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A Conceptual Framework for Understanding Use of the Internet for Health Related Information

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Abstract: This paper presents a conceptual staged model for understanding Internet use for health-related information; exploring the social and technology acceptance factors that promote the integration of the Internet as an e-health resource. The method had two stages: a qualitative phase used to identify salient factors in the use of Internet-based health information and a quantitative phase allowing further exploration of the factors found in the first phase. We identify four clusters (active-sceptic, active-convinced, compliant-sceptic and compliant-convinced) based on approach to healthcare that, alongside cues to action, differentially determine the timing and utilisation of Internet-based health information. The paper concludes with three interlinked implications for promoting integration of Internet-based health information focusing on policy, promotion and system design.

1. Introduction

This paper presents a conceptual model for exploring how and to what degree the Internet, viewed as an e-Health application, is integrated into citizens' lives and healthcare. The model describes citizen use of the Internet for accessing health-related information, through integration of social factors with technology acceptance factors.

It is important to undertake such a study for several reasons. Firstly, e-Health is a major priority within e-Europe, promoting quality, access and efficiency of health provision across Europe [1]. Whilst e-Health initiatives can revitalise health service delivery, several issues need resolving before e-Health can reach its promised potential; foremost amongst these is better integration of citizen needs and interests into e-Health applications [2,3]. Studies identifying integration success factors are essential to maximise the benefits gained from future e-Health applications. System designers recognise the need to take a more user-centred approach to the design of e-health. We wholeheartedly agree with this view and take a look at the adoption of e-health from a user's perspective.

Secondly, individuals in affluent countries are increasingly expected/expecting to take responsibility for their own health promotion and illness management [3]. It is towards the Internet that citizens often turn for health information, and the Internet is advocated as a tool for patient education [3]. However, optimally achieving the benefits of this resource requires examination of citizen use of the Internet in the health context and, importantly, understanding how users perceive its value, role and formal/informal integration as an e-Health tool. Although there is a trend towards patient empowerment, we should be careful not to make assumptions about the extent to which citizens 'buy into' this.

Thirdly, policymakers have come to consider the Internet is a vital e-Health tool. Within the e-Europe framework, for example, initiatives such as the EU Health Portal and NHS Direct Online (UK) have successfully formally harnessed the power of the Internet as an e-Health resource [1]. However, the Internet is often used in an informal, non-directed, voluntary manner. The large, developing body of health-related information on the Internet is often unregulated leading to concerns among medical professionals about quality [2]. In this sense, the Internet is not part of the formal health service provision but an added mostly uncontrolled factor that nevertheless may significantly impact on formal healthcare.

To understand successful integration of the Internet as an e-Health resource in everyday life, social factors must augment the existing body of evidence relating to technology acceptance. Social factors explain the context, value and practical application of the Internet as a source of health information from the citizen's perspective. This paper presents a model that identifies and combines social factors with technology acceptance factors. The recent Unified Technology Acceptance and Use of Technology (UTAUT) model [4] underpins model development; combining the strengths of prominent models, underlining commonalties and promoting factor parsimony. The UTAUT model can be adapted to an e-Health scenario; drawing on current literature and our own research findings we, firstly, identify important social factors and, secondly, redefine the technology acceptance factors within an e-Health context. The resulting model furthers understanding of how the Internet is integrated into everyday life as an e-Health resource and serves as a framework for informing the design of future Internet–based e-Health research and applications.

2. Objectives

In order to understand the use of the Internet for health-related information this paper will:

1. Identify how Internet-related technologies are/are not integrated into the lives of citizens as an e-Health resource, focusing on its role as a source of health information, identifying social factors influential in integration.
2. Identify those technology acceptance factors that are influential in a citizen's use of Internet-related technologies within an e-Health context.
3. Present a conceptual framework combining technology acceptance factors with social factors for understanding the use of the Internet for health information.
4. Identify the potential pragmatic implications of this model.

3. Methodology

To elicit information regarding the integration of the Internet as a health information resource, the research was structured around two inter-connected phases. In each phase participants had, within the last 12 months, consulted a qualified professional and made related use of the Internet. Each phase focused on experiences with healthcare professionals and associated use of health information.

