Evaluation of a Dutch women's health website

A mixed methods study

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ABSTRACT

Introduction: Women's health is gaining attention the last few years and women's health should be improved in many aspects. E-health could enable improvement of women's health. A Dutch website was developed to improve women's health by using three strategies: giving trustworthy information, listening to women and taking women seriously. Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) are aspects of the Technology Acceptance Model (TAM) which is often used in e-health evaluation.

Aim make recommendations for improvement of the website to the developers in their further design of the website.

Design An explanatory sequential mixed methods model was used.

Methods A consecutive sample was used to recruit participants. A total of 130 participants responded to an online survey about PU and PEOU. A focus group with five participants and telephone interviews with two participants were organised to retrieve in-depth information on the results of the survey and on the three strategies used by the website.

Results PU and PEOU were rated high in this study and were also recognised during the focus group and telephone interviews. The attention for women's health was found of high importance. Public relations is another subject often discussed in the focus group. Survey participants did not take action after reading the information, however focus group and interview participants thought taking action meant remembering the information for later use.

Discussion The TAM is difficult to use in a website evaluation because it is not specifically developed for website evaluation. Furthermore the mean age and education of participants was relatively high.

Conclusion Information on the website was found useful, easy to find and up-to-date. The time-effort of visiting the website was found to be worthwhile. The attention for women's health on the website is also positive point, however, visibility of the website should be improved.

DUTCH SUMMARY

Inleiding Vrouwengezondheid is een onderwerp dat steeds meer aandacht krijgt en dat op meerdere punten zou kunnen worden verbeterd. E-health kan hierbij gebruikt worden. Een Nederlandse website is ontwikkeld om de vrouwengezondheid te verbeteren die gebruik maakt van de volgende strategieën: geven van betrouwbare informatie, luisteren naar vrouwen en vrouwen serieus nemen. Het Technology Acceptance Model wordt vaak gebruikt om e-health te evalueren. Ervaren nut (PU) en ervaren gebruiksgemak (PEOU) zijn belangrijke aspecten in dit model.

Doel Aanbevelingen geven aan de ontwikkelaars van de website om de website te kunnen verbeteren

Design Er is een verklarend sequentieel mixed methods design gebruikt.

Methode Een clustersteekproef van alle vrouwen die zich hebben aangemeld voor de nieuwsbrief is genomen. In totaal 130 participanten hebben gereageerd op een online vragenlijst over PU en PEOU. Een focusgroep met 5 participanten en 2 telefonische interviews zijn uitgevoerd om diepte informatie te verkrijgen over de drie strategieën.

Resultaten PU en PEOU werden hoog beoordeelt en werden ook herkend in de focusgroep en telefonische interviews. De aandacht voor vrouwengezondheid werd ook positief gevonden. Zichtbaarheid van de website is een groot verbeterpunt. Resultaten van de vragenlijst laten zien dat participanten geen actie ondernemen op basis van de informatie op de website, maar in de focusgroep vonden de participanten dat herinneren van de informatie ook actie ondernemen is.

Discussie De TAM is moeilijk te gebruiken in website evaluaties omdat het model niet specifiek ontwikkeld is voor website evaluaties. Verder was de gemiddelde leeftijd en opleidingsniveau relatief hoog binnen de participanten.

Conclusie De informatie op de website werd als nuttig, makkelijk te vinden en actueel ervaren. De moeite die het kostte om de website te bezoeken was de moeite waard. De aandacht voor vrouwengezondheid werd als zeer positief ervaren, maar de zichtbaarheid van de website zou verbeterd moeten worden.

INTRODUCTION

Women's health is gaining in attention in The Netherlands the last few years (1). This attention is due to the gender differences in multiple aspects of health care, for example in cardiovascular diseases (1) and cerebrovascular diseases (2). In clinical trials and treatment outcomes gender differences were found (3,4). Because of these gender differences and because most trials were held with male participants, female patients are receiving treatments that are aimed at men (4). E-health could be used as a platform to emphasize the gender differences.

