Cancer Patients on Facebook: A Theoretical Framework

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Abstract. The growing presence of the technology cause of an essential need to explore cancer patients' behavior in online communities. Social Network Sites (SNS) such as Facebook provide an interactive environment to deliver health information to cancer patients. Only a few studies have looked at the role of Facebook for cancer patients despite their potential deliver health messages to large audiences. Hence, there should be more rigorous research to explain the cancer patients' behavior in SNS. This study propose a theoretical framework to explore the cognitive, social and technological constructs that affect the performance of cancer patients in Facebook by using social cognitive theory (SCT). Based on purposive sampling, questionnaires were distributed to 178 breast cancer patients in cancer support groups in Peninsular Malaysia. Through this study, a basis for the investigation of Malaysian social network support in using SNSs is successfully established.

Keywords: Cancer; E-Patients; Health 2.0; Social Cognitive Theory; Social Network Sites

1 Introduction

One of the main health dilemmas afflicting Malaysia is cancer [1]. The incidence of cancer is 30000 yearly and Breast Cancer (BC) is the most common cancer [1]. Nowadays, patients and their families often cite difficulties such as lack of information, insufficient psychosocial support, and uncoordinated care [2]. There are some studies that described improvements that Social Network Sites (SNS) could offer to health care such as openness, communication, greater transparency, improved patient support and knowledge translation [3]. It can serve as key health communication channels to provide a location for online dialogue and encourage communities and individuals to interact by providing information related to disease treatment, and survivorship [4].

SNS have attracted general population in middle-income and high-income countries. Hospitals and cancer support groups should embrace SNS that they may contribute to quality improvements in healthcare. Active use of SNS by healthcare institutions could also speed up information and communication provision to patients and their families, thus increasing quality even more [5-6]. Applying theories are useful

because they provide a framework to help identify the determinants of successful intervention. Koskan et al. [7] have done a systematic literature review on SNS in cancer related research and the results show that the usage of theories is still lacking. However, Social Cognitive Theory (SCT) is the most comprehensive theory that could explain the effect of individual and environmental constructs on certain behavioral patterns in the context of Health Information Systems (HIS).

Since using SNS seems to be significant for individuals with cancer; there is a need for conducting more research to understand factors that can potentially affect cancer patients' performance in using SNS. Early research (1996–2007) was mainly descriptive studies of online discussion forums. Later, researchers began analyzing SNS; therefore, future research should determine how SNS can influence cancer patients' behavior [7]. Impact of SNS on users can be estimated through their performance [8]. There is still the lack of studies consider the impact of participating in BC Facebook groups [9]. Therefore, the main objective of this study is to determine the factors that affect the performance of cancer patients in SNS.

2 Literature Review

The research study's literature review is divided into two main sections. Firstly, a brief description of SNS in healthcare is provided. Secondly, the theoretical perspective is considered.

2.1 Social Network Sites in Healthcare

The increase in SNS membership has been followed by an increase in SNS user research [10]. Previous studies have identified improvements that social networks could offer to health care such as openness, communication, greater transparency, improved patient support and knowledge translation [3]. Hospitals and cancer support groups should embrace social network as they may contribute to quality improvements in health care. Active use of SNS in health care institutions could also speed up information and communication provision to patients and their families, thus increasing quality even more [5-6].

There is very little literature is known about the advantages of support services for cancer patients. Loader et al., [11] distinguished that informational support can be provided in online communities by virtual relationships. These kinds of support can be received through online interactive services as the helpful real-world contact persons' support [12]. SNS provide the ability for patients to exchange information on subjects such as clinical diagnosis sources of medical evidence, treatment options, adverse treatment effects, the experience of bodily symptoms and experiences with health care providers [13].

2.2 Social Cognitive Theory

SCT is found to be the most comprehensive theory that could explain the performance of cancer patients in SNS because it considers the individual performance and identifies how people acquire and maintain certain behavioral patterns. In addition, SCT describes that there is a dynamic and continuous interaction among the behavior, individual and environment.

The behavioral factors can be the performance, use or adoption. It is important to note that, according to SCT, the environmental factors are twofold which are social support and situational factors [14]. The situational factors are system and task characteristics and the TTF theory can explain them properly [15]. Among individual factors, the literature revealed the important role of cognitive factors. Figure1 shows there is not any Information Systems (IS) model which considers the effect of both environmental and individual factors on behavior and there is still the lack of comprehensive model which consider the effect of those factors on behavior.

