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Expectations and attitudes in eHealth: A survey among patients of Dutch private healthcare organizations.

H.C.A.A. HENDRIKX[1], S. PIPPEL[2], R. VAN DE WETERING[1] AND R.S. BATENBURG[3]

[1]Department of Information and Computing Sciences, Utrecht University, Institute of Information and Computing Sciences, Utrecht, the Netherlands
[2]Medgids Kanaalweg, Utrecht, the Netherlands
[3]Department of Information and Computing Sciences, Utrecht University, Institute of Information and Computing Sciences, Netherlands Institute for Health Services Research (NIVEL), Utrecht, the Netherlands

ABSTRACT

Internet usage has been steadily increasing over recent years, and people have become used to manage the medical aspects of their lives using the Internet. Meanwhile, many organizational changes are influencing the provision of healthcare.

This raises the question whether the demands of healthcare patients match the current online healthcare (or: eHealth) interventions, and which interventions are the most interesting. In order to explore the attitude of citizens/patients for (new) eHealth services an adapted version of the technology acceptance model is developed and tested, using a survey held among health consumers in private healthcare organizations. The results of this survey showed that services like online prescription refills and online appointments are deemed useful. Also, patients are in need for quality information regarding health issues. This indicates that patients are ready for the adoption of eHealth services, but providers of such services should make sure that it is easy to use and that using it has a clear advantage.

INTRODUCTION

Healthcare systems among western countries are currently in a transition phase facing challenges to improve clinical quality, enhance and improve service efficiency, expand access, and, at the same time, reduce costs. The Netherlands is no exception in this. A general health reform was implemented in the Netherlands in 2006, aimed to improve healthcare delivery towards a more demand and quality driven healthcare system.[1] This reform is still ongoing[2] and under increasing pressure

of the economic crises, leading to both governments and health insurers to constantly cut budgets.

An important pillar of the Dutch healthcare system concerns the role of primary care (and the general practitioner (GP) in particular) as gatekeeper between patient and specialized and long-term care.[3,4] In addition, the Dutch reformed system has substantially increased the role of health insurances to directly purchase and deliver care for their customers, and empowered patients to get a more prominent role.[5] This entails that health consumers will have more freedom to select a physician, hospital, or clinic, given the contracts and arrangements their respective health insurance have made with care delivery institutions as hospitals, clinics, and practices. As a result, the need for sources where health consumers can get information regarding the quality of care, which is needed to make an informed decision, is growing.[6] These information sources are an important condition for the healthcare system to function and to stimulate the care sector to improve the 'value for money' of their products.[6]

Research on health information sources is inconclusive.

Some studies suggest that health information sources and too limited and have little value,[7] while others expect positive effects from them.[4] Presenting healthcare information is, in any case, difficult because consumers are easily overwhelmed and overloaded by the large amount of information on web pages and can only process a few parts of information simultaneously.[6] Furthermore, in case patients do not understand the presented information, they may not feel qualified to use it and might turn to other sources of information, e.g. experience of friends and family or other people they trust. For instance, recent research has shown that higher-educated people are more likely to respond to health plan report cards[7]. Besides the differences based on education, there also appears to be differences between subgroups based on age, gender, and ethnicity.[8] It should also be recognized that some patients are not actively choosing their healthcare provider, but rather follow the advice their GP gave them.

Obviously, this does not match with a demand driven healthcare system that attributes responsibility for healthcare choices to the patient.[7] Another problem is the quality of healthcare information, and when different sources show dissimilar information.

In general, people trust information on provider quality more when it is obtained from physicians, friends, and family than information from employers, magazines, drug companies, government agencies, and the Internet.[7,8] Finally, the study of Bottles can be referred to,[9] who found that 80% of health consumers are using Health 2.0 tools to obtain a second opinion and to check on the physician's advice. This actually implies that additional information and services can potentially be provided to the health consumer over the Internet. Around the globe, numerous initiatives are taken to stimulate eHealth information, e.g. the fact that an American initiative (ZocDoc) received a large investment in August 2010[10] and just now opened their service to the sixth metropolis in the USA,[11] shows that such initiatives are promising.