E-health in the present study is defined as:

> "An emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies. In a broader sense, the term characterizes not only a technical development, but also a state-of-mind, a way of thinking, an attitude, and a commitment for networked, global thinking, to improve health care locally, regionally, and worldwide by using information and communication technology" (5, p1).

This definition is applicable to a dynamic environment such as the Internet (5). Eysenbach claims an important component of e-health should be a critical evidence-based evaluation of the information and communication technology (5,6).

An academic teaching hospital and a health care insurer developed a website with health information specifically for women and thereby contributed to e-health in The Netherlands. This website named 'www.vrouwmc.nl' was launched on February 16, 2013. Accordingly the components of information and communication technology, this website will be investigated in this study.

Information on different subjects related to women's health, like menstrual blood loss and hormones (see figure 1) is available on this website. The website is created to give information to three target groups: the health care consumer, the health care professionals and the integrated care deliverers (see figure 1). On this moment the website was developed for the first category. In the future it will be developed further for the other two categories. The goal of the website is to provide information and ultimately to improve healthcare for women by giving trustworthy information, listening to women, and taking women seriously (7). Women in The Netherlands should be more aware of their own body to improve their own women's health (1). This website is relevant in this, because it gives the information to understand their

own body. In nursing practice, giving health information is also a great task and the emphasis in nursing should lie on being a knowledge worker instead of a task performer (8). When developed for health care professionals, nurses could use the website in practice.

E-health has certain potential in improving healthcare and reducing healthcare costs (9). However, the implementation and adoption of e-health is not always effective due to amongst other coordination and communication issues (10). Website evaluation in the past is mostly aimed at what information is available on the Internet on a certain disease or treatment (11,12). Another website evaluation focused on the use of the information found on treatment decisions using the Michigan Assessment of Decision Style (MADS) (13). Usage of e-health is subsidiary on multiple variables, such as performance expectancy, effort expectancy, social influence, facilitating conditions, voluntariness of use, perceived system quality, and attitude towards using the technology (14,15). Multiple models exist that measure aspects of these concepts (16-18). The Technology Acceptance Model (TAM) (see figure 2) was chosen in this study as a conceptual framework, because the TAM is a broad model widely used to predict and explain the use of e-health (19,20). Bartlett et al (21) used the Unified Theory of Acceptance and Use of Technology (UTAUT) model to develop and evaluate a website for cancer patients, which is an expanded model based on the TAM. However, most evaluations are based on information for patients instead of a large population like all women from a certain country. The UTAUT measures the role of social influences (15), which are not relevant in this study.

The TAM is based on principles adopted from the Theory of Planned Behaviour (16,18). Fundamental aspects of the TAM are Perceived Usefulness (PU), Perceived Ease of Use (PEOU), attitude towards using the technology and actual system use (18). Because PU and PEOU are core aspects of the TAM, they will be used in the present study. The definition of PU according to Davis is "The degree to which a person believes that using a particular system would enhance his or her job performance" (17 p320). PEOU is defined as "The degree to which a person believes that using a particular system would be free of effort" (17 p320).

The concepts PU and PEOU are essential in evaluating the provided information for women's health. An important part of PU is job performance. In this study, job performance is seen in the context of women understanding their own body and thereby improving women's health (1). PEOU in this study focuses on the website

usability. Using the TAM is scientifically relevant due to the fact that multiple types of e-health use the TAM for evaluation. However, no other non-patient website evaluation using TAM was found. Furthermore, an evaluation whether the goals of the website have been achieved will be part of this study.

Problem statement

Gender differences in health care can be emphasized using e-health. Www.vrouwmc.nl has been developed to give attention to women's health, but has never been evaluated. Using the TAM with the main concepts PU and PEOU to evaluate the website, insights can be given on how to improve the website. Also an evaluation of the strategies used by the website will be done.