In the qualitative phase, 10 focus groups (n=53) (audio-recorded) were conducted in 6 UK locations. Participants were recruited and compensated through a specialist fieldwork company. Following transcription the focus group datasets were analysed using template analysis [13], identifying factors influential in using health information from the Internet.

In the quantitative phase, a survey (N=333) was conducted using a professional data collection agency. Items regarding use of the approaches to healthcare and issues relating to use if Internet-based health information were based on the previous qualitative phase. Results were analysed using (1) K-means cluster analysis to elicit profiles of groups with respect to their beliefs and behaviour in healthcare services and health information usage and (2) Cross-tabulations to identify patterns of and differences in attitude to health information usage. The sample consisted of 29% (n=96) non-Internet users and 71%

(n=237) Internet users. The results of both phases are utilised in the next section of the paper to develop the conceptual model through (i) building a picture of the social factors influential in Internet-based health information use (section 3.1) and (ii) defining technology acceptance factors within e-health terms (section 3.2). A conceptual model is proposed at the end of the paper that draws the social and technology acceptance factors into one coherent framework, where the identified relationships are based on the evidence gathered within this project in tandem with the literature.

4. Building a Conceptual Model

Our construction of a conceptual model of citizen use of the Internet to access health-related information is based on our own empirical research and the literature. This section explores building blocks of the model to demonstrate how technology acceptance can be framed within the social context underpinning the integration of e-Health within a citizen's daily life.

4.1 Social Factors

Social factors frame Internet use for health information within a meaningful context; we are concerned with understanding what value Internet-based health information has for the individual citizen. We identify not only what function health information serves (cues to action), but also how attitudes to healthcare and involvement in healthcare contribute to health information seeking behaviour.

4.2 How do Citizens Approach Healthcare?

We argue that a citizen's approach to healthcare underpins their approach to health information. From our data we identified four main clusters of consumers according to the degree to which they are convinced or sceptical of conventional medicine (belief) on alongside their expectations of being able to actively seek other medical information/opinions or resignation to the one the system provides them (behavioural expectations) (see figure 1 below and table 1 for the demographic profile of the clusters).

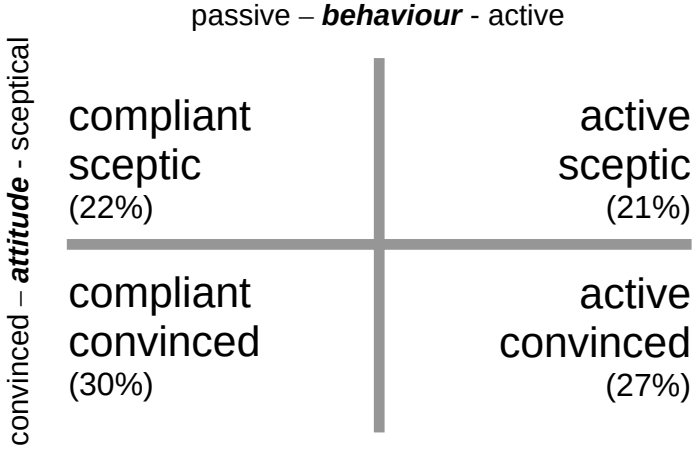

Figure 1: UK Citizen's Approach to Healthcare

1. The active sceptic moves within and between conventional and alternative medicine and gathers information from both.
2. The active convinced accepts conventional medicine but is interested in locating the best practitioner.
3. The compliant convinced still expect to be directed by their GP because of the professional's superior knowledge and experience.

4. The compliant sceptic is doubtful of authority but sees no alternative to consulting a doctor.

Table 1: Demographic Profile of Clusters (N=333)

Cluster: ***Demographic***	***Active Convinced***	***Compliant Sceptic***	***Compliant Convinced***	***Active Sceptic***
Gender (M:F %)	42:58	44:55	31:69	23:77
Age (18-44:45+ %)	47:53	40:60	39:61	33:67
Education ***(degree level or above: A-level or below %)***	48:52	27:73	33:67	60:40

We explored the extent to which these clusters differentiated between citizens according to cues to action.

