Psycho-Oncology
Psycho-Oncology **23**: 685–691 (2014)
Published online 10 January 2014 in Wiley Online Library (wileyonlinelibrary.com). **DOI**: 10.1002/pon.3471

E-loyalty towards a cancer information website: applying a theoretical framework

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Abstract

***Objective*: To provide more insight into user perceptions related to e-loyalty towards a cancer information website. This is needed to assure adequate provision of high quality information during the full process of cancer treatment—from diagnosis to after care—and an important first step towards optimizing cancer information websites in order to promote e-loyalty.**

***Methods*: Participants were cancer patients ($n = 63$) and informal caregivers ($n = 202$) that visited a website providing regional information about cancer care for all types of cancer. Subsequently, they filled out a questionnaire assessing e-loyalty towards the website and user perceptions (efficiency, effectiveness, active trust and enjoyment) based on a theoretical framework derived from the field of e-commerce. A structural equation model was constructed to test the relationships between user perceptions and e-loyalty.**

***Results*: Participants in general could find the information they were looking for (efficiency), thought it was relevant (effectiveness) and that they could act upon it (active trust) and thought the visit itself was pleasant (enjoyment). Effectiveness and enjoyment were both positively related with e-loyalty, but this was mediated by active trust. Efficiency was positively related with e-loyalty. The explained variance of e-loyalty was high ($R^2 = 0.70$).**

***Conclusions*: This study demonstrates that the importance of user perceptions is not limited to fields such as e-commerce but is also present within the context of cancer information websites. The high information need among participants might explain the positive relationship between efficiency and e-loyalty. Therefore, cancer information websites need to foster easy search and access of information provided.**

Received: 28 May 2013
Revised: 26 November 2013
Accepted: 5 December 2013

Introduction

When people are diagnosed with cancer, they are often overwhelmed by emotions such as fear, anger, worry and anxiety [1]. This does not only hold for patients but also for their informal caregivers (e.g. partner, parents or friends) [2]. To deal with the emotions that a cancer diagnosis brings along, adequate information provision is of great importance [3]—also after treatment [4]. Such information can have a range of positive effects, such as reducing anxiety, gaining a sense of control over the disease and even a better health-related quality of life [3,5].

Even though most cancer patients prefer information provision by their health care provider, they often indicate the Internet as an important source for health information [4,6]. There are several reasons why patients and their informal caregivers search (additional) health information online. Firstly, they may be dissatisfied with the information provided by health care providers [1,7–10]. Secondly, they might want to reassure themselves to have all available information and thereby gain a sense of control over the disease [11–13]. Thirdly, because of shock or denial at the moment of diagnosis, information might have been forgotten and needs to be retrieved at a later point in time [3].

Because of the ubiquitousness of cancer information on the Internet and the explosive growth of this medium in recent years, many patients and their informal caregivers experience difficulties in retrieving the information they need. They are often unfamiliar with websites and find it difficult to distinguish reliable information sources from unreliable ones [14]. Many oncological care providers experience the same problems; unfamiliarity with relevant websites and uncertainty about the quality of information makes them hesitant to refer patients to the Internet for additional information on their disease [15]. The development of comprehensive and reliable cancer information websites, preferably in collaboration with professionals in cancer care, is therefore vital to meet the demands of patients and informal caregivers. With this aim, six hospitals in Limburg (a region in the Netherlands), the Comprehensive Cancer Centre South and the Maastricht Radiation Oncology Clinic have developed a website (www.kankerwiehelpt.nl) that

combines information about all types of cancer with regional information about oncology care. This website provides regional information covering the whole southeast of the Netherlands. Patients and their informal caregivers can be self-directed to the website or by their oncology professionals—both nurses and doctors. The website distinguishes itself from other Dutch cancer information websites by offering tailored, hospital-specific information on oncological care and elaborate information on a range of paramedic professionals that might play a role in cancer care (e.g. physiotherapists, social workers or suppliers of wigs and hair pieces within the region). All information on the website is provided and constantly reviewed and updated by professionals in oncology care, ensuring its accuracy and actuality. Furthermore, the website covers the full cancer treatment process—from diagnosis to after care, making it specifically suitable for recurrent visits throughout patients' trajectories. Such recurrent visiting may promote optimal use and benefit of the provided information and may support patients and their informal caregivers in their varying informational demands during all stages of their treatment process.