Research aim

The aim of this study is to make recommendations for improvement and refinement of the website to support the developers of www.vrouwmc.nl in their further design of the website and eventually to improve women's health. Nurses can use this website to spread knowledge on women's health to their patients.

Research questions

How do female visitors of the website vrouwmc.nl rate the perceived ease of use and perceived usefulness of the website?

What are experiences of female visitors of the website with the three strategies used to provide information?

METHODS

Design

In this evaluation study the Explanatory Sequential Mixed Methods Model (22) was used to make a summative evaluation (23) to assess www.vrouwmc.nl (see figure 3) and develop information to modify the website (23). His model was used because information on the three strategies could only be retrieved by in-depth research.

Setting and subjects

The study population consisted of women aged 18 years or older who visited the website. All 1586 women who had signed up for the newsletter in March 2014 received a hyperlink to an online survey. In this consecutive sample (22) a low risk of bias exist because all members of the accessible population are asked to participate. The sample size was calculated using Raosoft at 385 participants, with a margin of error of five per cent, a confidence interval of 95%, an estimated sample size of 5.000.000 women and a response distribution of 50% (24). A purposive sample for the focus group was taken from all interested women as indicated on the returned questionnaires. All women who could not join the focus group due to the large distance to the location received an email with a request for a telephone interview, and were asked to email their telephone number.

Data collection

The present study started with a survey. Survey participants were asked whether they wanted to join a focus group. Hence the quantitative data collection preceded the qualitative data collection. An addition to the study was made with telephone interviews due to the limited number of participants in the focus group. All participants were asked to visit the website prior to the data collection.

Survey

TAM consists of multiple dimensions of which PEOU and PU are the original dimensions from the development of the TAM. Numerous types of e-health like teledermatology (20) and web-based e-health interventions (19) are evaluated with the TAM. The TAM questionnaires were translated in Dutch and adjusted to an evaluation of a women's health informational website. Only questions applicable to a website evaluation were used. Two researchers of which one is a native English speaker did translation and adjustment. The survey questions were pilot tested and suggestions on completeness of the survey and whether the survey questions are understandable were done in a research group.

The hyperlink to the survey was attached to an information letter in which the purpose of the study and the duration of the questionnaire were explained and was open for two months. The survey consisted of 25 questions (appendix B). After the informed consent and the seven socio-demographic questions, 11 questions focused on PU and four questions on PEOU followed. One question asked the participants to give a grade to the website between one and ten, thereafter three open ended questions were asked about technical problems, whether the participants would recommend the website and if they had any other subject they wanted to discuss. One multiple-choice question was about what subjects the participants had visited. The last two questions concerned joining the focus group.

All questions on PU and PEOU were answered with a five point Likert Scale with the answer ratings: totally agree, agree, don't agree/don't disagree, disagree, and totally disagree. In the TAM multiple Likert Scales are used in different studies (19,25), in the present study, the five point Likert Scale was chosen after advise from an expert in the field who supervised a graduation research in which the TAM was incorporated (26). One reminder message was sent after two weeks. The survey could only be visited once from a unique IP-address.

Focus group and telephone interviews

The focus group participants received an email with information on the focus group such as duration, topics to discuss and an instruction to visit the website in the week preceding the focus group. For the focus group and telephone interviews a questioning route using the three strategies used by the website was developed. These three strategies are: give trustworthy information, listen to women and take women seriously. The questioning route consisted of 16 questions. Three introductory questions, three questions on each strategy, two questions where participants could bring in their own subject and two question that came forth of the survey. The moderator for the focus group was the primary researcher, who was supported by a process coordinator and two researchers who made field notes during the focus group. The focus group was audio recorded with consent of the participants. Afterwards the primary researcher transcribed the recordings.

The focus group was held at the beginning of May 2014. The two telephone interviews were held in April and May 2014.

Participants of the telephone interviews received an email in which the duration of the interview and topics to discuss were explained.

Data analysis

Survey data was analysed using the Statistical Package for the Social Sciences (SPSS) for mac version 20 (27). Mean and standard deviation were calculated for the interval and ratio data. Frequencies were calculated for the nominal data.

