org/10.1177/0961000619836716>

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## List of Tables

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Table 1. Hofstede's national culture dimensions	19
Table 2. High context (HC) versus low context (LC) cultures	21
Table 3. The response rate of the online survey	43

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## List of Figures

---

Figure 1. The included articles in this dissertation	12
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## Abbreviations

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ASEN: Asian East and Southeast countries

ECENT: European Central, East, and ex-Soviet countries

IBM: The International Business Machines Corporation

IDV: Individualism

ISU: Information sources use

LIS: Library and Information Science

LTO: Long-term orientation

MAS: Masculinity

MONASTIC: Muslim World, Middle Eastern countries, and South Africa

NEWS: Daily newspapers

NEWT: News broadcasts on radio or TV

NSD: Norwegian Centre for Research Data

NUANCE: European North and Northwest countries, and Anglo World

OHI: Online Health Information

PDI: Power Distance

PRIM: Printed magazines

Q&A: Question and Answering sites

SACRA: South and Central American countries

SAUCE: European South and Southeast countries

SDA: Secondary data analysis

SNs: Social Networking sites

TIES: Talk with friends or colleagues to get information

TOHI: Trust in online health information scale

UAI: Uncertainty avoidance

UCLA: University of California – Los Angeles

URL: Using internet or email

WVS: World Values Survey

# Chapter 1: Introduction

“National Culture cannot be changed, but you should understand and respect it.”

— *Geert Hofstede*

## Background

The internet is like an information ocean and it serves as a medical diagnosis tool for many people (Niedzwiedzka et al. 2014). The major features of the internet such as invisibility, comfort, and availability (Williams et al., 2003) has increased the likelihood of this medium as an online health information channel. For instance, about 35 percent of adults in the United States surfed the web to resolve a health issue (Fox & Duggan, 2013), and the younger information seekers had high trust in online health information (Beck et al., 2014). In addition, health information seekers regarded the internet as a valued channel for seeking professional advice because it was free of charge compared with the consultations with physicians (Ginman, 2000, p. 184). Finally, there is evidence that the trust in online health information sources is growing (Ek et al., 2013).

However, access to reliable health information through the internet is very challenging because studies have criticized the completeness and reliability of online health information (cf. Benigeri & Pluye, 2003), and if these shortcomings are ignored, it may lead to inevitable consequences for health consumers. As an example, the Pew Internet and American Life Project reported that three million American adults indicated “they or someone they know extremely harmed by following retrieved online health information and advice” (Fox, 2006, p. 8).

Trust formation of users, that is credibility judgments and usefulness perceptions towards online health information (Rowley et al., 2015), is influenced by both internal (cognitive) and external (socio-cultural) factors (Hilligoss & Rieh, 2008) and the lack of understanding of these factors will misguide the future practices and research in this domain. As Ginman (2000, p. 184) states, our beliefs are not only based on our psychological characteristics but also they are constructed on our social interactions in society, such as acting in the family, working places, memberships, etc. and this social context alters our way of information reception or rejection. One social factor that influences or modifies human trust is national culture (Doney et al., 1998), which is often measured by reported nationality of people (Hofstede et al., 2010, p. 21). In addition, many studies show that social and cultural factors influence, for instance, the frequency and the extent of online information seeking by user (Neumark et al., 2013; Oh &

Kim, 2014), source preferences (Yoon & Kim, 2014), and concerns about privacy and inappropriate content (Neumark et al., 2013; Oh & Kim, 2014).

However, the relationships of national culture and trust in online health information have not been a major area of research for researchers of information science or health science. Lewis (2006, p. 523) argues that previous researchers have ignored the surrounding social context of information users “that is embedded in and framed by a kind of health habitus”.

Given the fact that prior knowledge and experiences, beliefs and confirmation by other sources that might be regarded as authoritative are important factors behind trust formation process of individuals (cf. Bansal & Gefen, 2010; Borzekowski et al., 2006; Kim et al., 2011; Lim et al., 2011; Payton et al., 2014; Yoon & Kim, 2014; Rowley et al., 2015), cultural or socio-cultural characteristics might have a significant influence on this trust formation process. However, there is a dearth of theoretically driven empirical studies in this field.

Furthermore, information scholars have highlighted the possible influence of national culture on predicting information behavior (e.g. Wilson, 1997), however little is known on the cross-cultural differences and information use of people in large scale, i.e. cross-country level. Thus, the purpose of this dissertation is to pursue the impact of cultural background on information source use and examine cultural differences in trust formations

This investigation is important because the individual features of users (Ginman, 2000, p. 181; Case, 2012, p. 206; Envald, 2013, p. 19) together with contextual factors of information seekers (Marchionini, 1997, p. 38; Johnson, 2003) could stimulate the healthy performance of individuals and result in healthy citizens. However, the role of collective values (i.e. national culture) in information evaluation and trust formations is currently little studied and this dissertation is to fill that gap.

#### The rationale for the topic of the dissertation

The straightforward idea of this dissertation is that by exploring possible connections between national culture and information behavior of various groups of individuals, and specifically, the users’ trust formations towards online health information, these relationships could be taken into consideration when fitting online health information to different groups of individuals with the different cultural background. This research will help the health practitioners to plan or develop new systems or applications based on the cultural preferences of different groups of individuals.

This dissertation is among the first studies (Kim, 2013; Gnanlet & Yayla-Kullu, 2014) done in information science to investigate the cultural patterns of information sources use in cross-country level. For this purpose, the author directly links all Hofstede's national culture dimensions (Hofstede, 1984; Hofstede, 2001; Hofstede et al., 2010) with the general information sources uses of 47 countries. Thus, it is an examination of the usefulness of noted dimensions in information science, based on a number of premises of previous studies (i.e. Wilson, 1997; Steinwachs, 1999; Komlodi & Carlin, 2004). Furthermore, because of the importance of theory-driven studies in science production (Ammerman et al., 2002; Glanz & Bishop, 2010; Legler et al., 2002; Noar et al., 2007), their examination could enrich the information behavior research field too (Wilson, 2009).

Moreover, since the internet, to large extent, makes room for the dissemination of information outside any control systems than the traditional media, there are many concerns regarding the credibility of online information (e.g. Ayeh et al., 2013) and especially the online health information (Chen et al., 2000). Since users' access to trustworthy information in digital environments is very vital and access to low quality or risky information may have negative consequences for users of online health information (cf. Roberts & Copeland, 2001; Fox, 2006, p. 8), this dissertation has a focus on online health-related information.

### The current research

In cross-country level, the research on the association of national culture and information behavior, up to this time, has focused on comparisons of one nationality, or a couple of culturally different groups, whereas large-scale comparative studies of information behavior of nationalities based on national culture dimensions still missing. Thus, as Fort et al. (2013) and Komlodi (2005a, p. 111; Komlodi, 2005b) state more inter-cultural studies are required in information studies. In accordance with this, Spink and Heinström (2011, p. 254) suggested that cultural approach could supplement the mainstream cognitive approach in the information behavior field. As Komlodi (2005a) explains:

“Most of existing cross-cultural information behavior research reports differences in behavior, without examining the cultural variables to identify why these differences occur. A more thorough study of the impact of culture on information behavior will lead to deeper understanding of behavior and enable the designers of search systems to create interfaces that will be more usable by users from the different cultural background.” (Komlodi, 2005a, p.112).

To this end, the current research would characterize the information source use of people in cross-country level based on their national culture dimensions. This would help us to understand the cultural patterns of information source use.

Furthermore, the specific focus of previous researchers on trust in online health information did not result in generalizable findings for health or system practitioners. A recent review in this field by Sbaffi and Rowley (2017) showed deficiencies in literature to understand the trust formations of different socio-demographic groups of users towards online health information. These researchers called for more socio-cultural studies in this domain. In addition, their review highlighted that cultural and demographic factors such as national culture (especially in non-Western cultures), age, gender, education, and income may be more investigated in future studies to have a better synthesis of online health information seeking behavior of users.

This research will fill in the highlighted gaps by Sbaffi and Rowley (2017) through the following actions. First, it will focus on college students, to have a ground for comparable findings around the topic. Second, the limited number of works in this field used different conceptions of trust and different measures to examine the trust formation of users. This research will use the same instrument of previous researchers (Rowley et al., 2015) to explore and explain the similarities and differences of trust formations of users towards OHI. Third, it will include non-Western nationalities to enrich the literature.

#### Aim and research questions

This study aimed to investigate the characterization of trust formations of users based on their national cultures. More specifically, the research was focused on investigating the similarities or differences of trust formations of groups of individuals (i.e. Chinese, American, and South Korean) based on their reported nationalities and in light of national culture theories. The main research question of this dissertation was:

- *How could national culture characterize the trust formation patterns of users towards online health information?*

To answer this question (in Article 5), different conceptions of trust in trust literature were reviewed (in Article 1) to find a practical definition of trust applicable to online health context in current dissertation. Then, factors influencing trust formations of users towards online health-related information were examined (Article 2) to know the current debates around the topic. Later, the theory-driven models of trust in online health context were analyzed (Article 3) to characterize the applied theories in this domain and to find a proper theoretical foundation for empirical studies of this dissertation.



However, since previous researchers did not empirically relate the national culture dimension and information behavior of people in cross-country level, and they were mostly stopped in assumptions (or claims) phase, there was a gap in the literature around the relationships of national culture dimensions with information behavior, and specifically with the trust formation of groups of users. Because of the importance of this knowledge and its relevance to the topic of the dissertation, I examined this relationship (in Article 4). For this purpose, I conceptualized ‘information source use’ as an expression of trust. This is in accordance with the conceptions of trust in the literature, that is, usefulness perceptions of information (cf. Scott et al., 2008; Percheski & Hargittai, 2011; Selkie et al., 2011, Senkowski & Branscum, 2015) or intention to use information resources (cf. Allam et al., 2014; Jones & Biddlecom, 2011; Lim et al., 2011). I could access two large-scale data sets: 1) World Values Survey data on information source use of countries, and 2) the mean scores of Hofstede’s national culture dimensions for 76 countries. After aligning the two data sets, the researcher used the available data for 47 countries in the statistical analyses. Thus, the second research question of this dissertation was formulated as follows:

- *How could national culture explain the information source use of people on a cross-country level?*

Therefore, using the Hofstede’s national culture dimensions<sup>1</sup> (1980; 2001; 2010), and Hall’s theory of high versus low context cultures (1976), this dissertation will answer the two previously noted research questions.

The position of this dissertation in the LIS Wilson (2000, p. 49) defined information behavior as “the totality of human behavior in relation to sources and channels of information, including both active and passive information seeking, and information use”. However, as Spink and Heinström stated, the information scholars have had different conceptions of information behavior, i.e. as an “instinctive genetically based phenomenon” or an “instinctive and inherent mechanism”. Consequently, each of these school of thoughts resulted in different paradigms of information behavior studies, such as a focus on individuals factors (i.e. psychological perception of information behavior) or contextual factors (i.e. the sociological view of information behavior) (Spink & Heinström, 2011, p. 4). The current dissertation fits within information behavior studies, and it emphasizes the social perceptions of information behavior, that is, it investigates the information source use and trust patterns of individuals according to their cultural background. Thus, the focus of this study is

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<sup>1</sup> The rationale for applied theories is provided in Chapter 2.

on national culture (the reported citizenship of individuals). Thus, other related perceptions of culture such as institutional culture, information culture, etc. are beyond the scope of this research.

Original publications in this dissertation and their relationships  
 This dissertation consists of five original articles, of which, three (Articles 1-3) are reviews, and two are empirical studies (Articles 4 & 5), as listed below. The empirical studies of this dissertation were focused on linking the cultural dimensions and information sources use in cross-country level based on a secondary data analysis (Article 4) and examining the interactions of national culture and trust in online health information through an online survey (Article 5). The relationships between these five articles and their links to the theme of this dissertation are presented in Figure 1.

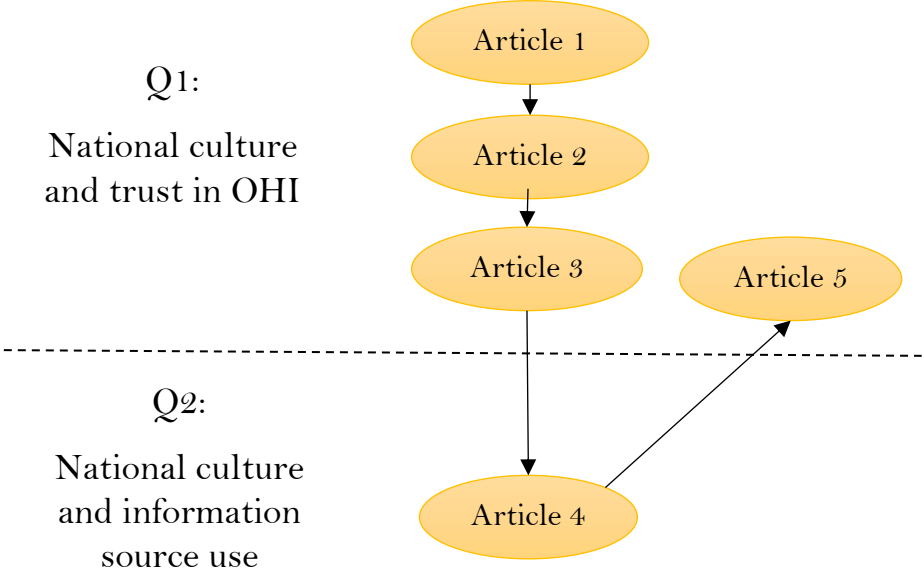


Figure 1. The included articles in this dissertation

Articles 1-3 contributed to the final empirical studies of this dissertation (i.e. Article 4 & 5) as described here. Article 1 showed that online trust, e-credibility, general trust, functional trust, routine trust, and the website credibility were among the main faces of trust in person-to-systems level. These conceptions of trust were in accordance with a recently operationalized definition of trust in online health information presented by Rowley et al. (2015) as usefulness and credibility perceptions of users.

Following Rowley et al. (2015), I selected the following practical definition of trust to be used in this dissertation, *trust in online health information is the credibility judgments and*

*usefulness perceptions of individuals towards online health information.* The antecedents of this type of trust included information quality, information style, the brand of the source, information verification, personal recommendations, website design, ease of use, the disclosure of author information.

The Article 2 showed that the survey method was the mainstream method of investigating trust in online health information. Besides, it revealed the lack of socio-cultural comparisons in this domain, and specifically, the lack of data on non-Western societies to make international comparisons and syntheses. Furthermore, the results of Article 3 revealed that previous models of trust in online health contexts neglected the socio-cultural context of the information seeking process and consequently missed the related theories. Thus, cultural theories became the points of departure in Article 4 & Article 5.

In addition, there was a missing empirical connection between national culture and information behavior, although there were many claims in the literature for this interaction (cf. Wilson, 1997; Steinwachs, 1999). Thus, there was a gap in understanding the general patterns of information source use for societies around the world. Article 4, through a secondary data analysis, linked the Hofstede's national culture dimensions with the information source use of 47 countries and illustrated a pattern for these interactions. This examination was fruitful in discovering the general patterns of trust in OHI for included nationalities in this study. As the Article 4 revealed, the three dimensions of national culture had correlations with the information source use of countries. This finding affirmed the idea that national culture seems to serve as an important factor in interpreting the information-related activities of individuals. Thus, it was likely that national culture could explain the trust formation of people towards OHI too.

Therefore, in Article 5, based on the findings of Articles 1-4, I used a survey to explore the associations of national culture theories and consumers' trust formations towards online health information. Following Hofstede et al. (2010) I used nationality as a representative measure for national culture, and I applied Hofstede national culture dimensions (1984; 2001; 2010) and Hall's theory of high versus low context cultures (1989) to examine the perceptions and the degree of importance of antecedents of trust in online health information among diverse participants in the study (i.e. Chinese, Americans, and South Korean).

### Structure of the dissertation

The structure of the dissertation is as follows. Chapter 1 (this chapter) is an introduction to the topic with a short description of the research environment followed by the aims, objectives and research questions of the dissertation. Chapter 2 present the research overview and the theoretical point of departure. Chapter 3 is devoted to the methodology and the rationale of the methodological choice. Furthermore, the data collection and analysis of the included Articles 1-5 are presented in detail. Chapter 4 summarizes and synthesizes the findings of included articles in the dissertation. Finally, the contribution of the results of this dissertation to both theory and practice are described and suggestions for future studies are made in Chapter 5.

## Chapter 2: Research Overview and Theoretical Point of Departure

“All theories are legitimate, no matter. What matters is what you do with them.”

— *Jorge Luis Borges*

## Introduction

This chapter encompasses the theoretical framework and literature review of the dissertation. It starts with the conceptions of culture and cultural theories and explains the rationale for the choice of theory. Then, it reviews the conceptions of culture in the library and information science and highlights the current research.

### What is culture?

There is not a consensus on the definition of culture (Kuper, 1999). In different disciplines, culture is defined in dissimilar ways, based on the centrality of individual or groups in that field. For example, of the socio-cultural point of view, culture is “the way of life (i.e. beliefs, social norms, and customs) of a particular group of people” (Merriam-Webster dictionary, 2017) at a particular time (Cambridge Dictionary, 2017). Nevertheless, psychologists define the culture as well-regulated and essential worldviews in the life of a person (Seel, 2012, p. 881), and it may be related to the genetics properties of individuals (Gintis, 2007).

However, there is a consensus that national culture is an aggregate (not an individual) construct, which is common among the members of a society, and it is learned (Fischer, 2009, p. 29). Hofstede regards national culture as “the collective programming of the mind that distinguishes the members of one group or category of people from others” (Hofstede et al., 2010, p. 344). According to Hofstede, the culture is a multi-layer construct (Hofstede et al., 2001, p. 11; Hofstede et al., 2010, p. 8), and its layers could resemble an onion, in which the artifacts and practices are at outer layers, and the values shape the core of the onion. Culture has different meanings based on its application level. For instance, the conceptions of national/societal culture, institutional/professional culture, and scientific culture are different (Hofstede et al., 2010, p. 43; Singer et al., 2016) and the researchers should clearly define their conceptions of culture in their scholarly works. Fanon (1963) presented an early definition of national culture as:

“the whole body of efforts made by a people in the sphere of thought to describe, justify, and praise the action through which that people has created itself and keeps itself in existence” (Fanon, 1963, p. 223).

Besides, countries are different based on their *identity* (language and religion), *values*, and *institutions* (rules and laws) (Hofstede et al., 2010, p. 22). According to Hofstede, national culture is “the collective programming of the mind acquired by growing up in a particular country” (Hofstede et al., 2010, p. 520). Hofstede recognizes the reasoning, sensing, and behaving of individuals as *mental programs*, and in his opinion, these mental programs of individuals are rooted in the society in which a person takes the path of childhood toward adulthood (Hofstede et al., 2010, p. 5).

### National culture theories

Many theories of national culture have emerged in the literature to explain the differences and similarities among nations. The Hofstede’s national culture dimensions (1980; 2001), the GLOBE (Global Leadership & Organizational Behavior Effectiveness) model (House et al., 2004), and Hall’s theory of high- versus low-context cultures (1976) are very popular in cultural studies.

I have applied the Hofstede’s national culture dimensions (1980; 2001; 2010) and Hall’s (1976) cultural theory in this research because of their evidenced analytical power and extensive applications in predicting human behavior in relation to information and communication technologies (cf. Gould et al., 2000). Furthermore, as Hall (2003) states:

“In multidisciplinary fields, such as information science, engagement with theory originally derived elsewhere ... is important. ... This practice might generate practical solutions to real problems serves as [a] justification of the approach. To an extent, it might be argued that ‘borrowed’ theory is a tradition of information science” (Hall, 2003, p. 288).

Finally, the information scholars have approved the influence of both cognitive developments and (national) culture on the information behavior of children (Spink & Heinström, 2011, p. 248, 254), or on the general information seeking behavior of individuals. In addition, information scholars (directly or indirectly) have confirmed the fruitfulness and analytical power of these two theories to investigate the information behavior of users (e.g. Wilson, 1997; Komlodi & Carlin, 2004).

## Hofstede's national culture dimensions (HNCD)


Geert Hofstede, a Dutch anthropologist, and former IBM employee developed four dimensions for national culture (Hofstede, 1980; 1983; 1984), i.e. power distance, individualism-collectivism, uncertainty avoidance, and masculinity-femininity. Hofstede and colleagues (Hofstede et al., 2010) added two other dimensions to this cultural module: indulgent vs. restraint societies, and long-term vs. short-term orientation. These dimensions are described based on the Hofstede's later findings.

According to Hofstede (2011), the power distance is the degree of acceptance and agreeableness of power inequality in society among lower classes of individuals in a society (Hofstede, 2011, p. 9). This distance is manifested for instance in the relationships between children and parents, staffs and managers, and citizens and politicians. The uncertainty avoidance refers to the degree of resilience of society towards ambiguous situations (Hofstede, 2011, p. 10). For example in countries with large uncertainty avoidance, changing a job is among the most uncertain situations for people. The individualism-collectivism dimension is defined as the extent of group orientations among people in a society. The masculinity-femininity dimension refers to the idea that there are differences between the male and female values in different societies based on their attitudes towards gender roles. The time orientation dimension is characterized by the perceptions of citizens of a society towards the time, which affects their subsequent behaviors. Finally, the indulgence versus restraint dimension refers to the degree of agreeableness of enjoyment in society.

A number of characteristics of societies based on their scores on noted dimensions are depicted in table 1.



Table 1. Hofstede's national culture dimensions (Hofstede, 2011, pp. 9-15)

example societies	low		high	example societies
Scandinavian countries	<ul style="list-style-type: none"> <li>The children are respected as adults.</li> <li>The education system is student-oriented.</li> <li>The lower social classes of individuals act (or expect to act) as advisors to the people on the power.</li> </ul>	<b>power distance</b>	<ul style="list-style-type: none"> <li>The children are followers of parents.</li> <li>The teachers (not students) have the authority in the education system.</li> <li>The people of lower classes in the hierarchy of power are obedient of the individuals of higher classes.</li> </ul>	Russia & Indonesia
USA & UK	<ul style="list-style-type: none"> <li>The goal of the education system is "learning how to do"</li> <li>The people frequently use <i>We</i> rather than <i>I</i> in their daily language</li> </ul>	<b>individualism</b>	<ul style="list-style-type: none"> <li>The goal of education is "learning how to learn"</li> <li>The people frequently use <i>I</i> rather than <i>We</i> in their daily conversations.</li> </ul>	Iran & Mexico
China & UK	<ul style="list-style-type: none"> <li>People are convenient with uncertainty in everyday life.</li> <li>The ambiguity is an approved norm.</li> <li>Individuals are open to changing their current occupation.</li> </ul>	<b>uncertainty avoidance</b>	<ul style="list-style-type: none"> <li>People are distressed and worried in vague situations.</li> <li>The ambiguity is regarded as a hazard.</li> <li>The people prefer to keep their jobs even though the job is unlikely.</li> </ul>	France & Argentina
Scandinavian countries	<ul style="list-style-type: none"> <li>There is a harmony between work and personal life.</li> <li>There is kindness towards powerless individuals.</li> <li>Many women have the opportunity to act as officials in the society.</li> </ul>	<b>masculinity</b>	<ul style="list-style-type: none"> <li>The job proves to be more important than family.</li> <li>The powerful people are appreciated.</li> <li>The women have fewer opportunities to serve as political actors in society</li> </ul>	Columbia & South Africa
USA, Australia, Latin America & Muslim countries	<ul style="list-style-type: none"> <li>The people feel that life's imperative events happened in the past or is occurring at the present.</li> <li>The people spend what they earn (i.e. consuming behavior).</li> <li>The students associate their success or failure to the chance.</li> </ul>	<b>time orientation</b>	<ul style="list-style-type: none"> <li>The people believe that life's imperative events will happen in the future.</li> <li>The people have a saving tendency rather than consuming behavior.</li> <li>The efforts are the reason for students' success, and the failure is associated with the insufficiency of attempts.</li> </ul>	East Asian cultures
Romania & Morocco	<ul style="list-style-type: none"> <li>The society determines people's desire for enjoyment through rigid social rules.</li> <li>The freedom of speech is not a major concern.</li> </ul>	<b>indulgence</b>	<ul style="list-style-type: none"> <li>The society acknowledges the people's desires to the enjoyment</li> <li>The freedom of speech is regarded as a substantial element of life.</li> </ul>	Scandinavian countries

## High context versus low context cultures

Edward T. Hall is one of the ancestors of the intercultural communication field (Rogers et al., 2002). In his foundational book, *beyond the culture*, Hall referred to a failed project of machine translation in the United States and explained the cause of that failure in neglecting the context. Thus, in order to have a successful communication, Hall emphasized the interconnectivity of *meaning* and *context*. In view of Hall, the context is the surrounding information around an event (Hall & Hall, 2001, p. 200) and the amount of provided information may vary in different cultures. As Hall ascertained,

“While a linguistic code can be analyzed on some levels independent of context (which is what the machine translation project tried to accomplish), in real life the code, the context, and the meaning can only be seen as different aspects of a single event” (Hall, 1981, p. 90)

Similar to Hofstede’s perception of culture (2001, p. 11), Hall perceived culture as a multi-layer phenomenon, which has both explicit and implicit layers. As Hall described:

“Beneath the clearly perceived, highly explicit surface culture, there lies a whole other world, which when understood will ultimately radically change our view of human nature” (Hall, 1981, p. 15).