Compared with other industries, online services have been slowly adopted by the healthcare sector so far.[12–14] One reason might be that a person's personal health data are sensitive information, and exchanging this over the Internet quickly results in privacy concerns. On the other hand, the public majority has been using online services for several years now, and meanwhile got used to the idea of managing

many aspects of their life online. With the introduction of web 2.0 and related techniques, the quality and possibilities of web-security have become more professional too. So it might be that the readiness for the adoption of eHealth is at a springboard point in time. According to Allen et al.[12] healthcare consumers will increasingly embrace online tools. According to Lupiáñez- Villanueva et al.[15] the Internet 'could be considered as one of the main resources for health information; as a medium for interaction; as a tool for healthcare delivery; and public health'.
For the Netherlands, research has shown that the adoption of eHealth is still waiting for its breakthrough, as in other countries. Most eHealth applications under study can be categorized into three main clusters; e-Care, e-Care support, and e-Public health.[16] According to van Rijen et al.[16] the following interventions are most promising in the shortto- medium term: medical information on the Internet (Health education), peer consulting, E-commerce (online sales of products and services), (continuing) medical education, online consultation, tele-homecare, call centers, electronic prescription, and electronic health records. Possibilities of web 2.0 also started to appear in the realm of healthcare.
[17] According to van Limburg,[17] eHealth can create three key benefits to modern day healthcare: (1) better information, (2) effective care, and (3) focus on patient. The authors also state: 'These new possibilities however require a reformation within the organization and cause a need for new business models to see how traditional healthcare organizations can embrace eHealth in their services'.[17] In this paper we describe the results of a recent study to measure the actual interest of Dutch healthcare consumers in eHealth, and their usage intention towards eHealth products and services. Through this study, we aim to determine if eHealth adoption is indeed at a point of breakthrough and identify the key drivers and barriers for this adoption. The empirical base of the study is a survey and expectations are test by multivariate data analyses.
Before turning to the Method and data collection and the Results section, in the next section we first describe the theory and conceptual model applied.

MODEL REVIEW AND THEORY

Our study draws upon the TAM that is highly cited and applied in information systems and information technology (IS/IT) research. TAM was initially developed in 1989 and can be used to help predict the degree to which a person plans to perform some specified future behavior.[18] This model was subsequently extended to incorporate additional theoretical constructs,[19] coined as 'TAM2'. In another extension, TAM was interwoven with the model of Perceived Ease of Use and three other theoretical extensions to develop an integrated model of Technology Acceptance called TAM3.[20] The core of this model, however, remained unchanged during these steps and is depicted in Fig. 1.
The core of TAM implies that a consumers' intention to use a certain product of service (behavioral intention) is positively influenced by the perceived usefulness and perceived ease of use of that product/service. The behavioral intention in turn effects a person's actual usage behavior.[19,20] Furthermore, it assumes that when a service is perceived as being easy to use, the perceived usefulness also increases. TAM was subsequently extended by Venkatesh et al.,[21] who combined it with the motivational model;[21,22] including extrinsic motivation and intrinsic motivation as two key constructs.[21] Eventually, TAM, TAM2, and extended TAM are also applied

for healthcare consumers, for instance by Wilson and Lankton,[23] Kim and Chang,[24] Holden and Karsh,[25] and Mohamed et al.[26] For our study, we were specifically inspired by Wilson and Lankton[23] who tested the extended TAM model using survey data. In their research, they translated the variables user acceptance enablers, short-term use, and continued use into five 'antecedent factors', i.e. satisfaction about medical care, perceived health knowledge, information-seeking preference, healthcare need, and Internet dependency.
It is expected that these factors are significantly correlated with the other variables in the model, except for behavioral intention. The version of the TAM model as developed by Wilson and Lankton[23] is used as the conceptual model for our empirical study and depicted in Fig. 2.
All relationships drawn within the model are formulated as hypotheses to be tested, i.e.:

H1a: 'Perceived Ease of Use' has a positive effect on behavioral intention;
H1b: 'Perceived Usefulness' has a positive effect on behavioral intention;
H2: 'Perceived Ease of Use' has a positive effect on 'Perceived Usefulness';
H3: 'Internet Dependency' has a positive effect on 'Perceived Usefulness'.