Focus group and interview data and field notes are imported in NVivo for Mac (28). The analysis of data was done using open, axial and selective coding from the Grounded Theory approach (29) to develop higher-level understanding of www.vrouwmc.nl. In the open coding process the topics in the questioning route were used. In the axial coding process a mind mapping approach was used. In the last coding step the mind map was processed in a table and discussed with two researchers to synthesize the definitive codes. Data triangulation was achieved by using multiple data collection methods. Reliability was obtained by using two researchers through the process of data collection and analysis.

Ethics

The Medical Research Ethics Committee in Utrecht assessed this study and the Medical Research Involving Human Subjects Act was found not applicable. Informed consent was obtained from all participants. At the beginning of the focus group and each interview, informed consent was asked. This study was done according the declaration of Helsinki (30).

RESULTS

Participants

A response rate of 9.5% was achieved (see figure 3). Mean age of the sample was 54.8 years (see table 1). Of all women 86.9% visited the website for personal reasons and 60% searched specific information for themselves. The first visit to the website was in 40.8% of the participants between one and six months ago from the moment they responded to the survey. Of all women, 85.5% received a university education. Computer literacy was high, 43.1% was able to use the computer usually without support from others. The Internet was used for a variety of purposes but 93.8% used it amongst other for checking their email.

There were 7 participants who signed up for the focus group Of them 5 participants participated, and two cancelled the day and morning before. Two participants joined a telephone interview. Mean age of the participants in the focus group and telephone interviews was 59, with a range of 47 to 66 years.

Survey

PEOU was rated high for all items. Of all participants 65% could find the information they were looking for quickly. In five PU questions, the answer category 'totally agree' was rated in more than 50% of the participants. The questions where the response to the totally agree answer category was less than 50% were: health related actions, new insights, to understand how body works, to understand complaints, to recognise health risks and to take follow-up actions (see table 2).

Focus group and telephone interviews

Data from the focus group and interviews were coded in four main codes (see table 3). Two of these codes agreed with PU and PEOU. The codes found were female specific, information, searching information and practical tips. PU was found in the female specific code as women in the focus group thought the information on the website was useful. In the code searching information, PEOU could be recognised. Difficulty in finding some subjects was mentioned by women in the focus group as well as in an interview.

Female specific

Women perceived the information as useful, and could use the information for preventive purposes. Some women used the information for informing relatives about

certain health risks. Women did not often take direct actions after reading information, but said they would do so if the information is troublesome. Women feel heard because of the agenda on the website, where information on women-related meetings can be found. After reading the information on the website, some felt motivated to search for more information, they wanted to know more.

Information

The professional voices heard on the website are important for trustworthiness of the website. Also the agreement of the information on the website and information women received from other sources was appreciated by the participants. Some women missed an interactive part on the website. Two missed multicultural information, but they did think the emphasis should lie on women's health.

Searching information

Women did think the information in general was easy to find. Subjects are clear on the homepage, but when looking for a specific subject like menopause, they did get lost in the website. Sometimes when using the search button, wrong information was given, for example, information on vaginal prolapse was shown when searching for 'pain in hands'. The search button is used by participants, others don't even search in the topics but type in a search term when entering the website.

Practical tips

All participants gave numerous practical tips. Tips were divided in different categories of which the public relations (PR) is the largest category. Participants also said they wanted to learn by hearing answers to questions that were asked by others. A Frequently Asked Questions (FAQ) section was suggested to add to the website.

DISCUSSION

The website www.vrouwmc.nl has a high perceived usefulness according to all participants. However, the survey demonstrated that women are not taking health related actions after reading the information on the website. In the focus group, this opinion was different. Women said they did not often take direct actions, but memorized the information for later use. This suggests multiple interpretations on the question were possible which was also an explanation mentioned in the focus group. Perceived ease of use was rated good.