4.3 Cues to Action

Cues to action represent the stimuli prompting an individual to seek health information and indicate why the Internet becomes integrated into everyday life; the Internet gains value as an e-Health resource as a means to address 'cue to action' goals. Users described themselves as ranging from 'learners' to 'addicts' in using the Internet for information. Health information was broadly used for two major goals: health promotion and illness management. Illness management was strongly emphasised, health information helped users to take control of their illness/condition and ultimately improve their quality of life:

'I wasn't happy with the … sort of take these for the rest of your life and you'll be alright (approach). I didn't want to be alright, I wanted to be better'

Focusing on the doctor-patient consultation, users discuss using the Internet-based health information to augment information from the doctor, challenge the doctor's opinion, and compensate for the lack of discussion with the doctor:

'[the doctor is] only telling a certain amount … having a quick look (on the Internet), you say wait a minute, why didn't you tell me that? But your doctor just tells you what he feels you could cope with'

'I wasn't going to be fobbed off'

'you go to the doctor's and you've got your five minute slot … they sort of talk to you … [but] they're sort of clockwatching … so it's nice to be able to … look up some of [the information on the Internet]'

We can see in Table 2 how the goal of information seeking activity on the Internet differs according to cluster membership. We compared the relative percentages of frequency of use between the four clusters from which there are two implications:

1. The propensity for members of clusters to seek health information in relation to illness management forms a continuum – active-sceptics at one pole represent consistent (perhaps habitual?) information seeking; compliant-convinced at the opposite pole represent low levels of information seeking. Active-convinced and compliant-sceptic are located in the middle of the continuum.
2. The timing of seeking health information differs according to cluster - active groups tend to seek information prior to the consultation; sceptic groups tend to seek information following the consultation. All groups are likely to search for information to confirm and/or understand information provided by the healthcare profession. These findings are consistent with previous research in the area [8].

Table 2: Percentage of Clusters who use Heath Information often or very often (N=237, Internet Users)

Cluster: **Consultation stage**	**Active Convinced**	**Compliant Sceptic**	**Compliant Convinced**	**Active Sceptic**
Seek information before seeing the healthcare professional ($\chi2$=31.114, d.f.=12, p=0.002)	50.9	40.4	24.2	75.5
Understand professional terminology ($\chi2$=23.710, d.f.=12, p=0.022)	56.4	57.5	37.9	71.1
Find information on professional's recommended course of action ($\chi2$=33.938, d.f.=12, p=0.001)	43.6	55.3	31.7	66.7
Lack of information from healthcare professional ($\chi2$=29.937, d.f.=12, p=0.003)	16.4	29.6	10.3	44.5
Dissatisfaction with information from healthcare professional ($\chi2$=24.182, d.f.=12, p=0.019	20	31.9	8.6	44.4
Curiosity ($\chi2$=14.548, d.f.=12, p=0.267)	69.1	66	62.1	71.7

The continuum suggested above parallels the continuum of 'level of thinking' proposed within the Elaboration Likelihood Model; an individual's position on this continuum will determine the application of central (effortful) information processing or peripheral information processing (less effort). Positioning on the continuum is dependent on motivation and ability [11]. Our definition of motivation is twofold (1) cues to action and (2) approach to healthcare. The active-sceptic is highly motivated and applies an effortful central processing of information throughout the healthcare encounter. At the other end, the compliant-convinced is less motivated and resorts to peripheral (low effort) information processing. The level of ability can be explained through technology acceptance factors.

4.4 Defining Technology Acceptance Factors for e-Health

Technology acceptance factors are a well-established approach to understand a citizen's use and non-use of various information systems. The UTAUT model [4] specifies four central factors in the acceptance and use of technology (performance expectancy, effort expectancy, social influence and facilitating conditions). In terms of intention to use the Internet for health information these factors can be adapted to the e-Health scenario.