Furthermore, Hall believed that culture is multi-functional, and one of its functions is a *selective screen* between the person and his surrounding world (Hall, 1981, p. 85), and highlighted five episodes to decode this selective screen, that is, subject or activity, the situation, one’s status in social system, past experience, and culture (Hall, 1981, p. 87).

In view of Hall (1981), the world cultures could be categorized into a spectrum of low versus high context with different communication styles, as follows:

“A high context (HC) communication or message is one in which most of the information is either in the physical context or internalized in the person, while very little is in the coded, explicit, transmitted part of the message. A low context (LC) communication is just the opposite; i.e., the mass of the information is vested in the explicit code.” (Hall, 1981, p. 91).

Hence, Hall (1981, p. 91) placed USA, Germany, Switzerland, and the Scandinavian cultures in the low end of the continuum (LC), and China, Korea, Japan in the higher end of the scale (HC). The features of HC and LC cultures and their preferred mode of communications are summarized in Table 2.

Table 2. High context (HC) versus low context (LC) cultures (Hall & Hall, 2001, p. 199-202)

example societies	Low	↔	High	example societies
USA, Swiss, Scandinavian countries, Germany, and northern European societies	<ul style="list-style-type: none"> <li>• The information connections are not well developed in LC societies.</li> <li>• The people of LC requires “detailed background information” for decision making about any task</li> <li>• The LC cultures lack the personal relationships in work and daily life</li> <li>• The people of LC tend to rely upon the analysis of others</li> <li>• The people of LC address each other with the first name, not with the titles</li> </ul>	<b>Context</b>	<ul style="list-style-type: none"> <li>• The HC cultures have strong information connections with family members, friends, colleagues, and clients</li> <li>• The HC cultures have “close personal relationships” in work and daily life</li> <li>• The people of HC do not require contextual information in their communication process.</li> <li>• The people of HC tend to have their own analysis of the received content</li> <li>• The people of HC address others with formal titles, not with the names</li> </ul>	Japan, France, Arab countries, and Mediterranean societies

### Criticisms of applied theories in this dissertation

#### Criticisms of Hofstede’s national culture dimensions

Researchers have criticized Hofstede’s approach in dimensionalizing national culture (e.g. Baskerville, 2003; 2005; Javidan et al., 2006). McSweeney (2002) holds some of the main criticisms of Hofstede’s national culture dimensions as below:

- 1) The methodological criticism (i.e. the general limitations of surveys in measuring the complex phenomena of culture, and the limited number of responses for some of the countries in an early study by Hofstede);
- 2) The approach criticism (i.e. the limitation of using nationality in explaining the cultural differences);
- 3) The sample criticism (i.e. the IBM employees cannot be seen as a representative of the whole nation);
- 4) The data criticism (i.e. the oldness of Hofstede’s cultural data); and
- 5) The dimensionality of culture criticism (i.e. the reduction of national culture into four dimensions).

In reply to these critics, Hofstede (2002, p. 1356) indicates that:

- 1) The survey is one of the methods to study cultural characteristics, but not the only method;

- 2) The application of nationality as the unit of analysis in cultural studies is limited, but it is the only available consistent unit of analysis for cultural comparisons;
- 3) The differences between national cultures could be explained by matched samples (the same group of people of each country);
- 4) The successful replications of Hofstede's national culture dimensions confirm the validity of his original data; and
- 5) All researchers have the opportunity to add theoretically separate dimensions of culture to HNCD, but the new dimensions should be empirically tested and confirmed.

In accordance with Hofstede's reply to the critics, a bibliometric investigation of the applications of Hofstede's national culture dimensions showed the validity of his cultural dimensions (Søndergaard, 1994) during the time. Likewise, a comprehensive review (Taras et al., 2009) on national culture theories showed both the predominance of the Hofstede's national culture dimensions in cultural studies and the effectiveness of these cultural dimensions in predicting the investigated variables. Additionally, the review showed that the twenty-six facets of national culture found in the literature could be grouped into the four of Hofstede's national culture dimensions, i.e. IDV, MAS, UAI, and LTO. Furthermore, the review indicates that nearly all (97.5%) of identified scales (n=121) for measuring national culture comprised some similar conceptions to Hofstede's national culture dimensions (Taras et al., 2009, p. 360).

Finally, yet importantly, many researchers replicated and confirmed the validity of Hofstede's national culture dimensions (e.g. Hoppe, 1990; Merritt, 2000). A more recent study shows the stability of Hofstede's national culture dimensions over time (Beugelsdijk et al., 2015).

### Criticisms of Hall's theory of HC versus LC cultures

Although Hall's theory of HC versus LC cultures is very widespread in cultural communication studies (cf. Mattila, 1999), a couple of researchers criticized this theory. For instance, a systematic review of the applications of Hall's theory of HC versus LC cultures in cross-cultural studies (Kittler et al., 2011) did not result in a coherent synthesis on the categorization of countries in HC versus LC cultural groups presented by Hall. However, the included studies in the noted review mostly examined Hall's theory of HC versus LC cultures with quantitative designs, in samples of students, and with using nationality as representative of national cultures (Kittler et al., 2011, p. 76). The focus on nationality as representative of national culture is the common problem of all dimensional theories, which have dimensional assumptions towards

national culture and they reduced the national culture into a limited number of dimensions. As Hofstede explains:

“Nations as political bodies supply all kinds of statistics about their populations... A strong reason for collecting data at the level of nations is that one of the purposes of cross-cultural research is to promote cooperation among nations. ... The (more than two hundred) nations that exist today populate one single world, and we either survive or perish together. So, it makes practical sense to focus on cultural factors separating or uniting nations” (Hofstede et al., 2010, pp. 21-22).

Finally, as Hofstede added, although using nationality as a representative for national culture is the only achievable benchmark for categorizing the people, it “should be used with care” (Hofstede et al., 2010, p. 21).

The conceptions of culture in information science  
The surrounding context of users has been an important factor in predicting their information behavior (e.g. Wilson, 1996; 1997). Accordingly, the Information Seeking in Context (ISIC) conferences represent the current trends in contextual information seeking behavior (cf. Byström, 1999; Kim & Sin, 2015; Paul, 2015; Moring, 2017). One contextual factor in the information seeking process is the surrounding context of users (Spink & Heinström, 2011, p. 186), which Wilson (1996; 1997) highlighted it. In Wilson’s *revised general model of information behavior* (Wilson & Walsh, 1996), the context of information, and the surrounding context of information seekers, and environmental factors are included as part of information seeking and use process. Furthermore, in a non-linear model of information behavior (Foster, 2005), and its recent developments (Foster & Urquhart, 2012), the social and organizational context was among the external factors influencing information seeking behavior.

Thus, contextual factors such as culture are important in users’ judgment and acquisition of information (Kim, 2013, p. 249). In Library and Information Science (LIS), different conceptions of culture have been investigated. These conceptions could be categorized as follows: 1) information culture (or culture of information) (cf. Curry & Moore, 2003; Choo et al., 2008; Vick et al., 2015; Sundqvist & Svärd, 2016), 2) information behavior as an antecedent of acculturation or socialization process (cf. . Ostroff & Kozlowski, 1992; Morrison, 1993), and 3) national culture as a predictor or modifier of information-related behavior of individuals. The first and second categories are beyond the scope of this study. The third group of studies in LIS assume national culture as a social variable (which solely or in collaboration with other factors) influence or moderate the information behavior of individuals (cf. Wilson, 1997; Clarissa et al.,

2005; Komlodi & Carlin, 2004; Komlodi & Hercegi, 2010; Spink & Heinström, 2011; Kim, 2013; Dankasa, 2017).

#### National culture and information behavior: what we know

The first study on the interactions of national culture and information behavior may date back to the Hall (1976) theory of culture. Hall (1976) in his book, *beyond culture*, categorized Americans in the low-context culture and Koreans in the High-context culture. In the realm of Hall (1976), Americans preferred more descriptions (i.e. texts) while Korean, Japanese, and Taiwanese preferred more *visuals* rather than *words* in their daily life. In addition, Hofstede related the personality differences of individuals with the differences in national cultures, i.e. national culture influence the way that individuals of a country behave in answering psychology tests (Hofstede & McCrae, 2004, p. 70).

Menou (1983, pp. 121-127) highlighted the cultural nature of information and emphasized the information acculturation as an ideal means of information transfer. Furthermore, the researcher pointed out the difficulty of inspecting all cultural antecedents of information production, transfer, and use. Besides, the researcher ascertained that the proper information should be localized with the cultural background of users.

In information science, we may perhaps regard Wilson's (1997) study among the first which to somewhat referred the links between the national culture dimensions and information behavior. Wilson (1997) hypothesized that Hofstede's national culture dimensions could have correlations with information seeking and use of people. As an example, Wilson (1997, p. 561) related the well-established tradition of libraries to the low power distant, individualist dimensions of Scandinavian countries. However, the Paisley's (1968) conceptual framework for studying information behavior of scholars in context (i.e. cultural system, political system, etc.) may be the first research, which referred to the surrounding context of information seekers (Spink & Heinström, 2011, p. 185; Byström et al., 2017).

National culture differences resulted in the different use of library systems. For example, Liu and Redfern (1997) investigated information seeking behavior of multicultural students through a survey. They found that native English speakers were more successful in using the library services than those that their first language was not English. In addition, more or less, Asian students were reluctant to ask reference questions, although they were aware of their difficulties in using the library services. Similarly, Duncker (2002) showed the problems of Maori (an indigenous population of New Zealand) in using digital libraries, and link these problems with *cultural experiences* of Maori users (i.e. low knowledge of Maori of Western

classification systems) and biases in the digital library designs (e.g. misrepresentation of Maori content in digital libraries that is solely based on Western classification styles). Lastly, Caidi and Komlodi (2003) highlighted the cross-cultural differences in using digital libraries during a workshop in this field. They called for further investigations into the culturally diverse user groups of different information resources. In addition, they highlighted the future research directions in this field, that is, to investigate the role of national culture in information seeking and use, the interaction of culture and other individual and societal variables in predicting information seeking and use of individuals, and the comparative studies of different groups of users.

The relationships of national culture and information seeking patterns were revealed in the works of Iivonen and Domas White (2001), Lee et al. (2005), Yeh (2007), Reinecke and Bernstein (2008), and Caidi et al. (2010). These studies showed that information search of people could be characterized by their national culture. Iivonen and Domas White (2001), used a mixed method approach to investigate the initial online searching strategies (search engines, directories, and direct website address) and they revealed significant differences between Finnish and American searchers, that is, Finns used search engines more than Americans did, and they trusted in online directories less than Americans did. Lee et al. (2005) analyzed user-generated queries in a Korean search portal and in *Google Answers* and found cultural differences of users based on queries. They linked these differences with the cultural values of Koreans (collectivist) vs. Americans (individualist). Furthermore, they suggested including unbiased cultural metadata to facilitate the information retrieval process for multilingual or multicultural users. Yeh (2007) with a qualitative interview on the information behavior of two tribes in Taiwan (Yami and Tsau) suggested a new model of information behavior, including two concepts of *information fullness* and *information emptiness*, to explain the relationships of national culture and information behavior. For example, a person who has an information gap in a situation first aligns this information need with his mental knowledge repository (i.e. *fullness*). If he could not fill the gap with his mental knowledge repository (i.e. *emptiness*), then he seeks for the required information from different information sources.

Hyldegård (2009) found that collaborative information seeking process had commonalities with general information search pattern of an individual based on the *information search process (ISP) model* (Developed by Carol Kuhlthau). However, the social and contextual factors such as *work task* and *group work* activities influenced the process (Hyldegård, 2009, p. 157).

Kim (2013), in an experimental study, studied the relationships of national cultural differences and information *perception* and *recall* by Korean and American students. They confirmed the individualism of Americans and the collectivism of Koreans. In addition, they found that Koreans were more likely to feel comfortable with high-context communications, in which most of the information is in the receiver not in the transmitted content, and Americans were more comfortable with low-context communication, that is, direct and most of the information are coded in the message and are transmitted directly to the receiver.

Gnanlet and Yayla-Kullu (2014) linked the Hofstede's national culture dimensions with an international data of 111 airlines and found that power distance had significant negative effects on website quality of airlines and quality of information provided during in-flight personnel-passenger communications. In addition, uncertainty avoidance and individualism had significant negative effects, and collectivism had a significant positive influence on the quality of information delivered during in-flight communications. Reinecke and Bernstein (2008) showed that the cultural background of users is fruitful for predicting their preferences for selecting interfaces design of websites.

A comprehensive review (Caidi et al., 2010) on information seeking and use of immigrants called for more studies with a focus on socio-demographics of information users to have a better understanding of the information behavior of newcomers to a country. This need for cross-cultural studies was highlighted by later researchers (Spink & Heinström, 2011, p. 186) which pointed out the lack of investigations on the direct links of socio-cultural factors and information behavior in empirical studies.

### Trust in online health information

Although there is not a universal conceptualization of the trust, it is relatively agreed that the trust is an attitude-related phenomenon and it is both vital and risky, that is, the trust is vital, because it shapes the human communications, and it is risky because the human beings must rely upon the others to perform cooperatively (McLeod, 2015). The human's trust in one medium, object or source is transferred to another. For instance, Ye (2010) found that the trust in OHI had a correlation with the trust in mass media (TV and newspapers/magazines) and public healthcare. A similar finding of (Crawford et al., 2014) showed that trust in health websites was highly correlated with trust in health forums. Furthermore, Mou et al. (2017) found that individuals' trust in online health provider had a positive relationship with their trust in health-related websites. In addition, trust is a multidimensional and dynamic (evolutionary) phenomenon (cf. Ganesan & Hess, 1997; Gefen, 2002).



It worth mentioning, there is not a consensus on the trust dimensions in different fields. In a recent qualitative study (Lovatt et al., 2017) on trust formations of users in an online health forum, three dimensions for trust emerged. The *structural* dimension of trust refers to the fact that the features of the information provider influence trust. The *relational* dimension of trust emphasizes the relatedness of trust to the perceptions of other members of a person's network. The *temporal* dimension of trust shows that trust is evolutionary and it is changed over time.

Accordingly, the ambiguity of trust conceptualization and dimensions has been transferred to digital the environments too. For instance, the previous research have used notions of trust such as individuals' credibility perceptions towards an online object, content, or source (cf. Bansal & Gefen, 2010; Batten & Dutton, 2011), the users' intention to use online service (cf. Allam et al., 2014), and the usefulness perceptions of online information (cf. Payton et al., 2014). The later researchers have applied a mix of noted concepts as an indicator or main building block of trust. For instance, Rowley et al. (2016) and Kim and Syn (2016) used credibility judgments and usefulness perceptions of users towards online health information as an indicator of trust.

Again, because of the different conceptions of trust in online health environments, it is very hard to synthesize the findings on trust in the online health domain. However, there is one exception. The Health Information National Trends Survey (HINTS) is one of the established research groups investigating cancer-related information seeking of people in the USA, and their survey includes data on trust in OHI in different years. The HINTS data are freely accessible for research use, and many researchers have investigated the HINTS data on trust in OHI with different aims. For instance, based on 2007<sup>2</sup> HINTS data, Ha and Lee (2001) found that the individuals' self-confidence in health-related information seeking were positively correlated with their perceptions of health literacy and trust in information sources (doctors, health care professionals, government health agencies, family and friends, and the internet). Ye (2010) showed that individual factors such as education, income, and health status had no significant correlation with trust in OHI. Other researchers, such as Miller and Bell (2012) revealed that the older adults had a lower tendency to search for, and lower trust in OHI and Sak and Schulz (2018) confirmed this.

Some researchers focused on the content or system related antecedents of trust in OHI. For instance, Harris et al. (2011) modeled the covariates of information quality, impartiality of information, credible design, and personalization as antecedents of individuals' trust in OHI. In

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<sup>2</sup> This number refers to the HINTS data of year 2007.

a qualitative (observation and diary) study, Sillence et al. (2007) found that website design (e.g. font, graphics and navigation possibilities of the website) was antecedent of mistrusting or rejecting the health website, and the content-related factors (source credibility and personalization) were predictors of trust in health websites. Al-Shamaileh and Sutcliffe (2012) in a mixed method study (questionnaire and interview) confirmed the quality of the content, brand of the source, and the website interactivity as the three strongest antecedents of users' preferences of health websites. Hale (2013) showed that those individuals who had quality internet access showed higher self-efficacy in information seeking and trust in online health sources. In addition, Xiao et al. (2014) analyzed 2003 HINTS data and found that individuals with younger age, with higher education, and higher income were more active health-related information seekers. In addition, the access to the internet, and trust in OHI were positive predictors of frequency of online health-related search, diversity of search (i.e. online shopping of medical products, taking part in a support group, searching for OHI, and other health-related activities), and preference of online information sources. Furthermore, the perceived health status was the negative antecedent of the frequency of search and diversity of search of individuals. Shahrokni et al. (2014) used the 2012 HINTS data and found that the online cancer survivors (i.e. those who had access to internet) had more trust in the internet as a health information source than the offline cancer survivors (i.e. those without access to internet). Furthermore, the radio and religious groups were more trustful for offline cancer survivors than for online cancer survivors.

The findings of other researchers on trust in OHI, albeit not with the similar conception of trust, follow. Zulman et al. (2011) in a national (telephone) survey in the USA found that the older adults were less likely to trust the health information on the internet. Zhang et al. (2017), through an online survey at a large Southwestern University (USA), found that the previous experience of individuals with internet sources was a positive predictor of their use of online sources (search engines, social question & answering sites, online health communities, and social networking sites) for health purpose. Geana et al. (2012) in a survey on the American Indians and Alaska Natives (AIAN) in the USA found that the younger AIAN had lower odds to search, use, and trust in online health information than the older adults did. However, the older adults reported the most difficulties in finding health information on the internet than the adolescences did. The survey study of Kwon et al. (2015) on Korean's trust in OHI showed that of the investigated factors (age, education, income, sex, and health status) only age and income had correlations with trust, that is, the age correlated with trust in OHI negatively; while the income had a positive correlation with trust in OHI sources. Kim and Syn (2016) in a survey

on trust patterns of American students on Facebook showed that the participants had higher credibility and usefulness attitudes towards the low-sensitive health information provided on Facebook, and the professional information sources. Females reported higher trust in highly sensitive health information provided on Facebook than males did. The education level was a positive predictor of students' credibility and usefulness judgements of professional information providers on Facebook. The students living in campus halls had lower odds to regard health-related information on Facebook as credible and useful. Beck et al. (2014) confirmed that the females and those individuals with higher official position (executives vs. staff) had more odds to use OHI.

Later studies show the role of gender in trust formations. For instance, Rowley et al. (2017) found that the trust formations of both genders were based on four factors: the credibility of content (the factual, impartial, believable, and objective information), the personal recommendations (of information by family members or friends), ease of use, and the brand of the source. However, they revealed some gender differences. The style (the structure, readability, understandability of the information) was just an antecedent of women's trust, while the familiarity (i.e. previous use of the online information provider) was only a predictor of men's trust.

Recently, the scholars investigated the influence of cultural background, through representative variables of race and nationality, on users' health-related information seeking and trust formations towards OHI. The findings of general studies showed that the cultural background of users had correlations with health-related information activities of individuals. For instance, a national telephone survey research in USA revealed that the dimensions of national culture (i.e. race), the existence of cancer in family members, and the degree of emotional state of individuals (i.e. regular worries about the cancer threat), were three antecedents of individuals' intentions to seek OHI (Andrews et al., 2005). A recent study of Yoon et al. (2017), based on a longitudinal data, found that during the investigated time interval (i.e. 10 years) the amount of online health information seeking for foreign-born individuals was increasing, however, this group showed lower propensities to search for OHI and more problems in understanding the retrieved OHI in comparison with US-born individuals. Furthermore, Askola et al. (2010) showed that Japanese students preferred to get health-related information from family members, TV, or radio, while Finnish students visited their health care providers or internet to obtain health information. Besides, the findings of their study showed that family members were a more trustful source of health information for Japanese than for

Finns. The researchers claimed that the dissimilarities of cultural values of Japanese could explain the previously mentioned differences, i.e. the Japanese are more family-oriented, and possibly they have more activities that are interpersonal and they refer to family members for primary health concerns. Wong et al. (2012) in a survey study found that perceived ease of use and positive attitudes towards internet use were the most important antecedent of Chinese older adults' intention to use OHI. The study did not confirm the influence of ease of use on Chinese older adults' intention to use OHI, and the researchers explained this finding based on the Chinese values and beliefs. That is, the Chinese culture adores the personal efforts in order to succeed in natural life, and this could result in the low importance of ease of use to get health information for Chinese people. Based on a national survey, Neumark et al. (2013) found that Arabs were more likely than Jews to seek OHI. The internet skill level, the previous discussions with health professionals, and the level of trust in OHI were positively correlated with OHI-seeking for both Arabs and Jews. However, the inadequacy of the internet skills and English language, lower trust in OHI, lack of time and privacy, limited access and the expense were more predominant among the barriers of OHI-seeking for Arabs than for Jews.