METHOD AND DATA COLLECTION

During the summer of 2011, a questionnaire was developed consisting of three parts. The first part was designed to retrieve general information from the respondent. Then the Internet use of the respondent was queried, what healthcare services they currently use, and the type of specialists they visited.
Next, the respondents were asked about their demand for different eHealth services and interventions.
The eHealth services presented in the survey are shown in Table 1. Driven by our conceptual model, the questionnaire consists of statements which cover the variables in the TAM-related model. Finally, socio-demographic characteristics as queried data are control variables for adoption of eHealth.[27] The survey was distributed among patients of private healthcare organizations in the Netherlands, a limited and coherent type of healthcare providers that can be expected to invest relatively much in information and communication technology (ICT) and eHealth to obtain competitive advantage. To achieve a varied sample of private healthcare organizations, clinics in different parts of the Netherlands, providing various medical specializations were contacted using convenience sampling. In total, eight organizations were contacted, four of them replied positively and wanted to participate. The survey was subsequently conducted by distributing it among patients in the waiting rooms of the respective organizations. In total, 68 persons completed and handed in (returned) the questionnaire.

Variable construction

'Attitude towards eHealth adoption' is the central dependent variable in our conceptual model. It was constructed by counting the number of eHealth services respondent marked as 'interested in'. Twelve is the maximum score, 0 the minimum. Table 1 shows that most respondents indicated as interesting (1) (medical) information about illnesses and possible treatments and (2) requesting a prescription refill over the Internet are most prominent in patients interests. A minority of the respondents indicated not to be interested in eHealth services at all.

[FIGURE 1][FIGURE 2][TABLE 2][TABLE 3]

Next the respondents' behavioral intention variable was measured. This was done by averaging the scores of two questions related to behavioral intention, as both variables are highly and positively correlated (Pearson's correlation is +0.70, Spearman's ρ is +0.65; P<0.00).

Factor analysis was performed to measure the variables perceived ease of use and perceived usefulness within the conceptual model. In a preanalysis, the overall KMO (0.791) measure verified the sampling adequacy, all KMO values for the independent items are >0.711. Also, Bartlett's test of sphericity resulted in $\chi^2(15) = 166$, P < 0.001, indicating that factor analysis is appropriate. Only one component showed an eigenvalue over 1, which is Kaiser's criterion, explaining 56% of the variance. The second component had an eigenvalue of 0.923.

In Table 2, the factor loadings for each of the items after rotation are shown. The items clustering indicate that 'component one' measures the (latent) variable perceived usefulness by its items, and the 'second component' indeed measures the (latent) variable perceived ease of use.

In both cases the Cronbach's α of the latent variables is above 0.70, conforming the factor analysis results.

RESULTS

As normality tests show that most of the variables are not normally distributed, Spearman's correlation test should be used to test the assumed relations.

Next to this, Pearson's correlations were calculated as well to investigate the robustness of the results.

The results of the correlation calculations are shown in Table 3.

First of all, we are interested in the assumed relationship between behavioral intention and interest in adoption. Correlation results are significant: ρ = 0.688 (P < 0.001) and r = 0.640 (P < 0.001). This indicates that there is indeed a positive correlation between behavioral intention and a person's interest in adoption of eHealth. The same applies for the other relationships assumed. All correlations (Spearman and Pearson) are positive and significant, indicating that all hypotheses are supported.

This also supports the relationships as drawn earlier in the conceptual model.

In a second step the four hypotheses are re-tested by controlling for age, an important and relevant background characteristics of the respondents with regard to health status and IT use.

Table 4 shows all the correlation coefficients and corresponding significance by three relevant age groups and each of the four hypotheses. The outcome is that all hypotheses are confirmed for the age group 65 and older, but for the two younger age groups results three out of four hypotheses are not supported. The conceptual model and hypotheses appear to be specifically supported for the group of elderly respondents. An alternative explanation for this interesting result is that younger people are interested in using eHealth services and online services at a higher level compared with elderly persons. Hence, their behavioral intention is less influenced by Perceived Usefulness and Perceived Ease of Use, which do not correlated as strong as for the elderly as well. In other words, the variation in the interest of elderly people in eHealth is larger, and more determined by the 'thresholds' as specified by the TAM model as perceived usefulness and perceived easy of use.

