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# **Gender as an influencer of online health information seeking and evaluation behaviour**

by

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## **Abstract**

This article contributes to the growing body of research that explores the significance of context in health information behaviour. Specifically, through the lens of trust judgements, it demonstrates that gender is a determinant of the information evaluation process. A questionnaire-based survey collected data from adults regarding the factors that influence their judgement of the trustworthiness of online health information. Both men and women identified credibility, recommendation, ease of use, and brand as being of importance, in their trust judgements. However, women also take into account style, whilst men eschew this for familiarity. In addition, men appear to be more concerned with the comprehensiveness and accuracy of the information, the ease with which they can access it and its familiarity, whereas women demonstrate greater interest in cognition, such as the ease with which they can read and understand the information. These gender differences are consistent with the demographic data, which suggest that: women consult more types of sources than men; men are more likely to be searching in respect of a long-standing health complaint; and, women are more likely than men to use tablets in their health information seeking. Recommendations for further research to better inform practice are offered.

**Keywords:** gender; trust; credibility; online health information, information seeking, information behaviour.

## **Introduction**

People are increasingly seeking health information and advice online. For example, statistics from Pew Research show that nowadays one in three adults in the US go online to try to identify a diagnosis or to know more about a health complaint (Fox & Duggan, 2013). In addition, for the UK, a report from Oxford Internet Surveys indicates that the number of people going online to seek health information has doubled since 2005 (from 37% to 69%, Dutton & Blank, 2013). Hence, the Internet is an important source of health information and advice, and the information obtained may have a significant effect on healthcare decisions and outcomes (Fox, 2011; Xiao, Sharman, Rao, & Upadhyaya, 2014) and reduce anxiety and depression whilst increasing feelings of self-efficacy and empowerment (Powell, Inglis, Ronnie, & Large, 2011; Sillence, Briggs, Harris, & Fishwick, 2007a; Ybarra & Suman, 2006). Powell, Inglis, Ronnie, and Large (2011) suggest that online information is used to educate, reassure, and to sometimes challenge information received from health professionals. However, health information seekers encounter a plethora of different web-based and other sources of health information, from a variety of organisations and individuals, and of varying quality, accuracy and reliability (Eysenbach & Kohler, 2002; Fergie, Hunt, & Hilton, 2013; Kitchens, Harle, & Li, 2014). This presents individuals with significant challenges in evaluating and selecting the sources to use, and more specifically in assessing the credibility and trustworthiness of those sources (Corritore, Wiedenbeck, Kracher, & Marble, 2012; Gray, Kelin, Noyce, Sesselberg, & Cantrill, 2005; Metzger & Flanagin, 2013). Yet, in health information seeking, source evaluation is especially important since the information or advice gleaned may have a significant effect on health-related behaviour and decisions (Kitchens, Harle, & Li, 2014; Zhang, 2014). Furthermore, research

suggests that ‘meagre information evaluation skills add to consumers’ vulnerability’ (Cline & Haynes, 2001, p. 671) and that individuals with higher eHealth literacy gain more positive outcomes from health information search including improved self-management of health care needs, and more effective interactions with their physician (Neter & Brainin, 2012). In addition, Stvilia, Mon, and Yi (2009) found that consumers may lack the motivation or literacy skills to evaluate the information quality of health web pages, and Chen, Lee, Straubhaar, and Spence (2014) suggest that digital inequalities may influence the extent of individual’s health information repertoires. Hence, research that enhances understanding of the factors that influence the evaluation and selection processes associated with digital health information is important, and can inform the design of information literacy programmes, health information content, health information systems, and the design of the interaction between patients and healthcare professionals.

Existing research suggests that there are a number of factors that come into play in source selection, including source-related (e.g. quality, accessibility, trustworthiness) and user-related factors (e.g. age, gender, health status). Amongst user-related factors, gender has been widely identified as an influencer of health information behaviour (e.g. Powell, Inglis, Ronnie, & Large, 2011; Hallyburton & Evans, 2014; Stern, Cotton, & Drentea, 2012). Others have suggested that these differences arise from gendered roles and contexts (Lorence, Park, & Fox, 2006; Powell, Inglis, Ronnie, & Large, 2011; Stern, Cotton, & Drentea, 2012). However, much of the previous research on health information behaviour is descriptive in nature, focussing on sources selected, frequency of use, searching for themselves or others, and the impact of the internet on health (Lorence, Park, & Fox, 2006; Powell, Inglis, Ronnie, & Large, 2011) rather than evaluation processes associated with that selection. In addition, many of the studies that link gender and health information behaviour are qualitative studies based on women only groups of participants (Genuis, 2012; Rubenstein, 2014; Sillence, Briggs, Harris, & Fishwick, 2007b). Accordingly, there is scope for a more analytical approach to understanding online health information evaluation, and for research comparing the health information behaviour of men and women. This study draws on previous theory and research in the area of trust judgements relating to digital information seeking as a basis for exploring aspects of the differences between men and women in their health information seeking behaviours. Previous research has proposed that credibility and trust are important influencers of the use of the internet for information on personal health (Harris, Sillence, & Briggs, 2011; Kelton, Fleischman, & Wallace, 2008; Lemire, Pare, Sicotte, & Harvey, 2008). In addition, a range of factors that might contribute to trust judgements have been identified, including design factors and content factors (e.g. Sillence, Briggs, Harris, & Fishwick, 2007b; Rowley, Johnson, & Sbaffi, 2014). However, although some do examine the role of trust in the health information behaviour of women (e.g. Genuis, 2012; Harris, Sillence, & Briggs, 2011), none of these studies undertakes a comparative study of the effect of gender on information evaluation. Hesse et al. (2005) is the only study to examine the effect of gender on trust judgements in health information seeking, but this study does not explore the antecedents to trust in any depth.