Several researchers studied the trust formations of users in online health environments with the cultural lens. For instance, Oh and Kim (2014) in a survey of American and Korean students found that Americans were more involved in online health-related interactions with social media. However, the Koreans trusted social media (podcasts, blogs, Q&A, and social networking sites) more than the Americans did. In addition, the researchers found that self-confidence in search skills and the higher health concerns had correlations with individuals' trust in health-related information on social media. Gao et al. (2015) in a survey of Chinese users of a Chinese blog (i.e. Weibo) on health-related issues showed the uniqueness of credibility judgments in blogs. The researchers found that while source credentials were not a major antecedent of credibility judgments of blog users, the negative comments of personal networks (especially friends) decreased the credibility of provided health-related messages. The researchers related these findings with the unique nature of identifying credible information on blogs, which requires the users' ability in handling huge amount of information. Song et al. (2016) compared the trust of Americans, Koreans and Hongkongers in social media as a health information source and they found that the Asian sample reported more trust in blogs, online support group, social networking sites than the Americans did. In addition, the Asian sample was more frequent users of blogs and social networking sites than the Americans were. However, the Americans had more preferences for using the professional OHI providers such

as WebMD and Centers for Disease Control and Prevention (CDC). Furthermore, Zhang et al. (2017) showed that race was an antecedent of using newer technologies, that is, the Whites compare to non-Whites were more likely to use crowd-sourcing sites to search for factual content. The study of Paige et al. (2017) on Black/African Americans and Caucasians showed that eHealth literacy was positive antecedent of trust in online health channels (YouTube, Twitter, Pinterest, Facebook, support groups, blogs/diaries) and sources (health care providers, friends and family members, and government organizations). Although the age and gender could not predict the trust in OHI, the noted researchers showed that interaction effects of eHealth literacy with age and gender moderated trust in OHI. That is, considering the lower level of eHealth literacy, trust in OHI channels was higher for females and older adults. The researchers revealed that the YouTube and Twitter were highly trusted sources for those Black/African Americans that had low eHealth literacy, while the public health websites and the religious institutions were highly trustful channels for those Black/African Americans, which showed higher eHealth literacy. Furthermore, the older adults were more trustful in Facebook and they had low trust in online support groups. However, no effect of race on trust in OHI was found in this study. Finally, Somera et al. (2016) administered a survey on Guam residents and compared their findings with 2011 HINTS data for the USA. The researchers found that, on average, the Guam sample had higher trust in online health-related information than the American sample had. In addition, the Guam sample rated the religious organizations, as a health information source, higher than the American sample.

Two recent systematic reviews of the literature on trust in OHI categorized the antecedents of trust in OHI. In the first review, Kim (2016), based on 20 published articles (during 2000-2013), synthesized the antecedents of trust into three categories, that is, socio-individual factors, website-related factors, and interactional factors. Among the socio-individual category, the review confirmed the positive correlation between education and income and negative correlation of age with trust in OHI. However, the review identified just one study, which directly investigated the culture with the representative variable of race. The review showed the contradictory findings on the role of website-related factors (e.g. website appearance) on trust. However, information quality and ease of use were among the most prevalent antecedents of trust in this category. Of the interactional factors, the review found brand or reputation of the source, positive previous experience with the health websites, and familiarity as the antecedents of trust in OHI. In the second review, Sbaffi & Rowley (2017) showed the positive correlations of the content-related factors (the authority of the source, quality of content, ease of use, and content features) and website-related factors (layout, interactivity, and the authority of website

owner) with the users' trust in OHI. In addition, the review showed the age, gender, and the perceived health status of users as influencers of trust in OHI.

In summary, antecedents of trust in OHI could be categorized into content- and source-related factors (such as information quality, believability, comprehensiveness, etc.), the technological factors (e.g. quality of internet access), literacy and skills (e.g. information literacy, eHealth literacy, etc.), social and demographic characteristics of users (age, gender, education level, gender, income, institutional position, etc.), health-related factors (severity of health issues, health status, etc.), psychological factors (such as self-efficacy, personality, etc.), and cultural factors (such as race, ethnicity, nationality, etc.).

As the reviewed literature show, the trust formation process is very complex, and it is very hard to include all influencing factors on trust in one study, and the previous researchers, maybe because of practicality, have investigated a couple of aspects of this process. Furthermore, because of the use of different conceptions of trust, it is very hard to synthesize the literature in a conclusive way. However, the literature shows that the cultural background of individuals could be a predictor or modifier of their trust formation toward OHI, which deserves more investigation. Furthermore, there is a dearth of cultural research on the degree of importance of content- and system-related factors, which contributes to the trust process.

Thus, in this research, in order to avoid the ambiguity, and in accordance with research in the health domain (cf. Lovatt et al. 2017) the trust is seen as a social phenomenon, which are influenced by the characteristics of information, source, the context (in which trust occurs), and the subjective norms. In addition, the new conception of trust in OHI (Rowley et al., 2015; Kim & Syn, 2016), which regards the trust as the credibility and usefulness perceptions of users towards OHI, is applied.

The applied concept of trust in OHI in this research is influenced by users' assessments of information quality, information style, ease of use, information verification, personal recommendations, the brand of the source (Rowley et al., 2015), the disclosure of source, and website features, which are described here. Credibility is the degree of believability of an information content and the expert skill or knowledge of the source in providing unbiased information (Hilligoss & Rieh, 2008, pp. 1468-1469). In this research, the credibility is applied as the self-reported perception of users of the reliability (or believability), trustworthiness, and impartiality of provided online health information. Usefulness is measured by the opinions of users towards the usability of the provided information content. The usefulness in this research

is the reported perceptions of users regarding the interest rate and fruitfulness of OHI for them in understanding their health concerns, and the alignment of the retrieved content with their expectations of the health information provider or source. The information quality refers to the reported attitudes of individuals towards comprehensiveness, currency, accuracy, and objectivity of retrieved online health information. Information style refers to the way of representation of information. The information style is measured through the users' reported attitudes towards the understandability of provided information, the structure of the presented content, and the error-freeness of the content. Information verification which has been among the main elements of a non-linear model of information behavior (Foster, 2005) and had an effect on the credibility judgments of users towards online information (cf. Lim, 2013), is applied as the judgments of users towards reliability, correctness, and completeness of information from other sources such as cross-referencing, fetching the links, researching the content in other information providers and so on. The 'personal recommendation' as an antecedent of trust, refers to the totality of recommendations provided by other important people which influences the decisions of an individual in using or not using a special information source or content. Brand of the source is used here as the degree of famousness or popularity of logos, symbols, and signs, which makes the retrieved information source or content more identifiable and unique. Thus, the brand of the source was measured by the degree of famousness and reputation of the logo of the online health information provider or source. The ease of use is the accessibility and usability of the provided online health information for users, which was measured through users' attitudes towards easy-to-find, free, fast, and accessible online health information. The representation of the characteristics of author/provider/writer of online health information/content is labeled as disclosure of source in this research. The disclosure of source is measured by the revealing of names, affiliation, and expertise of the provider, author, or writer of online content in this research. The website features, which are important for the users during information seeking and use, are termed as website design in this research. The website design was assessed through statements such as up-to-date-ness of websites, the interactivity of websites, the inclusion of privacy policy in the website, the traceability of the website in the physical world, for instance, through checking the physical address information of the website owners and so on.

## Chapter 3: Research Design and Methods



“A change in quantity also  
entails a change in quality.”  
— *Friedrich Engels*

## Introduction

The epistemological and methodological bases for this dissertation are discussed in this chapter.

Merriam-Webster dictionary defines *paradigm* as:

“A philosophical and theoretical framework of a scientific school or discipline within which theories, laws, and generalizations and the experiments performed in support of them are formulated” (Retrieved from <https://www.merriam-webster.com/dictionary/paradigm>)

In a similar way, Kuhn (1962) defined research paradigm as “the set of common beliefs and agreements shared between scientists about how problems should be understood and addressed” (as cited in Durach et al., 2017, p. 68). Paradigm includes the fundamental assumptions of researchers to target a research problem, and the methods of investigations and finding the solutions (Neuman, 2014, p. 96). The paradigms differ according to “presuppositions regarding reality and how it may be understood” (Mittwede, 2012, p. 23).

In my research, the research paradigm is very close to post-positivism. The ontological stance in post-positivism, like positivism, is the idea that there is a reality independent of the human mind (Neuman, 2014, p. 98) and the researcher is able to find it. However, post-positivists have confidence in the use of diverse research methods (Wildemuth, 1993). From the epistemological point of view, the post-positivists supposed that “some relatively stable relationships exist”, besides the suitability of methods was of high importance for them (Onwuegbuzie & Leech, 2005, p. 269).

In summary, this dissertation applied post-positivist paradigm and focused on mixed methods. The dissertation includes two quantitative (i.e. survey method and secondary data analysis) and three qualitative (i.e. review) studies.

## Research Design

This dissertation includes five articles. Articles 1-3 are conceptual, theoretical, and literature reviews. The reviews were done to investigate the applied concepts or faces of trust in previous

literature (Article 1), to identify the theories used in modelling trust in online health contexts (Article 2), and to summarize the empirical findings on factors influencing trust in online health context around the extracted themes (Article 3).

The dissertation includes two quantitative studies, that is, Article 4-5. In Article 4, I used secondary data analysis (SDA) to identify how national culture could characterize information source use of individuals in cross-country level. In Article 5, I specifically focused on explaining trust formations of individuals based on their national culture.

Thus, this dissertation is an article-based one and consists of five articles. The research design of the whole dissertation and its advantages and disadvantages are discussed here.

### The reviews

The researchers must map the main concept(s) of their works and illustrate the “network of relationships” among them (Rocco & Plakhotnik, 2009, p. 126). A conceptual review is a thorough review of the main concept(s) in a study, which shows the application of those concepts in relevant fields, “where the purpose is not to further investigate a specific theory” (Rocco & Plakhotnik, 2009, p. 126). Thus, the conceptual review is used for description or clarification of the perceptions of the researcher regarding the applied concepts in research. Article 1 of this dissertation is a conceptual review of the interdisciplinary literature on the concept of trust and its related conceptions and the application levels in the society.

The Article 2 of this dissertation was devoted to a scoping review. The scoping review provides a complete picture of advancements in a specific research domain (Grant & Booth, 2009). Article 2 maps the current state-of-the-art on the research of students’ trust in online health information in order to have a general assessment of this process. I searched the literature to find applied trust-related concepts, research designs, and general findings of previous literature on trust formations of individuals towards OHI, and factors influencing this process. This is in accordance with the aim of scoping reviews, as described by Mays et al. (2001), that is:

“to map rapidly the key concepts underpinning a research area and the main sources and types of evidence available, and can be undertaken as stand-alone projects in their own right, especially where an area is complex or has not been reviewed comprehensively before” (Mays et al., 2001, p. 194).

The last review of this dissertation is a theoretical review of trust models in the online health contexts. The purpose of theoretical reviews is to examine the applied theories in a specific domain. This type of review helps to have an overview of the applied theories, the

relationships among them, and to identify the neglected theories in a research field (The University of Southern California, 2017).

### Secondary data analysis

Article 4 of this dissertation benefited a secondary data analysis (SDA) approach in characterizing the relationships of national culture and information source use. SDA is the use of ready or previously gathered data in order to investigate a new research problem (Brewer, 2012).

The SDA has many advantages as follows. First, because of availability of the data, it is cost-effective, and there is some evidence that secondary data is less biased data than self-gathered data by researchers (Brewer, 2012, pp. 166-167). Second, there is a chance for other researchers to replicate the previous studies and to corroborate or falsify the available understanding around a new research field or to find “serendipitous relationships not considered in primary research” (Smith, 2008, p. 21). Third, SDA has frequently been used in cultural studies. For example, researchers used SDA to investigate the relationships of national culture dimensions with other variables such as antibiotics use (cf. Deschepper et al., 2008), the personality traits of nations (cf. Hofstede & McCrae, 2004), the tax evasion in countries (cf. Tsakumis et al., 2007), cross-cultural differences in subjective well-being of nations (cf. Arrindell et al., 1997), the adoption of information technology products (cf. Bagchi et al, 2004), internet use and access of countries (cf. Gong et al., 2007), and finally, the societal creativity (cf. Rinne et al., 2013).

Many researchers have criticized using secondary data to investigate new research problems. For example, Smith (2008, p. 330) pointed out the social construction of secondary data and the fact that it “cannot be reduced to numeric form”, and often is “full of errors”. However, as Smith (2008) highlighted:

“... without secondary data and the official data collected by governments and non-government organizations in particular, how would social scientists be able to describe the social world around them, posit theories and test them empirically?” (p. 330).

I agree with Smith (2008) on the fruitfulness of secondary data in science production. For example, even the Hofstede’s national culture dimensions, which have shown its analytical power in explaining the cultural differences and similarities, were based on re-using data previously gathered by IBM. Hofstede (1984) used 116000 questionnaires of IBM employees in 40 countries of the world to develop his primary four national culture dimensions, which is a type of “empirical typology” (Hofstede, 2001, p. 28), that is, a typology for national cultures

based on previously gathered (empirical) data. Furthermore, the conception of “errors” in secondary data by researchers could not confirm that other types of primary data gathering methods are “error-free” (Smith, 2008, p. 26).

### Practical considerations of using SDA in this dissertation

In order to have a proper SDA, the researcher must evaluate the reliability, validity, and generalizability of the used datasets (Dunn et al., 2015, p. 1299). In addition, the data set should be relevant to the applied theories in the study (Magee et al., 2006, p. 51) and the research questions (Dunn et al., 2015, p. 1299). However, the alignment of data set with the applied theory in the research should not be overestimated and it can be used for the relationships of variables or concepts of the theories (Magee, 2006, p. 51).

In Article 4 of the dissertation, I used the large datasets of WVS 5 (2005-2009) and Hofstede’s national culture scores for characterizing the relationships of information sources use of countries with national culture. In other words, the Hofstede’s national culture dimensions (i.e. individualism, power distance, uncertainty avoidance, long-term orientation, masculinity, and indulgence) were considered as independent variables and the diverse use of information sources (i.e. using daily newspapers, news broadcasts on radio or TV, printed magazines, internet or email, books, talk with friends or colleagues to get information) was regarded as dependent variables. Thus, it is in accordance with the affirmation of previous researchers (cf. Magee, 2006, p. 51) on the alignment of research questions and theoretical framework with the use of secondary datasets.

In addition, the reliability and validity of secondary data are dependent on the research design, the data gathering process, sampling procedures and the final sample size (Dunn et al., 2015, p. 1299). For this purpose, I explain the sample characteristics of both data sets here.

The two datasets noted above were freely available for the researchers. These datasets and their sources are described in detail as follows.

### The World Values Survey data

“The World Values Survey ([www.worldvaluessurvey.org](http://www.worldvaluessurvey.org)) is a global network of social scientists studying changing values and their impact on social and political life, led by an international team of scholars, with the WVS Association and WWSA Secretariat headquartered in Vienna, Austria” (<http://www.worldvaluessurvey.org/WVSContents.jsp>)

The World Values Survey (WVS) website freely provides the datasets of global surveys on different aspects of culture and society in different periods of time (i.e. waves). The surveys

comprised mostly of face-to-face interviews. The researchers covered respondents from 97 countries, representing 90 percent of the world's population (Inglehart, 2015, p. 345). Six waves of WVSs were carried out between 1981-2014 on a cross-sectional sample of individuals aged 18 years and older. The Wave 7 is in progress, and 15 countries have finished their fieldworks. The purpose of WVS is as follows:

“The WVS seeks to help scientists and policymakers understand changes in the beliefs, values, and motivations of people throughout the world. Thousands of political scientists, sociologists, social psychologists, anthropologists, and economists have used these data to analyze such topics as economic development, democratization, religion, gender equality, social capital, and subjective well-being” (<http://www.worldvaluessurvey.org/WVSContents.jsp>).

In Article 4, for the dependent variable as ‘information source use’ (ISU), I used the WVS Wave 5 (2005-2009) data of the statements on information use as answers to the question below: “People use different sources to learn what is going on in their country and the world. For each of the following sources, please indicate whether you used it last week or did not use it last week to obtain information (read out and code one answer for each)”. This data (Inglehart et al., 2014), in different file formats (e.g. SPSS, Excel, etc.), was freely accessible for research purpose.

The respondents reported the use of daily newspaper, news broadcasts on radio or TV, printed magazines, in-depth reports on radio or TV, books, internet/email, and talk with friends or colleagues as (1) Used [the source] last week, (2) Not used [the source] last week, (3) No answer, (4) Don't know. The details of coding these data and further statistical steps are provided in Article 4.

#### National culture data

Geert Hofstede could access around 116000 questionnaires' data of International Business Machines Corporation (IBM). The IBM had collected the noted data from its staff in different subsidiaries of IBM in 72 countries and in two different points in time (i.e. the year 1968 and 1972) (Hofstede, 2001). The datasets included questions about values. Hofstede analyzed these value-related questions and extracted four dimensions of national culture for world countries. Later, Hofstede added two other dimensions to his national culture dimensions. The mean scores of Hofstede's national culture dimensions are freely available to use for research at <https://geerthofstede.com/research-and-vsm/dimension-data-matrix/>.

The WVS (2005-2009) used mostly face-to-face interviews (via stratified random sampling) to gather the representative data for more than 90 percent of the world population (Inglehart, 2015, p. 345). The sample selection was cross-sectional and composed of citizens with 18-year-old and above in each country. In some countries, the representatives of the research group used the national registry information to target the sample. The response rate to the items of ISU was very high (more than 90 %) and the missing data formed less than one percent of the data. Thus, the response rate was not a major concern in this study.

### Survey method

The survey is “the most widely used social science data-gathering technique” (Neuman, 2014, p. 316). The gathered data in survey research is mostly “quantitative” and it lets the researchers ask questions about the past or present behavior of individuals, and in this way, the researchers could test their hypotheses and find the causal relationships among investigated variables (Neuman, 2014, p. 319). The advantages of online surveys (Wright, 2005) could be listed as below:

- 1) The low cost of administering online surveys. The researchers spend lower money on spreading and gathering online surveys than traditional mail surveys, because they do not pay for the traditional delivery system, printing fees, etc.
- 2) The data gathering speed. The sending and receiving processes of online surveys are very easy. The researcher designs the survey with the help of current survey systems and then s/he send the survey link to the mailing lists or directly to the e-mail addresses of respondents. In this way, the researcher does not need to delay the research process with the physical delivery system (through the traditional mail).
- 3) Access to special groups of individuals, which were difficult to access in the real world. Because of the technological advancements, the researchers have access to members of online forums working on sensitive topics such as online dating, LGBT, addiction, racism, and so on.

Although online surveys have many advantages, multiple sources of errors (e.g. administration, sampling, or respondents’ errors) have been reported for this research technique. As Neuman (2014, p. 321) summarized, the “administration errors” include:

- 1) The post-survey data processing errors: for instance, after data gathering, and before any analysis, the researcher does not clean the data,

- 2) The “mode effects”: the paper-and-pencil or online modes resulted in different response rates; and,
- 3) The “comparability error”: conducting the same survey in different time periods resulted in different data).

Neuman (2014, p. 321) described the other sources of errors in surveys as “sampling errors”, which refers to the type of sampling (probabilistic, convenient, etc.) and its consequences for generalization of the results; the “coverage error”, which means that certain group of individuals is neglected because of improper sampling, and finally, the “nonresponse error”, which refers to the those individuals who did not respond the survey at all or did not respond a number of questions).

In addition, researchers revealed the influence of mode of survey administration (e.g. by phone, by email, by post, etc.) on the response rate of the surveys. As an example, Sheehan (2011) showed the decrease of response rate for e-mail surveys from 1986 (i.e. 61.5 %) to 2000 (i.e. 24 %). Besides, the shorter surveys (cf. Steele et al., 1992), the interest rate of survey topic for the respondents (cf. Sheehan & Hoy, 1999), and the number of “follow-up contacts” of survey administrator (cf. Yammarino et al., 1991) have been reported as positive influencers on the response rate of all modes of surveys.

### Practical considerations of survey method in this dissertation

In the survey study of this dissertation (Article 5), I adopted convenience sampling technique because it allowed me “to achieve a breadth of understanding” (Etikan et al., 2016, p. 3) about the investigated topic, that is, trust in OHI.

In order to reduce the common errors of survey research, I followed suggested clues by previous researchers to avoid the errors as described here.

### The rationale for sample selection

For sample selection, I concentrated on undergraduates. The rationale for this sample selection is explained below. First, the student population in the world is growing. The Chronicle of Higher Education Almanac 2015–16 reported that (in Fall 2013) nearly 20,375,521 students were enrolled in colleges and universities of USA (Hammond, 2015, p. 33). In addition, the previous investigations on students’ mental health problems showed that students face many barriers to reaching the traditional health system such as time barriers, privacy issues, the psychological and financial barriers (Hunt & Eisenberg, 2010), and communication obstacles (Kennedy et al., 2001). Thus, the results could be helpful for policy

making for this group. Second, the previous researchers confirmed the validity of Hofstede national culture dimensions based on “matched samples” of students in each country (cf. Søndergaard, 1994). Third, students have been active online health information seekers (cf. Gray et al., 2005; Percheski & Hargittai, 2001) and because of the topic of this dissertation that is focused on trust formations towards OHI, this sample selection is not problematic. Fourth, the students reported difficulties or problems in judging the quality and trustworthiness of online health information (cf. LaJoie & Ridner, 2009; Hanik & Stellefson, 2011).

Finally, trust formations of individuals have been a major factor influencing their subsequent actions such as online health-related activities (Hou & Shim, 2010; Hale, 2013; Selsky et al., 2013; Lee et al., 2016; Lee and Chae, 2016), online self-disclosure (Lin et al., 2016), intention to use or adopting online health services (Mou & Cohen, 2014a; 2014b; 2014c; Jin et al., 2016), feeling empowered during patient-doctor communications (Benetoli et al., 2018), the change of health behavior such as the frequency of consultations with physicians (Beck et al., 2014), the self-efficacy belief in managing personal health (Ye, 2010), or purchasing prescription drugs (Zulman et al., 2011), and the general well-being of individuals (Mano, 2015).

### Improving response rate

In order to increase the response rate, I contacted the sample at the targeted university three times, albeit with the help of system administrator of the university. However, this action did not result in an exceptional response rate.

### The research setting

The research setting of the survey study of this dissertation (Article 5) was the University of California – Los Angeles (UCLA), and the Oslo Metropolitan University (OsloMet), previously known as the Oslo and Akershus University College of Applied Science (HiOA). Five hundred bachelor American, South Korean, and Chinese students studying at the UCLA, and 500 Norwegian students studying at the OsloMet were targeted. The link of the online survey including a consent form was submitted to targeted students. The Norwegian sample was excluded because of low response rate, that is, nine of 500 submitted questionnaires were returned. The response rate for the survey study of this dissertation was 13 percent, and the details of the response rate for each nationality is depicted in Table 3. The low response rate for the survey in this study is not a major problem. For example, previous research has shown that the accuracy of ‘surveys with very low response rates’ could be higher than ‘surveys with much higher response rates’ (cf. Krosnick, 1999, p. 540).



The total number of returned questionnaires was 195, of which, 189 complete questionnaires were included and analyzed in this research.

Groups	Number of submitted questionnaire	Number of returned questionnaires	Response rate (%)
American	500	87	17.5
Chinese	500	46	10
South Korean	500	56	11
Norwegian	500	9	2

### Instrument

The Trust in Online Health Information (TOHI) scale developed by Rowley et al. (2015) was used, with minor modifications, as an instrument of the online survey. The modifications aimed to shorten the questionnaire not to change the primary concepts or dimensions.

The survey was administered to examine the trust formations of people towards OHI. The TOHI-modified (Appendix 3) included eight dimensions as antecedents of trust in OHI. The eight dimensions of TOHI-modified were represented in 28 statements as follows, the brand of sources (3 questions), disclosure of source (3 questions), website design (5 questions), information quality (4 questions), ease of use (3 questions), personal recommendations (3 questions), information style (3 questions), and information verification (4 questions).

The trust in OHI (as the dependent variable) was measured by two core criteria, that is, credibility (3 statements), and usefulness (6 statements).