[TABLE 3]

CONCLUSION AND DISCUSSION

The goal of this research was gauging the public interest in eHealth services. In order to investigate the need for such interventions, surveys have been conducted among patients. After analysis, the results have been provided to the participating healthcare organizations, and an interview was conducting in order to map the organizational interest in eHealth. The survey and interviews indicate that both healthcare consumers and healthcare providers show interest in adopting various eHealth services.

A TAM-related model was tested to explore the determinants (or: thresholds) in the area of eHealth. Synthesizing from the outcomes using this model, we argue that user interfaces of provided eHealth services should be kept ‘simple’ and ‘easy to use’, and that it is important to demonstrate that eHealth services are perceived as useful for mainstream adoption. This specifically appears to be the case for elderly patients.

This study has several limitations. Obviously, the current sample size is small, although, the outcomes of this study are promising. Because of the limited number of respondents in this study we were only able to use factor analysis where standard error of the mean would have been preferred. The main focus for future research should be on increasing the sample size and (cross) validating the model to allow for critical reflection. What is also not addressed in this paper is the application in other domains and fields in medicine. We expect that the model can similarly be used to describe and reconstruct any case.

To conclude, we expect that the amount of eHealth services will grow the coming years and that careful consideration of interface design and deployment will positively affect adoption rates.

Our adopted framework is therefore designed for further empirical research and practical application.

[TABLE 4]

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FIGURE AND TABLE

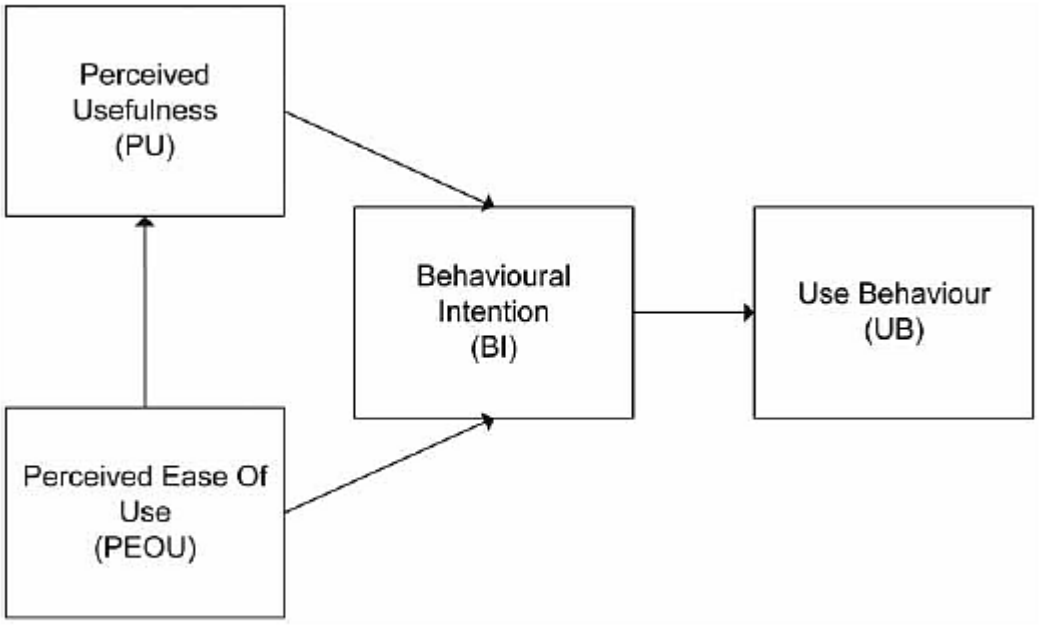

Figure 1: The technology acceptance model.

