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Exploring Personalised Features of Health Information Websites – an Empirical Review

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Abstract

Personalisation of health information websites and portals is becoming a commonplace practice. Personalisation aims to improve users' online experiences by providing relevant medical information in a timely manner. However, reported limited success of the health information websites demonstrates that users are dissatisfied with them. In the service quality theory, user satisfaction is linked to the consistency by which the service attributes are delivered. This study regards personalised features as service attributes and examines the consistency of their functionality through the conduct of a competitive analysis of eight most popular American and Australian health information websites. The results demonstrate a lack of consistency in the functionality of personalised features which might be linked to the lack of user satisfaction with the health information websites. Further research is needed to establish what functionality of personalised features is expected by users of the health information websites to increase their satisfaction and, subsequently, continuous use of these websites.

Keywords

Health information websites, health portals, health consumers, personalisation, personalised features

INTRODUCTION

When it comes to searching for medical information, there are a vast number of sources available such as doctors, nurses, family, friends and more. However, more often than not the Internet becomes a primary source for such information due to its wider availability and popularity (Baker et al. 2003; Fox 2006; Fox and Jones 2009). The research shows that the users are often more satisfied with the information they receive from the Web compared to other media sources (Raupach and Hiller 2002). However, there are a few problems that health information consumers (or users) face when they try to find health information online, one of which is information overload which occurs when users are no longer able to process retrieved information effectively due to its volume (Chen et al. 2003).

Given the overabundance of health information resources and subsequent information overload experienced by health consumers, health information websites and portals (referred to in this paper as health information websites) should make information provision better targeted to the users' needs and expectations. It justifies the importance of the research on the appropriate ways of representing and providing health information online (Childs 2004). One of the potential solutions is to employ intelligent technologies as a part of the health information websites to facilitate personalisation to enable differentiated information provision and to cater for individual needs of the users (Vermaas & Wijngaert 2005; Eagan 2006).

Personalisation can be defined as a website's capability to provide users with the most relevant information based on user's information needs (Kasanoff 2001). Personalisation is one of the most popular intelligent technologies introduced across health information websites in order to enhance information provision and to deliver relevant information in timely manner (Fisher et al 2009), there still seems to be lack of empirical research with regards to what personalised features are most common across health information websites, and whether there is any uniformity and consistency in the functionality that they provide.

Personalisation is regarded as a service of delivering relevant information to the right people at the right time with specific parameters of personalised features regarded as service attributes (Burstein et al. 2005). There are a number of studies that demonstrate that consistency by which the service attributes are delivered is one of the measures of service quality (Domingo 2003; Furrer 2005). Thus to be a high quality service, personalisation should demonstrate certain uniformity/consistency in the functionality of the personalised features regardless of the provider, i.e. health information website.

We posit here that, following the service quality research logic, the uniformity and consistency in personalised features can signify the quality of personalisation as a service provided by the health information websites. To that end, this research seeks to answer the questions: “How do most visited health information websites approach personalisation?”; “What are the personalised features they implement?”; “Is there any uniformity in the functionality of personalised features across health information websites?”

In order to answer these questions, this study conducted a competitive analysis of health information websites chosen on the basis of their popularity ranking among health consumers. The popularity of websites was calculated by the number of yearly visitors. Through this analysis, a range of personalised features implemented across eight selected websites and their functionality were identified. This study provides an empirical perspective on what personalised features are common across the most popular health information websites along with the functionality of those features. The major outcome of this research is a classification of personalised features and their functionality that is currently implemented across health information websites. The findings indicate a lack of uniformity across implemented features that might be one reason for user dissatisfaction with personalised health information websites reported by Fisher et al (2007). The results of this study could serve as a framework for further usability studies and guide better design of health information websites.