The TOHI-modified showed good reliability score measured by Cronbach Alpha as follows: the brand of source ( $\alpha = .824$ ), disclosure of source ( $\alpha = .865$ ), website design ( $\alpha = .809$ ), information quality ( $\alpha = .889$ ), ease of use ( $\alpha = .869$ ), personal recommendations ( $\alpha = .693$ ), information style ( $\alpha = .876$ ), information verification ( $\alpha = .875$ ), credibility ( $\alpha = .881$ ), and usefulness ( $\alpha = .884$ ).

The author investigated the validity of TOHI-modified through exploratory factor analysis (EFA) and the scale had a good fitting index.

### Ethical considerations

The Articles 1-4 of this dissertation did not include human subjects or identifying information of individuals. Thus, the confirmation of study by Institutional Review Board (IRB) was not

necessary. For Article 5, the following actions were performed. Prior to commencing the online survey, I sent the research design to and got the approval from the Norwegian Centre for Research Data (NSD) (Appendix 6) to conduct the survey. In addition, since I had some changes in the research design of the survey, I reported these changes to the NSD, and they were approved (Appendix 7).

Besides, since a part of research setting of the online survey was the University of California – Los Angeles (UCLA), I sent the application to the Institutional Review Board (IRB) of the UCLA to get the permission for surveying the students. After passing a research ethics module, I got the approval from the IRB of the UCLA (Appendix 8). Then, I could send the survey link to the students at the UCLA. Finally, the consent form of the survey (Appendix 1 & 2) requested the students to voluntarily participate in the survey. For having higher response rate and compensation of students' participation in the survey, a 100-dollar lottery was included in the survey for all groups. However, the students had the option to register for the lottery without participating in the survey.

Regarding the background information collected, the online questionnaire was designed to gather that personal information which had effects in previous literature (age, gender, education, health status, and nationality). The respondents were asked to place their age within a range of age groupings rather than their exact age. The only information that could identify the participants was their email address. I gathered the email address of students for lottery purpose. However, after the final data analysis, I made the data anonymized.

The gathered data through online survey were imported into SPSS software. The variables were computed based on the mean score of the participants' response on each dimension, and the scale was checked for validity and reliability. Since two core criteria for trust was intended to be measured in this study, that is, credibility and usefulness, the multivariate analysis in Amos was used. In addition, the general fit of the structural models was reported.

I planned to include the Norwegian students in the study, but because of the low response rate (of 500 submitted, just nine questionnaires were returned), they were excluded in the final analysis of this study.

Finally, in order to include my published articles in this dissertation, I contacted the publishers (i.e. IGI Global). The IGI Global approval letter is provided in Appendix 4, and for the article published in IFLA journal (SAGE), no permission was required (Appendix 5).

## Chapter 4: Summary of Included Articles

## Summary of Article 1

Khosrowjerdi, M. (2016). Trust in People, Organizations, and Government: A Generic Model. *International Journal of Electronic Government Research*, 12(3): 55-70. doi:[10.4018/IJEGR.2016070104](https://doi.org/10.4018/IJEGR.2016070104)

### Aim(s)

To have a common ground for communicating the findings of this trust-related project, the first article of this dissertation was devoted to an analysis of faces and concepts of trust in the previous literature.

### Design

This study was a literature review on the conceptions of trust in previous literature. After a general search of trust-related concepts, 87 publications were included in the final analysis.

### Major findings

The faces and conceptions of trust were extracted from the literature based on an analysis of 87 publications, and a three-tier model of trust was developed. The first tier of the model designated three major levels of trust: individual (micro), institutional (meso), and governmental (macro). The second tier differentiated seven kinds of trust relationships in society based on those three levels, that is, 1) The person-to-person(s) trust, person-to-organization(s) trust, person-to-system(s) trust, and person-to-government trust were allocated to micro level, 2) The organization-to-organization(s) trust, and organization(s)-to-government trust were attributed to meso-level trust, and 3) The government-to-government(s) trust was devoted to macro level. The third tier described the related concepts and aspects of trust at each level of society.

### Contribution to my research project

In the individual level of trust, I found four types of trust relationships: person-to-person(s), person-to-organization(s), person-to-system(s), person-to-government. Focusing on the trust in person-to-system(s) level, I found that online trust, e-credibility, general trust, functional trust, routine trust, and the web(site) credibility were among the main faces and types of trust at this level. This was relatively in accordance with the applied conception of trust in the online health domain, that is, the credibility judgments and usefulness perceptions of individuals towards online health information (cf. Rowley et al. 2015). Thus, I used this operational definition of ‘trust in online health information’ in this research project.

## Summary of Article 2

Khosrowjerdi, M. & Sundqvist, A. (2017). Students' Trust Formation and Credibility Judgments in the Online Health Context. *Tidsskriftet Arkiv*, 8(1). Doi: <http://dx.doi.org/10.7577/ta.2165>

### Aim(s)

To identify the state-of-the-art of research design and empirical findings on trust in online health information.

### Design

I searched the title, abstract, and keywords of indexed publications in Scopus<sup>TM</sup> to find the related empirical studies. The search query was based on a protocol previously used by other researchers. I included those studies that were in accordance with inclusion criteria, that is, 1) their participants or subjects were students, and 2) they (directly or indirectly) investigated the students' trust or its core criteria (such as credibility, usefulness, etc.) concerning online health information. After screening retrieved records (n = 5431), 270 articles were selected for the full-text check. This step, and the search for the noted query in online archives of key journals and crosschecking the references of retrieved articles resulted in 61 unique articles for inclusion.

### Major findings

The survey method was the main methodology for about sixty percent of included studies. Furthermore, the review showed a gap in the knowledge available to a larger international audience and a need for further studies to make international comparisons and syntheses. Finally, this review pointed out the lack of research on the interactions of national culture and trust in online health information.

### Contribution to my research project

Since the majority of previous studies in this field utilized the survey method, I selected the survey as the method of my empirical study. Furthermore, I included three nationalities in my final empirical study to have a cross-cultural study and to fill the gap revealed in this article.

## Summary of Article 3

Khosrowjerdi, M. (2016). A review of theory-driven models of trust in the online health context. *IFLA Journal*, 42, pp. 189-206, doi: [10.1177/0340035216659299](https://doi.org/10.1177/0340035216659299).

### Aim(s)

To identify the state-of-the-art of applied theories in investigating trust in online health information.

### Design

The international indexing databases such as Web of Science and Scopus, alongside Google and Google Scholar, were searched with general queries such as ‘online health information seeking’, ‘trust in online health’, ‘credibility of online health information’, ‘interactive health communication models’. The inclusion criteria were defined in order to identify those theory-driven models which used and tested at least a theory for investigating and explaining trust in an online health environment. Twelve relevant English publications were chosen for final analysis.

### Major findings

The previous theory-driven models of trust in online health contexts benefited from different theories within different disciplines (mostly from psychology), and they neglected the socio-cultural context of information seeking process and consequently missed the relevant socio-cultural theories. The analyzed theoretical models (n=12) mostly used surveys as their research method (seven studies), and the students were the main participants of online trust modeling in the health context.

### Contribution to the general research project

Because of the lack of cultural theories in modeling trust in online health information, I selected Hall’s theory of high versus low context cultures and Hofstede’s national culture dimensions as the main theoretical point of departure in my empirical studies (Articles 4-5)

## Summary of Article 4

Khosrowjerdi, M., Sundqvist, A., & Byström, K. Cultural patterns of information source use: A global study of 47 countries. *The Journal of the Association for Information Science and Technology (JASIST)*. Accepted with revisions.

Doi: <http://dx.doi.org/10.1002/asi.24292>

### Aim(s)

Most of the previous studies on the interactions of cultural dimensions and information seeking behavior were focused on a couple of countries. Thus, there was not a general pattern for the information behavior of different nationalities. This study aimed to link the current data on information source use of countries with Hofstede's national culture dimensions to illustrate the interactions of national culture and information source use in cross-country level.

### Design

This study had a secondary data analysis approach. I used three sets of data as follows, 1) the country-level data on information source use from World Values Survey (2005-2009); 2) country-specific mean scores of Hofstede's national culture dimensions of power distance, individualism, masculinity, uncertainty avoidance, long-term orientation, and indulgence; and 3) measures of wealth through Gross Domestic Product (GDP) and Gross National Income (GNI).

### Major findings

The analyses confirmed the correlations of three dimensions of Hofstede's national culture dimensions, that is, individualism and indulgence exhibited positive correlations with information source use of nations, and the power distance showed a negative relationship with information sources use of world countries. Furthermore, a general pattern of information source use of nations was presented.

### Contribution to my research project

This study advanced our understanding of the relationships of national culture and information source use, which helps us understand trust. It gives a broad understanding of how national culture influence information source use which then forms a context for excavating deeper into trust formations patterns of individuals in the final empirical study (i.e. Article 5).

## Summary of Article 5

Khosrowjerdi, M. National culture and trust in online health information. *Journal of Librarianship and Information Science (JOLIS)*. Accepted with revisions.  
Doi: <http://dx.doi.org/10.1177/0961000619836716>

### Aim(s)

To investigate and explain the trust formations of three groups of individuals based on their cultural background

### Design

An online survey was administered on Chinese, American, and South Korean undergraduate students at a comprehensive university in California, USA.

### Major findings

The information quality was the strongest predictor of credibility judgments of OHI for all cultural groups. However, the cultural comparisons revealed the differences between trust formations of Americans, Chinese, and South Koreans in online health environments. The information verification was, on average, a stronger predictor of usefulness dimension of trust for South Korean groups, while the information style was the strongest antecedent of usefulness for Chinese and American groups. The South Korean group considered more clues during their trust formation process than the Chinese and American groups did. Furthermore, the disclosure of author information and the personal recommendations were only predictors of South Koreans' trust in online health information.

### Contribution to my research project

The findings of this article, in accordance with the findings of Article 4, confirm the importance of national culture in general information source use, and in trust formations of individuals towards online health information.



## Chapter 5: Conclusions and Future Research Agenda

“Information is culture-specific and, consequently, is largely uncommunicable unless it has been accultured.”

— Michel J. Menou

## Conclusions

This dissertation explored how national culture could characterize the dimensions of information behavior, that is, information source use and trust in online health information.

For this purpose, a conceptual review illustrated the different applied concepts of trust in the literature in a generic model (Article 1). This model was not examined in this dissertation, however, it showed the different types and faces of trust in the literature, and finally, it helped to operationalize the trust concept in this dissertation. Next, the two theoretical and literature reviews (Article 2 and 3) shaped the foundation of empirical studies of this dissertation. Following previous theorists (Hofstede, 1984; 2001; Hall, 1989) and researchers (cf. Inglehart & Baker, 2000) I accepted the dimensionality of national culture and used it as an antecedent of information source use of nations (Article 4), and as a theoretical lens to explain trust formations of consumers towards online health information (Article 5). Furthermore, I used nationality (i.e. reported citizenship by respondents) as a representative of national culture (Article 5). This approach was based on the idea that a major part of human cultural values is established through childhood in the country of birth of individuals because, in this period, the individuals are “most susceptible to learning and assimilating” (Hofstede et al., 2010, p. 4).

This dissertation aimed to answer two main questions. The answer to the questions is explained through the applied theories as follows.

- *Could national culture characterize the information source use of nationalities?*

In the cross-country level, the findings showed that three of Hofstede’s national culture dimensions, that is, power distance, individualism, and indulgence had correlations with information source use of nationalities as follows. The power distance (the way people of a society interacts with authorities) showed negative correlation with information source use of nations; the individualism (the degree of centrality of person or groups in a country) and indulgence (the agreeableness of joy and happiness in a country) had positive correlations with information source use of nationalities.

Furthermore, based on the observed information sources use of different nationalities, a cultural pattern of information source use was presented. In this pattern, the world cultures were categorized into four clusters. The first cluster includes those nationalities (i.e. South and Central American societies) with large power distance, low individualism, and high indulgence. This cluster had a low propensity to use various information sources. The second cluster comprises those nationalities (such as Central and Eastern Europe) with large power distance and low indulgence, which are mostly collectivistic. This cluster showed a low tendency to use different information sources. The third cluster contains the nationalities (e.g. Northern and Northwestern Europe) with small power distance and high indulgence that are mostly individualistic. This cluster had the highest self-reported use of various information sources. The last cluster (e.g. Muslim countries) refers to the power-distant, restraint, and collectivistic societies, which reported the lowest use of various information sources.

These findings are in accordance with the Hofstede's national culture theory. In addition, the findings are in agreement with the previous findings on the interactions of cultural characteristics with information-related activities.

From the theoretical view, the societies with large power distance are more likely to limit the citizens' use of information sources, because the authority, decision-making, and power are devoted to the superiors (Hofstede et al., 2010, p. 73). Thus, it is normal that the degree of power distance in countries negatively correlates with the amount of information sources use of those societies. Furthermore, in individualistic cultures, the reading is embedded into the citizens' life, and the learning process is interactive (Hofstede et al., 2010, p. 118), that is, the individuals are searching various information sources to take part in problem-solving tasks in schools, institutions, and so on. In those societies, the media plays a crucial part in informing the citizens. Therefore, it is rational that people of those cultures refer to diverse information sources. Finally, in indulgent societies, the leisure activities is an accepted norm of social life. People have more freedom of expression and sovereignty to enjoy life (Hofstede et al., 2010, p. 281). While, in restraint societies, the sovereignty to enjoy life is severely (Hofstede et al., 2010, p. 281). Thus, the higher tendencies of people to do recreational activities such as reading books and newspapers, and surfing internet in indulgent societies, and consequently higher use of different information sources are rational.

From the practical view, these findings are in accordance with previous findings on the negative correlation of power distance with information-related activities, and with general technology use. For example, Dawar et al. (1996) found that cultural dimensions of uncertainty avoidance and power distance correlated with information search patterns of individuals, that

is, those societies that have higher uncertainty avoidance and power distance refer more personal information sources during the shopping process. Furthermore, Matusitz and Musambira (2013) found that two cultural dimensions of power distance and uncertainty avoidance had negative correlations with internet use in the societies. That is, countries with high power distance or with large power distance had low internet use and vice versa.

- *Could national culture characterize the trust formations of individuals towards online health information?*

The examination of the antecedents of trust formations of individuals toward online health information with their cultural background revealed interesting findings.

Specifically, the findings showed that the South Korean group were more likely to consider personal recommendations and disclosure of author information during their trust formation process than the American and the Chinese groups were. In addition, for Americans, the information quality was the strongest predictor of trust in online health information. The importance of personal recommendations and disclosure of author information for the South Korean group could be explained by Hall's theory of high versus low context cultures (1976). According to Hall (1976), users from high context cultures (i.e., South Korea and China) may tend to draw substantially less information from the explicit content presented in the message because those individuals have most of the background information about the message. While users of low context cultures (i.e. USA) are more likely to utilize the more informational parts of online information (e.g. texts). Hence, it is acceptable that for American users, the quality of content, which is informational, play a stronger role in their trust judgments than personal recommendations or disclosure of the author information.

Furthermore, the comparison of findings of this dissertation with previous findings of Rowley et al. (2015) reveals interesting discoveries. I found that information quality, information style, and the ease of use were the three most important antecedents of Americans' trust in online health information. The importance of noted antecedents of trust was in accordance with previous findings for UK students (Rowley et al., 2015). If it is assumed that, the participants in Rowley et al.'s study were British or mostly British, then these findings could be explained through Hofstede's national culture dimensions. The mean scores of USA and UK based on Hofstede's national culture dimensions are very similar, that is, individualism (91 vs. 89), uncertainty avoidance (46 vs. 35), power distance (40 vs. 35), indulgence (68 vs. 69), long-term orientation (26 vs. 51), and masculinity (62 vs. 66), respectively. Since the national culture

is an antecedent of health behavior of people (cf. Deschepper et al., 2008), I conclude that cultural similarity results in relatively the same trust patterns of individuals in online health environments.

In summary, this dissertation revealed that national culture is a factor correlating with information source use and trust formations of individuals. It contributes to the literature on national culture, information source use, and trust in online health information as follows. First, it developed a typology of trust concepts that may serve as a ground for trust researchers. Second, it illustrated the cultural patterns of information source use among nationalities. Third, it revised a previously designed questionnaire (i.e. TOHI) and examined it in a more diverse sample, which may be used by future researchers in the online health field. Finally, it showed the differences in trust formations of people based on their cultural background. The findings of this dissertation may be fruitful for triggering general information source use of people. Furthermore, it could have insights for health-related website designers, health practitioners, and researchers as below.

I agree with Menou (1983, 121-128) who believed information has cultural nature, and the *accultured* information is a prerequisite for proper dissemination of information, that is, the information ought to be adjusted to the cultural background of societies. Thus, the cultural patterns of information source use (revealed in Article 4) could help to identify the similar cultural groups, and combining the findings of Article 5 could be helpful in designing a culturally responsive process for online health-related information dissemination.

## The contribution of the dissertation

### Contribution to trust studies

This research investigated the trust formations of users towards online health information through the lens of national culture. It showed that trust formation of people is predictable according to their national culture (as a group tendency and not necessarily applicable to specific persons). This contribution emphasizes the fact that health-related information activities of individuals are culturally distinctive, and this knowledge could assist in planning and implementing a responsive health information delivery to groups of people. It is, to somewhat, a confirmation of the knowledge (in healthcare domain) that all health-related activities of individuals are culturally unique and the ideal health care services should be designed based on the cultural values and norms of individuals (cf. Giger & Davidhizar, 2002).

Furthermore, the generic model of trust (GEMOT) presented in Article 2, could be a helpful framework for trust researchers to share their findings around the trust types. In addition, it may be useful in defining the practical definitions of trust for future researchers.

#### Contribution to the information behavior field

To the best of my knowledge, this research (Article 4) is the first study, which empirically examined the associations of national culture and information sources use. The study depicted the cultural patterns of information source use in cross-country level. This categorization could be useful in delivering information services to different/similar cultural groups. Specifically, the diversity of users is a major topic of focus in academic libraries. Previous research has shown the importance of considering cultural factors in the information services of academic libraries to international students (cf. Ball & Mahony, 1987; Ciszek & Young, 2010). The current study categorizes the information sources use of individuals into clusters based on their cultural background. This categorization could assist in planning and disseminating academic information to international students, in a culturally responsive mode. In addition, this dissertation highlights the importance of cultural theories to explain the information-related activities of users. This is a signal to develop cultural theories or models of information behavior.

#### Contribution to methodology

This research (Article 4) used the secondary data analysis for cross-country analysis of information behavior. This approach may be helpful in future studies to find out more about the other important characteristics of the diverse group of users of information services.

In addition, the research (Article 5) confirmed the applicability of TOHI Scale in studying the trust formations of users in digital health environments. Besides, it added two new dimensions to this scale (website design and disclosure of source), which one of them was confirmed as a source of trust formation for the health information seekers. Finally, this study shows that antecedents of trust are not stable factors, and they change with the cultural context of the users.

#### Contribution to the theory

This dissertation applied the Hofstede national culture theory and Hall's theory of high versus low context cultures and showed their fruitfulness in cross-country comparisons of information behavior people. It holds the idea that socio-cognitive view of information behavior (cf. Komlodi, 2005a; Spink & Heinström, 2011) might assist in better explanation and interpretation of information behavior of people. It also contributes to the conceptualization of trust, which

by a fruitful combination of theories, could contribute as an analytical framework for future research.

### Implications for practice

In homogenous cultures, that is, those societies that could be easily titled as low-context (i.e. mostly individualistic) or high-context (i.e. mostly collectivistic) cultures, and in culturally diverse societies, the health practitioners and website designers could apply following acculturation approaches to disseminate health-related information.

#### *The provision of accultured health information in low-context cultures*

As the findings of this dissertation revealed, the low-context cultures trust mostly on the direct and explicit health-related information. Thus, in traditional health-related activities, health practitioners could give weight to those clues, which had an influence on the trust formations of individuals. Since information quality, information style, ease of use, and information verification were the antecedent of trust for individuals of low-context cultures, it is recommended that health information providers consider them to make the information more trustful.

In order to provide a more quality information, the health information providers could provide the comprehensive, accurate, fact-oriented, objective, and up-to-date information about the health issue. Considering the style-related clues, the providers could focus on the readability and understandability of the health message, and deliver the information in a manner that is clearly structured, and professionally presented. The ideal health-related content for this cultural group comprises minimal medical jargons and no spelling mistakes. The verifiability of information could be undertaken through providing references to other related sources and including hyperlinks to similar reliable web pages or sources. Finally, the free and accessible health information would catch the attention of this group. Because of the importance of speed of message for people of low-context cultures, the health-related information could be provided in a broad spectrum of health issues and could be accessible in all public spheres such as public libraries, metro stations, shopping centers, and albeit in general health and medical centers. In the digital environment, this could be possibly performed through providing easily discoverable (with proper metadata) and easily downloadable health-related information files and flyers.

### *The provision of accultured health information in high-context cultures*

The findings of this dissertation also revealed that Koreans (as people of high-context culture) consider information quality, information style, ease of use, personal recommendations, the disclosure of author information, and the information verification during their trust in OHI. Furthermore, it showed that for China as a high-context culture, the information quality, information style, and information verification were the predictors of trust in OHI. It worth mentioning, China and South Korea are regarded as high-context cultures, and it is supposed that their communication styles are relatively similar. However, according to Hofstede's national culture dimensions, those two societies have major differences in some dimensions. China has the lowest uncertainty score among the investigated countries in this study, and this may be the reason for the different trust behavior, that is, the South Korean group used more cues during trust formation process. However, incorporating the findings on the trust formations of Chinese and South Koreans calls for special attention to information verification and information style during health-related information dissemination in those societies. The health website designers could include diverse cues such as providing links to other relevant information, the representation and the style of the health information, and so on in order to increase the trustworthiness of the online information for the users.

### *The provision of accultured health information in culturally diverse societies*

In culturally diverse societies, a mixture of previously mentioned suggestions for high- and low-context cultures could possibly result in information acculturation. However, as previous studies showed, the websites of high-context cultures are not favorable for the international audience (cf. Usunier & Roulin, 2010) maybe because the information providers in those societies assume that the background information about the content does exist in the end users. Thus, it is recommended that health information providers in high-context cultures which intend to target the international audience, or they would like to share the health information with all subgroups in the country, consider these limitations. In order to trigger the users' trust, the health information providers could organize the health information/content in a direct and explicit manner, which does not need supplementary information from the users. In this way, "the information that makes up the explicit portions of the message is neither inadequate nor excessive" (Hall, 1981, pp. 92-93). In addition, they could re-consider the information quality in a way that is persuasive for all user groups. In this manner, the health-related information activities would be more inclusive and, in accordance with the preferences of all user groups.



## **Limitations and future research**

### *Methodological limitation*

Previous researchers have criticized the use of nationality as representative of national culture, and its reduction into dimensions (cf. Baskerville, 2003; 2005; Javidan et al., 2006). In addition, this approach neglects the fact that sub-cultures exist in national cultures and all nationalities are not culturally homogenous (Hofstede et al., 2010, p. 60). It is recommended that future researchers consider this limitation. They could, for instance, focus on comparing the trusting behavior of culturally homogenous nationalities or investigate the possible differences or similarities of trust behavior of sub-cultures of a country.

As part of this research (Article 4), I used a number of datasets from different sources. This approach was applied in many studies, for instance, to investigate the relationships of national culture and antibiotic use (Deschepper et al., 2008). However, it is recommended that upcoming researchers use more inclusive datasets, hopefully from one source, to reduce the possible bias in statistical inferences based on different data sources. For example, Inglehart and colleagues showed that world countries could be characterized by two cultural dimensions, that is, 1) traditional values versus secular-rational values, and 2) survival values versus self-expression values (cf. Inglehart & Baker, 2000, p. 29). The data for their cultural differentiation is available along with the data of information source use that were used in this research. It will be interesting to see if their cultural dimensions could characterize information source use of nations.