Performance expectancy – defined as the *'degree to which an individual believes that using the system will help him or her to attain gains in performance'* (p.447 [4]). Thus use of Internet-based health information is related to the initial cues to action:

'obviously the Internet is a valuable tool in assisting people to be able to go in and find things out'

The model should ask: 'does using of the Internet for health information aid health promotion and/or illness management for citizens?'

Effort expectancy – defined as *'the degree of ease associated with the use of the system'* (p450 [4]). Thus citizens' use of the Internet to find the appropriate health information is proportional to their perception of how easy it is to use:

'On the Internet you can find out exactly what you want to know … in minutes'

Citizens within all clusters used the Internet as it was convenient (active-convinced 75.3%, compliant-sceptic 76.6%, compliant-convinced 67.3%, active sceptic 82.2%).

Social influence – defined as *'the degree to which an individual perceives that important others believe he or she should use the … system'* (p. 451 [4]). Do important social figures encourage use of the Internet and respect the individual for doing so? Within e-Health not only does this include family, friends and other peer groups, but also healthcare professionals. The perceived attitudes of healthcare professionals alongside previous experiences of healthcare services could profoundly impact on the intended integration of Internet-based health information into the formal healthcare encounter.

Table 3: Perceived Attitudes of Professionals to 'Informed' Patients (N=237, Internet Users)

Cluster: ***Perceived attitude***	***Active Convinced***	***Compliant Sceptic***	***Compliant Convinced***	***Active Sceptic***
Healthcare professionals encourage patients to use the Internet for medical information **(χ2=8.545, d.f.=12, p=0.741)**	23.7	21.3	10.3	13.3
Healthcare professionals dislike being challenged by well-informed patients **(χ2=26.915, d.f.=12, p=0.008)**	56.3	80.9	55.1	71.1

The majority of citizens in all clusters disagree that healthcare professionals encourage use of the Internet (Table 3). The two sceptic groups in particular feel that healthcare professionals dislike being challenged. The overall perceived norm is not one of encouragement. A point of further enquiry is to what degree do clusters differ on the degree to which they are influenced not to search the Internet for information because of this perceived lack of encouragement? It is reasonable to assume that active-sceptics are not influenced by this to the same degree as other clusters. The compliant-sceptic for example may search for information on the Internet but not discuss this with their doctor.

Facilitating conditions – defined as *'degree to which an individual believes a [social] and technical infrastructure exists to support use of the system'* (p.453, [4]). This factor consists of two main elements (see [7] for further discussion). (1) Are the tangible resources available to support use of the Internet for health information? (including the characteristics of the current healthcare system and personal social support systems) and, importantly, (2) does the individual feel they have the requisite knowledge to find and use that information?

As Table 4 shows, clusters do not differ significantly with respect to finding the doctor's advice easier to understand that Internet-based advice. However, at either end of the information seeking continuum there is trend for the active-sceptic to be more comfortable with advice on the Internet and for the convinced-compliant to be more comfortable with the doctor's advice. Some users noted the potential for confusion in using medical information on the Internet and concern over how health information is presented:

'most people looking up on the Internet, medical [information], [think] wait a minute, that sounds like what I've got and they'd be over visiting the doctor. I think I've got yellow fever or something because I looked [on the Internet] … I've got symptoms similar'

'all this information [from the Internet] can suddenly confuse them and get them into a bad state'

'as far as the Internet is concerned, maybe it was a bit too heavy on the medical side. You know, it didn't say in layman's terms, you can get this, you get that, you take this, it does that. You want to know in simple terms'

Table 4: Perceived Accessibility of Information (N=237, Internet Users)

Cluster: ***Information accessibility***	***Active Convinced***	***Compliant Sceptic***	***Compliant Convinced***	***Active Sceptic***
Find doctor's advice easier to understand than the Internet (χ2=12.754, d.f.=12, p=0.387)	51	44.7	56.9	31.2

4.5 Trust

From table 5 we can see that all clusters are in favour of medical information on the Internet being regulated to a greater extent. The active-sceptic cluster has more trust in Internet-based health information than the other three clusters; the other clusters perceiving the healthcare professional to be more trustworthy than the Internet. This is reflected in their relative uses of the Internet for health information.