This article contributes to the growing body of research that demonstrates gender is an influencer of health information behaviour. By so doing, it contributes to understanding of the role of context in shaping information behaviour. Specifically, the aim of this research is to use the lens of trust judgements, supported by information on other aspects of health information behaviour, to demonstrate that gender is a determinant of the information evaluation process. The research objectives are to:

1. Identify the factors that influence trust judgements in online health information seeking, for men and women, respectively.
2. Discuss the differences in trust judgements between men and women.
3. Identify other differences in health information seeking behaviour between men and women, to inform discussion regarding the context of trust judgements.

Next, prior research into gender and information seeking behaviour is explored and summarised, followed by theoretical and empirical perspectives on trust formation in digital information evaluation. An outline of the survey-based methodology is then presented, together with a profile of the participants. The findings and discussion section reports and comments on the trust scales for men and women, respectively, and offers additional analysis on other aspects of information behaviour. The conclusions and recommendations summarise the contribution of the research and offer an agenda for further research.

## **Literature Review**

### Gender and other demographic factors as influencers of information behaviour

Various studies have demonstrated that gender, together with other factors, such as age, income and education, may influence health information behaviour. Indeed, evidence suggests that being female, younger, and having a higher level of educational attainment are all associated with more frequent health related use of the Internet (Atkinson, Saperstein, & Pleis, 2009; Fox & Jones, 2009; Hale, Cotten, Drentea, & Goldner, 2010; Powell, Inglis, Ronnie, & Large, 2011; Sillence, Briggs, Harris, & Fishwick, 2007a; Ybarra & Suman, 2006). Complementing this, Kim (2015) found that inactive health information seekers were: younger, male, highly educated, white and from high income households. Some researchers have specifically considered the influence of gender alongside other demographics. Amongst cancer survivors, Mayer et al. (2007) found that, significant predictors of information seeking included: age (less than 65), gender (female), income (high), and having a regular health care provider. Lorence, Park, and Fox (2006), using data from the 2002 Tracking Survey of the Pew Internet and American Life Project, showed that health information seeking behaviour is associated with gender, age, race and ethnicity, internet experience, and two factors relating to health status. Dobransky and Hargittai (2012) suggest that health information seeking is a function of socio-economic status, or 'health lifestyles', which are determined not only by a combination of demographic factors, but by the interactions between them. Sillence, Briggs, Harris, and Fishwick (2007b) found that women were the predominant users of the Internet for health advice, whilst Percheski and Hargittai (2011) and Smith (2011) suggest that this gendered behaviour is already established in young adulthood. Indeed, Smith (2011) suggests that women are more likely than men to consult both the Internet and health professionals,

and furthermore are significantly more likely to trust these various information sources. A recent study by Hallyburton and Evans (2014) shows that whilst males are more active Internet users than females, females are more likely to engage in health information seeking online.

Whilst the majority of searches are for information relating to the searchers' own health (Atkinson, Saperstein, & Pleis, 2009; Powell, Inglis, Ronnie, & Large, 2011), many people also conduct searches on behalf of others (Fox & Jones, 2009). This behaviour is significantly related to gender, with women more likely than men to seek information for someone else (Lorence, Park, & Fox, 2006; Powell, Inglis, Ronnie, & Large, 2011; Rutten, Arora, Bakos, Aziz, & Rowland, 2005). Studies have shown that women's health information seeking encompasses the health of children, spouses and parents (Ramirez, Leyva, Graff, Nelson, & Huerta, 2015), and that they undertake a health information intermediary role on behalf of family members and others in their personal networks (Harris & Wathen, 2007; Wathen & Harris, 2007). Stern, Cotton, and Drentea (2012) suggest that women's traditional role as gatekeeper of the family's health, compounded for some by their role as a parent, leads to a higher level of engagement in health information searching, and in the use of that information (Warner & Procaccino, 2004). Parenting is a typically a gendered activity (Walzer, 1998), and there is evidence that suggests that mothers find social, emotional and instrumental support through the use of online health message boards (Drentea & Moren-Cross, 2011; Ley, 2009). Wathen and Harris (2007) suggest that such emotional support is a key component of health information seeking, whilst, Myrick, Willoughby, and Verghese (2015) view emotion as a motivator for health information seeking. Stern, Cotton, and Drentea (2012) and Ybarra and Suman (2006) both argue that to understand the gender divide in health information behaviour it is important to consider the wider context in which this information seeking is occurring. This aligns with the stance adopted by Hupfer and Detlor (2006) and Riedl, Hubert, and Kenning (2010), who both invite consideration of the nature of gender that extends beyond a mere reporting of sex. Hupfer and Detlor (2006) suggest that to understand gender differences in web information seeking, it is important to view gender as a composite of sex and the gender-related self-concept traits of self- and other-orientation. In addition, in respect of trust formation, in an fMRI study of perceived trustworthiness of eBay offers, Riedl, Hubert, and Kenning (2010) demonstrate a neuro-biological difference between men and women; the brain areas that encode trustworthiness differ between women and men, and women activate more brain areas than men.