In this research, I calculated an information source use index for countries, composed of citizens' responses towards using diverse information sources such as daily newspapers, news broadcasts on radio or TV, using printed magazines, in-depth reports on radio or TV, books, internet/email, and talk with friends or colleagues. However, some dimensions of information source use, such as using daily newspapers, and watching TV, or listening radio may have different correlations with Hofstede's national culture dimensions than I found here. For example, the media use, that is, TV and radio usage rate reported by both democratic and authoritarian societies shows that world countries are active users of TV and radio programs. This may root in the different role of public media in authoritarian and democratic societies. For instance, in Norway, "on an average day", the TV watching rate and radio listening rates are 67% and 59%, respectively (*Norwegian Media Barometer*, 2015). This high rate of media use is the result of cultural policies in welfare states, that is, "citizens were to be educated as valuable, fully mature members of society with the ability to take responsibility for their lives on an individual as well as collective basis." (Duelund, 2003, p. 488; as cited in Syvertsen et

al., 2014). However, in authoritarian societies such as Russia, although “established systems circumscribe news and information for mass audiences and shape the dominant political narrative” (Walker & Orttung, 2014, p.71), a high percent of citizens (i.e. 88 %) reported that they get the national and international news through TV (Walker & Orttung, 2014, p. 76). This may be a clue for the dual functions of information sources use as follows. In authoritarian societies, the citizens use the media to decrease the prevalent uncertainty in the society such as economic, political, or social pressures. While in welfare systems, the information source use is a means for citizens’ participation in society. Thus, it is necessary to see if linking the dimensions of information source use (e.g. the uses of TV or radio broadcastings, internet & email, etc.) with the Hofstede’s national culture dimensions corroborates or falsifies our findings on general information source use of countries.

In this research, I did not differentiate among different online health information or channels. It would be helpful to see the similarities or differences of trust behavior of users towards different types of online information (e.g. blog posts or comments, films, videos, recordings, website articles, articles in reliable websites, Wikipedia articles, etc.) through various channels (such as YouTube, Facebook, question and answering (Q&A) websites, etc.). For this purpose, the TOHI scale needs more revisions to include the relevant content- and system-related features.

In order to have a ground for comparing results with the previous findings on trust in online health information, I administered a survey of students in this study. However, students are not representatives of public consumers of health. Thus, it would be helpful to investigate the trust formations of other active users of online health information, such as people with chronic pains, marginalized people, and people with moderate to low online information literacy to have a better health-related information delivery for all citizens in society. Studies (cf. Diviani et al., 2006) showed that people with lower health literacy had used “non-established” criteria during their evaluation of online health-related information.

The low response rate and the similarity of age ranges of participants in this research (Article 5) did not let to control the possible effects of age and discipline in this research. Previous studies have confirmed that information seeking is dependent on the discipline and age. For instance, Whitmire (2002) revealed that students of soft disciplines (e.g. humanities) were more active information seekers than students of hard disciplines (e.g. engineering) were (as cited in Catalano, 2013, p. 262). Besides, a systematic review of the literature (Waterworth & Honey, 2018) showed that the demographic factors, the degree of trust in information, the health status, internet skills, and the opinions of older adults towards health professionals

influenced their perceptions of the usefulness of online health-related information. Thus, these differences may be transferred to the source preferences and trust formation of individuals towards online health information too. Furthermore, the current understanding of the influence of age and discipline in trust formations of users is not conclusive. It is recommended that upcoming researchers control the possible effects of discipline and age on trust formations towards online health information. Some studies (e.g. Scott et al., 2008) showed that health-related disciplines show better information seeking skills, but other (Tubaishat & Habiballah, 2016) revealed that, for instance, nursing undergraduates could not recognize high- and low-quality health-related information.

Previous studies have confirmed the associations of personality traits of users with their critical information judgments (cf. Heinström, 2003), and their trust in online information (Bansal et al., 2016). In addition, studies (Hofstede & McCrae, 2004) revealed the correlations of dimensions of personality and the Hofstede's national culture dimensions. An investigation of simultaneous effects of national culture and personality traits will reveal the share of personality traits and cultural factors in predicting trust formations of individuals towards online health information. In addition, there is a debate on the relationships of personality traits and cultural factors (cf. Hofstede & McCrae, 2004, p. 70-78), and it is not clear if personality traits of nations shape the cultural values, or the national culture dimensions form the personality traits of nations. Thus, it would be helpful to see which variable (personality or national culture) could serve as the predictor and which factor modifies or intimidates in online trust formation of individuals.

Finally, since this dissertation studied the matched sample of undergraduates, I did not control if the information literacy of users influences or modifies the trust formations of individuals. Upcoming researchers could first evaluate the information literacy and health literacy of users, and then assess their trust formations, for example through search scenarios or thinking aloud protocols, to see the possible behavioral similarities or differences of investigated groups (i.e. those with low, moderate or high literacies).

### *Conceptual limitation*

In this research, I used the practical definition of trust in online health information presented by Rowley et al. (2015). However, the literature shows that there is not a consensus on a unique definition of trust in online health context (cf. Sbaffi & Rowley, 2017). Of the main tasks of forthcoming researchers could be on conceptualizing trust in online health information

in an applicable and practical form or using the relatively same concepts of trust for inclusive findings in this field.

This research, because of the practicality, assumed ‘trust’ as an interaction which occurs between a person and health information provider, and this interaction may be affected by many internal (e.g. personality traits, cognitive factors, affections, etc.) and external (e.g. contextual) factors. Accordingly, the questionnaire was administered at one point in time. However, trust is not a static but dynamic phenomenon (Zahedi & Song, 2008) and it evolves over time (Jøsang et al., 2003; Sillence & Briggs, 2007; Zahedi & Song, 2008). Specially, the previous studies showed the dynamics of trust during interactions with health information providers, and explained this dynamism through information integration theory (IIT), which ascertains, “beliefs are revised gradually and the new information is integrated with the old belief to produce the new belief” (Zahedi & Song, 2008, p. 243). Thus, it is suggested that future researchers use longitudinal study designs to investigate trust formations of users towards online health information. In this way, the dynamics of trust, and its possible changes or modifications would not be neglected.

This research designed a generic model for different applied concepts of trust in literature and their relationships. However, I did not test it. A study (OECD, 2011, p. 91) confirmed the lower general trust of Germany in comparison with the UK, and the Netherlands and another study (van Der Schee et al., 2007) showed German people reported lower trust in healthcare than people of noted countries did. Thus, it is probable that general trust plays a central role in shaping specific trust of users towards online health information, and this deserves more investigations.

Thus, the importance of learning more about the cultural differences in the global socio-economics, but also global information society remains to be a central research object for information studies.

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# Appendices

**Dear Student(s)**

You are invited to take part in a survey about trust in online health information. This study is part of a Ph.D. project at Oslo University College (HiOA) in Norway concerning how cultural factors may impact on students' trust in health information on the internet. I hypothesized that cultural factors may influence students' credibility judgments towards online health information. Your participation will require approximately 30 minutes and is completed online at your computer. There are no known risks or discomforts associated with this survey. Taking part in this study is voluntary. If you choose to be in the study, you can withdraw at any time. Your responses will be kept strictly confidential, and digital data will be stored in the secure online system of HiOA. Any report of this research that is made available to the public will NOT include your individual information by which you could be identified.

After finishing the survey, you are asked to include your UCLA e-mail address for a raffle of 100-dollar award for compensating your participation in the survey (there will be three winners in total, and the chance for winning is 1 in 500, approximately). Participation in this study is not required in order to participate in the raffle.

If you have questions about your rights while taking part in this study, or you have concerns or suggestions and you want to talk to someone other than the researchers about the study, please call the OHRPP at (310) 825-7122 or write to:

*UCLA Office of the Human Research Protection Program, 11000 Kinross Avenue, Suite 211, Box 951694, Los Angeles, CA 900095-1694.*

Filling this survey indicates that you are 18 years of age or older, and indicates your consent to participate in this survey. Thanks for your participation.

*Mahmood Khosrowjerdi,*

Ph.D. candidate, Oslo University College (HiOA), Norway &  
VGR at Improvement by Design (IBD) Lab, GSE&IS, UCLA.

No. 8907, 8<sup>th</sup> floor, Mathematical Science Building, UCLA.

Contact: [mkhosro@ucla.edu](mailto:mkhosro@ucla.edu) & [Mahmood.Khosrowjerdi@hioa.no](mailto:Mahmood.Khosrowjerdi@hioa.no)

Phone: 

---

## Appendix 2: Consent form – HiOA participants

---

Dear Student(s)

You are invited to take part in a survey about trust in online health information.

This study is part of a Ph.D. project at Høgskolen i Oslo og Akershus (HiOA) in Norway concerning how cultural factors may impact on students' trust in health information on internet. Your participation will require approximately 30 minutes and is completed online at your computer. There are no known risks or discomforts associated with this survey. Taking part in this study is voluntary. If you choose to be in the study, you can withdraw at any time. Your responses will be kept strictly confidential, and digital data will be stored in secure online system of HiOA. Any report of this research that is made available to the public will NOT include your individual information by which you could be identified.

After finishing the survey, you are asked to include your HiOA e-mail address for a raffle of 100-dollar award for compensating your participation in the survey (there will be two winners and the chance for winning is 2 in 500, approximately). Participation in this study is not required in order to participate in the raffle.

If you have questions about your rights while taking part in this study, or you have concerns or suggestions and you want to talk to someone other than the researchers about the study, please contact the NSD (Norwegian Centre for Research Data) at +47-55582117 or write to:

*NSD - Norwegian Centre for Research Data, Harald Hårfagres gate 29, N-5007  
Bergen, Norway*

Filling this survey indicates that you are 18 years of age or older, and indicates your consent to participate in this survey. Thanks for your participation.

*Mahmood Khosrowjerdi,*

Ph.D. candidate, Høgskolen i Oslo og Akershus (HiOA), Norway

Pilestredet 35, Oslo, PE724

Contact: [mkhosro@ucla.edu](mailto:mkhosro@ucla.edu)

Phone: 



**Do you agree to participate in this survey?**

Yes

No

## **Part 1: Demographic**

**Your gender?**

Male

Female

Other

**Your age (in year)?**

Under 20

20-24

25-29

30-34

35-39

40-49

50-59

60 or over

**You are a .....** (SH: semester hours)

Freshman (Less than 32 SH)

Sophomore (At least 32 SH but less than 64 SH)

Junior (At least 64 SH but less than 96 SH)

Senior (At least 96 SH)

**Your nationality?** .....

**Any other nationalities background** (if different) .....

## **Part 2: Search-related questions**

*Here we ask questions about your last search for online health-related information.*

**During the past 6 months, have you explored any health-related information on the internet?**

Yes

No

I do not remember

**What was the purpose of your last search for health-related information?**

General inquiries

Specific health concerns

I do not remember

### What kind of health-related information you were looking for?

- Alcohol and other drugs
- Bodyweight
- Cancer
- Fitness/exercise
- HIV/AIDS
- Medicines and pharmaceuticals
- Mental health
- Nutrition and diet
- Sexual/reproductive health
- Sexually transmitted diseases
- Tobacco and smoking
- Others
- I do not remember

### Part 3: Trust-related question

Generally, during your search for online health information, what factors you would regard as important? (1 = of very little or no importance, 2 = of little importance, 3 = of moderate importance, 4 = Very important, 5 = of utmost importance)

#	Statements	1	2	3	4	5
1	The website features the logo of a respected or well-known brand					
2	The source brand has a good reputation					
3	The source is on the website of a specialist health charity					
4	Disclosure of the name of the author(s) of the content					
5	Disclosure of affiliation of the author(s) of the content					
6	Disclosure of the education level, expertise, or credentials of the author(s) of the content					
7	The website has a 'privacy policy' section					
8	The website is recently updated					
9	The website is traceable in the real world, e.g. it had 'about us' or 'contact us' sections or physical address					
10	The design and interactivity of website are favorable					
11	The website is not commercial					
12	The retrieved information is comprehensive and current					
13	The retrieved information is accurate					
14	The information/content includes the recent developments and facts about the health issue rather than opinions					
15	The reliability (believability) of content					
16	The objectivity (impartiality) of the information					
17	The general quality of the information					
18	The information source is easy to access or easy to find					
19	The information/content is free of charge					
20	The speed with which I find the information is important for me to use it					
21	The recommendations by family or friends to use the source or their previous use of the source					
22	The recommendation of a health professional to use the source					

23	The recommendations of other members of a website or other members of your social networks					
24	The information is easy to understand or easy to read					
25	The information is clearly structured or professionally presented					
26	The information has no evidence of proofreading oversights (such as spelling mistakes etc.)					
27	The information could tell me most of what I need to know					
28	The information could help me to understand the health issue better					
29	The information is interesting to me					
30	The fact that I could use the information					
31	The extent to which the information could add my previous knowledge or tailored to me personally					
32	The extent to which I feel that the website or the provided information tried to help me (or it was in my best interest)					
33	The content has references to other related sources					
34	The website or the content has hyperlinks to other web pages and documents					
35	The information is consistent with what I found in other sources					
36	The information appears to be objective					
37	The extent of consistency of retrieved information with my previous knowledge					

Thanks for your response(s). Please include your academic email address in the provided box below if you want to be registered for the 100-dollar lottery.

**APPROVED**

By Jan Travers at 1:05 pm, Mar 27, 2017

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Fax: \_\_\_\_\_

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## Appendix 5: Permission for the inclusion of Article 3 in the dissertation

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0167 OSLO

Vår dato: 02.12.2016

Vår ref: 50793 / 3 / MHM

Deres dato:

Deres ref:

#### TILBAKEMELDING PÅ MELDING OM BEHANDLING AV PERSONOPPLYSNINGER

Vi viser til melding om behandling av personopplysninger, mottatt 27.10.2016. Meldingen gjelder prosjektet:

50793                      *Students' trust formation and credibility judgements towards online health information: the role of general trust, cultural factors and personal capital*  
Behandlingsansvarlig    *Høgskolen i Oslo og Akershus, ved institusjonens øverste leder*  
Daglig ansvarlig        *Mahmood Khosrowjerdi*

Personvernombudet har vurdert prosjektet, og finner at behandlingen av personopplysninger vil være regulert av § 7-27 i personopplysningsforskriften. Personvernombudet tilrår at prosjektet gjennomføres.

Personvernombudets tilråding forutsetter at prosjektet gjennomføres i tråd med opplysningene gitt i meldeskjemaet, korrespondanse med ombudet, ombudets kommentarer samt personopplysningsloven og helseregisterloven med forskrifter. Behandlingen av personopplysninger kan settes i gang.

Det gjøres oppmerksom på at det skal gis ny melding dersom behandlingen endres i forhold til de opplysninger som ligger til grunn for personvernombudets vurdering. Endringsmeldinger gis via et eget skjema, <http://www.nsd.uib.no/personvern/meldeplikt/skjema.html>. Det skal også gis melding etter tre år dersom prosjektet fortsatt pågår. Meldinger skal skje skriftlig til ombudet.

Personvernombudet har lagt ut opplysninger om prosjektet i en offentlig database, <http://pvo.nsd.no/prosjekt>.

Personvernombudet vil ved prosjektets avslutning, 01.10.2017, rette en henvendelse angående status for behandlingen av personopplysninger.

Vennlig hilsen

Katrine Utaaker Segadal

Marianne Høgetveit Myhren

Kontaktperson: Marianne Høgetveit Myhren tlf: 55 58 25 29

Vedlegg: Prosjektvurdering

*Dokumentet er elektronisk produsert og godkjent ved NSDs rutiner for elektronisk godkjenning.*

**Mahmood Khosrowjerdi**

---

**From:** Åsne Halskau <asne.halskau@nsd.no>  
**Sent:** Wednesday, April 26, 2017 1:46 PM  
**To:** Mahmood Khosrowjerdi  
**Subject:** Prosjektnr: 50793. Students' trust formations and credibility judgments towards online health information: The cultural perspective

**AFFIRMATION**

Referring to change request form received 24.03.2017 ref. project 50793. "Students trust formation and credibility judgements towards online health information: the role of general trust, cultural factors and personal capital"

The Data Protection Official has registered that the following changes are made in the project:

1. The samle is changed to students from University of California Los Angeles, USA and HiOA (Norway).
2. The survey questionnaires are changed.
3. The method of recruitment is changed and it is stated in the change request form that the link to the online questionnaire will be sent to the students directly. Reward for participation is introduced to promote recruitment.
4. The end of the project is now 30.03.2018
5. The project title is now "Students' trust formations and credibility judgments towards online health information: The cultural perspective".
6. The consent forms are also changed.

-----

The consent forms are updated to reflect the changes. We assume that the way recruitment is conducted does not violate the duty of confidentiality and that the procedure also ensures voluntary participation. The Data Protection Official also recommend that the universities involved approve the study. We presuppose that the project otherwise remains unchanged.

You will receive a new status inquiry at the end of the project.

Do not hesitate to contact us if you have any questions.

--  
Åsne Halskau  
Seniorrådgiver | Senior Adviser  
Seksjon for personverntjenester | Data Protection Services  
T: (+47) 55 58 21 88

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<b>FROM:</b>	TODD FRANKE, PhD Chair, NGIRB
<b>RE:</b>	IRB#17-000139 Investigating the role of culture in students' trust in online health information

The UCLA Institutional Review Board (UCLA IRB) has approved the above-referenced study. UCLA's Federalwide Assurance (FWA) with Department of Health and Human Services is FWA00004642.

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# Trust in People, Organizations, and Government: A Generic Model

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## ABSTRACT

There have been many efforts to model trust at different levels of society and in a variety of contexts, however much confusion remains regarding the various concepts, types and levels of trust. In order to give trust researchers a common ground for communicating their findings, a generic model of trust that relates conceptually to various levels of social interaction is needed. To this end, and based on a literature review, trust faces and types were extracted from the literature and they were put together to form a general model of trust. This paper presents a three-tiered model of trust. The first tier of the model designates three major levels of trust: Individual (micro), Institutional (meso), and Governmental (macro). The second tier differentiates seven kinds of trust relationships in society: Person-to-Person(s), Person-to-Organization(s), Person-to-System(s), Person-to-Government, Organization-to-Organization(s), Organization(s)-to-Government, and Government-to-Government(s). The third tier describes the related concepts and aspects of trust at each level of society.

## KEYWORDS

Credibility, GEMOT, Government, Model, Organizations, Review, System, Trust

## INTRODUCTION

Trust is among the main empowerment accelerators for states (Castells, 2009, p. 16), organizations, and individuals and it is an essential factor for interactions and collaborations in community (Flavián et al., 2006). Trust is also among the main influencing factors on people's intention to use the e-government services (Carter & Bélanger, 2005). However, the concept of trust is "elusive" and "fleeting" (Haukkala et al., 2015, p. 3), "confusing" (Lewis & Weigert, 1985; Shapiro, 1987) and "vague" (McKnight & Chervany, 2000). Thus, the concept of trust remains "abstract" and "complex," which makes defining it and its building blocks challenging (Wang & Emurian, 2005, p. 107). Even within specific fields of research, there is not a unique definition of trust. Therefore, the definition of trust is very context-related or "situation-specific" (Frank, 1988; Seckler et al., 2015).

Trust is defined differently in various disciplines. For example, in psychology, trust is defined as the "reliance upon the characteristics of an object, or the occurrence of an event, or the behavior of a person in order to achieve a desired but uncertain objective in a risky situation" (Giffin, 1967, p. 105). While in philosophy, trust is "accepted vulnerability to another's possible but not expected ill will (or lack of good will) toward one" (Baier, 1986, p. 235). Alternatively, in sociology, trust is termed as "a property of collective units" (Lewis & Weigert, 1985, p. 968). For the purposes of this study, we use the noted sociological definition of trust. In this regard, based on the level of social interactions of actors, their trust behavior gradually evolves from "mistrust" to "trusting," (Magrath & Hardy, 1989, p. 385). This conception of trust is relational, and it is "applicable" to all levels of interactions of actors (people, institutions and systems) in society (Lewis & Weigert, 1985, p. 968).

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Within the field of trust research, it is generally agreed that trust is a “multi-dimensional” construct (Chen & Dhillon, 2003; Flavián et al., 2006; Casaló et al., 2007; Casaló & Cisneros, 2008). However, there is not a consensus on the dimensions of trust (Wang & Emurian, 2005). Some researchers believe that trust is composed of three elements: “benevolence,” “honesty,” and “competence” (e.g., Chen & Dhillon, 2003; Casaló et al., 2007; Casaló & Cisneros, 2008; Flavián et al., 2006). Some others point out that specific beliefs of “integrity,” “ability,” and “benevolence” are precedents for general trust (Gefen, 2002). In addition, many researchers have considered the conceptualization of trust. For example, Blomqvist’s research shows that common synonyms of trust are “competence,” “credibility,” “confidence,” “faith,” “hope,” “loyalty,” and “reliance” (Blomqvist, 1997, p. 279) and finally, Hardin defines trust as a “three-part relationships: person A trusts person B to do X” (Hardin, 2004, p.6).

Furthermore, different trust models have been developed in various studies. A review of these models shows that the researchers have developed them based on different points of view. The systemic and technical approach to modelling trust in computer and information science studies resulted in numerous models (e.g. Wang & Vassileva, 2004; Xiong & Liu, 2003; Meng et al., 2012; Hamouid & Adi, 2015; Tahta et al., 2015; Twyman et al., 2015; Hoogendoorn et al., 2014; Lian-ju et al., 2014; Park et al., 2015; Jelenc et al., 2013; Lee & Turban, 2001). In addition to systemic and technical models of trust, there are many generic models of trust (e.g. Tan, 2000; Tan & Thoen, 2002; Kinatader et al., 2005; Mayer et al., 1995). However, they also focus on functional trust and factors influencing an individual’s trust formation in daily activities.

Furthermore, typologies and frameworks of trust concepts have also been developed (e.g. Rousseau et al., 1998; Li, 2007, 2008). However, none of the previous models have taken a more generalized approach to modeling trust in society. The previous models presented detailed reviews of trust constructs (e.g. McKnight & Chervany, 2000), but they lacked a relational approach (between different actors and at different levels) of trust formation in society and consequently there is ambiguity in identifying what type of trust relates to what level of relationships in society. Bachmann (2011, p. 2011) draws our attention to this gap and suggests that future researchers of trust to study the trust at the “macro level”.

While acknowledging the contribution of previous studies in defining trust and its constructs, this paper does not attempt to present an explicit definition of trust or its building blocks rather it identifies emergent trust types and concepts in society. This study will provide a common ground for communicating research findings and facilitate a better understanding of different types of trust in society. This common ground would enable researchers to effectively communicate findings across trust studies. Thus, the study answers following questions:

**Question 1:** What are the different types and aspects of trust in previous studies?

**Question 2:** Is it possible to shape a more generic model for trust?

The rest of the paper is organized as follows. Following the Methodology, the Literature Review presents different types of trust in society. In Discussions, the author answers the research questions and propose a general model of trust. Finally, the concluding remarks and the limitation of proposed model are summarized in Conclusion.

## METHODOLOGY

To produce an acceptable model of trust requires analysis of existing trust types in literature. Due to the plethora of publications on trust, a systematic review of trust models and typologies is very difficult. For example, submitting the following query in Scopus (Figure 1) retrieved 41516 records that requires a long-term research and enormous financial resources to target the issue.