In order to stimulate recurrent visiting, knowledge of factors underlying website loyalty is required. Previous studies identified factors related to website loyalty—besides content [16]—based on characteristics of the *visitor* (e.g. their health-related behaviour [17,18]) as well as the *website* itself (e.g. visual complexity of the homepage [19]). The study at hand focuses on the cutting surface: *visitors*' perceptions of the *website* resulting in a user experience [20,21]. User experience refers to what a person thinks and feels during and after exposure to a website [22]. The main idea is that a positive user experience leads to loyalty towards a website (i.e. e-loyalty). E-loyalty consists of visiting a website again and/or recommending a website to others (e.g. fellow patients and informal caregivers). The latter is based on previous research indicating that word-of-mouth recommendation is an effective strategy to improve the use of a website by others [23,24].

User experience consists of cognitive and affective perceptions [25]. Cognitive perceptions are rational in nature and are induced by utilitarian or cognitive motives. Affective perceptions are emotional in nature and are induced by hedonic or affective motives [26]. The key user perceptions are efficiency, effectiveness, enjoyment and active trust [25]. These terms are derived from other fields such as e-commerce, and although they can have a different meaning within psycho-oncology, we chose to use the same terminology as in previous studies to avoid further confusion. *Efficiency* refers to easy search and access of (cancer) information provided, and *effectiveness* refers to the quality of that information (e.g. in terms of personal relevance to the patient or informal caregiver) [27]. The idea that a positive user experience increases e-loyalty does not only apply to cognitive perceptions but also to affective perceptions [28]. These affective perceptions are also referred to as *enjoyment* (e.g. the experience of visiting the website being pleasant) [29]. *Active trust* refers to the confidence in acting on the provided information on a website, which can result in increased e-loyalty [30]). These user perceptions are mostly studied within other fields, such as e-commerce. We are aware of only two other studies within the field of (public) health that assessed user perceptions and their relationship with e-loyalty; they both found that both effectiveness and enjoyment were positively related with e-loyalty, which was partly mediated by active trust [31,32], indicating the importance of the latter and thus of providing high quality information. There was no direct effect of efficiency, but this could be explained by the websites used in these previous studies being aimed at primary prevention (e.g. moderate alcohol use). It is plausible that the information need of visitors of these websites might be lower in comparison with cancer patients and their informal caregivers. Therefore, we expect that efficiency is positively related with loyalty towards the cancer information website investigated in the study at hand.

In short, the present study provides more insight into user perceptions related to loyalty towards a cancer information website. This is (a) needed to assure adequate provision of high quality information during the process of cancer treatment from diagnosis to after care and (b) an important first step towards optimizing cancer information websites in order to promote loyalty. To our knowledge, this is the first study focusing on loyalty towards a website within the context of patient education.

Methods

A cross-sectional study using self-reported measures was conducted. The previously mentioned website (www.kankerwiehelpt.nl) was used in this study and is denominated as 'the website' in the remainder of this article. We would like to acknowledge a recently made plea for full disclosure to maximize scrutiny, foster accurate replication and facilitate future data syntheses (e.g. meta-analyses) [33,34]. Therefore, the questions used in the current study, as well as non-identifiable data, syntax and output of the analyses are available at http://sciencerep.org/9/.

Participants and procedures

The target population were Dutch (former) cancer patients and their informal caregivers. They were recruited by means of two strategies: (a) by sending invitations on behalf of the Comprehensive Cancer Centre South through online cancer-related discussion groups and a panel of care callers to visit the website and (2) by asking visitors of the website to evaluate it. Potential participants were

DOI: 10.1002/pon

only invited to participate in the study after they visited at least three pages of the website (as tracked by server registrations), which was based on user statistics reported by Google Analytics [35]. After completing an informed consent form, participants had to fill out a questionnaire, which took about 10 min. Participants were informed that the purpose of the questionnaire was to evaluate the website. Small incentives were raffled off among the participants (i.e. three gift vouchers of €25 each).

Measurements

Age, gender and level of education were assessed as socio-demographic variables. Furthermore, the role of participants (i.e. patient or informal caregiver), whether participants had visited the website before, and phase in treatment process (diagnosis, in treatment or after care) were assessed. The questions on e-loyalty and user perceptions were based on previous studies in which they were validated in Dutch [31,32]. The following constructs were assessed in these questions, which all had to be answered on a 7-point Likert scale ranging from 'strongly disagree' (=1) to 'strongly agree' (=7).