Table 5: Perceived Trustworthiness of Information (N=237, Internet Users)

Cluster: **Perceived trustworthiness**	***Active Convinced***	***Compliant Sceptic***	***Compliant Convinced***	***Active Sceptic***
I would prefer health information to be regulated χ2=13.164, d.f.=12, p=0.357)	79.2	85.1	70.7	75.5
Taking advice from healthcare professional is less risky than Internet (χ2=13.603, d.f.=12, p=0.327)	67.3	78.7	69	55.5

Clusters differentiate between the different sponsors of websites in terms of trustworthiness (Table 6). Clusters rank sites similarly, with professional organisations and charities ranking 1st and 2nd as the perceived most trustworthy sites. Online Forums and Commercial sites rank lowest. However, there is one notable exception. Active Sceptics rank charities 4th (with only 55% ranking this site trustworthy or very trustworthy); the 'professional' sites are all ranked above).

Table 6: Ranking of Sites as Trustworthy or Very Trustworthy (%, N=237, Internet User)

Cluster: **Website:**	***Active Convinced***	***Compliant Sceptic***	***Compliant Convinced***	***Active Sceptic***
Professional Association (e.g. British Medical Association)	78.2	74.5	74.1	82.2
Charity (e.g. Citizens Advice Bureau)	70.9	66	70.7	55.5
Government Agency (e.g. NHS Direct Online)	69.1	59.6	70.7	71.7
Ombudsman/Regulator (e.g. Health Service Ombudsman)	67.3	51	50	71.1
Online Forums (peers)	27.3	29.8	37.9	46.7
Commercial (e.g. pharmaceutical company)	20	23.4	24.1	11.1

Users note the problem of having to search through websites to get trustworthy information, *'you've got [to] get rid of all the rubbish'* and sometimes getting the right information is *'trial and error'*. When searching for information in a time constrained situation, users will use past experience as a basis for trusting a site:

'I haven't got time to go to half a dozen websites. I know I've sort of had success with this one before so I'm going to go back to that one and have a look in that one.'

5. Understanding Use of the Internet for Health Information

The proposed conceptual model highlights how social and technology acceptance factors can be combined to aid understanding of the integration of the Internet as a health information resource into a citizen's everyday life.