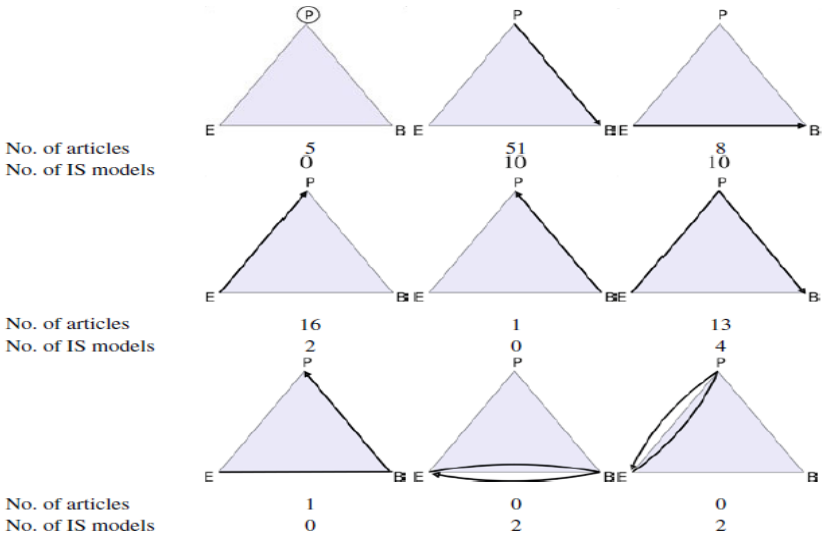

Figure 1. Investigated SCT Interactions in Previous Research Adapted from Carillo [14]

The developed conceptual model must allow the testing and hypothesizing of certain relationships to consider whether or not the formulated theory is valid [16]. Our contention is that integrating both personal and environmental factors can enhance our understanding of individuals' performance in the context of Health Information Systems (HIS).

3 Methodology

This research applied a survey method. To increase the reliability and validity of the research instrument, three experts with HIS research experience in quantitative meth-

ods and scale development evaluated the survey's content validity. Based on purposive sampling, 178 breast cancer patients who had experience of using cancer support groups answered the questionnaire. Smart PLS 3 was used to conduct analysis in two main stages: (1) the assessment of the measurement model, including items reliability, convergent and discriminate validities, and (2) the assessment of the structural model.

Based on the research model and hypotheses, we included the following variables in this study: outcome expectation, self-efficacy, social support, task characteristics, technology characteristics, task technology fit, and performance. A 5-point Likert scale was adopted for the evaluation. Outcome expectation was taken from [17-18] and self -efficacy was adopted from [19-20]. Social support adopted from [21-25]. Task characteristics, technology characteristics, task technology fit and performance were based on the variables used by Mirabolghasemi and Iahad [4].

4 RESULTS

4.1 The Demographic Information of Respondents

This study collected data from 178 respondents in cancer support groups in Peninsular Malaysia. Table 1 shows the demographic details of the respondents.

Table 1. The Demographic Details of Respondents

		Frequency (N=178)	**Percentage (%)**
Age	18-24	2	1
	25- 34	33	18
	35- 44	67	38
	45- 54	42	24
	55-64	34	19
Race	Malay	58	33
	Chinese	95	53
	Indian	25	14
Education	High school	55	31
	Diploma	40	22
	College Certificate	45	25
	Bachelor's degree	33	19
	Master degree	5	3
Stage of cancer	Stage1	14	8
	Stage 2-3	155	87
	Stage 4	9	5
The Times of Using SNS	Daily	87	48
	Weekly	64	35
	Monthly	27	15

Out of 178 respondents 38 per cent are aged 35 to 44, 24 per cent are aged 45-54, 19 per cent are aged 55 to 64, 18 per cent are aged 25 to 34, and 1 per is aged 18-24.The majority of respondents, 53 per cent are Chinese, 33 per cent are Malay, and 14 per

cent are Indian. The majority of respondents, or 87 per cent, are in stages 2 or 3 of breast cancer, 5 per cent are in stage 4, and only 8 per cent are in the early stage of breast cancer. Only 15 per cent of the respondents used SNS monthly, and while 48 per cent used SNS daily, and remainder used SNS on a weekly.