E-loyalty

Four items (Cronbach's $\alpha = 0.97$) were used to assess e-loyalty; two items regarding the intention to visit the website again (i.e. 'I would visit this website again'; 'I would return to this website if I was looking for information about cancer'), and two items regarding recommendation of the website to others (i.e. 'I would recommend this website to others'; 'I would recommend this website to others if they were looking for information about cancer'). Principal component analysis extracted one underlying factor for these items (eigenvalue = 3.697). Therefore, these four items were used as proxy for e-loyalty.

User perceptions

- *Efficiency*: Two items ($\alpha = 0.98$) were used to assess perceived efficiency ('It took little effort to find information on this website'; 'I could easily search for information on this website').
- *Effectiveness*: Two items ($\alpha = 0.93$) were used to assess perceived effectiveness ('The website provided relevant information'; 'The website provided useful information').
- *Enjoyment*: Two items ($\alpha = 0.97$) were used to assess perceived enjoyment ('I thought my visit to the website was pleasant'; 'I thought my visit to the website was nice').
- *Active trust*: Three items ($\alpha = 0.90$) were used to assess perceived active trust ('I could act upon the information provided at this website'; 'I could use the information provided at this website in daily life; 'I feel like I could use the information at this website if needed').

Analyses

First, using Predictive Analytics SoftWare Statistics 18.0 (IBM Corporation, Armonk, NY, USA), attrition analyses were conducted to compare participants who completed all items (concerning both e-loyalty and user perceptions) with those who did not. Comparisons were made in terms of age, gender, level of education, role of the participant, whether the participant visited the website before and recruitment strategy. Attrition analyses were conducted by means of chi-squared and independent-samples t-tests. Subsequently, Pearson correlation coefficients were used to provide more insight into correlations between constructs.

Second, using Mplus 6 (Muthén & Muthén, Los Angeles, CA, USA), a structural equation model using all available data was constructed to test the relationships between user perceptions and e-loyalty. E-loyalty was regressed on efficiency, effectiveness, enjoyment and active trust. Active trust was regressed on efficiency, effectiveness and enjoyment. Age, gender, level of education, role of the participant, whether the participant visited the website before and recruitment strategy were taken into account as potential covariates of e-loyalty. A level of significance of 0.05 was used for the relationships within the model. Comparative fit index (CFI), Tucker–Lewis index (TLI), root mean square error of approximation (RMSEA) and standardized root mean square residual (SRMR) were used as model fit indices. CFI and TLI are goodness-of-fit indices, where larger values signal better fit. Values over 0.95 indicate close fit. RMSEA and SRMR are goodness-of-fit indices, where larger values signal worse fit. Indicators of close fit are, respectively, RMSEA ≤ 0.05 and SRMR ≤ 0.09 [36,37].

Results

In total, 265 cancer patients ($n = 63$) and informal caregivers ($n = 202$) participated, of which 191 completed all items (retention rate: 72%). Those who did not complete all items did not differ in terms of age ($t(262) = 0.26$, $p = 0.80$), gender ($\chi^2 = 0.11$, $p = 0.74$), level of education ($\chi^2 = 4.04$, $p = 0.13$), role of the participant ($\chi^2 = 0.02$, $p = 0.90$), whether the participant visited the website before ($\chi^2 = 0.03$, $p = 0.86$) and recruitment strategy ($\chi^2 = 1.88$, $p = 0.17$). Table 1 shows the sample characteristics. Of the sample, 22% had visited the website before.

Descriptive statistics and correlations between e-loyalty and user perceptions are shown in Table 2. Overall, participants scored relatively high on e-loyalty and user perceptions (all means >5 on a 7-point Likert scale), which indicates that the user experience was positive. Participants in general could find the information they were looking for, thought it was relevant and that they could act upon it and thought the visit itself was pleasant. Correlation coefficients are medium to large in terms of effect size [38] and were all significant ($p < 0.001$).