Hesse et al. (2005) is the only study to examine the effect of gender on trust judgements in relation to health information sources. The study used data from the Health Information National Trends Survey (US) to explore the level of trust associated with different information sources. Respondents expressed a high level of trust for information provided by physicians, but were more ambivalent as to the trustworthiness of the Internet. Whilst this study does not delve into the nature or influencers of trust, it did find that trust in health information was strongly age and gender dependent, and that these factors were even stronger influencers in the context of Internet information, with women being generally more trusting of most sources.

## Theoretical and empirical perspectives on trust formation in digital information selection

Many studies identify trust as one of the factors influencing health information searching. For example, Lemire, Pare, Sicotte, and Harvey (2008) found that the use of health information was influenced by the trust placed in the information, whereas Xiao, Sharman, Rao, and Upadhyaya (2014) noted that trust in online health information can affect frequency of search, and diversity of information usage. However, despite the evidence of the significance of importance of trust, only a few studies offer deeper insights into trust formation in online health information seeking. Amongst these is Sillence, Briggs, Harris, and Fishwick (2007b), who, in their diary study on patient use and evaluation of online health information, found that the factors contributing to the selection and trust of web sites can be divided into design factors (clear layout, good navigation aids, interactive features), and content factors (informative content, unbiased information, clear, simple language). These findings are consistent with Fogg et al. (2003)'s large scale qualitative study which investigated users' evaluation of the credibility of web sites in ten categories, one of which was health. Key themes included design look, information design/structure, and information focus. Other researchers have conducted quantitative studies, which provide greater opportunities to test relationships between trust and its associated influencers. For example, Harris, Sillence, and Briggs (2011) proposed and tested a predictive model of trust in internet-based health information and advice, with information quality, personalisation, impartiality and credible design as antecedents to trust, and corroboration and threat as mediating variables. In addition, Corritore, Wiedenbeck, Kracher, and Marble (2012) showed that trust in health websites was significantly explained by students' perceptions of website credibility, ease of use and risk, whilst Robins, Holmes, and Stansbury (2010) demonstrated that visual design judgements correlate with credibility ratings of health information websites. Recently, Rowley, Johnson, and Scaffi (2014) have developed a scale that shows that authority, style, content, usefulness, brand, ease of use, recommendation, credibility and verification are all influencers of trust formation in online health information seeking.

Other studies on trust online, but not specifically in the health domain offer further insights into the factors that affect trust or credibility formation. For example, Rieh and Hilligoss (2008)'s interview-based study identified current knowledge on the topic, quality control mechanism (refereeing, editing), and verification (through using multiple sources and co-referencing) as key processes in evaluation. Hargittai, Fullerton, Menchen-Trevino, and Yates Thomas (2010), in a large mixed method study of first year undergraduate students, found the following to be pivotal to credibility assessment: identifiability of information, currency, other sources for validation, whether fact or opinions are presented, authorship, and linking sites. In Iding, Crosby, Auerheimer, and Klemm (2009)'s study students were found to associate credibility with information focus or relevance, educational focus, and name recognition and, recognised that information might be wrong on the basis of corroboration with other web sites, own expertise, information focus, information design, and bias. Usefully, on the basis of a review of research into trust formation and credibility evaluation, Metzger and Flanagin (2013) suggest that the heuristics applied by users relate to reputation, endorsement, consistency, self-confirmation, expectancy violation and persuasive intent.

However, it is also important to acknowledge that trust and credibility formation is not only a function of information characteristics, but is also influenced by user characteristics such as domain expertise, information skills, and source experience (Lucassen & Schraagen, 2011; Wathen & Burkell, 2002).

### Summary and contribution

Online health information use is becoming an increasingly important activity in health promotion and supporting self-management of health issues. Research shows that men and women adopt different health information seeking behaviours, but does not explore gender differences relating to the evaluation and formulation of trust judgements regarding online health information sources. Informed by previous contributions regarding trust formation in digital environments, this study addresses this research gap by undertaking a comparative study of the influencers of trust formation for men and women, respectively. Influencers included in this study were: authority, content, style, usefulness, brand, ease of use, recommendation, credibility, triangulation, and familiarity. Through this lens, insights regarding the role of gender in health information seeking emerge, which invites further discussion and exploration of the role of context and user characteristics in health information seeking.

This article first focuses on the effect of gender on trust formation in health information behaviour, and later explores aspects of context some of the broader information behaviours that may contribute to this. The central propositions explored in this study are:

Proposition 1: Gender affects trust formation in digital health environments.

Proposition 2: Women are more proactive in health information seeking than men.

Proposition 2a: Women consult a wider range of health information sources in the process of health information seeking than do men.

Proposition 2b: Women are more likely than men to undertake a search in respect of a less serious complaint.

Proposition 2c: Men are more focused in their health information seeking than women.

Proposition 2d: Women are more likely than men to access health information using mobile devices.

## **Methodology**

### Research design

A questionnaire-based survey was conducted to identify the antecedents to trust in health information seeking, and to profile other selected aspects of health information seeking. Survey-based research designs have been used in other studies on online trust formation (e.g. Fogg et al., 2003; Hargittai, Fullerton, Menchen-Trevino, & Yates Thomas, 2010) and on health information behavior (e.g. Sillence, Briggs, Harris, & Fishwick, 2007a,b; Smith, 2011;



Zulman, Kirch, Zheng, & An, 2011) to generate sufficiently large datasets to facilitate profiling a population and conducting sophisticated statistical analysis.