INCLUSION OF PERSONALISED FEATURES TO ENHANCE USER SERVICES IN E-HEALTH

Providing certain uniformity in implementation of personalised features as part of a better personalised services is one of the issues to address to better satisfy user requirements for medical information online (Domingo 2003; Furrer 2005). Personalisation can be defined as an understanding of “the user, the user’s tasks, and the context in which the user accomplishes tasks and goals” (Karat et al. 2000, p. 50). Personalised features are defined as features referring to the adjustment of the services in order to suit the individual needs and preferences of the individuals (Steinmetz and Wolf 1997). Personalisation in the Internet context focuses on users’ individual needs and helps them search for the information by providing a set of extra parameters, subsequently decreasing the redundancy of the search results, and retrieving more relevant information (Gustafson et al. 2008).

Personalisation is particularly important in the health context as in order to find relevant medical information, health consumers have to be as specific as possible in their search, and “assemble and understand the retrieved information in the context of their personal health concerns” (Lewis et al. 2005, p.4).

Personalisation is implemented via a range of intelligent personalised features that facilitate the provision of tailored resources to meet the needs of health consumers (Tochtermann 2003). There are many features that can be personalised to allow users to obtain information that is adapted to their needs, goals, knowledge, interests or other characteristics (Kramer et al. 2000; Zimmermann et al. 2005). In the health field, personalised features facilitate users in finding relevant health information in order to use it in the context of their personal health (Lewis et al. 2005). There are many personalised features common for health websites such as improved search facilities, personalised newsletter and a set of health tools that adjust the website content to match user information needs.

Luo and Najdawi (2004) suggest that improved search facilities are one of the personalised features of health information websites. For instance, provision of an option for searching within a topic of interest is one of the ways to personalise search. It also includes differentiation between health professionals and health consumers in order to deliver certain type of medical content they would potentially be interested in. Various options to specify search results, refine or advance search are examples of personalised search features. This non-generalist approach allows for treating users individually in accordance with their personal information needs, taking into consideration various criteria that help distinguish and identify information of potential relevance and interest to them. Overall, personalised search is one of the most effective uses of intelligent technologies in order to facilitate health consumers’ decision making when it comes to obtaining medical information that suits their individual needs (Burstein et al 2005).

There are a range of other personalised features such as symptoms checker, find a doctor, personalised newsletter, drug interaction checker that help users find up to date, relevant information that matches their needs. One of the main advantages of such tools is that they use ‘simple’, non-scientific terms dealing with certain health-related issues, assisting the user in dealing with the complexity of medical terms and jargon while searching for health information online (Moon and Burstein 2005). By asking users to specify various parameters, such as gender, weight, height, their location, such features help in retrieving more relevant information and monitor certain aspects of users’ health.

Overall, personalised features implemented across various health information websites are important as they potentially provide users with more relevant information in timely manner. 'Tailored' approach to information provision aims to reduce information overload, frustration and confusion of health consumers searching for medical resources online. However, despite obvious advantages that health information websites have to offer by introducing personalised features, there is evidence that they are not widely used and in many cases the users are dissatisfied with them (Fox 2005; Fisher et al 2007; Fox 2008).

There is significant research that links the consistency of the website functionality to increased user satisfaction (Adamson and Wallace 1997; Ozok and Salvendy 2000; Abidi and Chong 2004). Research presented in this paper aimed to empirically determine whether the health information websites provide any consistency or uniformity in the implementation of personalised features reviewed above. A competitive analysis of selected websites was conducted and the results are described and discussed.

RESEARCH APPROACH

Competitive analysis was chosen to answer the research questions about how most visited health information websites implement personalisation, what personalised features they implement and whether there is any uniformity in the functionality of such features. Traditionally, competitive analysis helped companies gain a better understanding of the competitors, their capabilities and strategies (Smith et al. 1992). Competitive analysis of the selected marketing niche starts by identifying the most successful competitors and defining specific aspects that make these competitors more successful (Bloodgood and Bauerschmidt 2002). According to Martilla and James (1977) effective competitive analysis is rather specific in terms of analysing certain features and services that can be improved rather than conducting generic analysis. Thus effective competitive analysis can be used to identify which attributes of competitors' product or service should be improved to become competitive and potentially successful.