All participants thought the subject women's health was important and should get more attention. This was recognised in the codes from the focus group and telephone interviews. However, Maas (1) says the gender differences in health care are still large. This suggests that the participants in the sample are more aware of gender differences in health care than the study population. Focus group and telephone interview participants also thought women's health information important for others, as a large part of the tips was made on public relations. They thought website visibility should be improved to enable more women in visiting the website.

The strategies giving trustworthy information, listening to women and taking women seriously were recognised on the website. Nevertheless multiple practical tips, like adding more diverse team members to the website team, were given to make the website agree more with these three strategies.

Using the Technology Acceptance Model (TAM) was a logical decision to make, however, it is difficult to compare with other studies using TAM because it is used in a wide range of e-health technologies like teledermatology (20) and web based e-health interventions (19). Website evaluations were done with different models, like UTAUT (21), MADS (13), and the Suitability Assessment of Materials (SAM) model (31). Numerous website and web-based technology evaluations use parts of the TAM (19-21). However, there was no evaluation method or instrument found that aims specific at health information websites. An instrument using part or whole of these models should be developed to generalize website evaluations because none of these models alone seem able to evaluate websites. The TAM could be part of such a model, as this model is widely used. It does not however completely cover a website evaluation as seen in this study by deletion of questions not applicable to website evaluations.

Participants found difficulty distinguishing the two strategies listening to women and taking women serious. General practitioners often provide health information; a study on what participants appreciate in communication shows that listening and showing interest amongst other is mentioned as important (32). In future research questions, the effect of communication on websites on perceived usefulness can be investigated.

Strength of this study is the use of a mixed methods design which resulted in a comprehensive understanding of the usability, usefulness of the website and the strategies used by the website. In-depth information was gathered on the three strategies by using qualitative data collection methods, and the response to the survey was processed in the questioning route for the focus group and telephone interviews as to supplement each other.

Limitations of this study are the low response rate for the survey and the limited number of participants in only one focus group. Additional interviews did compensate for this, but only two interviews were added due to low response. Another limitation could be the sampling method. The mean age in the participants was high. Also educational level was high. The website aims at the adult women aged above 18, but this result suggests that the women visiting the website are middle-aged. This could suggest the information on the website is specifically for middle-aged women. This could also suggest the younger women are not looking for women's health information. Further research should aim at what the informational needs are for younger and low-educated women, and whether they can find their information on the website.

The website is on this moment developed for health care consumers. Health care professionals, like nurses and integrated care deliverers, could find this website useful for their practice, the results from the focus group and telephone interview suggests a need in women's health information. When the website is further developed for these groups, information can be given by these professionals in addition to the information for health care consumers on the website. This can result in an improvement of women's health in the Netherlands. Also visibility of the website should be improved to reach a larger population.

CONCLUSION AND RECOMMENDATIONS

Conclusion

Participants found the information on the website useful and up-to-date and thought the time effort was worthwhile. They could find the information quickly on the website, and thought the website looks professional and nice. The fact that a website solely about women's health exists was mentioned positively multiple times. Visibility of the website can be strongly improved.

Recommendations

Further research on models to evaluate health related websites is advised because no model exists yet that focuses on website evaluations.

The website should be further developed for different target populations like health care professionals to reach a larger population. Furthermore the visibility of the website should be improved. Lastly, the informational needs of women in different age groups should be studies, as well as the needs of women with different educational levels.

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Tables and figures

Table 1: Participants (n = 130)

Characteristic		Frequency, n (%)	
Age	-	Mean: 54.8	
		SD: 10.4	
Background of visit [a]	Private	113	(86.9)
	Work	35	(26.9)
	Study	3	(2.3)
Reasons for visiting[a]	Search general information	72	(55.4)
	Search specific information for themselves	78	(60)
	Search specific information for another	15	(11.5)
	Question to a professional	8	(6.2)
First visit to website	- <1 month	46	(35.4)
	- Between 1 and 6 months	53	(40.8)
	- >6 months	31	(23.8)
Education	Grammar/Elementary School	0	(0.0)
	High School	19	(14.6)
	University	111	(85.5)
Computer literacy	Highly able, no support needed	52	(40)
	Able, usually without support	56	(43.1)
	Able, sometimes without support	21	(16.2)
	Able always with support	1	(0.8)
	Unable	0	(0)
Internet use[a]	- for work or education	97	(74.6)
	- to check email	122	(93.8)
	- To search health information	117	(90)
	- To search other information	120	(92.3)
	- For social media	77	(59.2)
	- For recreation	61	(46.9)