The questionnaire was based on one used in earlier surveys conducted by the same research group (Rowley, Johnson, & Sbaffi 2014; Rowley, Sbaffi, & Johnson, 2015), but adapted to provide a more extensive set of demographic information. The main body of the questionnaire included 55 five-point, Likert-scale statements covering the ten factors that were deemed, on the basis of previous research as summarised in the literature review, to be potential antecedents of trust formation in the context of digital health information sources. Items were included for authority, content, style, usefulness, brand, ease of use, recommendation, credibility, triangulation, and familiarity. Prior to the rating of the Likert-like statements, respondents were asked to think about an incidence when they had recently searched online for health or medical information and indicate whether their search was caused by a health complaint they or a member of their family were experiencing or simply general interest. Subsequently, they were asked to indicate, on a scale from 1 to 10, how trustworthy they judged the information found online in that instance to be. Additional questions confirmed if the interest in the selected health topic was recent or long standing and if the respondent had consulted other sources as well as the internet (e.g. GP, Medical Specialist, etc.) in relation to this health matter. At the end of the questionnaire, participants were asked about their disposition to trust and their health status, before being asked to provide basic demographic data (including gender, age, occupation and education) and data on their online behaviour (such as technology used and frequency in accessing the internet).

The questionnaire was piloted with a small sample of people representative of the target population to remove inconsistencies and to improve its readability and design.

### Participants

Participants to this study were recruited through a UK survey solutions company among regular internet users across a variety of educational and employment backgrounds, all above 22 years of age. Respondents were contacted by email, which directed them by hyperlink to the online questionnaire. The online survey was designed so that only complete questionnaires were accepted. The survey was sent to about 2,000 email addresses and a total of 484 questionnaires were returned (24% response rate), 13 of which were deemed unusable, leaving 471 responses for analysis.

As shown in Table 1, 54.4% of respondents were female and 45.6% were male, providing a reasonably balanced gender distribution. All age groups were also well represented and the age categories indicated in the table provide an overview of the sample. In addition, about 55% of the participants were employed or self-employed and 62% had “A” level education or above. On frequency of use of the Internet, 91% of the respondents use the internet many times every day. In terms of health status, 67% of the respondents considered themselves to be healthy, about 25% reported a major personal health issue and another 26% admitted to having a member of their family afflicted by a major health issue.

Table 1. Participant demographics.

	<b>Categories</b>	<b>Total no.</b>	<b>%</b>
<b>Age</b>	22-30	66	14.0
	31-40	86	18.3
	41-50	114	24.2
	51-60	97	20.6
	61+	108	22.9
<b>Gender</b>	Males	215	45.6
	Females	256	54.4
<b>Employment status</b>	Student	14	3.0
	Employed	221	46.9
	Self-employed	37	7.9
	Homemaker	48	10.2
	Not employed	26	5.5
	Retired	95	20.2
	Unable to work	30	6.4
<b>Education</b>	Below GCSE*	32	6.8
	GCSE*	150	31.8
	“A” level**	98	20.8
	Undergraduate degree	128	27.2
	Postgraduate degree	63	13.4

\* UK GCSE corresponds to GED qualification in US and Canada and Certificate of Education in Australia.

\*\* UK “A” level corresponds to AP qualification in US and Canada and HSC in Australia.

Table 2 summarises some aspects of the critical health information seeking incident the respondents were asked to think about before completing the survey.

Table 2. Critical health incident profiles.

	<b>Categories</b>	<b>Total no.</b>	<b>%</b>
<b>Level of involvement</b>	General interest	198	42.0
	Not serious	175	37.2
	Serious	98	20.8
<b>Interest in topic</b>	Recent	335	71.1
	Long standing	136	28.9
<b>Additional sources Consulted</b>	General Practitioner	257	54.6
	Medical Specialist	124	26.3
	Other health prof.	72	15.3
	Friends & family	136	28.9
	Social media	19	4.0
	No-one	105	22.3
	Can’t remember	16	3.4

The main reason for the health search was reported as “general interest” in 42% of the cases and due to some kind of complaint in 58% of the cases; 71% confirmed that the interest in the

health topic had only been recent. Almost 55% of the people had consulted a GP in addition to their online query, whilst 29% had also consulted “friends and family”.

## Findings

### Trust formation – Confirmatory Factor Analysis

Data were entered into IBM SPSS Statistics 22. Each of the two datasets, for males and females respectively, were subjected to Principal Component Analysis (PCA) and Confirmatory Factors Analysis (CFA) in turn, in order to explore differences between the factors that affected the formation of trust judgements of male and female respondents. PCA was used to test that items loaded onto the predicted factors, and to calculate the contribution of each factor to trust formation. CFA was used to further verify the factor structure and to determine the adequacy of model fit to the data (Schmitt, 2011). CFA was also conducted on other demographic variables (i.e. age, education, and employment status and sector of employment), but results were inconclusive.