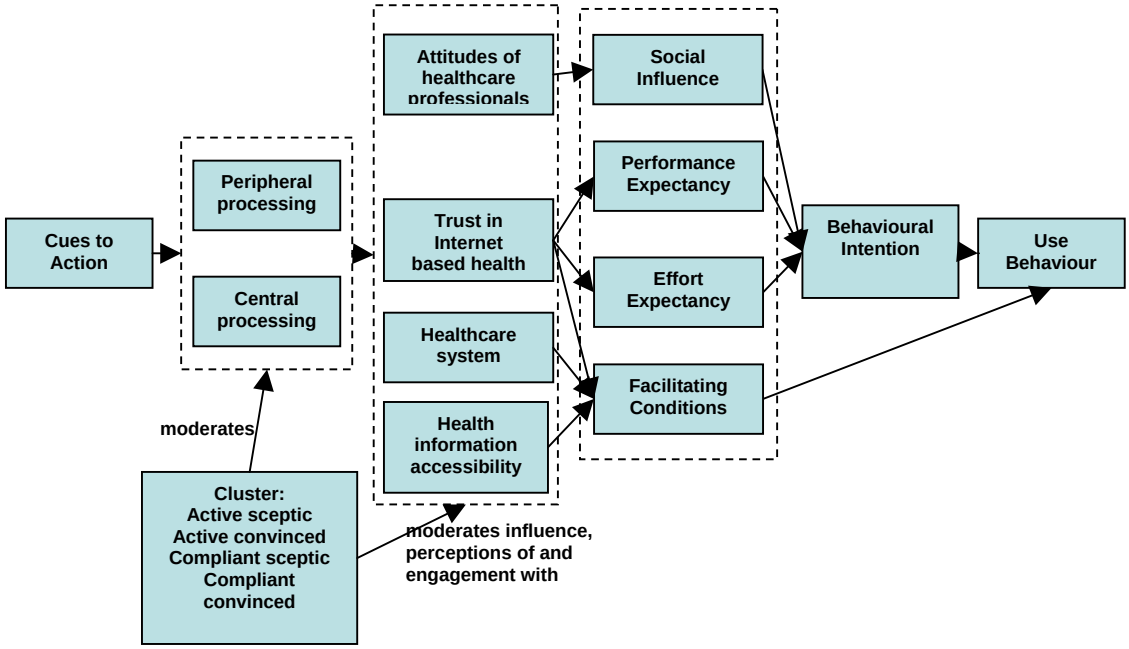

Figure 2: Conceptual Model of Internet-Based Health Information Use

The model is not intended to represent all potential pathways nor does it present all possible factors. Rather it represents a staged model, indicating the steps that move an individual towards the use of health information use on the Internet and emphasising those issues that require consideration and further investigation.

6. Implications for e-Health

With regard to healthcare information that might be provided via the internet, it seems likely that there will be a diversity of needs. For example, the compliant-convinced are less likely to seek information, whilst the active-convinced might seek statistics on professional performance, the active-sceptics will gather conventional and alternative information on treatments inside and beyond the NHS. In terms of integrating the Internet as an e-Health resource there are three major interlinked implications.

6.1 Policy Implications

Encouraging good patterns of information gathering, from the perspective of the medical profession, among such diverse clusters obviously requires a set of quite different strategies. Our argument is, therefore, that a policy that seeks to integrate the Internet into the health system would be unwise to rely on improving technical factors in isolation from social considerations. Rather frameworks of patient expectations can help us anticipate the reception of Internet information and interface systems. Elsewhere we have argued that policy changes in, for example, encouraging patient empowerment [5] or developing new regulatory regimes [6] might be informed by considering a diversity of patient expectations. In this way it might be possible to conceptualise and plan a range of initiatives to facilitate a positive reception from differing clusters of patients and, as importantly, avoid alienation.

6.2 Promotional Implications

At the promotional level we can utilise such methods as social marketing to promote the use of Internet-based health information; where marketing to identified cues to action will increase the salience of health communications. When coupled with the relative approaches to healthcare (clusters) that influence processing-type, this is very important in underpinning the design of health communications (see [11] & [12] for further discussion).

6.3 System Design Implications

To design systems that present the most useful knowledge and information structures, human-centred computing design emphasises the need to look beyond the user interface and focus on analysis of functional and task issues relevant to users [9, 10]. The cues to action inform such design by identifying the goals (part of functional analysis) that citizens apply to Internet-based health information. These goals are intimately linked with the citizen's interaction with healthcare services and varying levels of satisfaction with said services determining differences beyond usage rates in terms of the functionality and required timing of the information. Any health information service should support a citizen to address cues to action. However, beyond an analysis of goals, system design should parallel policy in accommodating a range of patient expectations and approach to healthcare.

6.4 Future Research

A planned programme of research based in the UK is in progress and will further investigate the issues highlighted in this article and refine the conceptual model over the next 2 years. This research draws on diverse research methodologies to: conduct a wide scale survey to test the underlying hypothesised relationships between the model factors; a longitudinal combined survey and ethnographic study exploring the proposed pathways in the use of Internet-based health information within the context of clinical consultations.

7. Conclusions

The conceptual model highlights factors influential in citizen use of the Internet for health information. Placing that use in context, particularly focusing on the interplay between healthcare professionals and citizens, provides valuable insight into the value of the Internet and underpins its integration into everyday life. The model serves as a framework for informing the design of future Internet–based e-Health applications. A major advantage of such a model is that it indicates where interventions could be implemented to encourage use of the Internet for health information. There is no doubt that technology acceptance factors are essential design indicators underpinning the success of e-Health applications. However, social factors must be taken into account in the wider implementation of e-Health applications in order to smooth the integration of such applications into everyday life and, importantly, promote consistent and prolonged usage of such applications.

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