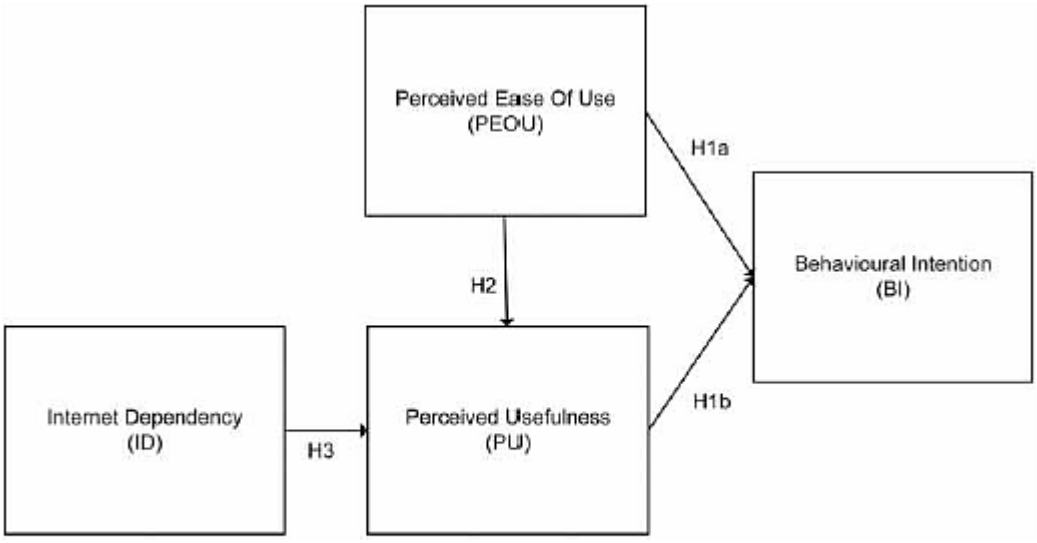

Figure 2: The model used in this study.

Table 1: Most interesting services according to patients

	Service	# Yes	% of total valid
1	(Medical) information about illnesses and possible treatments	44	64.7
2	Requesting a prescription refill over the Internet	38	55.9
3	Making an appointment with your GP over the Internet	37	54.4
4	Making an appointment at the hospital or with a medical specialist over the Internet	31	45.6
5	General (medical) information about how you can live a healthier life	24	35.3
6	Request information over the Internet (The healthcare organization will contact you to inform you about a treatment.)	22	32.4
7	The possibility to fill out an anamnesis form online	19	27.9
8	Buying prescription medication online. (Online pharmacy.)	18	26.5
9	Finding, contacting, and bringing people with a high risk for certain disease together, so they can talk to each other about their health issue	11	16.2
10	E-monitoring. (Your health is monitored over the Internet using special equipment.)	8	11.8
11	Online therapy. (e.g. psychotherapy over the Internet)	6	8.8
12	Online diagnosis. (Your physician examines you using a webcam and attempts to diagnose you.)	3	4.4
13	None	13	19.1

Table 2: Factor analysis for Perceived Usefulness and Perceived Ease of Use

Item	Rotated factor loadings	
	Perceived usefulness	Perceived ease of use
Overall (eHealth), will be useful in managing my healthcare	0.791	–
Using (eHealth) will enhance my effectiveness in managing my healthcare	0.684	0.188
Using (eHealth) will support critical aspects of my healthcare	0.603	–
(e-Health) will be easy to use	–	0.968
I will find it easy to get (eHealth) to do what I want it to do	–	0.790

Table 3: Correlation results by each of the four hypothesis

Hypothesis	Spearman's ρ (sig.)	Pearson's r (sig.)
H1a (PEOU → BI)	0.508 ($P < 0.001$)	0.601 ($P < 0.001$)
H1b (PU → BI)	0.768 ($P < 0.001$)	0.696 ($P < 0.001$)
H2 (PEOU → PU)	0.486 ($P < 0.001$)	0.589 ($P < 0.001$)
H3 (ID → PU)	0.260 ($P = 0.033$)	0.358 ($P = 0.003$)

Table 4: Correlation coefficients for each of the hypotheses per age group

		<40 ($N = 25$)		40–64 ($N = 22$)		65+ ($N = 12$)	
		cor.	P	cor.	P	cor.	P
H1a (PEOU → BI)	ρ	0.340	0.071	0.238	0.285	0.966	0.001
	r	0.357	0.057	−0.007	0.975	0.949	0.001
H1b (PU → BI)	ρ	0.659	0.001	0.843	0.001	0.741	0.006
	r	0.713	0.001	0.709	0.001	0.683	0.014
H2 (PEOU → PU)	ρ	0.312	0.100	0.338	0.124	0.681	0.015
	r	0.330	0.080	0.312	0.157	0.627	0.029
H3 (ID → PU)	ρ	−0.115	0.551	0.513	0.015	0.751	0.005
	r	−0.120	0.535	0.434	0.044	0.733	0.007