To verify the suitability of both the male and female datasets for CFA, their Cronbach’s Alpha coefficients were calculated. With a value of 0.971 for the males and 0.955 for the females, the reliability of the scale was confirmed (Bryman & Bell, 2011). The KMO Measure of Sampling Adequacy was 0.922 for the males and 0.926 for the females, greater than the recommended value of 0.6 and the Bartlett’s Test of Sphericity was statistically significant at the .000 level (Tabachnick & Fidell, 2007). Item Reliability (IR) ranged from 0.71 to 0.95 for the males and from 0.72 to 0.99 for the females, all exceeding the acceptable value of 0.5 (Hair, Black, Babin, & Anderson, 2010). Composite Reliability (CR) for the male factors ranged from 0.77 to 0.95 and from 0.79 to 0.95 for the female factors, with all the values above the 0.60 benchmark (Bagozzi & Yi, 1988). Finally, the Average Variance Extracted (AVE) ranged from 0.62 to 0.87 for the males and from 0.66 to 0.90 for the females, all exceeding the threshold value of 0.5 (Fornell & Larcker, 1981), showing that these items were empirically distinct. Together these indices showed that both models had an appropriate level of reliability, convergent validity, and determinant validity (Tables 4 and 5).

The fitness measures for the males and female measurement models are shown in Table 3. These include: GFI (Goodness of Fit Index), AGFI (Adjusted Goodness of Fit Index), NFI (Normalised Fit Index), CFI (an incremental fit index of improved NFI) and RMSEA (Root Mean Square Error of Approximation). Since all of the fit measures fall into acceptable ranges, the proposed models provide a suitable fit.

Table 3. CFA Models Fit Statistics.

Fit index	Male Model	Female Model	Recommended Value	Suggested by authors
TLI	0.968	0.967	>0.95	Hair, Black, Babin, and Anderson (2010)
CFI	0.976	0.977	>0.95	Hu and Bentler (1999)
RMSEA	0.059	0.059	<0.06	Hu and Bentler (1999)
Chi-square/d.f.	1.790	1.933	<3	Hair, Black, Babin, and Anderson (2010)
NFI	0.948	0.955	>0.9	

GFI	0.913	0.936	>0.8	
AGFI	0.869	0.894	>0.8	

Table 4. Results of CFA – Men.

Factor	Item	Mean	IR	CR	AVE	Variance %
<b>1</b> Credibility/Content	CR4 - The quality of the information	4.51	0.91			39.98
	CR3 - The impartiality of the information	4.39	0.88			
	CR1 - Whether I feel I can believe the information	4.41	0.87			
	CR2 - The objectivity of the information	4.34	0.87			
	CR5 - The extent to which the source contains facts rather than opinions	4.43	0.86	0.95	0.73	
	CO2 - The comprehensiveness of the information	4.52	0.78			
	CO4 - The accuracy of the information (such as the absence of errors)	4.47	0.78			
<b>2</b> Recommendation	RE6 - My friends and family use the source	3.07	0.83			13.46
	RE1 - Family and friends have recommended the source to me	3.07	0.83	0.82	0.69	
<b>3</b> Ease of Use	EU1 - How easy it was to access the information	4.09	0.92			5.19
	EU2 - How easy it was to find the information	4.16	0.89	0.90	0.75	
	EU4 - The speed with which I found the information	3.95	0.79			
<b>4</b> Brand	BR3 - The information source (e.g. website) carries advertising	3.21	0.95			3.24
	BR2 - The information source carries the logo of a well-known brand	3.07	0.92	0.93	0.87	
<b>5</b> Familiarity	FA2 - Previous positive experience with information from the same source	3.93	0.86			2.89
	FA3 - Whether the information is on my favourite health web-site that I always use	3.32	0.71	0.77	0.62	

Table 5. Results of CFA – Women.

Factor	Item	Mean	IR	CR	AVE	Variance %
<b>1</b> Credibility	CR4 - The quality of the information	4.66	0.94			34.38
	CR5 - The extent to which the	4.55	0.85	0.93	0.73	

	source contains facts rather than opinions CR2 - The objectivity of the information CR3 - The impartiality of the information CR1 - Whether I feel I can believe the information	4.50 4.52 4.64	0.84 0.82 0.82			
<b>2</b> Recommendation	RE6 - My friends and family use the source RE1 - Family and friends have recommended the source to me	3.32 3.21	0.89 0.82	0.85	0.74	11.43
<b>3</b> Style	ST3 - The clarity of the structure of the information ST2 - The ease with which I can read the information ST1 - The ease with which I can understand the information	4.55 4.48 4.52	0.89 0.88 0.85	0.91	0.76	5.49
<b>4</b> Brand	BR2 - The information source carries the logo of a well-known brand BR3 - The information source (e.g. website) carries advertising	3.28 3.32	0.99 0.90	0.95	0.90	3.53
<b>5</b> Ease of Use	EU4 - The speed with which I found the information EU5 - That the information appeared high in the search engine's ranking	4.29 3.98	0.89 0.72	0.79	0.66	2.98

#### Differences in information behaviour between men and women

Additional analyses explored any significant differences in the health information behaviour of men and women (Table 6a-d). These results confirm earlier research that suggests that men and women have different health information seeking behaviours. For clarity of interpretation, all percentages reported in the following tables add up to 100% when totalling the males and females values in each column only and not across rows. In terms of sources consulted in relation to the critical incident health topic, chi-square tests for independence (with Yates Continuity Correction) indicate significant association between gender and two of the additional sources consulted: Other health professionals  $\chi^2(1, n=471)=4.26, p=.02$  and Friends and family  $\chi^2(1, n=471)=3.83, p=.05$  (Table 6a). While the percentages of males and females consulting General Practitioners (GPs), Medical Specialists, social networks or no-one are fairly similar, females access other health professionals and family and friends for guidance and advice much more than males.

Table 6a. Additional sources consulted.