Competitive analysis is a method often used by website designers and developers in order to determine the strengths and weaknesses of competitors and similar products and services they offer (Nielsen and Mack 1994). For the purpose of this research, it was envisaged that competitive analysis would help identify the most popular and widely used health information websites in order to explore personalised features they have. Subsequent analysis of the identified personalised features provided valuable information in regards to their consistency and uniformity across various health information websites.

Competitive analysis was carried out in two phases. The first phase included identification of the most popular and widely-used health information websites. Due to the availability of the usage data the sample was restricted to health information websites from the USA and Australia. The second phase involved exploration and analysis of the functionality of the personalised features of the identified health information websites.

Phase 1 – selection of personalised health information websites

In order to identify the most popular and widely-used health information websites we conducted a review of health information websites that were claimed to be the most popular and the most visited in 2009 and 2010 in the USA and Australia. As there was no intention of a cross-cultural comparison, the choice of the health information websites was based on whether they had met the criteria listed below rather than the country of origin.

In the second iteration of the selected health information websites, we only included those websites that were: (1) providing generic health information, i.e. non-disease, sex or age specific; (2) reputable websites supported by the government, health divisions and organisations that demonstrate that they are an integral part of a country's health strategy, that excludes various private bodies and pharmacy companies; (3) written in English; (4) claiming to have personalised features; (5) easily available to the users across the globe without the need to register to access personalised features as it is reported that the users are often unwilling to register due to the privacy concerns (Kobsa 2007); (6) not serving as storage of personal health records online.

Phase 2 - examination of personalised features

Phase 2 aimed to identify and analyse a range of personalised features presented across selected health information websites. However, a number of steps were required to locate the personalised features: (1) Open 'home page' and examine for evidence of personalised features (as most of them are on the home page); (2) Read 'about us' statement; (3) Look at the 'site map' section; (4) Read 'help' section; (5) Search for 'personalisation' and 'personalised features' using the website's search engine; (6) Use their search engine (search term 'tamoxifen') to see if the search is personalised. Identified personalised features were subsequently analysed on the basis of the frequency of occurrence, and functionality.

RESULTS

Selected health information websites

eBizMBA.com, an eBusiness knowledgebase that provides a range of marketing and analytical services, listed 20 most visited US health information websites as of June 2010. This was determined by a combination of inbound links, Google page rank and U.S. traffic data (Top 20 Most Popular Health Websites 2010). Another e-marketing agency MarketingCharts.com which is a sister publication to MarketingVox, MediaBuyerPlanner and Retailer Daily, released top 10 health information websites based on the share of visits in 2009 (Top 10 Health & Medical Information Websites 2009). Based on the six inclusion criteria identified in the previous section, the list of the reviewed websites was narrowed to six American personalised health information websites and two Australian ones, represented in Table 1. Selected Australian health information websites included in the list were claimed to be the most visited by HitWise Experian, the leading global information services company that provides data and analytical tools (HitWise Experian 2009). We reached saturation with the selected number of health websites – eight overall - as we identified all existing personalised features that fit the criteria identified earlier.

Table 1. Analysed health information websites

#	Health website	Description
1	WebMD	WebMD (http://www.webmd.com/) has been developed by WebMD Health Corporation, a subsidiary of Emdeon Corporation, and it “delivers an unprecedented level of personalisation with an unparalleled user experience” (David Gang, Executive Vice President)
2	MedicineNet.com	MedicineNet.com (http://www.medicinenet.com/) provides easy-to-read, in-depth, authoritative medical information for consumers via its robust, user-friendly, interactive website since 1996.
3	everydayHealth	EverydayHealth.com (http://www.everydayhealth.com/) is a leading provider of online health information helping the users manage their own and their family's conditions and overall well-being through personalised advice, tools, and communities.
4	Healthline	Healthline (http://www.healthline.com/) is an independent company that offers a taxonomy-driven medically guided search platform that provides a semantic organization and contextual presentation of health-related information. Healthline offers users to register to get access to their personalised features that can help manage users' health.
5	revolutionhealth	Revolution Health (http://www.revolutionhealth.com/) is a leading consumer-centric health company founded in 2008 to transform how people approach their overall health and wellness. By putting individuals at the center of their own healthcare, Revolution Health allows them to make informed choices and offers more convenience and control over their individual healthcare decisions.
6	WellSphere	WellSphere (http://www.wellsphere.com/) is a website that recognises that each person has their own unique health questions, we developed a model that combines personalized information, social support, and online tools to help people address their individual concerns.
7	HealthInsite	HealthInsite (http://www.healthinsite.gov.au/) is an Australian Government initiative, funded by the Department of Health and Ageing. It aims to improve the health of Australians by providing easy access to quality information about human health.
8	Better Health Channel	Better Health Channel (http://www.betterhealth.vic.gov.au/) was founded in 1999 by the Victorian Government, Australia as a consumer health information website for the Victorian community.