4.2 The Reliability and Convergent Validity of Survey

The reliability of the survey was assessed through the use of Cronbach's Alpha and Composite reliability tests. Table 2 shows that the Cronbach's Alpha for this study ranges from 0.718 to 0.896, and the Composite Reliability ranges from 0.842 to 0.918. The above results consequently have the recommended value of 0.70, indicating that the items used represent the constructs are reliable. Convergent validity was then tested using Average Variance Extracted (AVE) that should be a value greater than 0.5 to be confirmed [26]. AVE is greater than 0.5 for all of the constructs so the value was considered to indicate good convergent validity. Therefore, sufficient reliability and convergent validity are demonstrated in Table 2.

Table 2. Results of Reliability and Convergent Validity Tests

Constructs	Reliability		Convergent Validity
	Cronbach's Alpha	Composite Reliability	AVE
Outcome expectation	0.718	0.842	0.640
Self-efficacy	0.863	0.902	0.648
Social support	0.881	0.913	0.678
Task characteristics	0.849	0.888	0.571
Technology characteristics	0.787	0.858	0.525
Task-technology fit	0.857	0.913	0.778
Performance as a behavior	0.844	0.906	0.763
Performance as an outcome	0.868	0.910	0.717
Performance	0.896	0.918	0.616

4.3 Discriminant Validity

The discriminate validity of these measures was also tested by evaluating AVE, and comparing the square root of its value to the latent variable's inter-correlations with other latent variables [27]. As presented in Table 3, the square root of AVE is greater than the latent variable inter- correlations with other latent variables. The HTMT

value was also below 0.90. Therefore, discriminant validity was established between the reflective constructs.

Table 3. Structural Model Results

	OE	Performance	SE	SS	TAC	TTF	TEC
OE	0.800						
Performance	0.667	0.784					
SE	0.661	0.772	0.805				
SS	0.561	0.726	0.681	0.823			
TAC	0.449	0.619	0.674	0.617	0.756		
TTF	0.508	0.641	0.603	0.522	0.647	0.882	
TEC	0.400	0.497	0.517	0.363	0.546	0.716	0.725

*Note: OE= Outcome Expectation, PA= Positive Affect, SE= Self- Efficacy, SS= Social Support, TAC= Task Characteristics, TTF= Task-Technology Fit, TEC= Technology Characteristics

4.4 Assessment of Structural Model

Once the construct measures are reliable and valid the structural model is assessed. This consists testing the relationships between the constructs and the model's predictive capabilities [27]. Structural model results are summarized in Table 4.

Table 4**.** Structural Model Results

Hypothesis	Path coefficient	t-value	Result
Outcome expectation-> Performance	0.182	2.373	Supported
Self-efficacy-> Performance	0.332	3.508	Supported
Social support-> Performance	0.297	3.772	Supported
Task characteristics-> Task-technology fit	0.365	5.985	Supported
Technology characteristics -> Task-technology fit	0.517	2.738	Supported
Task-technology fit->Performance	0.198	3.972	Supported

As can be seen in Table 4, outcome expectation (β=0.182, t value=2.373), self-efficacy (β=0.332, t value=3.508), social support (β=0.297, t value=3.772), all showed a significant positive relationship with performance. On the other hand, task characteristics and technology characteristics should fit to have (β=0.198, t value=3.972) a significant positive relationship with performance.

The model as presented in Figure 2, demonstrated 77% variance in cancer patients performance in using SNS. The results of the hypotheses testing showed that outcome expectation, self-efficacy, social support had a significant positive relationship with

performance. Meanwhile, cancer patients' performance in using SNS was determined directly by the fit between task and technology characteristics. The last criterion for assessing the structural model is the evaluation of effect size f^2 in the structural model [27]. If $0.02 < f^2 \leq 0.15$ the effect is small, $0.15 < f^2 \leq 0.35$ the effect is medium, and if $f^2 > 0.35$ the effect is large. The results of this study showed that the independent constructs had small effect size on performance.