	GP	Medical Specialist	Other health professionals (*)	Friends and family (*)	Social networks	No-one
Males	44.7%	50.0%	38.9%	38.2%	52.6%	51.4%
Females	55.3%	50.0%	61.1%	61.8%	47.4%	48.6%

Chi-square value	0.11	1.06	4.26	3.83	0.15	1.53
Sig.	.74	.30	.02	.05	.69	.22

(\*) significant results

Table 6b. Level of involvement.

	General interest	Not serious	Very serious	Chi-square value	Sig.
Males	51.5%	38.9%	45.9%	6.00	.05
Females	48.5%	61.1%	54.1%		

Table 6c. Interest in selected health topic.

	Recent	Long standing	Chi-square value	Sig.
Males	41.8%	55.1%	6.43	.01
Females	58.2%	44.9%		

Table 6d. Technology used to access information.

	Computer	Tablet (*)	Smartphone
Males	47.7%	37.7%	45.2%
Females	52.3%	62.3%	54.8%
Chi-square value	0.12	8.88	0.02
Sig.	.61	.00	.89

(\*) significant result

With respect to the level of involvement while performing the online search (Table 6b), 61% of females declared that a non-serious complaint was the trigger for such search against only 39% of males ( $\chi^2(1, n=471)=6.00, p=.05$ ). Also, a chi-square test for independence indicates significant association between gender and interest in health topic,  $\chi^2(1, n=471)=6.43, p=.011$  (Table 6c). About 55% of males report a long-standing interest in the health topic searched online compared to 45% of females.

Finally, in connection with the technology used to access the online health information, chi-square tests for independence have shown a significant association between gender and one of the devices used to go online: Tablet  $\chi^2(1, n=471)=8.88, p=.00$  (Table 6d). 62% of female respondents favour the use of tablets compared to only 38% of males.

## Discussion

### Trust formation

#### **Proposition 1: Gender affects trust formation in digital health environments.**

The CFA conducted on other demographic variables (i.e. age, education, and employment status and sector of employment) was inconclusive. This lends support to the argument that gender is the most important demographic differentiator of health information behaviour (Hallyburton & Evans, 2014; Lorence, Park, & Fox, 2006; Powell, Inglis, Ronnie, & Large, 2011; Sillence, Briggs, Harris, & Fishwick, 2007a).

Tables 4 and 5 present the trust formation scales for men and women, respectively. The men's measurement model consists of five factors and 16 items, explaining 65% of the total variance in trust judgements (Table 4). The women's measurement model consists of five factors and 14 items, explaining 58% of the total variance in trust judgements (Table 5).

The findings from this research align with previous research that suggests that men and women adopt different health information seeking behaviours (Powell, Inglis, Ronnie, & Large, 2011; Hallyburton & Evans, 2014; Stern, Cotton, & Drentea, 2012). But, the evidence from this study is that the differences are subtle, and that there are strong similarities in men and women's trust formation processes in the context of online health information. Specifically, Credibility, Recommendation, Ease of use, and Brand are common; women also take into account Style, whilst men eschew this for Familiarity; also the items that load onto factors are predominantly the same for men and women.

This research agrees with many other studies that trust formation involves a range of factors and that credibility is a pivotal component (Fogg et al., 2003; Harris, Sillence, & Briggs, 2011; Iding, Crosby, Auerheimer, & Klemm, 2009; Sillence, Briggs, Harris, & Fishwick, 2007a). Both of the credibility scales include the five original items for Credibility. Men's behaviour, in particular aligns with Corritore, Wiedenbeck, Kracher, and Marble (2012)'s finding that trust in health websites is strongly influenced by credibility, and ease of use. Also, the items loading onto credibility for men include two relating to information/content quality, viz comprehensiveness and accuracy. Other studies have also identified the importance of content and quality factors in influencing trust (Fergie, Hunt, & Hilton, 2013; Harris, Sillence, & Briggs, 2011; Stvilia, Mon, & Yi, 2009). The absence of content factors in the women's scale may be due to search context including role and relatively high frequency of searching (Atkinson, Saperstein, & Pleis, 2009; Fox & Jones, 2009; Hale, Cotten, Drentea, & Goldner, 2010; Powell, Inglis, Ronnie, & Large, 2011).

The second most significant factor, Recommendation, has only received occasional mention in previous studies (e.g. Hargittai, Fullerton, Menchen-Trevino, & Yates Thomas, 2010; Rieh & Hilligoss, 2008) and in an earlier study by the authors with students (Rowley, Johnson, & Sbaffi, 2014) was found to be the least significant factor influencing trust in online health information. Recommendation may align with Metzger and Flanagin (2013)'s heuristic of endorsement, and its relative importance may be related to the potential significance of the information in health-related behaviour, decisions and outcomes (Fox, 2011; Kitchens, Harle, & Li, 2014; Xiao, Sharman, Rao, & Upadhyaya, 2014; Zhang, 2014). Further, the reliance on recommendations from friends and family may be an indicator that health decisions involve family and friends. Ease of use features for both men and women, but for men it has a stronger impact on trust formation for women. Ease of use, often associated in other studies with design (Fogg et al., 2003; Robins, Holmes, & Stansbury, 2010; Sillence, Briggs, Harris, & Fishwick, 2007b), is for women associated with speed of access, whereas for men, ease of access and ease of finding information are also taken into consideration. Brand features in fourth position in both scales. In commercial settings brands are often used to cultivate trust and can be seen as indicators of quality (Hargittai, Fullerton, Menchen-Trevino, & Yates Thomas, 2010), but no other studies have explored its impact on health information seeking.