Figure 1. Sample search strategy to trace the relevant studies in Scopus

```
TITLE-ABS-KEY (trust types OR types of trust) OR  
TITLE-ABS-KEY (trust typology OR typology of trust) OR  
TITLE-ABS-KEY (trust categorization) OR  
TITLE-ABS-KEY (antecedents for trust) OR  
TITLE-ABS-KEY (antecedents of trust) OR  
TITLE-ABS-KEY (sources of trust) OR  
TITLE-ABS-KEY (trust model) OR  
TITLE-ABS-KEY (model of trust)  
AND (LIMIT-TO (LANGUAGE, "English"))
```

Therefore, the current review is not a systematic review, but it tries to present a snapshot of the trust literature. The search for trust types and aspects was done in Scopus (<http://www.scopus.com/>) & Web of Science (<http://webofknowledge.com>) in order to find concrete journal articles and Google Scholar (<http://scholar.google.com/>), to find and trace the gray literature (dissertations, conference papers or abstracts, etc.). The terms such as “trust types (types of trust),” “trust faces,” “trust typology,” “trust categories,” “trust categorization,” “antecedents for trust” and “sources of trust” were searched in noted sources. Those studies containing a typology (or categorization) of trust types or more general models of trust were extracted for review. The publication date and type were not limited, but the search queries were limited to documents in English. Finally, 87 documents were included in current review.

## LITERATURE REVIEW

Based on the literature review, the types of trust in society are described below.

### Personal (Inter-Personal) Trust

Personal knowledge of others shapes “personal trust” (Noorderhaven, 1992). Trust at the inter-personal level is formed via interactions of social actors in society and lead to common laws and virtues (Leung et al., 2011, p. 1196). The person who trusts (trustor) has an overall faith in other individuals who are trusted (trustee), and this is because of the “integrity,” “fairness,” “responsibility,” “helpfulness,” and “benevolence” of the trustee (Leung et al., 2011, p. 1196). The trust of individuals (in institution A) to other people (in institution B) is based on feelings (Ashnai et al., 2015). It worth mentioning, some functions of digital environments, such as “invisibility,” “anonymity” and “informality,” have resulted in new “real vs. hidden” / “visible vs. invisible” identities for individuals in these spheres, and this has resulted in some challenges for their trust formation in the digital arena (Usta et al., 2014, p. 215).

### Specific Trust

The trust of people based on their direct “experiences” of others” is termed as “specific trust” (Halinen, 1994). This type of trust is related to “knowledge-based trust” (i.e. trust of a person based on his “knowledge” of the others) (Yamagishi & Yamagishi, 1994). As the information and experiences develops by time, the “knowledge-based trust” and “specific trust” evolves too (Zahedi & Song, 2008). Specific and knowledge-based trust may occur in inter-personal level (the trust of person A to person B), organizational level (the trust of organization A to organization B), and / or system level (trust of person A to system B).

### Dispositional Trust

Suh and Kwon (2006) defined another type of trust as “dispositional trust,” i.e., the trust of an individual based on his or her general willingness or tendency for trust in others. In this realm, trust

is regarded as characteristic of a person which leads to “trustworthiness” beliefs of other people (Suh & Kwon, 2006, p. 198).

### **Cognitive Authority (Trust in Authorities)**

Different types of “authorities” have been categorized in the literature, such as “cognitive authority” (influence on thoughts), “administrative authority” (influence on actions), and “institutional authority” (influence derived from institutional affiliation) (Wilson, 1983). “Cognitive authority” is defined as “influence on one’s thoughts that one would recognize as proper” (Wilson, 1983, p. 15). Wilson linked cognitive authority with credibility, “those we think credible constitute the potential pool of cognitive authorities on which we might draw” (Wilson, 1983, p. 16) and credibility in his approach had two dimensions: “competence” and “trustworthiness” (Wilson, 1983, p. 16). However, the conceptual dimensions of cognitive authority are not just limited to people and it can be applied to documents, because people may refer to documents to recognize what they do not understand (Rieh, 2010, p. 1340). The document itself has different types of authorities such as “personal authority (author), institutional authority (publisher), textual type authority (document type), and intrinsic plausibility authority (content of text)” (Rieh, 2002, p. 147).

### **Referral Trust vs. Functional Trust**

The indirect trust of a person in performance of other people is called “Referral trust,” and the direct trust of an individual in the performance of other actors in society is termed as “functional trust” (Jøsang and Bhuiyan, 2008). The following example, simulated based on the work of Jøsang and Bhuiyan (2008, pp. 179-180), illustrates these types of trust: James needs to have his article edited so he asks Baran for his advice about where to find a good editor. Baran is trusted by James to know about a good editor (George). Baran in turn trusts George to be a good editor. The trusting behavior of Baran in George is direct and “functional” whereas the trusting behavior of James in Baran is indirect and “referral”.

Functional trust is applicable to all trust levels in a society. For example, if Person A trusts Person B to be a good friend, this kind of trust is a functional trust in individual level. If institution A trusts institution B to be a good collaborator, this is also functional trust in organizational level. Finally, the trust between governments based on their proper performance is also functional trust in governmental level.

### **Institutional (Institution-Based or Organizational) Trust**

Institutional trust is a significant element for collaboration of actors in an institution (Leung et al., 2011, p. 1196) and their communications with the external actors. This type of trust has two aspects:

1. The trust of individuals to their parent institution or to other institutions to perform certain activities such as buying, selling etc. (Leung et al., 2011, p. 1196); and
2. The trust of an institution to other institutions for any collaboration.

Institutional trust has two building blocks: “structural assurance,” i.e. the belief that resources and regulations are well ordered to promote the success of the organization, and “situational normality,” i.e. the confidence that organizational setting is standard and satisfactory to reach achievements) (McKnight & Chervany, 2001, pp. 37-38).

### **Routine Trust**

Routine trust is a kind of institutional or personal that considered in “long-term” interactions of actors in society (Noorderhaven, 1992). For example, a researcher who only searches for articles in databases that he is familiar with and has had satisfactory results from would be considered to have routine trust

of those particular databases. Or, when a person buys his daily requirements from specific shopping centers and he is satisfied with this action, he has a routine trust regarding these shopping centers.

### **General(ized) Trust**

General(ized) trust is trusting in the society, people, or institutions as a whole. Generalized or trust is regarded as an aspect of “social capital” that is related to opinions and feelings (Sturgis et al., 2010, p. 45). General trust is applicable to all trust relationships in society. In personal level, the faith in “strangers” forms the generalized trust (Bac, 2009; Badescu & Sum, 2015). At the institutional level, the prestige, brand and current assets of institution are among the antecedents of general trust (Halinen, 1994). Finally, in societal level, the literacy level and financial position of citizens influence the degree of this type of trust (Putnam, 2000; Delhey & Newton, 2003). Totally, the “dishonesty,” “scandal,” “corruption” in society reduce the generalized trust (Castells, 2009, p. 291), and this trust is correlated with many variables such as age, country of birth, education and economic stress of citizens of a society (Lindström, 2004).

### **Social Trust**

Various factors influence social trust in society. The psychological characteristics of individuals have a peripheral influence on the social trust (Delhey & Newton, 2003), although, resemblance among people is a major source of social trust (Thirunarayan & Anantharam, 2011). An individual may trust the others who are more ‘similar’ to him (for example, family members, friends, colleagues, etc.) (Alesina & Ferrara, 2002, p. 210). However, the trust levels of individuals towards different social actors have different degrees and it is more “a property of each specific trustor–trustee interaction” (McEvily et al., 2012). Totally, “less homogeneous” societies and those with “higher income inequality” have less amount of social trust (Alesina & Ferrara, 2002, p. 210).

### **Trust in Elites (Elite Dominance)**

Generally, in democratic societies, the citizens elect their representatives or elites to be accountable for “interests, rights and opinions” of greater part of community (Christiano, 2015).

Trust of citizens in officials of public institutions and the governmental representatives is termed as “trust in elites”. Usually people trust their officials if they have major characteristics including honesty, intelligence, and independence (Castells, 2009, p. 236). In this regard, “political influence based on public opinion can be transformed into political power only through institutionalized procedures” (Gripsrud et al., 2010, p. 187). This trust in elites is also called as “elite dominance” (Ferree et al., 2002, p. 291).

### **Trust in Government**

Trust in government is viewed as a major antecedent of agreeableness of government strategies and “policies” (Castells, 2009, p. 287). This type of trust has three levels: trust between citizens and government, trust between organizations and government, and trust between governments.

Trust (of citizens) in government and vice versa is based on two elements: 1) “social trust” (the faith of people in their society), and 2) “political trust” (evaluating the performance of public institutions by citizens) (OECD, 2013, p. 21). It should be noted that trust of citizens and governments to each other, like the other types of trust in society, is bi-lateral. The proper functions of government is a mirror of amount of government’ trust in citizens (OECD, 2013, p. 23).

The fruitfulness of relations between government and organizations is based on social interactions that are “highly institutionalized,” “responsive” and “public” (Kathuria et al, 2009, p. 4). The effective relationships of government and organizations needs at least three optimistic “mechanisms” (transparency, reciprocity, and credibility) and a mixture of them results in trust between organizations and government (Harriss, 2006, p. 1).

A review on trust literature shows the lack of studies focused on government-to-government trust, while the “trust in government” is well-documented in the previous publications (OECD, 2013, p. 23).

Trust is a “necessary condition” for interactions between governments (Hoffman, 2002). Two different assumptions regarding trust between governments exist: In Realist approach, the governments are “mistrustful to each other” and the security issue between them will never be solved, but liberal scholars believe that “cooperation” can help to cope with the “security” issue (Weinhardt, 2015, p. 27). However, the trust among governments has three aspects: “strategic trust,” “generalized trust,” and “relational trust” (Weinhardt, 2015, p. 36).

Interestingly, the world citizens’ trust in their governments and elites has been decreased during past years (Kaina, 2008; Castells, 2009, p. 286). Finally, trust of people in technology (internet) and government were reported as the main influencing factors on intention to use the e-government services (Carter & Bélanger, 2005).

### **Media Trust**

The “transparency” is a paramount paradigm about “public discourse” (Ferree et al., 2002, p. 291). The media has a dual (positive or negative) function in this transparency. It can provide trustworthy information for all citizens and show the reality of society or government (the positive side), or it can purposely misrepresent the facts (the negative side) (Ferree et al., 2002, p. 292). However, in authoritarian societies where media is part of the government body, or under the control of “rightwing or leftwing dictatorships,” trust in media is challenging. In these societies, media is a source of power for governors and it shows whatever is dictated by government rather than what is really happening in the society (Castells, 2009, p. 109). Furthermore, the real democratic societies need “involving” citizens rather than “informing” citizens, in which, the citizens are informed of the activities in the society and they can easily share their ideas and influence the governmental decisions (Lievrouw, 1994, pp. 351-352).

### **Political Trust**

Trust in political system and public services of a society is named as “political trust”. We have two levels of political trust in society two levels: macro-level trust or “organizational political trust” (i.e. the trust of citizens towards public institutions) and micro-level trust or “individual political trust” (i.e. the citizens’ confidence in their governors or leaders) (OECD, 2013, p. 21; Blind, 2007, p. 4).

It is worth mentioning that political trust boosts social trust (Tao et al., 2014). Distrust in government may raise dissatisfaction regarding the “political system,” and results in “institutional disintegration” and low participation in political events (Castells, 2009, p. 287) and it may increase the indifferent behavior of citizens towards governmental rules and regulations (OECD, 2013, p. 23). It should be noted, the people of a society may trust their officials based on their “public appearances” and behaviors, and this is termed as “psychological political trust” (Warren, 2006, p.7 quoted in Castells, 2009, p. 289).

### **Public Trust**

The concept of public trust indicates that citizens of a society trust their public representatives for representing the general enthusiasm in the action or process of making important decisions (Blind, 2007, p. 13). The concepts of public trust and its evolution is rooted in “democratic societies” (Huffman, 2008). Public trust has three building blocks: “transparency” (providing credible information), “accountability” (commitment and responsibility), and “integrity” (the right performance of people) (DiPiazza & Eccles, 2002, pp. 3-6). Thus, for citizens of a society, public trust means “confidence,” “honesty,” “stability” and “security” by the society, and it is regarded as a “mental behavior” (Ortiz, 2003).



## System Trust (Trust in Systems)

When we judge the believability of an (information) system or medium based on its unique characteristics, we are involved in credibility assessments of the system (system trust). Credibility of system includes “truthfulness,” “believability,” “trustworthiness,” “objectivity,” and “reliability” (Hilligoss & Rieh, 2008, p. 1473).

Media credibility involves the credibility of different media channels that transfer an information (Rieh, 2010, p. 1339), and it influences on the “selective involvement” of the citizens in society (Metzger et al., 2003).

In addition, the unique characteristics of the internet and web have resulted in different types of trust and credibility as “web(site) credibility,” “online trust,” and “E-credibility”.

The users’ credibility judgements of websites, systems or information itself have six dimensions:

1. **Surface Credibility:** Credibility based on the appearance or style of information object or system;
2. **Content (Message) Credibility:** Quality of content, structure, language, and presentation;
3. **Source Credibility:** The trustworthiness of information source or provider;
4. **Reputed or Conferred Credibility:** Based on the reputation of source based on suggestions by others;
5. **tabulated Credibility:** Believability of content based on peer ratings, and
6. **verified, Hybrid, or Emergent Credibility:** Credibility based on verifiability of information based on different sources (Fog, 2002; Rieh, 2010, p. 1339).

Furthermore, in the digital sphere, all citizens have the opportunity to act as communicators, and it resulted in a new research endeavor as “social media credibility”. This domain considers measuring the credibility of social media based on characteristics such as “authenticity,” “legitimacy,” “transparency,” “authority,” or “passion” (Kang, 2009, pp. 3-5).

Finally, “e-credibility” consists of four indicators, “trustworthiness,” “accuracy,” “completeness,” and “timeliness,” which create the “believability” feeling in the trustor regarding the online service and provider (Haas & Wearden, 2003, p. 170).

A mixture of previously digital trust types (mentioned above) shapes the concept of “online trust,” which is a general term for different kinds of trust in digital environments.

## Trust Based on Contract Law (Contractual Trust)

The institutional cooperation is based on reciprocal “understanding” and “trust,” and regular norms and rules of commerce shape “trust based on contract law” (Blomqvist, 1997). The ethical foundation of this type of trust (trust in light of contractual law), include “equity,” “responsibility,” “commitment,” and “trust” (Blomqvist, 1997, p. 275). In other words, a written contract between two parties, shapes the contractual trust (Leung et al., 2011, p. 1196), based on the “rationality” (Ashnai et al., 2015), and at minimum level of risk (Klang, 2001, p. 295).

## Calculative vs. Non-Calculative Trust

Trust is an important antecedent to institutional collaborations (Smith et al., 1995). In institutional relationships, the institutions behave rationally, and their trust first develops on a “calculative basis” (Shapiro et al., 1992). Thus, if two institutions start their collaborations based on initial analysis of the costs and benefits of their interactions, they are involved in “calculative trust” (also called contractual trust) (Doney & Cannon, 1997; MacDuffie, 2011). Furthermore, when the benefits of dishonesty or fraud do not surpass relevant costs, institution A concludes that institution B is trustful (Akerlof, 1970). When the trust is “calculative,” if a problem occurs during the transactions or communications between two institutions, both parties will modify their “behaviors” (MacDuffie, 2011, p. 40).

Finally, trust between institutions without a “written contract” and based on “social norms,” is termed as “non-calculative trust” (Akerlof, 1970, p. 500). In this realm, “social identity” is the foundation of “non-calculative trust,” and a break of trust during the institutional cooperation is viewed as a disloyalty or “fraud” (MacDuffie, 2011, p. 40).

## DISCUSSIONS

Generally, as it is shown in current review, many types of trust can be used interchangeably. For instance, general trust and social trust are two faces of the same construct, and they refer the trust attitudes of actors in society in general. In addition, public trust, political trust, and trust in elites have the same conception and they can be used in the same way, because they less and more consider the trust formation of citizens in political system and services. Furthermore, contractual trust, trust based on contract law, and calculative trust are the various forms of trust of actors in society in which the cost and benefit analysis of cooperation or communication between actors is performed before any action.

However, in order to answer the first question of this study “What are the different types and aspects of trust in previous studies?” different trust types were identified in the review. As we see in the review, there are a number of trust types, which are applicable to one level of communications in society, and other trust types, that are applicable to different levels (more than one level) of interactions in society. For example, the “calculative trust” is related to organizational level (trust between organization), but online trust is applicable only regarding the online sphere, because this type of trust emerged in response to trust issues in digital environment. In addition, three types of trust including routine trust, functional trust, and generalized trust are applicable to all levels of trust in any society.

The second question of this study was around the possibility of shaping a more generic model of trust. The review shows that previous studies had different aims and cover different aspects of society and social interaction in trust categorization and modeling. Richard (1984, p. 12) refers to three levels of analysis for modeling organizational systems: the behavior of main elements (actors) of the system, the functions or features of some parts of the organizational structure, and the features or functions of the organization as a whole (collective entity). In addition, trust is also regarded as a sociological concept. In this realm, trust is an attribute of “collected units” (Lewis & Weigert, 1985) that means trust is applicable to all relationships of social actors in society.

Following the Richard’s categorization of organizational level and sociological definition of trust, the trust system in a society can be categorized in three main levels: 1) Individual (micro) level, 2) Institutional (meso) level, and 3) Governmental (macro) level. These levels are explained below.

### Individual (Micro) Level of Trust

All trust types that consider the trust formation during the communications of individuals in society are included in this level. Three types of trust relationships are mentioned here in this level.

- **Person-to-Person(s) (P2P) Trust:** The “Person-to-Person(s) (P2P) Trust” is formed and evolved among people in a society. This type of trust is fairly documented in previous studies. The faces of P2P Trust in literature is personal (inter-personal) trust, specific trust, cognitive authority, functional trust, and referral trust.
- **Person-to-Organization(s) (P2O) Trust:** The dual communications and trust of organizations are included in Person-to-Organization(s) (P2O) type of trust. There are “institutional trust,” “routine trust,” and “general (generalized) trust” in literature that refers to trust in P2O relationships.
- **Person(s)-to-Government (P2G) Trust:** The “Person(s)-to-Government (P2G) Trust” is the dual trust behavior of citizens and government. P2G Trust has been well documented in the literature.

The concepts such as “trust in elites” (elite dominance), “media trust,” “social trust,” “political trust,” and “public trust” shows the different approaches to this type of relation.

- **Person-to-System(s) (P2S) Trust:** Person-to-System(s) Trust relates to the trust of individuals in systems (or infrastructure) that transfer the information or message (system-side trust) and in information (or content) itself (content-side trust). P2S Trust was termed under “media (channel) credibility,” “web (site) credibility,” “social media credibility,” “online trust,” and “E-credibility” in trust literature.

### **Institutional (Meso) Level of Trust**

The trust formation among non-governmental organizations with each other and with government body are included in this level. Two kinds of trust relationships are included in this level.

- **Organization-to-Organization(s) (O2O) Trust:** One of the important factors in collaboration and cooperation between organizations is trust. Organization-to-Organization(s) (O2O) Trust shapes among different organizations and institutions in a society. Some types of O2O trust are “trust based on contract law,” “calculative trust,” “functional trust,” and “non-calculative trust.”
- **Organization(s)-to-Government (O2G) Trust:** The dual side trust of organizations (non-governmental) and government are included in O2G Trust. In this relation, three major concepts are reported in the literature, including transparency, reciprocity, and credibility. This type of trust is not very well documented in trust literature.

### **Governmental (Macro) Level of Trust**

All trust types and faces in government-to-government relationships and cooperation are included in this level. Most of studies on trust in Government-to-Governments (G2G) level (that are termed in literature as “trust in international relations”) are rooted in “rational choice theory”. They consider trust as influencing factor on “risk” perceptions of officials involved in international relations (Weinhardt, 2015, p. 28). Generally, in G2G level, we have three types of trust: “strategic trust,” “generalized trust,” and “relational trust” (Weinhardt, 2015, p. 36).

These three major trust levels and the seven kinds of relationships are shown in a conceptual model in Figure 2.

Furthermore, in order to clarify the application level of trust types in society, a matrix of these relationships is shown in Table 1.

## **CONCLUSION**

Because of the multi-dimensionality of trust and diversity of trust types, a meta-analysis of trust literature led to a generic model of trust (GEMOT). The model has three major levels, and seven types of interactions. In each level, the trust types and kinds of interactions are described.

In comparison with the previous technical models of trust in different contexts (e.g. Wang & Vassileva, 2004; Xiong & Liu, 2003; Meng et al., 2012; Hamouid & Adi, 2015; Tahta et al., 2015; Twyman et al., 2015; Hoogendoorn et al., 2014; Lian-ju et al., 2014; Park et al., 2015; Jelenc et al., 2013; Lee & Turban, 2001) and more general models of trust (e.g. Tan, 2000; Tan & Thoen, 2002; Kinateder et al., 2005; Mayer et al., 1995) that were less and more focused on the psychological conceptions of trust (as a property of individuals), the General Model of Trust (GEMOT) has a holistic point-of-view and observes trust phenomenon as a social activity among all social actors in society. Since this model is general, even in a specific context of study in different disciplines, the researchers may benefit from this model in formulating their trust context and related definitions. The proposed model has following advantages:

Figure 2. A Generic Model of Trust (GEMOT)

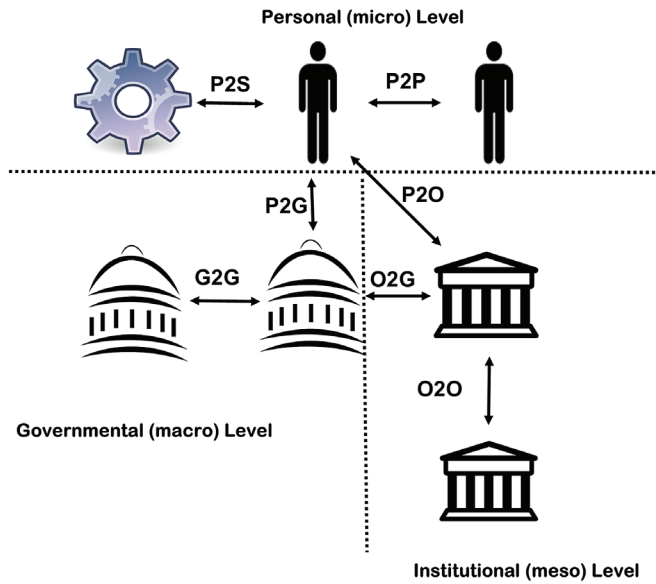


Table 1. A matrix of trust types (faces) and their application levels in society

Trust type	Application level						
	Person to person(s) trust	Person to organization(s) trust	Person(s) to government trust	Organization to organization(s) trust	Organization(s) to Government trust	Government to government(s) trust	Person(s) to system(s) trust
Calculative vs. non-calculative trust				•	•	•	
Cognitive authority	•	•					
Dispositional trust	•						
E-credibility							•
Functional trust	•	•	•	•	•	•	•
General(ized) trust	•	•	•	•	•	•	•
Institutional (organizational) trust		•	•		•		
Inter-Personal trust	•	•					•
Media trust		•	•				
Online trust							•
Political trust			•				
Public Trust		•	•				
Referral trust	•	•					
Relational trust				•		•	
Routine trust	•	•	•	•	•	•	•
Social media credibility							•
Social trust		•	•				
Specific trust	•	•					•
Strategic trust				•		•	
System trust							•
Trust based on contract law				•			
Trust in elites		•	•				
Web(site) credibility							•

1. The model is based on the trust literature.
2. The model conceptualizes trust types and levels in an inter-disciplinary manner and it is not limited to just one discipline. In the model, the trust types have been captured from several disciplines and it will be useful for researchers and practitioners interested in trust study.
3. The model is flexible. For example, if a new type of trust emerges, it can form a new major level (such as P2P Trust) in the model, or it can be added to the related interaction level (such as specific trust).
4. The trust types are related to each other in a new approach, which can open additional research possibilities.
5. Each trust type is clearly defined and described so it can easily be distinguished from the other types.