All of the selected health information websites provide access to a range of personalised features and give the users access to generic health information gathered in accordance with either HON code or TRUSTe quality seals and certifications which makes the selected health information websites reputable (HON 2008, TRUSTe 2008), thus they satisfy the selection criteria.

Personalised features of health information websites

As a result of the examination of the selected health information websites, six personalised features were identified. These features along with their short description are listed in Table 2.

The analysis of the identified popular health information websites established that the Personalised search was implemented across all of the eight selected websites, Health tools/calculators across six of them, followed by the

Symptoms checker and Find a Doctor presented on five websites, Personalised newsletter and Drug interaction checker were implemented on 3 and 1 health information websites respectively.

Table 2. List of identified personalised features

#	Personalised feature	Description
1	Personalised search	A search function is one of the most popular functions included on most health information websites. As a personalised function, the search should provide a number of extra characteristics that allow users to narrow/specify the search results either before or after the search process.
2	Symptoms checker	Symptoms checker is a tool that helps users identify what condition they have depending on the symptoms they experience.
3	Find a Doctor	Find a doctor is a feature that allows users locate health specialists or services in the area specified by the users.
4	Personalised newsletter	Personalised newsletter is a feature that allows health consumers to subscribe to a newsletter by setting up certain parameters in relation to what information they are willing to receive and how often.
5	Health tools/calculators	There were a wide number and range of various health tools/calculators available on the websites. A Health tool is a stand-alone application or module implemented and designed by various health information websites that delivers a specific service. The users are asked to provide certain information in order to obtain the summary of calculated results, for instance, for the feature 'Body mass index' the users are asked to provide their weight and height.
6	Drug interaction checker	Drug interaction checker allows users to check how drugs interact with each other and other substances such as food, alcohol, caffeine, etc.

Based on the frequency of implementation of the identified personalised features, they can be divided into two categories – 'frequently implemented' and 'rarely implemented'. 'Frequently implemented' personalised features, i.e. features implemented by more than half of the selected websites, were: (1) Personalised Search; (2) Health Tools/Calculators; (3) Symptoms Checker; (4) Find a Doctor. The 'rarely implemented' personalised features, i.e. features implemented by less than 50% of the selected websites, were (1) Drug interaction checker and (2) Personalised Newsletter. 'Frequently implemented' personalised features were subsequently analysed to identify their major functional characteristics.

Each of the identified 'frequently implemented' personalised features has different functionality depending on the health website. Analysis of the functionality of the 'frequently implemented' personalised features is presented in Table 3.

'Health tools/calculators' were not included in Table 3. Even though they were claimed to be 'frequently implemented' personalised features, the analysis showed that there was no great diversity in their functionality. Such features are very specific and usually single-task oriented (eg, calculating body mass index, calories intake, etc). Thus being well presented across the selected health information websites, health tools/calculators demonstrate consistency and uniformity of their functionality which distinguishes them from other 'frequently implemented' features, and mitigates the need for their further analysis.