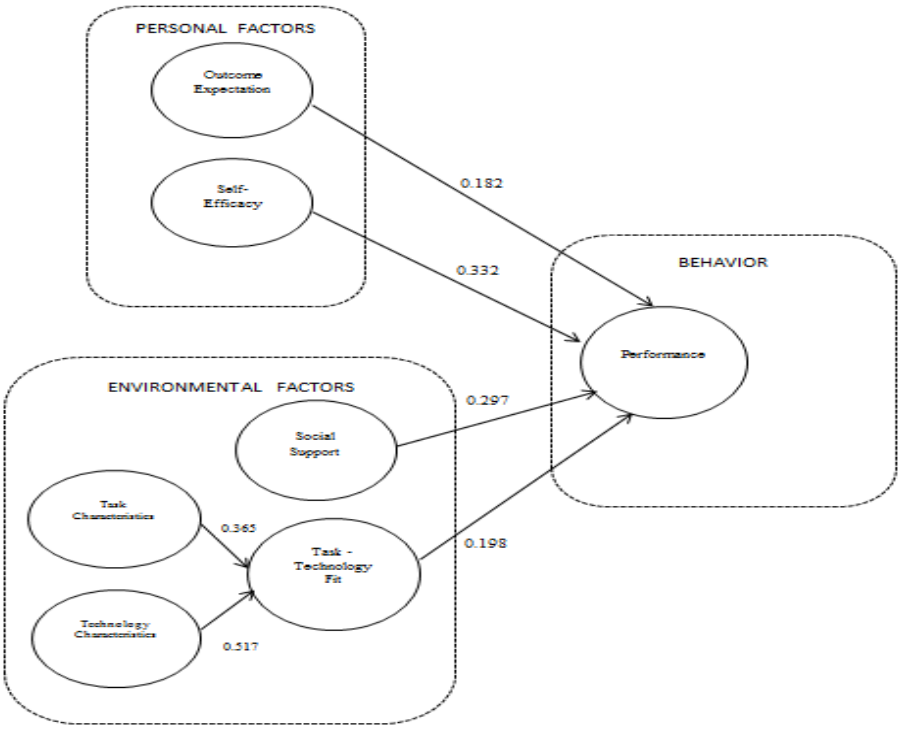

Figure 2. Results of the PLS Analysis

5 Discussion

SNS provide an interactive environment to deliver health information to cancer patients. Growing presence of the technology cause of an essential need to explore performance in the context of IS [28]. Most of the studies on SNS for cancer patients are more descriptive rather than theory building. Therefore, this study explores factors that can affect on the performance of cancer patients in using SNS.

The hypotheses of this study consider whether combinations of outcome expectation, self-efficacy, social support and task technology fit lead to increased performance in using SNS. Moreover, this study's findings provide evidence supporting hypotheses stating that task characteristics and technology characteristics have significant and positive impact on TTF, and that TTF has a significant and positive impact

on cancer patients' performance in using SNS. The major contribution of this study is the formation of a theory-based model which integrates SCT and the theory of TTF.

The findings have resulted in practical and theoretical contributions, which may help online cancer support groups to obtain a more comprehensive perspective of the way SNS affect the performance of cancer patients when using SNS. In particular, researchers in the field of HIS would get an opportunity to explore how this integrated model helps to predict cancer patients' performance in using SNS.

6 Conclusion

SNS have attracted millions of users and many of them have integrated these sites into their daily practices. The factors that affect the performance of cancer patients in SNS is investigated using 178 respondents in two hospitals and four cancer support groups in peninsular Malaysia. The results show that outcome expectation, self-efficacy, social support had significant positive relationship with performance. Moreover, cancer patients' performance in using SNS was determined directly by fit between task and technology characteristics.

Finding factors that are related to performance of cancer patients in the SNS will enable health care providers to generate ideas on how an effective social network intervention for cancer patients can be conducted and it can help health care providers to design intervention more clearly. In addition, meeting patients' needs may result in cost savings, patient empowerment and activation and these are ways for achieving patient cantered care.

While contributing to both theoretical and practical contributions, the study had some limitations that should be dealt with future studies. First, gathering data from the whole population of cancer patients using Facebook were not possible and the data collection had done using 178 respondents. The reason was that some of the cancer patients were not keen to answer the questionnaire. Therefore, the broader sample size and the cross-cultural research in the broader geographical sample distribution may provide the new contributions in the future research. This study considered breast cancer patients' performance in using Facebook which is the most popular SNS among cancer support groups. Future research should validate and test the findings using other types of SNS.

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