It should be noted that this model is a conceptual illustration based on a conceptual analysis of select trust studies. As a result, the model provides a useful analytic tool for future studies on trust.

However, this review has some limitations, because it reviewed just English publications. Although the searches performed were extensive, however, it is possible that other relevant studies (in other languages) did not appear in the search results. Thus, a more systematic review of trust types (e.g. without limiting the publications to English works), may result in an improved version of current model.

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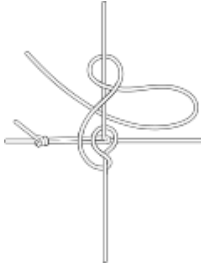
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## Article 2

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PEER REVIEWED ARTICLE

Mahmood Khosrowjerdi and Anneli Sundqvist

## 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 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
TITTLE-ABS-KEY
( health information OR digital health OR ehealth OR electronic health OR internet
health OR virtual health)
AND
TITTLE-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.

<b>Table 1. Researchers' notions of trust</b>	
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.



<b>Research design</b>	Survey	35
	Experiment	12
	Focus groups	6
	Mixed methods	2
	Interview	3
	Observation	2
	Diaries	1
<b>Country of study</b>	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.

<b>Study</b>	<b>Number of students</b>	<b>Going online for health information / percent</b>
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 7<sup>th</sup>-12<sup>th</sup> 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 10<sup>th</sup>-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 Ettl 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 7<sup>th</sup>-12<sup>th</sup> 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									
	Schools	Family members	Friends or peers	Health Professionals	Internet (online sources)	Magazines	Newspapers	Books	TV	Social institutions
Study										
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 prerequisite 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.

#	Extension of websites			
	.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 a 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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## Article 3

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# A review of theory-driven models of trust in the online health context

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## Abstract

Generally speaking, theory-driven studies are more successful in producing a desired result than those missing the theoretical grounds. This paper aims to provide an informal assessment of theoretical foundations of trust models in online health context. After a review of literature, 12 theory-driven models were analysed in detail. The findings showed that previous models benefited from different theories within different disciplines (mostly from psychology). The technology acceptance model, the elaboration likelihood model, the theory of reasoned action and the health belief model were the most frequently used theoretical frameworks. The reviewed models were able to account for 23–69% of variance in dependent variables. In conclusion, although the health studies are very open to interdisciplinary theories, the inclusion of institutional and national cultural theories in future researches may enrich the current individualistic perspective with a broader context of society that jointly form trust behaviour and credibility judgements of health consumers in digital health environments.

## Keywords

Credibility judgement, cultural theories, online health, theory-driven models, trust

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## Introduction

Today the Internet often serves as a medical and health diagnosis tool. About 70,000 websites were providing health information in 2000 (Grandinetti, 2000) and the number of these online information providers is increasing daily. Googling the word *diabetes* resulted for example in 1,990,000 pages, which shows the huge amount of information on diabetes on the Web (searched by the author, 10 February 2015).

A recent report published by Pew Internet and American Life Project showed that ‘35% of US adults have gone online to solve a medical condition’, while only half of them ‘visited a medical professional’ to check it up (Fox and Duggan, 2013). A previous report in this series also reported that ‘three million adults said that ‘they’ or ‘someone they know’ have been seriously harmed by following online health advice’ (Fox, 2006: 8). Hence, access to and trust in accountable online information is vital in the health domain.

However, finding credible online information is not so easy and requires different competencies or skills. Many situational and contextual factors have an influence on accessing the relevant information, evaluating the retrieved information, trusting and finally acting on it to solve the problem at hand (Xie, 2011).

In order to study individuals’ interaction with health systems, several researchers have investigated the trust formation of users in online environments, and they agree that trust is a ‘multi-dimensional’ (Casaló and Cisneros, 2008; Casalo et al., 2007; Chen and Dhillon, 2003; Flavián et al., 2006) and contextual or context-specific construct (Frank, 1988; Seckler et al., 2015). Because of this contextual nature of

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trust, different models of trust in different disciplines have emerged.

The existence of such models motivated some researchers to review them in depth. Xie (2011) reviewed 10 models of information searching and concluded that 'very few findings of user studies have been applied in information retrieval systems' design', and that there is no comprehensive model of information searching that fits for all contexts. The researcher remarked the need for models for 'cross-language retrieval'. Järvelin and Ingwersen (2011) reviewed the user-oriented and cognitive model of information retrieval and they claimed that in order to understand human interaction with systems and the information search process, both the systemic context (system, network and information space) and the socio-cultural and organizational context need to be considered. In another review on human-computer interaction research in information retrieval, Lin (2009) described some of the models in this research domain. The researcher concluded that 'system-centred' and 'user-centred' information retrieval researches complemented each other. In his review on information behaviour models, Wilson (2009: 2399) divided these models into three categories: 'models of activity' (or descriptive models); 'models that connect information seeking of individuals to their characteristics, information source features, or other behavioural aspects'; and finally, 'hypothesis-testing models' that test the relationships between variables of models. Wilson finally concluded that in order to get an enriched research area in information behaviour, it is fruitful to 'move from descriptive models to the development and testing of theory-driven models'. In a recent review on theoretical models of health information seeking on the Web, Marton and Choo (2012) analysed four theory-driven models in the online health context. They found that the reviewed models used multidisciplinary frameworks and had good prediction power for targeting the complex behaviour of consumers in the online health context. The theories behind the models were reported as the theory of planned behaviour, the uses and gratifications theory, the technology acceptance model, the health belief model, the expectancy-value approach, the embedded media perspective and the behavioural model of information seeking on the Web. The survey was the only research method used to test the correlations of the variables in the models, and all of the reviewed models used multiple regression analysis. Finally, the included models accounted for between 23% and 50% of variance in dependent variables (Marton and Choo, 2012).

In summary, reviewing both general information behaviour models and models devoted to an online health context, suggests the current user-centred

approach in information behaviour models could be improved by considering community, culture and societal factors in future modelling.

### Problem statement

In order to advance our understanding of interactive health communications of users and systems, both descriptive statistics and conceptual studies derived from theories are necessary (Marton and Choo, 2012; Wilson, 2009). Based on the 'epistemic function of models, theory-driven models are direct descendants of theory', and they are directly extracted from related theories (Portides, 2014: 81). Generally speaking, theory-based studies in social and behavioural science are more successful in producing a desired or intended result, than those missing the theoretical grounds (Glanz and Bishop, 2010). The health domain is not an exception, and it has been confirmed by some researchers that theoretical models of health behaviour are more effective than other models (Ammerman et al., 2002; Glanz and Bishop, 2010; Legler et al., 2002; Noar et al., 2007). In addition, developing and testing the theoretical models of (health) information behaviour will enrich this research field (Wilson, 2009).

To the best of our knowledge, no review has so far been published on trust models in the online health context, although some studies reviewed general models of information behaviour (Järvelin and Ingwersen, 2011; Lin, 2009; Xie, 2011), or broad health information-seeking models (Marton and Choo, 2012).

The current study will draw a general picture of the building blocks and theoretical foundations of trust models in the online health context. It will identify the possible gaps in these modelling and testing processes, and it will guide future researchers in applying a robust theoretical foundation. In addition, it can help to implement better health programmes and to identify the influencing factors on individuals or community groups (Glanz and Bishop, 2010).

To this end, Case's (2012) framework for reviewing human information behaviour studies is followed. In Case's framework, information behaviour reviews are categorized into four areas: 'information seekers by occupation (e.g. scientists, managers); information seekers by role (e.g. patient, student); information seekers by demographics (e.g. by age or ethnic group); and theories, models, and methods used to study information seekers' (Case, 2012: 295).

In line with the fourth category (theories, models and methods), the theory-driven models of trust in

online health context are reviewed selectively, and the following questions are addressed:

- Which theories have been used in modelling trust in the online health domain?
- How were the theories included and tested in the models (participants, research design and data analysis)?
- Are there any similarities/differences in the modelling of trust in the online health context?

## Method

To reach the goal of this study, recent (from 2000 to 2015) models of trust in the online health domain were reviewed.

This review is focused on those studies that tested a model in the online health context and the trust issue that was prominent in the model. The scope of models is limited to health science. Thus, models of trust in other disciplines such as information science, management, business, and so on were not included in this study. Furthermore, those models in the health context that did not consider trust in their modelling, or considered general modelling of information seeking were not included in the review.

The emphasis of this review is on theory-driven models in the online health context. The studies that used general conceptual or pure descriptive models (without empirical testing) were excluded. In addition, those models that were focused on trust but not theory driven were also omitted.

The search was performed with some general queries such as online health information seeking, trust in online health, credibility of online health information, interactive health communication models, and so on in Web of Science, Scopus, Google Scholar and Google (for in-progress or unpublished works) to trace and find the relevant studies for inclusion in the review. The relevant publications were not limited to any specific format, but English publications were chosen in order to have the same ground for analysis.

This review is selective, that is not a systematic one. However, we screened the studies and references included in previous reviews on online health information to find possible items for inclusion. These screened reviews are presented in Table 1.

Finally, 12 theory-driven models were included in this analysis. The sources of studies included in this review are shown in Table 2.

## Analysis

In this section, each study included in this review is analysed based on the theoretical roots, the relationships of the variables of the model, the participants in the studies, research design, and model measurement and accountability.

Liang et al. (2005) used the theory of reasoned action and the theory of transaction cost economics to investigate trust antecedents in online prescription filling by consumers. An online questionnaire (survey) was distributed among 145 undergraduate business students at a university in the south-eastern region of USA. The students were 18–43 years old (average age = 21.58 years) and mostly male (59%). Most of the participants (89%) had previous online shopping experience. Two online pharmacy websites were introduced in the questionnaire and the participants were asked to surf them and to answer the questionnaire. In the estimated model, the antecedents of trust (i.e. calculus-based trust, knowledge-based trust and institution-based trust) significantly and positively influenced the students' trust in online prescription filling. The opportunistic behaviour of health service providers (drug retailer) influenced the perceived uncertainty of online prescription fillings by students. Trust reduced uncertainty and impacted on the intention to use the online prescription fillings. Finally, the high uncertainty resulted in reduced intention to use. The estimated model based on partial least squares regression accounted for 36% of variance in intention to use online prescription filling by students.

Mongeau and Stiff's (1993) model and the elaboration likelihood model were the foundation of an experimental study by Hong (2006). The participants in the study were 84 students (62% female) at a major university in California, USA, with mean age of 21.64 years. Three desktop computers with high-speed Internet connection were used for web searching by participants. The tracings of the search sessions were registered by a software program via log registration including time spent per page and number of visited pages. The respondents were asked to surf as many web pages as they liked to find the information in order to recommend it to a family member who required it. Two search tasks were provided for the participants: a general task that was to locate any 'tobacco cessation strategy', and a specific task that was to find a 'specific tobacco cessation method'. The task complexity were measured by time spent per web page in minutes, the number of pages used for each search, and some statements about the degree of difficulty of finding the required information. The final

**Table 1.** Previous reviews on online health information studies.

Author(s)	Databases (sources) searched	Number of included studies
Anker et al. (2011)	<ul style="list-style-type: none"> <li>• PsychInfo (1978–2010)</li> </ul>	129
Bernstam et al. (2005)	<ul style="list-style-type: none"> <li>• PubMed (1995–2003),</li> <li>• Google, Lycos, Yahoo, Excite, and Webcrawler (July 2003)</li> <li>• proceedings of American Medical Informatics Association (1998–2003)</li> </ul>	273
Eysenbach et al. (2002)	<ul style="list-style-type: none"> <li>• MEDLINE and PREMEDLINE (1996–September 2001)</li> <li>• Science Citation Index (1997–September 2001)</li> <li>• Social Sciences Citation Index (1997–September 2001)</li> <li>• Arts and Humanities Citation Index (1997–September 2001)</li> <li>• LISA (1969–July 2001)</li> <li>• CINAHL (1982–July 2001)</li> <li>• PsychInfo (1988–September 2001)</li> <li>• SIGLE (1980–June 2001)</li> </ul>	79
Marton and Choo (2012)	<ul style="list-style-type: none"> <li>• The analysis of previous reviews of McMullan (2006), Anker et al. (2011) and Renahy and Chauvin (2006)</li> <li>• Scopus (2000–2011)</li> <li>• Web of Science (2000–2011)</li> <li>• ProQuest Dissertations &amp; Theses (2000–2011)</li> <li>• Google</li> </ul>	4
McMullan (2006)	<ul style="list-style-type: none"> <li>• PubMed (1985–2005)</li> <li>• British Nursing Index (1985–2005)</li> <li>• CINAHL (1985–2005)</li> <li>• Ovid (1985–2005)</li> <li>• AHMED (1985–2005)</li> <li>• Google</li> </ul>	Not stated
O'Grady (2006)	<ul style="list-style-type: none"> <li>• MEDLINE (1966–2004)</li> <li>• PsychInfo (1840–2004)</li> <li>• ERIC (1966–2004)</li> <li>• ACM</li> <li>• Web of Science (2002–2004)</li> </ul>	Not stated
Renahy and Chauvin (2006)	<ul style="list-style-type: none"> <li>• MEDLINE (2000–2005)</li> <li>• Banque de Données en Sante Publique (BDSP, French public health databank) (2000–2005)</li> </ul>	60

website selected by the respondents was used to measure the credibility, the intention to revisit the web page and the difficulty of finding required information. Then, the participants were asked to give their opinions about the credibility of web pages found based on a Likert-style questionnaire. Two models were estimated in this study, the general task model and the specific task model. In both of them, the website credibility is influenced by reliance on the Web for health-related information, and credibility dimensions (trust/expertise and depth) are significant predictors to revisiting a website in future. However, the knowledge is a significant predictor for the general tasks that require more cognitive ability. The models were tested through structural equation modelling, i.e. path analysis. The general search model accounted for 14% of variance in trust/expertise, 5% in goodwill, 9% in depth and 23% in intention to revisit a site. The specific search model accounted

for 9% of variance in depth, 9% of variance in trust/expertise, 4% variance in goodwill and 24% in intention to revisit a site.

In order to study trust attitudes towards health information sources, Song and Zahedi (2007) applied the technology acceptance model and the actor network theory in their survey. The participants in the study were 494 graduate and undergraduate students at two large US business schools (in the Midwest and South). The average age of participants was 21.1 years. The participants were asked to first choose a health/fitness problem based on their interest, and then to select one of the health infomediaries WedMD.com or MedPlus.com to find some general information about it. After visiting the website, they were asked to provide the retrieved information from the health infomediary and finally to fill in the questionnaire. In their proposed model, the health infomediary (HI) environment (including favourable rep



**Table 2.** The current review and the source of included studies in the review.

Study included in this review	Found in following source
Harris et al. (2011)	Scopus
Hong (2006)	Marton and Choo (2012)
Johnson et al. (2015)	Scopus
Liang et al. (2005)	Google Scholar
Lim and Kim (2012)	Scopus
Lim et al. (2011)	Scopus
Mou and Cohen (2014a)	Scopus
Mou and Cohen (2014b)	Scopus
Song and Zahedi (2007)	Scopus
Yi et al. (2013)	Scopus
Yun and Park (2010)	Marton and Choo (2012)
Zahedi and Song (2008)	Scopus

utation of HI, prior positive experience with HI and structural assurance of the Web), the information quality of HI (understandability, relevance, usefulness, reliability, adequacy), the system quality of HI (ease of use and interactivity), and the trust signs of health infomediaries had an influence on trusting beliefs (ability, benevolence, integrity), and consequently, impacted on intentions to use HI in health decisions. Furthermore, the web users' propensity to trust negatively impacted on the risk. Subsequently, the risk decreased the intentions to use HI for health decisions. The model was tested via a structural equation modelling, and it accounted for 39% of variance in intention to use the health infomediary.

Zahedi and Song (2008) applied agency theory and information integration theory to study the dynamics of trust in the online health context. They surveyed 209 students in two universities in USA (one in the Midwest and the other in the South). Their study was performed in a lab experiment in three phases. In the first phase (T1, at the beginning of a month), participants were asked to freely select one of the health infomediaries WebMD or MedlinePlus, and search the selected website to get the required information about health and medical problems in which they had an interest. Then, they were asked to answer some questions regarding the content of the chosen health infomediaries, and finally they were given an assignment to complete later (Phase 2). At the end of the month, those participants who had completed the assignments were allowed to take part in the final survey (T2, Phase 3), which was about their present perceptions and beliefs about the health infomediaries. Generally, this study presumed trust as an evolving phenomenon. It examined the trust-building process based on three estimated models: the analysis

of trust in episode T1 (the first assessment of participants' trust in health infomediaries); the analysis of trust in episode T2 (after one month, the second assessment of participants in health infomediaries); and the transition process from T1 to T2 (the evolution of trust over time). The comparative statistics analysis showed a strong relationship between trustworthiness beliefs and trust attitudes over time, and the increasing influence on information quality perceptions. The dynamic model of trust showed satisfaction as the outcome of information uses. The estimated model based on structural equation modelling, accounted for 65% and 52% of variance in trust attitudes in T1 and T2, respectively.

Through mixing the variables of the technology acceptance model and the health belief model, Yun and Park (2010) administered a survey with convenient sampling to further investigate the disease information-seeking behaviour of students. The eligibility of participants in this study was the age (20 years old and more) and previous search for disease-related online information during the past six months. Most of the respondents ( $n = 212$ ) were women (62.7%), between 20 and 49 years old (about 95%), and college and university graduates (71.7% of the total). In the estimated model, the health belief model variables, health consciousness and perceived health risk, impacted on the perceived usefulness of information provided on the Web. Perceived usefulness, perceived credibility and perceived ease of use influenced on attitudes regarding online disease information, and finally they resulted in intention to use disease-related information on the Internet. In addition, perceived ease of use and perceived credibility of online information were affected by the Internet health information use efficacy of consumers. Although the model measurement was done via a structural equation modelling (path analysis), the  $R^2$  was not reported in their study.

Harris et al. (2011) used the extended parallel process model and protection motivation theory to investigate trust in online health information and advice. They prompted an online questionnaire on the *hungersite.com* website and gathered 561 responses. The participants were mostly female (72%),  $\geq 18$  years old, with previous search experience for themselves, and mostly from USA (59%) and UK (17%). After a structural equation modelling, information quality and impartiality directly predicted trust in online health and advice. In addition, personalization and credible design of website had an indirect and mediating role on trust through influencing information quality and impartiality. Furthermore, threat and corroboration influenced

trust in online health and advice, and the readiness to act on advice. Finally, trust and coping influenced readiness to act on advice provided in a health website. It is worth mentioning that adding the eHealth variables (perceived threat, coping and corroboration) increased the prediction power of the model. The estimated model accounted for 66% of variance in trust ( $R^2 = 0.66$ ), and 49% of variance in readiness to act on the advice ( $R^2 = 0.49$ ).

Lim et al. (2011) used the technology acceptance model and social cognitive theory to study women's acceptance of using mobile phones to seek health information. The participants were requested to fill in the first part of a survey, then to work with a health application and finally to finish the survey. A convenience sampling was applied. The participants were 164 Singapore women (21 years and older). In the estimated model, the behavioural intentions to use mobile apps for health information search was dependent on perceived usefulness (PU) ( $r = 0.59$ ,  $p < 0.01$ ) and perceived ease of use (PEOU) ( $r = 0.37$ ,  $p < 0.01$ ). Furthermore, the self-efficacy (SE) was positively correlated with behavioural intentions to use the mobile apps ( $r = 0.54$ ,  $p < 0.01$ ). The gathered data were analysed through a hierarchical regression analysis. Interestingly, including just the two variables of the technology acceptance model (PU and PEOU) in the regression model could account for 30% ( $R^2 = 0.30$ ) of variance in behavioural intention to use mobile phones to search for online health information. But, importing self-efficacy, technology anxiety and prior experience into the model resulted in an increase in accountability of model up to 44% ( $R^2 = 0.44$ ).

Lim and Kim (2012) selected the technology acceptance model as their theoretical ground and surveyed 274 undergraduates (45.2% male and 54.8% female) in March 2008. A total number of 500 questionnaires were sent out, and 274 complete questionnaires were returned (response rate 58%). The respondents were divided into two groups: high-trust and low-trust. In their estimated model, the information features (relevance, reliability and adequacy) influenced trust in health infomediaries. Trust in health infomediaries impacted on the intention to use. Furthermore, information relevance was an influencing factor on trust only for people with high trust, while information adequacy was an influencing factor for the low trust group. After structural equation modelling, the model accounted for 39.7% ( $R^2 = 0.397$ ) of the variance in trust for the high-trust group and 25.3% ( $R^2 = 0.253$ ) for the low-trust group. In addition the model accounted for 40.6% ( $R^2 = 0.406$ ) and 8.6% of ( $R^2 = 0.086$ ) of variance in the intention to use for the low-trust group and high-trust group respectively.

Based on the elaboration likelihood model and Toulmin's model of argumentation, Yi and colleagues (2013) proposed a model and tested it via field experiment. The participants were asked to first fill in a pre-test questionnaire including demographics and general Internet use, and then to browse three experimental web pages, and finally to report their attitudes. Three hundred health information seekers in Korea (150 men and 150 women) participated. The eligibility criteria were age ( $\geq 20$  years old) and previous search for online health information (82% reported personal previous search and 75.7% stated previous search for family members). In the estimated model, trust was positively dependent on perceived information quality and negatively influenced by perceived risk. Perceived information quality was positively influenced by argument quality and source expertise. In addition, the higher the perceived information quality, the lower the perceived risk regarding using the health information. Finally, perceived risk reduced trust in online health information. The model estimated by partial least squares regression accounted for 69% of variance in trust ( $R^2 = 0.69$ ).

Mou and Cohen (2014a) included the theory of reasoned action, expectation-confirmation theory and the IS continuance model to investigate students' trust formation in online health services. The participants were 70 students of a large national university in South Africa (95% between 18 and 25 years; 41.43% female, 60% with previous online health information seeking). The study was done in a lab setting in two phases. In Phase 1, the participants were invited to select one of four provided health infomediaries' websites, and to surf the selected website for information on general health issues such as diet and nutrition, exercise and fitness, and to search for specific tasks adapted from a previous study of another researcher. Lastly, the participants answered a survey questionnaire about their trust beliefs, their perceptions about the surfed health website, their subjective norms and their possible future intention to use health infomediaries. Participants were asked to return to the lab after seven weeks, in order to complete the second-round survey that captured their present perceptions, beliefs and intentions regarding the health infomediaries. In the estimated model, in Time 1, continuance intention was affected by perceived usefulness and trust in the health infomediary website. Perceived usefulness was significantly influenced by trust in the health provider, and behavioural intention significantly influenced actual use of the health infomediary. In Time 2, perceived usefulness and

confirmation were significantly influenced by actual usage. Confirmation had significant influence on perceived usefulness and trust in the health infomediary website. Confirmation and perceived usefulness determined the satisfaction of the received online health service. Perceived usefulness, trust in the health infomediary website and satisfaction contributed to the intention to use the health infomediary. Generally, the model showed the importance of perceived usefulness and trust in consumer acceptance of services of the online health infomediary (in both stages). The structural equation modelling (path analysis) showed that the model could explain 65% of the variance in intention to use the online health infomediary ( $R^2 = 0.65$ ).