DOI: 10.1002/pon

Table 1. Sample characteristics ($n = 265$)

Female [*n* (%)]	183 (69%)
Patient [*n* (%)]	63 (24%)
Phase (patients)	
Diagnosis	2/39 (5%)
Treatment	19/39 (49%)
After care	18/39 (46%)
Age [M (SD)]	56 (13)
Level of education [*n* (%)]	
Low	31 (12%)
Intermediate	121 (46%)
High	262 (42%)

Table 2. Descriptive statistics and correlations between e-loyalty and four types of user perceptions

	M (range: 1–7)	SD	1	2	3	4	5
1. E-loyalty	5.74	1.49	—	0.74	0.64	0.46	0.63
2. Efficiency	5.73	1.31		—	0.69	0.47	0.47
3. Effectiveness	5.93	1.10			—	0.62	0.68
4. Enjoyment	5.49	1.42				—	0.52
5. Active trust	5.30	1.19					—

All *p*-values were < 0.001.

Figure 1 shows the significant paths of the structural equation model that was used to test the relationships between user perceptions and e-loyalty. The CFI and TLI were 0.98 and 0.97, respectively; RMSEA and SRMR were 0.06 and 0.03, respectively—all indicating a close fit. Effectiveness and enjoyment were both positively related with e-loyalty, but this was fully mediated by active trust. The effect size for enjoyment was smaller ($\beta = 0.18$) in comparison with effectiveness ($\beta = 0.71$). Efficiency was positively related with e-loyalty. The explained variance of e-loyalty was high ($R^2 = 0.70$). None of the potential covariates was associated with e-loyalty, except for the role of the participant. Informal caregivers were more likely to be loyal in comparison with cancer patients.

Discussion

This study aimed to provide more insight into user perceptions related to loyalty towards a cancer information website. We investigated whether a framework of user perceptions known to be of importance in other fields can be used as a template for the explanation of e-loyalty in the area of (cancer) patient education. Perceived efficiency of the website was positively associated with e-loyalty, indicating that the easy search of and access to the provided information are related to higher intentions to revisit the website and to recommend the website to others. The direct effect of efficiency is contradictory to previous findings. This might 'differentiate health information websites from other commercial websites' [39]. Health-related websites are recognized as a service instrument to conform to public interests. Therefore, visitors of health information websites put much more stress on effectiveness rather than efficiency, such as the graphical user interface that defines a distinctive feature of the commercial-oriented websites [39]. This is in line with two previous studies within the field of health promotion [31,32]. The websites used in these previous studies, however, were aimed at primary prevention for the general public. It is plausible that the information need among members of the general public is lower in comparison with cancer patients and their informal caregivers. Patients with cancer are recognized as having specific information and communication needs throughout their trajectories: cognitive needs to obtain specific knowledge and factual information about the disease and its treatment (for an overview of information needs, see Rutten and colleagues [40]), and affective needs for support in dealing with their illness emotionally [41,42]. The high need to find information among the participants in the study at hand might explain the positive relationship between efficiency and e-loyalty. Therefore, cancer information websites need to pay attention to the graphical user interface to foster easy search and access of information provided, which subsequently

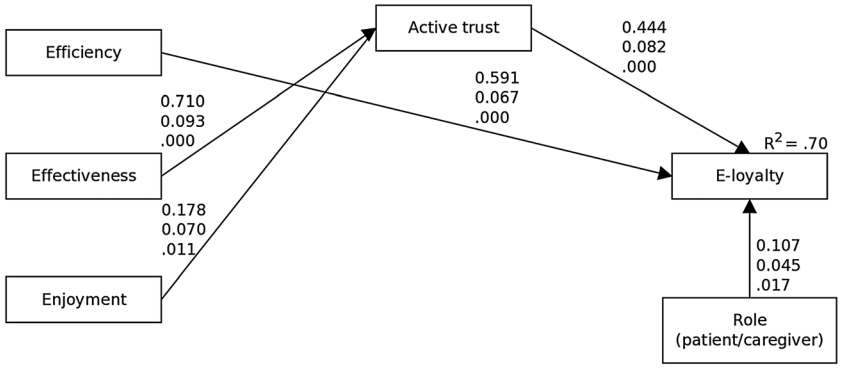

Figure 1. Structural equation model for the relationships between four types of user perceptions and e-loyalty. (Note: Numbers next to paths indicate, respectively, standardized estimates, standard errors and *p*-values)

DOI: 10.1002/pon

might affect e-loyalty. This can be achieved by several methods described elsewhere, for example, measurement scales [43], eye tracking [44] and analyzing server registrations [45].