Table 3. Analysis of the 'frequently implemented' personalised features

#	Personalised feature	Functional characteristics	Health information websites where the feature is present	Web sites count
1	Personalised Search	Term suggestions	WebMD; MedicineNet; Healthline; Revolutionhealth; Wellsphere; Healthinsite; Better Health Channel	7
Refine results by related health topic		WebMD; MedicineNet; Everydayhealth; Healthline; Healthinsite; Better Health Channel	6	
Refine results by content type, i.e. news, video, etc.		WebMD; Everydayhealth; Healthline; Revolutionhealth; Wellsphere; Healthinsite	6	

	Internal/web results	Healthline; Wellsphere; Healthinsite	3
	Type-in help	Healthline; Revolutionhealth; Wellsphere	3
	Shows related searches	Everydayhealth; Revolutionhealth	2
	Refine results by category, i.e. causes, treatments, etc.	WebMD; Everydayhealth	2
	Refine results by 'Info for kids, adults, etc'	Healthinsite	1
	Refine results by the date of creation/modification	Healthinsite	1
	Refine results by the language	Healthinsite	1
2	Symptoms checker	WebMD; Medicinenet; Everydayhealth/Revolutionhealth ¹ ; Healthline	4
	Visual map	WebMD; Medicinenet	2
	Refine by gender	WebMD; Medicinenet	2
	Typing the symptoms in	Everydayhealth/Revolutionhealth; Healthline	2
	Answering a set of Qs	WebMD; Everydayhealth/Revolutionhealth	2
	Refine by age	WebMD	1
3	Find a Doctor	WebMD; Everydayhealth/Revolutionhealth; Healthline; Better Health Channel	4
	By location, i.e. postcode, suburb, state	WebMD; Everydayhealth/Revolutionhealth; Healthline; Better Health Channel	4
	By the name	WebMD; Everydayhealth/Revolutionhealth; Healthline; Better Health Channel	4
	By the speciality	WebMD; Everydayhealth/Revolutionhealth; Healthline; Better Health Channel	4
	Search within specific radius	WebMD; Everydayhealth/Revolutionhealth	2
	Search by practice/clinic	WebMD; Better Health Channel	2
	By spoken language	Everydayhealth/Revolutionhealth; Better Health Channel	2
	By gender	Everydayhealth/Revolutionhealth	1

¹ These two health information websites use the same application for such features as 'Symptoms checker' and 'Find a Doctor'

DISCUSSION

The purpose of the study was to determine how most visited health information websites approach personalisation, what the personalised features they implement and whether there is any uniformity in the functionality of these personalised features. The analysis of the most visited American and Australian health information websites indicated there was a range of personalised features accessible to a wide range of users. The analysis identified six personalised features implemented across selected health information websites such as Personalised search, Symptoms checker, Find a Doctor, Personalised newsletter, Health tools/calculators and Drug interaction checker. Four of those features (Personalised Search, Symptoms checker, Find a Doctor and Health tools/calculators) were implemented on at least five health information websites out of the selected eight ('frequently implemented') and two (Personalised newsletter and Drug interaction checker) were 'rarely implemented', i.e. present on less than half health information websites. This demonstrates that there is a tendency to implement certain personalised features aiming to deliver specific rather than generic information to the target audience. Given that the websites were chosen on the basis of such characteristics as being generic in terms of the information provision and audience, the findings demonstrate some sort of consistency in relation to implementing personalised features on health information websites.

Further analysis of the 'frequently implemented' personalised features was aimed at identifying what functionality those features provided, and whether there was any consistency in their implementation across selected American and Australian health information websites. The analysis of the 'frequently implemented' personalised features demonstrates diversity in the functionality of similar personalised features offered by

selected health information websites, with the only exception of ‘Health tools/calculators’. The best example of such functional diversity would be the search option where the users are offered to filter the search results by a number of functional characteristics such as health topic, content type, category, and others. These characteristics vary from one health website to another, however, it was important to identify the most and least popular characteristics in relation to the search function and other identified personalised features. Such features as Find a Doctor and Symptoms Checker also demonstrate a variety of functional characteristics that can be implemented (see Figure 2).

The diversity of functionality of the identified ‘frequently used’ personalised features required further analysis to determine what functional characteristics were the most popular, i.e. represented on more than 50% of the selected features. They were labelled as ‘1st tier’, other characteristics were labelled as ‘2nd tier’ being not as popular, i.e. represented on less than 50% of the selected personalised features. Conceptually it is represented by Figure 2.