In another study, Mou and Cohen (2014b) used the health belief model and the extended valence framework to investigate the role of trust, risk barriers and health beliefs in students' acceptance of online health services. They examined the online trust behaviour of 703 first-year undergraduates in South Africa (46.5% male; 97% between 18 and 22 years; 52.1% with previous experience of online health information seeking), based on a laboratory-based experimental design and a survey. First, students (based on their choice) navigated one of three online health services provided by the researchers to perform a number of tasks, and next they completed a survey questionnaire. The findings showed that perceived susceptibility, perceived severity and perceived benefit had significantly positive effects on the intention to use online health services ( $\beta = .160$ ,  $t = 3.941$ ;  $\beta = .173$ ,  $t = 3.736$ ; and  $\beta = .107$ ,  $t = 2.225$ , respectively). Trust had positive effects on the intention to use ( $\beta = .462$ ,  $t = 9.476$ ) and perceived benefits ( $\beta = .365$ ,  $t = 6.118$ ), and a negative effect on perceived barriers ( $\beta = -.368$ ,  $t = 8.221$ ). Finally, self-efficacy moderated the effects of perceived severity on behavioural intentions ( $\beta = -.121$ ,  $t = 2.612$ ). The final model explained 44% of variance in intention to use online health services ( $R^2 = 0.44$ ).

Johnson and colleagues (2015) used the elaboration likelihood model and administered a paper-and-pencil survey with a convenient sampling of 292 third-year undergraduates at a large metropolitan university in the UK. Most of the participants were 18 to 21 years old and male (56.5%). The participants were asked to assume their previous search for health information on the Internet (for general inquiry or for specific use of themselves or their family members) in order to answer the questions. In their estimated model (based on structural equation modelling, path analysis), the information quality including content and style, and peripheral clues, i.e. ease of access and brand,

influenced credibility and usefulness judgement of the online health information. The final estimated model explained 53.6% of the variance in trust judgements by students ( $R^2 = 0.53$ ).

## Findings and discussion

### Research design

As we see in Table 3, the studies included in this review ( $n = 12$ ) mostly used surveys as their research method (seven studies). The others used lab experiments (three studies), or a combination of survey and lab experiment (two studies). This is similar to the previous finding that demonstrated the popularity of the survey method in testing theory-driven models in the online health context. For example, in their review of five theory-driven models of online health information, Marton and Choo (2012) found that the survey was the main research method used to test the relationships of variables in online health information seeking models. In addition, the focus on quantitative studies of information behaviour in the health context is a mainstream in this domain (Dorsey, 2008), and the tendency is for this to continue.

In the present study, students were the main participants of online trust modelling in the health context. Seven of 12 studies used students as survey or lab participants to test their models. A recent review also shows that students' studies shapes 19% of information seeking literature (Case, 2006). This approach seems to be an embedded habit in empirical studies in the online health domain and specially the study of trust (Bansal and Gefen, 2010; Batten and Dutton, 2011; Burger et al., 2015; Catellier and Yang, 2012; Douglas et al., 2004; Escoffery et al., 2005; Gray et al., 2005; Ivanitskaya et al., 2006; Jones and Bidlecom, 2011). This may be explained by the distinguished features of students. Students are well educated, very tech-oriented, and they are available and convenient to approach for investigating the health issues in online contexts. In addition, the cause may be the abundant interest in students' information seeking on the Web since 1995 onward, that is rooted in the consensus that students, and young people in general, seem to be more successful in 'everyday life' information seeking rather than in searching the Web for 'school-related assignments' (Limberg and Alexandersson, 2009: 3257).

However, using students to test the models is challenging. These models were designed based on some gaps in the online health domain, and then they were tested by the participation of students as well-educated individuals and digital natives as subjects.

**Table 3.** The theoretical framework and research design of reviewed studies.

Study	Theoretical framework	Research design	Participants (sample)
(Yi et al., 2013)	<ul style="list-style-type: none"> <li>• Elaboration likelihood model</li> <li>• Toulmin's model of argumentation</li> </ul>	Lab Experiment	300 health information seekers, 50% female, Korea
(Lim et al., 2011)	<ul style="list-style-type: none"> <li>• Technology acceptance model</li> <li>• Bandura's social cognitive theory</li> </ul>	Survey	164 women (86% Chinese, 6% Malay, and 8% Indian or Sikh), Singapore
(Song and Zahedi, 2007)	<ul style="list-style-type: none"> <li>• Technology acceptance model</li> <li>• Actor network theory</li> </ul>	Survey	494 graduate or undergraduate students, USA
(Lim and Kim, 2012)	<ul style="list-style-type: none"> <li>• Technology acceptance model</li> </ul>	Survey	274 undergraduates, 54.8% female, Korea
(Yun and Park, 2010)	<ul style="list-style-type: none"> <li>• Technology acceptance model</li> <li>• Health belief model</li> </ul>	Survey	212 participants nationwide, mostly women (62.7%), Korea
(Hong, 2006)	<ul style="list-style-type: none"> <li>• Mongeau and Stiff's model</li> <li>• Elaboration likelihood model</li> </ul>	Experiment + Questionnaire	84 students, mostly female (62%), (USA)
(Harris et al., 2011)	<ul style="list-style-type: none"> <li>• Extended parallel process model</li> <li>• Protection motivation theory</li> </ul>	Survey	561 participants, mostly female (72%), mostly from USA (59%) and UK (17%)
(Zahedi and Song, 2008)	<ul style="list-style-type: none"> <li>• Agency theory</li> <li>• Information integration theory</li> </ul>	Lab experiment	209 students, USA
(Liang et al., 2005)	<ul style="list-style-type: none"> <li>• Theory of reasoned action</li> <li>• Theory of transaction cost economics</li> </ul>	Survey	145 undergraduate business students (41% female), USA
(Johnson et al., 2015)	<ul style="list-style-type: none"> <li>• Elaboration likelihood model</li> </ul>	Survey	292 third-year undergraduate students (43.5% female), UK
(Mou and Cohen, 2014a)	<ul style="list-style-type: none"> <li>• Theory of reasoned action</li> <li>• Expectation-confirmation theory</li> <li>• IS continuance model</li> </ul>	Lab experiment	70 university students, mostly female (58.57%), South Africa
(Mou and Cohen, 2014b)	<ul style="list-style-type: none"> <li>• Health belief model</li> <li>• Extended valence framework</li> </ul>	Lab experiment + Survey	703 first-year undergraduates, female (53.5%), South Africa

Thus, the generalizability and testability of models for other people and contexts remains unclear. For example, how can we use the approaches of tested models in studies with different target groups? What can these models do for the general public, for culturally diverse groups, or those who do not have the features of students such as old people, housewives, people with a migration background or vulnerable people such as adolescents who have the competencies to use the technology but whose trust and judgments in online health domain differ?

The number of participants in the current review ranges from 70 participants in the study of Mou and

Cohen (2014a), to 703 participants in the work of Mou and Cohen (2014b). Generally, the average number of participants in the included studies reviewed (with the assumption of survey method) is slightly more than 300, which is enough for studies with regression analysis and structural equation modelling (or path analysis).

In addition, more females than males participated in the studies. The higher participation rate of females in comparison with males is in line with previous findings (Cho et al., 2015; Ghaddar et al., 2012; Jones et al., 2011; Longman et al., 2012; McKinley and Ruppel, 2014; Neal et al., 2011; Oh and Kim, 2014;



Pariera, 2012; Senkowski and Branscum, 2015; Smart et al., 2012).

### Theories behind the models

In general, different theories have been used to model trust formation of consumers in online health information. As shown in Table 3, most of the studies included in this review (10 of 12 studies) used at least two theories. The technology acceptance model used in four studies, the elaboration likelihood model used in three studies, and the theory of reasoned action and the health belief model applied in two studies, were the most used theoretical frameworks to study trust issues in online health settings.

Furthermore, it seems that mixing different theories to study trust in an online health context results in higher accountability of the estimated models. For example, in the study of Lim and colleagues (2011), mixing the approaches of social cognitive theory and the technology acceptance model increased the explained variance in the estimated model. Similarly, in the estimated model of Harris et al. (2011), adding the e-Health variables increased the prediction power of the model (i.e. increase in explained variance by independent variables). This is a clue for future studies of trust in online health contexts.

Table 4 shows the disciplinary origin of the theories applied in modelling trust in online health information. These theories are rooted in sociology, economics, psychology, marketing and consumer behaviour, communication, management, information systems and philosophy. Table 4 also demonstrates that online health behaviour studies are open to interdisciplinary theories. Nearly half of the theories are extracted from the psychology domain, maybe because of the task complexity in an online health context and the importance of individuals' cognitive factors and the behavioural perspective in this domain.

However, most of the models in this review have neglected the position of social and cultural influencing factors in trust formation. These models, less and more, were focused on the user-centric aspect of health information consumption. It should be noted, each interaction with an online health system includes the user, the system, the product (or content), and the institutional and social environment. In the current models, trust formation is regarded as a linear phenomenon that is formed by the interaction of user and the features of the system. This interaction has been measured just by the perceptions of the users regarding the information content, sources or the trustworthiness features of contents or sources.

As is shown in Table 4, the concentration of applied theories to modelling trust in an online health context is individualistic and mostly focused on the beliefs and perceptions of users to the system, its content and information sources.

Nevertheless, while acknowledging the efforts of previous researchers to apply user-centric theories and modelling the trust in online health, a broader understanding of how trust operates as a social and interactional phenomenon at community level is required for a comprehensive analysis of this complex issue, for example how the shared belongings of a community and the general trust in society lead to specific trust in digital artefacts.

In addition, the evolutionary nature of trust during time is neglected in most of the current models, and consequently, other important theories and models of online health information seeking were not included in the models. It worth mentioning that 'behavioural change is a *process*, not an *event*' (Glanz and Bishop, 2010), and it is not acceptable to say that at the time of X the target user trusted the health system based on some variables, and thus we can predict his trust behaviour for the future.

### Accountability of models

The accountability of reviewed models, the statistical techniques to test the models and the final dependent variables are shown in Table 5. As can be shown, the final dependent variables in most of the models were intention to use or visit the online health websites, trust in online health intermediaries and readiness to act on online health information and advice.

Furthermore, most of the models included in the current review used a type of structural equation modelling to determine the predictor variables.

Generally, the  $R^2$  (square of the correlation between the dependent and independent variables) was used to show the percent of variance explained by the estimated models. In the current review, it ranged from 0.23 in Hong's model (2006) to 0.69 in Mou and Cohen's study (2014a). This finding is in line with the findings of a previous review that reported the prediction power of models showing 23–50% of variance in the dependent variables (Mar-ton and Choo, 2012). It is worth mentioning that the low or high  $R^2$  value does not always equal the weakness or strength of the models or correlations of the variables, and some researchers (e.g. Frost, 2013) suggested that the *adjusted*  $R^2$  rather than  $R^2$ , and the standard error of the regression rather than the standard deviation of errors, should be considered. However, it is agreed that in social science, behavioural

**Table 4.** Applied theories in modelling trust in online health information.

Model / theory	Short summary of model or theory	Originated discipline	Theorist(s)/ developer(s)
Actor network theory (ANT)	In ANT it is assumed that there are different actor-networks in social relationships. It assumes that any actor (i.e. people, organization, and objects such as systems) in social links is similarly important. The interactions among the actors include both social and technical aspects, but the identification of these aspects is not always easy (Larsen et al., 2016).	Sociology	Latour, Callon and Law
Agency theory (AT), also called <i>principal-agent problem</i>	The AT was theorized based on employer-employee relationships. It is focused on the interactions (contracts) between employee and employer. The AT tries to resolve two issues in organization relationships: (1) the organization problem: when the wishes or objectives of the employer and employee are different or when verifying the performance of employee by the employer or principal is difficult) and (2) risk sharing: when the employer and employee have different risk preferences (or attitudes) and it may influence the actions of both parties (Eisenhardt, 1989).	Economics	Alchian, Demsetz, Eisenhardt, Jensen and Mekling
Elaboration likelihood model (ELM)	ELM is dual-process theory in which there are two routes towards persuasion: the central route and the peripheral route. By using the central route (that needs more cognitive processing) or the peripheral route (that requires less cognitive processing) the attitudes of individuals are changed and different judgements are made (Petty and Cacioppo, 1986).	Psychology	Petty and Cacioppo
Expectation-confirmation theory (ECT), also called <i>expectation disconfirmation theory</i>	In ECT, it is assumed that consumer satisfaction is the result of expectation and expectancy disconfirmation. The expectations, together with the perceived performance, influence on the consumers' satisfaction after purchase. The disconfirmation is assumed to affect the satisfaction, i.e. positive disconfirmation leads to satisfaction and negative disconfirmation results in dissatisfaction or low satisfaction. Finally, the degree of satisfaction influences attitudes and intentions of the consumer to purchase or not purchase a product (Oliver, 1980).	Marketing, consumer behaviour	Oliver
Extended parallel process model (EPPM)	The EPPM includes four perceptions of human being to predict the outcome of human behaviour in the communication process: self-efficacy (the perception of the competency to perform a task), response efficacy (the perception of risk control after	Speech communication	Witte

(continued)

**Table 4.** (continued)

Model / theory	Short summary of model or theory	Originated discipline	Theorist(s)/ developer(s)
Extended valence framework (EVF)	doing an action or task), susceptibility (the perception of the individual towards the impact of threat on him), and severity (perception regarding the harshness of health threat or disease) (Witte, 1992). EVF was developed based on the theory of reasoned action (TRA) and the Valence Framework. In EVF, trust directly influences purchase intention, and indirectly (as a moderator) on perceived risk and perceived benefit. Perceived risk and perceived benefit have direct effects on the intention to use. Finally, actual purchases of users are predicted by intention to purchase by consumers (Kim et al. 2009).	Economics and Psychology	Andersen
Health belief model (HBM)	HBM is a psychological model that is focused on predicting health behaviour of individuals. The behaviour (act on health information or change in decision) is influenced by individuals' cognitive factors. In HBM, the individuals' perceptions (perceived susceptibility/seriousness of disease) affect the modifying variables (perceived threat of the health problem) and finally lead to likelihood of action (behavioural change or action) (Green and Murphy, 2014).	Social psychology	Rosenstock, Hochbaum, Kegeles and Leventhal
Information integration theory (IIT), also called <i>integrated information theory</i>	The IIT explains conscious experience of complex systems. It claims that 'consciousness is integrated information' and the amount of this consciousness is dependent on the amount of integrated information produced by a set of elements. The quality of experience is determined by a collection of informational relationships generated within a complex system (Tononi, 2008).	Psychology	Tononi
IS continuance model	This model was proposed based on the expectation-confirmation theory (ECT). It claims that users' level of satisfaction with initial information systems' use (i.e. expectation of the information system and confirmation of expectation) is positively associated with their information system continuance intention, that is users' intention to continue using e.g. the online banking system. The amount of confirmation of users is positively associated with their satisfaction with information systems and their perceived usefulness. Perceived usefulness of information system affects the IS continuance intention by the user (Bhattacharjee, 2001).	Management, online banking use	Bhattacharjee

(continued)

**Table 4.** (continued)

Model / theory	Short summary of model or theory	Originated discipline	Theorist(s)/ developer(s)
Mongeau and Stiff model	The Mongeau and Stiff Model was developed based on the criticism of the Elaboration Likelihood Model (ELM). In this model, the issue involvement influences website credibility judgements by users and subsequently influences attitudes and intentions to use the received information (Mongeau and Stiff, 1993).	Communication	Mongeau and Stiff
Protection motivation theory (PMT)	In PMT, the perceived threat severity along with the perceived threat vulnerability affects the fear, results in protection motivation (threats for which there is an effective recommended response that can be performed by individuals), and finally leads to security-related behaviours (Boer and Seydel, 1996).	Health communication and social psychology	Rogers and Prentice-Dunn
Social cognitive theory (SCT)	Founded on Model of Causation, the SCT assumes human behaviour as mutual interactions between three entities: person, behaviour and environment. The person-behaviour interaction includes personal features such as thoughts and actions. The person-environment interaction focuses on human beliefs and competencies that are modified or changed by social factors in a context. Finally, the environment-behaviour interaction considers the relationships between a person's behaviour and the environment and their dual influences on each other (Bandura, 1989).	Psychology	Bandura
Technology acceptance model (TAM)	TAM is focused on the behavioural intention to use a system or product. This theory was adapted from the Theory of Reasoned Action (TRA). TAM assumes that peoples' intention to use a system is dependent on the perceived usefulness (the individual's belief that using a system will develop his or her job performance) and the perceived ease of use of the system (perceived degree of usability of a system by an individual). Perceived ease of use influence on perceived usefulness, and the user's behavioural intention to use the system influence on his or her actual use of the system (Venkatesh and Davis, 2000).	Information systems	Davis
Theory of reasoned action (TRA)	In TRA, the attitudes toward act or behaviour (i.e. the positive or negative feelings regarding performing an action), alongside the subjective norms (i.e. the beliefs of other individuals, that are important to the user, about performing a task or an action), affect the behavioural intention to use a system	Social psychology	Fishbein and Ajzen

(continued)



**Table 4.** (continued)

Model / theory	Short summary of model or theory	Originated discipline	Theorist(s)/ developer(s)
Transaction cost economics (TCE), also called <i>transaction cost theory</i>	and the final behaviour of the user regarding the system (Larsen et al., 2016). In TCE, the uncertainty and asset specificity directly or indirectly (through influencing the transaction cost) influences on the acceptance of the transaction. Transaction costs consist of different costs, such as search and information costs, bargaining costs, and policing and enforcement costs (Walker and Weber, 1984).	Economics	Coase, Williamson, Klein, Crawford and Alchian
Toulmin's model of argumentation (TMA)	TMA is based on the elements of an argument. It was proposed to strengthen the effects of trust-assuring arguments on consumer trust in an Internet store. Based on this model, three types of arguments are commonly used in daily communications: Claim, Data (the grounds for a claim), and Backing (the reasons of accepting the data) (Kim and Benbasat, 2006).	Philosophy	Toulmin

**Table 5.** Statistical analyses and model accountability of reviewed studies.

Study	Statistical approach/test	Dependent variable	Model R <sup>2</sup>
(Harris et al., 2011)	Structural equation modelling	Readiness to act on online health advice	0.49
(Hong, 2006)	Structural equation modelling	Intention to revisit a health infomediary website	0.23 for general search 0.24 for specific search
(Johnson et al., 2015)	Structural equation modelling	Trust judgements regarding online health information	0.536
(Liang et al., 2005)	Structural equation modelling	Intention to use online prescription filling	0.36
(Lim and Kim, 2012)	Structural equation modelling	Trust in online health information	0.397 for high-trust group 0.253 for low-trust group
(Lim et al., 2011)	Hierarchical regression analysis	Intention to use mobile apps for seeking health information	0.44
(Mou and Cohen, 2014a)	Structural equation modelling	Intention to use online health infomediary	0.65
(Mou and Cohen, 2014b)	Structural equation modelling	Intention to use online health services	0.44
(Song and Zahedi, 2007)	Structural equation modelling	Intention to use online health infomediaries	0.39
(Yi et al., 2013)	Multiple comparison test	Trust in online health	0.69
(Yun and Park, 2010)	Structural equation modelling	Intention to use health website to get disease information	Not reported.
(Zahedi and Song, 2008)	Structural equation modelling	Trust attitudes regarding health website	0.65 in Time 1 0.52 in Time 2

studies and psychology the  $R^2$  value of under 0.50 is acceptable (Frost, 2013) because of the complexity of predicting human behaviour.

## Conclusion

First, the current review draws a general picture of what has been done in modelling trust in the online health context until now. This may be useful for health information behaviour researchers searching for theoretical frameworks and research designs for their research.

Second, based on the assumption that predicting human behaviour (specifically in social science and psychology) is harder than establishing relationships of physical objects (in natural sciences) and the low  $R^2$  values of the estimated models in the current review (under 0.50) is acceptable, it can be said that most of models in this review had relatively good prediction power and model accountability.

Third, the information search process is not static (Xie, 2011). Trust is evolutionary and it evolves over time. As Magrath and Hardy (1989: 393) state, trust is an 'ongoing' process, in which trust relationships develop 'continuously'. However, most of the models included in this review regard the information seeking and search as a static process that happens between the user and the system, and suggest that the users just formulate a single type of query in the search process. Thus, it is recommended that future researchers consider the dynamics of both trust formation and the information search process.

Fourth, the theory-driven models in this study have applied a broad range of theories to investigate the trust in an online health context, and it shows the complexity of health information-seeking behaviour and the need for multidisciplinary frameworks to target the issue (Marton and Choo, 2012). Nearly half of the applied theories in the current review were adapted from the psychology domain. This can be explained by the 'functionalist' perspective that assumes the individuals' 'cognitive processes' are equivalent to their interactions with systems (Capurro and Hjørland, 2003). As Capurro and Hjørland (2003: 367) clarified, psychology is a connector between 'natural sciences', 'humanities' and 'social sciences', in which the information plays a dominant part, and this emphasis finally shaped the 'information-processing paradigm'. The focus on cognitive processing of information has influenced the information behaviour modelling too. However the cultural belongings (along with the individuals' characteristics) are among the predictors of information behaviour, and the cultural differences of information

consumers lead to different information use and perceptions in the digital sphere. For example, Chau et al. (2002) found that the Internet use behaviour of Hong Kong consumers (with value preferences for shared loyalty and relationships), is different from that of USA consumers (that have value preferences for personal competence and loyalty to oneself). Moreover, these cultural differences influence the perceptions of information systems use and outcomes too (Calhoun et al., 2002; Leidner et al., 1999). As an example, Calhoun et al. (2002) found differences in IT use patterns between consumers of higher context cultures (Korea) and lower context cultures (USA). Furthermore, time-orientation as a cultural value is an influencing factor on information selection preferences in online environments. For instance, Rose et al. (2003: 38–40) showed that the people from so called 'polychromic cultures' (e.g. Egypt and Peru), who like to do multiple things at the same time, had different concerns regarding website 'delays' in comparison with people of 'monochromic cultures' (e.g. United States and Finland) who tend to do just one thing at a time. Therefore, considering the socio-cultural and ecological theories – such as the cultural dimensions of Hall (1976) and Hofstede (1980) – in future modelling of trust in online health systems will enrich the current models that were mostly focused on intention to use an online health system on an individual level, and it will supplement the individualistic perspective of models with a socio-cultural perspective that altogether shape the information behaviour of people in a surrounding context.

Fifth, trust formation in the online environment is very complex. It involves different interactions with systems, sources and information. Hence, we need more investigations on other aspects rather than the intention to use. For example, little is known on information rejection, mistrust and information avoidance behaviour of health consumers. There are different 'socio-cultural barriers' in the information-seeking process that possibly influence trust in online health information. Savolainen (2016: 57) has categorized these barriers into six main types ('language problems, social stigma and cultural taboos, small-world related barriers, institutional barriers, organizational barriers, and the lack of social and economic capital'), and mentions the negative influence of these barriers on information access and evaluation by users. Considering these barriers in following trust studies will help to better understand the issue.

Finally, based on the current review, it is not evident what will happen to individuals when they trust online health information, and what they really do after trusting the retrieved or exposed information. It is important to explore the post-trust decisions of

consumers regarding online health information in future modelling. This step is necessary because acting on information retrieved from inappropriate sources may lead to irreparable consequences for consumers of health systems in a digital world.

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