Effectiveness and enjoyment had an effect on e-loyalty mediated by active trust. This is in line with the limited evidence that is currently available [31,32] and indicates the importance of providing high quality information. The large effect size regarding effectiveness is in line with the idea that the information provided on the website is highly relevant given the visitors' situation (e.g. themselves or a relative being recently diagnosed or treated for cancer). Enjoyment had a smaller effect size and might be a difficult user perception within the context of a cancer information website. Enjoyment relates to the experience of visiting the website, and this can—even for a cancer information website—be positive in the sense that patients feel emotionally supported or reassured, thereby satisfying patients' affective communication and information needs. However, the information provided on the website and the visitor's situation might be less likely to be explicitly associated with enjoyment. Active trust turned out to be a highly relevant user perception [30], especially within the context of a cancer information website that is aimed to provide reliable information that could be acted upon. This is also what the staged model of trust implicates; the first step that website visitors take is to have a rapid screening to see whether the information provided on the website is credible and can be trusted and, subsequently, acted upon [46]. This is likely to be facilitated by the website used in the study at hand by the information being provided, reviewed and updated by professionals in oncology care. Lastly, informal caregivers were more likely to be loyal in comparison with cancer patients. This is in accordance with existing evidence that informal caregivers are often even more likely than cancer patients themselves to go online to seek health information [2,14,47].

This study clearly demonstrates that the importance of user perceptions (i.e. effectiveness, enjoyment and active trust) regarding e-loyalty is not limited to fields such as e-commerce but is also present within the context of a cancer information website. The next question is how to improve user perceptions regarding such websites? To answer this question, website characteristics need to be systematically manipulated, and these manipulations should be linked to user perceptions and subsequently to e-loyalty. A possible characteristic to be manipulated, for example, is user control. Website visitors in a previous study thought that having control (i.e. being able to freely explore the website in a non-predetermined order) made it easier to search and access information, but this was shadowed by the direct negative effect that user control had on loyalty towards the website [32]. The increase in perception of efficiency, however, is in line with the *idea* of freedom of choice being more important than its actual existence [48]. Another example would be adding social presence elements: presenting human images [49] and testimonials [50] in which people share their experiences and ideas regarding the information presented on the website with others [51]. In short, more experimental studies regarding the improvement of user perceptions are needed, but these should be embedded within a theoretical framework such as the one presented in this study. Two recently published systematic reviews provide a detailed overview of website characteristics that might be related to e-loyalty and could be used as a starting point for future experimental studies [52,53].

Although this cross-sectional study is an important first step towards optimizing cancer information websites in order to promote loyalty, longitudinal studies are needed to investigate whether people will actually revisit the website and recommend it to others. The high percentage of explained variance regarding e-loyalty, however, is promising. Self-selection of the participants might have led to potential bias. Twenty-two percent of the participants had visited the website before, which is slightly higher than the general user statistics of the website (i.e. 15%) but comparable in the sense that the majority of participants was a first-time visitor. Furthermore, recruitment strategy was not related to e-loyalty, thereby decreasing potential bias due to self-selection. Moreover, participants could freely explore the website at their own convenience (in terms of time and location), without the limitations of a laboratory setting (e.g. standardized environment and forced exposure), which enhanced external validity (i.e. in vivo versus in vitro testing). These participants were already on the Internet, which might limit generalizability. The potential bias that this might cause is limited because of a very high Internet penetration rate in the Netherlands [54]. It is still possible, however, that despite high Internet penetration rates, only a selective group of people goes online to search for information about cancer.

Finally, the importance of a theory-driven solution to the issue of e-loyalty needs to be stressed in view of the omnipresence of the Internet in people's daily lives and its importance in terms of information provision regarding health-related issues. This study was the first to apply such an approach to a cancer information website, which turned out to give useful insight into user perceptions related to e-loyalty.

Acknowledgements

This study was supported by the Innovational Research Incentives Scheme Veni from NWO-MaGW (Netherlands Organization for Scientific Research—Division for the Social Sciences) accredited to the first author. We thank 'Huis voor de Zorg' for their help in the recruitment of participants.

DOI: 10.1002/pon

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