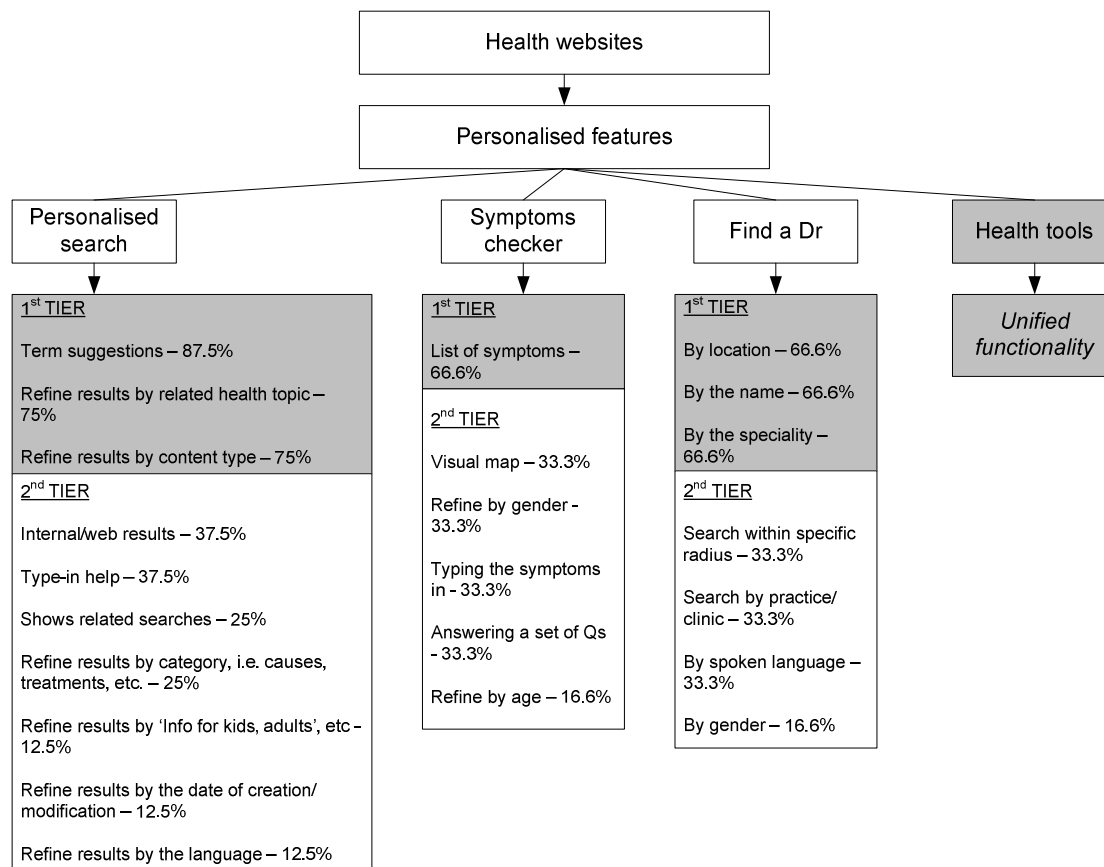


Figure 2. Classification of personalised features and their functional characteristics across health information websites

Figure 2 details four personalised features that are ‘frequently implemented’ across the selected health information websites, and three out of these four personalised features offer significantly different functionality. The lack of consistency of the functionality of the analysed personalised features is further analysed in the Table 4 below.

Table 4. Cross-analysis of the ‘frequently implemented’ personalised features and their functionality

Personalised feature	% across selected websites	% of ‘1 st tier’ characteristics	% of ‘2 nd tier’ characteristics
Personalised search	100%	30%	70%
Symptoms checker	62.5%	17%	83%
Find a Doctor	62.5%	43%	57%

As can be seen from the Table 4, even though such personalised features as Personalised search, Symptoms checker and Find a Doctor are relatively popular across the selected, most visited Australian and American health

information websites, they demonstrate diversity in the functionality they offer. In particular, in the set of functional characteristics they offer the users to choose from (see Figure 2 for the identified characteristics). These personalised features do not provide consistent, unified range of functional characteristics which might subsequently lead to users' dissatisfaction.