Style is the third most significant influencer for women, but does not feature at all in the men's scale. Style is composed of three items that are related to the readability and understandability of the information. Style features in many studies associated with trust formation and other aspects of digital information (Metzger, 2007; Rowley & Johnson, 2013; Sillence, Briggs, Harris, & Fishwick, 2007a; Walraven, Brand-Gruwel, & Boshuizen, 2009). Hence, the most surprising finding is not the inclusion of style for women, but its absence for men. On the other hand, Familiarity only occurs in the scale for men. It comprises two items ("previous positive experience with information from the same source" and "whether the information is on my favourite health web-site that I always use"), indicating the importance of habit in trust formation and an understanding of the information based on previous positive interaction with a particular source (Sillence, Briggs, Harris, & Fishwick, 2007a).

Differences in health information behaviour between men and women

**Proposition 2: Women are more proactive in health information seeking than men.**

Tables 6a-6d show a range of differences in the health information behaviours of men and women, and provide some context for the findings regarding trust formation behaviours. This data also confirms previous studies and offers some additional insights into the health information behaviours, which suggests that women are more active and proactive health information seekers than men.

**Proposition 2a: Women consult a wider range of health information sources in the process of health information seeking than do men.**

Table 6a shows that in general women were more likely than men to consult a wider range of sources, and are specifically more likely to consult other health professionals, and family and friends. This is in line with other studies that suggest that women are more likely than men to seek health information on the Internet (Hallyburton & Evans, 2014). Women are also likely to seek confirmation on a health issue by using several sources often using the internet alongside the advice of health professionals and family and friends (Harris & Wathen, 2007; Wathen & Harris, 2007; Warner & Procaccino, 2004), although these studies do not compare men and women. One study that does offer a comparison between men and women is Ramirez, Leyva, Graff, Nelson, and Huerta (2015), which suggests that 70% of the calls to a radio health information programme were from women.

**Proposition 2b: Women are more likely than men to undertake a search in respect of a less serious complaint.**

Table 2b shows that of the searches considered in completing this questionnaire, women were much more likely than men to reporting on a complaint that is in the 'not serious' category. This is in line with previous studies that suggest that women are often in charge of monitoring their family's health (Drentea & Moren-Cross, 2011; Stern, Cotton, & Drentea, 2012) and acting as a health information intermediary on behalf of others (Fox & Jones, 2009; Harris & Wathen, 2007; Wathen & Harris, 2007), which usually involves addressing minor complaints and searching remedies for common conditions. Moreover, females tend to look after their own wellbeing more actively than males (Warner & Procaccino, 2004).



**Proposition 2c: Men are more focused in their health information seeking than women.**

Table 6c suggests that men's health information seeking is more focused on long-standing complaints. This is consistent with the findings of a study on the acceptability of self-management support for men with long term conditions shows that "men place a high value on receiving health information and education in order to develop their capacity and 'become an expert' in their condition" (Galdas et al., 2014, p. 14). It may also be consistent with research that suggests that men are less active information seekers (Hallyburton & Evans, 2014; Kim, 2015).

**Proposition 2d: Women are more likely than men to access health information using mobile devices.**

Table 6d shows that women exhibit a much higher level of use of tablet devices than men for accessing health information. A recent eMarketer report (2013) demonstrates that the use of portable devices has grown amongst women in recent years. According to this research, 61% of women ages 25 to 49 in the US use tablets to go online while 55% of men from the same age group still prefer a computer. This discrepancy could be due to the fact that women are more likely to use mobile devices in their everyday tasks, while men are more likely to use them for leisure activities (Müller, Gove, & Webb, 2012). It also implies that health information seeking is more integrated into everyday life for women than it is for men, consistent with women's role as gatekeeper of the family's health (Stern, Cotton, & Drentea, 2012) and their higher level of use of friends and family as a source of advice (Harris & Wathen, 2007).

**Conclusion and recommendations**

Using the lens of trust judgements, this research extends the understanding of gender-based differences in the evaluation of online health information sources. In particular, the research shows that the factors that influence trust judgement in relation to online health information vary between men and women. This is consistent with previous research on gender and health information behaviour, and the differing roles of men and women in regarding health information seeking. More, specifically, whilst both men and women identified the centrality of credibility, followed by recommendation, in their trust judgements, three other factors varied between genders. In order of importance, for women, these factors were style, brand, and ease of use, whereas for men they were ease of use, brand, and familiarity. Also, taking into account differences between item loadings onto ease of use and credibility between men and women overall, men appear to be more concerned with the comprehensiveness and accuracy of the information, and the ease with which they can access it; they also regard familiarity as important. Women, on the other hand, demonstrate greater interest in cognition, such as the ease with which they can read and understand the information. These gender differences are also echoed in the findings from demographic data, which suggest that: women consult more different types of sources than men; men are more likely to be searching in respect of a long-standing health complaint; and, women are more likely than men to use tablets in their health information seeking. Broadly, it is likely that the interplay between

demographic factors (including gender) and context on the health information seeking behaviour, in general, and the formation of trust judgements, more specifically, is complex. Further understanding of these processes is important for health promotion, the design of health information content, self-management support interventions and health portals and the training of health professionals. Hence, we identify the following areas for further research:

#### Qualitative studies to generate deeper insights into trust formation

This study used a quantitative survey approach, which whilst it has the advantage of profiling of the differences between men and women, offers only limited insights into the nuances of the behaviours and judgements and the effect of the context on information seeking. More specifically, one of the limitations of the factor analysis approach adopted in this study is that much of the variance is explained by the first composite factor. Also, whilst the adoption of a critical incident approach encouraged respondents to reflect on a recent and ‘real-life’ information seeking experience, this approach means that respondents may be referring to a widely differing range of health information sources. Further studies, possibly in experimental settings, and focussed on either individual sources (e.g. NHS Choices (UK) or National Institutes of Health (US)) may offer a greater level of control over the context of the information seeking. Alternatively, adopting a focus on the cognitive heuristics that men and women adopt in information evaluation (Sillence, Briggs, Harris, & Fishwick, 2007a) and trust and credibility evaluation (Metzger & Flanagin, 2013), across a repertoire of sources, would support further exploration of the processes associated with the verification of information through triangulation across online, social media, professional, and other sources (Genuis, 2012).

#### Exploration of the relationships between demographic factors in trust formation

Secondly, this study did not reveal age to be a significant differentiator of trust formation in health information seeking. However, an earlier study by the same authors revealed a difference in trust formation in online information seeking at different stages in their study, which tends to be age-related (Rowley, Scaffi, & Johnson, 2015), but no clear distinctions in evaluation behaviours between men and women. Other studies have shown age to be an influencer of health information behaviour, in general, but offer no insights specific to evaluation or trust formation (Atkinson, Saperstein, & Pleis, 2009; Hale, Cotten, Drentea, & Goldner, 2010; Lorence, Park, & Fox, 2006; Powell, Inglis, Ronnie, & Large, 2011). Taken together the two studies conducted by the present authors might imply a tendency towards a transition to gender stereotypical behaviours at a certain life stage. There is a need for further studies that investigate any potential interactions between demographic variables in the context of the evaluation of online health information. Such studies might be beneficial in identifying digital inequalities specific to health information seeking (Chen, Lee, Straubhaar, & Spence, 2014), as a basis for health information policy development.

#### Promoting understanding of the effect of gender roles and information seeking context on trust formation

At a deeper level, further insights into the differences in information behaviour between men and women may emerge from linking findings on trust judgements and other aspects of information behaviour to gender roles, and possibly more generally, 'health lifestyles' (Cockerham, 2005). For example, women's behaviour may be influenced by their adoption of a mothering and health monitoring role and possibly within the family and amongst friends (Stern, Cotton, & Drentea, 2012; Warner & Procaccino, 2004), such that the triggers that result in men and women seeking health information are different. Men's information seeking may often be a response to immediate, perhaps perceived serious, health concerns, whereas women may adopt monitoring or 'just in case' strategies, embracing complaints with various levels of seriousness. A higher level of ongoing engagement with health issues and health information seeking is likely to enhance their information evaluation competency and domain knowledge, which, in turn can impact on information behaviour (Wildemuth, 2004). It would therefore be interesting to know more about the relative frequency of search and other specifics of search behaviour for men and women. For example, there is evidence from other areas of information seeking that experts focus more on the semantic features of the information, whilst those with less subject expertise pay more attention to surface features (Lucassen & Schrageen, 2011; 2013). However, such links between gender differences in health management behaviours and health information evaluation are speculative and more research is necessary.

Whilst this research identifies the information seeking context as a potential contributor to the different approaches to trust formation developed by men and women, we acknowledge that further research requires a clear conceptualisation of 'context' for health information seeking. Zhang (2013) reviews the various definitions of 'context', starting by quoting Dervin (2003): "there is no term that is more often used, less often defined, and when defined, defined so variously as context" (p. 112). In respect of this research it is useful to re-visit Dervin (1983)'s early definition of context as a situation bounded by time and space, where information problems arise and sense-making takes place, together with Taylor (1991)'s view of context as "information use environment", that determines "the criteria by which the value of information messages will be judged" (p. 218). Also helpful is Zhang (2013)'s health information searching model, with the following five layers: demographic, cognitive (factors related to the current search); affective (affective motivations behind the search); situational (users' perceptions of the current health condition); and, social and environmental (user's social roles, social norms, and various information channels). As discussed elsewhere in this article, the notion of gender may embrace both a demographic component and a social and environmental component. In this sense, this research has touched on trust formation in relation to these two layers of the context of information searching – but there is further work to do, in exploring both the impact of the other three contextual layers on trust formation, and other aspects, of the demographic layer, such as age, and education.

Trust formation in social contexts, including those associated with social media

Related to gender roles, is the increasing interest and developing knowledge base regarding the role of social media in health information behaviour. Rubenstein (2014), in a study of an online breast cancer community found that not only did participants exchange information

and social support, but that in most interactions the two were closely inter-woven, and consequently proposes that social support should be considered as information behaviour. This is consistent with Genuis (2012)'s finding that in constructing 'sense' from health information, trust was strengthened through interaction and referral between sources, and that women valued social contexts to support their learning and knowledge construction. In addition, various authors have noted the importance of health information repertoires that include both digital and personal information sources (Chen, Lee, Straubhaar, & Spence, 2014). Adams (2010) calls for more research into the reliability issues associated with Web 2.0, and two recent studies with students that explore the use of social media in health information behaviour raise the issue of trustworthiness (Fergie, Hunt, & Hilton, 2013; Zhang, 2012). However, none of these studies explores trust judgements in any depth or examines the effect of gender or other contextual or demographic factors. Hence, an important line of further research should centre on understanding the role of social media in health information behaviour, and, more specifically, in support and trust formation.

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