[a] = Multiple responses per participant possible

Table 2: Survey data: PEOU, PU and other

Concepts measured	Item description	Mean (sd)	1 n (%)	2 n (%)	3 n (%)	4 n (%)	5 n (%)
PU	Time effort worthwhile	1.36 (.68)	94 (72.3)	28 (21.5)	6 (4.6)	1 (.8)	1 (.8)
	Useful information	1.29 (.56)	99 (76.2)	24 (18.5)	7 (5.4)	0 (0)	0(0)
	Health related actions	2.55 (1.01)	17 (13.1)	48 (36.9)	52 (40)	3 (2.3)	10 (7.7)
	New insights	2.01 (.96)	45 (34.6)	49 (37.7)	30 (23.1)	2 (1.5)	4 (3.1)
	Up-to-date information	1.54 (.79)	78 (60)	38 (29.2)	12 (9.2)	0 (0)	2 (1.5)
	Useful subject information:						
	For reason visiting website	1.69 (.93)	69 (53.1)	42 (32.3)	12 (9.2)	4 (3.1)	3 (2.3)
	To understand how body works	1.92 (.95)	50 (38.5)	50 (38.5)	23 (17.7)	4 (3.1)	3 (2.3)
	To understand complaints	1.93 (1.00)	53 (40.8)	46 (35.4)	21 (16.2)	7 (5.4)	3 (2.3)
	To recognise health risks	1.92 (.96)	48 (36.9)	56 (43.1)	19 (14.6)	2 (1.5)	5 (3.8)
	To take follow-up actions	1.98 (.96)	44 (33.8)	56 (43.1)	23 (17.7)	2 (1.5)	5 (3.8)
	Time effort subjects worthwhile	1.52 (.85)	86 (66.2)	25 (19.2)	15 (11.5)	3 (2.3)	1 (.8)
PEOU	Information found quickly	1.48 (.76)	85 (65.4)	31 (23.8)	12 (9.2)	1 (.8)	1 (.8)
	Website looks nice	1.30 (.59)	100(76.9)	21 (16.2)	9 (6.9)	0 (0)	0 (0)
	Information subjects found quickly	1.52 (.85)	70 (53.8)	44 (33.8)	9 (6.9)	4 (3.1)	3 (2.3)
	Technical problems, n (%)	Yes: 1 (.8) technical problem not defined by participant					

Other	Grade website (1-10), mean (sd)	7.7 (.83)		
	Recommendation website to others? n (%)	Yes: 117 (90) No: 13 (10)		
	Why recommendation [a]	Information is trustworthy Women's health related		
	Why no recommendation [a]	Information is superficial		
	Subjects visited n (%)	Hormones	65	(18.8)
		Ageing	60	(17.3)
		Heart and blood vessels	50	(14.5)
		Bladder and intestines	33	(9.5)
		Cancer	31	(9.0)
		No specific subject	26	(7.5)
		Psychology	22	(6.4)
		Sexuality	19	(5.5)
		Anticonception:	17	(4.9)
		Blood loss	16	(4.6)
		Fertility	7	(2.0)
	Remaining comments[a]	Information is superficial More hyperlinks to other informational websites is recommended Difficulty finding subject menopause Website is complementary to other information sources		

1 = totally agree, 2 = agree, 3 = neutral, 4 = disagree, 5 = totally disagree, [a] =

Responses to open-ended questions were coded as if qualitative data, most common

codes are mentioned in table