It would be reasonable to assume that the 1st tier functionality should be 'just enough' to satisfy users' needs and meet their expectations, considering that there are the most popular functional parameters across the selected personalised features. However, reported limited success of the health information websites in general comparing to others such as Google demonstrates that it is not the case (Fox 2008). It might signify the need for the unified approach to the provision of functionality across personalised features. The fact that most of the functional parameters of the identified personalised features ('frequently implemented' ones) are the 2nd tier parameters and vary up to the 70%, indicates the functional uniformity and leads to the tentative conclusions that the needs and expectations of the users towards personalised features and their functionality need further research.

As previously stated, to be a high quality service, personalised features should demonstrate certain uniformity and consistency in the functionality of the personalised features regardless of the provider, i.e. health website. However, the obtained findings indicate that this is not the case and that further research that would involve users, is required to confirm that the users would prefer some consistency across personalised features to help them find information they need more efficiently.

CONCLUSIONS AND FURTHER RESEARCH

It is important to state that the conducted research identifies the ways most visited health information websites approach personalisation and reveals the range of popular personalised features they implement, and the functionality of such features. The conceptual representation of these findings (see Figure 2) might prove to be useful for the health website designers working on the introduction of personalised features to the health information websites. However, it is important to acknowledge that the findings open a plethora of new research questions needing to be addressed. These research questions mainly relate to the expectations and needs the users have towards personalised health information websites and their functionality. The diversity of the functionality of the identified personalised features clearly suggests the need for further research in the area that would involve users.

In general, personalised features aim to facilitate users in their decision making processes and to provide the right information in timely manner (Burstein et al 2005). However, this study shows that they appear to be inconsistently implemented across health information websites. If we assume that the designers of health information websites implemented discussed personalised features to help health consumers in the search for information, it is hard to see given the inconsistency of approaches, how decisions on what to implement were made. Without the clarity on such matter, it is doubtful that personalised features will provide high quality service to the health consumers and subsequently satisfy them.

In the light of these findings, it is important to determine what personalised features and what functionality the health consumers want to have implemented across health information websites. One of the potential directions of this research is to extract user expectations as personalisation is perceived as "an interplay of expectations that motivate action, actions that produce effects, and effects that are evaluated as feedback" (Oulasvirta & Blom 2008, p. 14). Thus it is important to provide more insight into the expectations the health consumers have towards the functionality of personalised features of health information websites. For example, such exploration will provide enough detail on the user preferences and expectations related to the search functionality, e.g. what options/filtering would be preferable or expected to satisfy the users. To that end, by revealing what the users expect in relation to the personalised features, it would be possible to produce more consistent approach in relation to introducing personalised features to the health information websites.

While the identified personalised features and their functionality are useful to provide an outlook on the existing health information websites and personalised features they implement, it is important to continue improving the functionality they provide. As the amount of health information available online keeps growing, it is important do not just provide the users with the means, i.e. personalised features, to obtain relevant information in timely manner but also to improve these features in order to boost the popularity of the health information websites overall. While this research serves as the first step to determine the range of existing personalised features and their functionality, it is important to continue the exploration. It is known that successful health information websites have to offer the users certain benefits that would make them come back, something that would make the use of a health website more relevant, personal and secure. And while personalised features certainly serve this purpose, their implementation should be seen as an opportunity rather than a given in order to improve user experience with health information websites.

To sum up, the findings of this research provide useful insights to the implementation and design of personalised health information websites. In addition, they could guide the adoption of personalisation and may offer helpful guidelines for practitioners in designing personalised health information websites. However, the identified diversity and inconsistency in relation to the functionality of the features, signifies the need to further explore what personalised features the users actually expect to see on the health information websites and how these features should function to benefit the users.

Thus further study of personalised features of the health information websites involving the actual health consumers could provide a lens to improve implementation of the personalised features within health information websites. It is believed that better understanding of the user expectations in related to the identified personalised features of health information websites, will help designing better health information websites that would provide more benefits to the users.

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