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Factors affecting online research by nurses in Taiwan

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Factors affecting online research by nurses in Taiwan

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Abstract

Purpose – The aim of this paper is to investigate predictors of online medical research by nurses.

Design/methodology/approach – A cross-sectional study was conducted and a representative sample of nurses was selected from three Taiwanese hospitals from 1 January to 31 March 2007. A total of 274 female nurses completed the questionnaire.

Findings – The results indicate that the expectancy value of internet characteristics, attitude towards online information seeking and perceived credibility of online information significantly and positively predict online information-seeking behaviour in nurses. Specifically, the multiple hierarchical regression analysis revealed that the perceived credibility of online information is the strongest predictive variable of online information seeking.

Originality/value – The findings of this study suggest that an important task for professional health organisations is to educate nurses in assessing the reliability of medical information found on the web, such as looking for credible institutional sites, verifying available information with that from other sources or sites, and using common sense.

Keywords Attitudes, Online operations, Nurses, Taiwan, Information retrieval

Paper type Research paper



Introduction

The web has become one of the most important information resources for nurses (Gosling *et al.*, 2004), who previously worked with information sources in a pre-digital era (McKnight, 2006). Researchers (Rasch and Cogdill, 1999) have found that the web

offers nurses powerful tools for seeking information (e.g. evidence-based practices, treatment recommendations and differential diagnosis) to aid them in decision making and problem solving in response to patient encounters. However, although there is a growing body of research on information seeking by nurses, most studies to date have focused on information needs (Cogdill, 2003; Rasch and Cogdill, 1999), the use of research information in clinical decision making (McCaughan *et al.*, 2005) and information-seeking behaviour (Andrews *et al.*, 2005; Cogdill, 2003; Dee and Stanley, 2005; Salanterä *et al.*, 2003; Yeh, 2000). Predictors of online information-seeking behaviour by nurses have not yet been characterised. Such a study would have considerably informed the development of theory concerning online information seeking by nurses.

Several theories or models, such as the Expectancy-Value Approach to Uses and Gratifications Theory (Palmgreen and Rayburn, 1985), the comprehensive model of information seeking (Johnson, 1997), the Theory of Planned Behaviour (Fishbein, 1967; Fishbein and Ajzen, 1975) and Credibility Theory (Hovland and Weiss, 1951), can be employed to better understand the factors affecting information seeking. Previous studies guided by these theories or models have found that the expectancy value of an information source (Ferguson, 1992), attitude towards online information seeking (Lu *et al.*, 2007) and the perceived credibility of information (Bennett *et al.*, 2004; Casebeer *et al.*, 2002) are associated with individual information-seeking behaviour. However, systematic studies are urgently needed to investigate how these factors affect information seeking by nurses in an online context. This study aimed to identify factors affecting online information seeking by nurses and improve the design of online continuing education programs for nursing professionals.

Predictors of online information seeking

Expectancy value of internet characteristics

The Expectancy-Value Approach to Uses and Gratifications Theory suggests that media use is a function of the strength of individual motives for media consumption (Palmgreen and Rayburn, 1985). This approach suggests that motivation is a function of expectancies and evaluations concerning media objects. "Expectancy" is the perceived belief that a media object (medium, program, content type and the like) possesses a particular attribute or that a behaviour may have a particular consequence whereas "evaluation" is defined as the degree of effect, positive or negative, toward an attribute or behavioural outcome (Palmgreen *et al.*, 1985). Thus, the level of motivation to seek gratification from a media object is expressed by $\sum GS_i = \sum b_i e_i$ (GS_i = the i th gratification sought from exposure to a media object (e.g. medium, program, newspaper, etc.); b_i = the perceived belief that media object X possesses a particular attribute; e_i = the affective evaluation of the attribute).

The Expectancy-Value Approach to Uses and Gratifications Theory is well suited to studying internet use (Kaye and Johnson, 2002; Kaye, 2005) and was used in this study to explicate certain fundamental gratification-consumption processes about information seeking online. As shown by the Comprehensive Model of Information Seeking developed by Johnson (1997), researchers must consider how users' perceptions of channel characteristics affect their channel selection. Researchers have found that internet characteristics such as efficiency, cost effectiveness (D'Alessandro *et al.*, 2004), timeliness (Napoli, 2001), hyperlinking (Treloar, 1999),

interactivity, anonymity (Cline and Haynes, 2001) and multi-presentation modes of messaging (e.g. text, sound and animation) (Lieberman, 2001) affect individual internet use and online information seeking. These theoretically driven, empirical studies imply that beliefs and the expectations of internet characteristics (e.g. accessibility, accuracy, usefulness, user-friendliness and multi-presentation modes of messages) may influence individual internet-related information seeking.

Attitude towards online information seeking

Attitude is the relatively enduring affective orientation of an individual towards an object, behaviour or process (Oliver, 1981). According to the Theory of Planned Behaviour, attitude is a direct determinant of individual behavioural intention and it can be captured in attribute dimensions such as good/bad, useful/not useful and the like (Fishbein, 1967; Fishbein and Ajzen, 1975). Kim and Hunter (1993) conducted an extensive meta-analysis of approximately 100 major studies of attitude-behaviour relationships and concluded that relevant attitudes strongly predict volitional behaviour. For example, studies of condom use in both adolescents and adults indicated that attitude towards condom use was significantly predictive of intention to use condoms (Godin *et al.*, 2005; Greene *et al.*, 1997). Similarly, in a survey of expectant mothers Kloeblen-Tarver *et al.* (2002) found that attitude towards breastfeeding influenced breastfeeding intentions.

In the context of internet and computer use, Bernhardt *et al.* (2004) reported that internet users who held positive views on the impact of human genetic research were more likely to engage in online discussions of human genetics than those who held negative views. In a survey of international students in universities in the USA, Lu *et al.* (2007) indicated that attitude towards online information seeking positively and significantly predicted information seeking about a disaster striking their countries. Given the findings of previous studies, it is possible that attitude towards online information seeking may impact online information-seeking behaviour among nurses.

Information credibility

According to Hovland and Weiss (1951) source credibility refers to the trustworthiness and expertise of a source. Communication researchers subsequently expanded the scope of this definition to include several dimensions of credibility including safety, qualifications, accuracy, fairness and completeness (Berlo *et al.*, 1969; Lee, 1978). In a literature review of information seeking in the health profession, Freeman and Spyridakis (2004) found that the more credible the source (e.g. highly reputable physicians or medical organisations), the more likely the information would be accessed and applied in practice. This finding is consistent with the assumptions of the elaboration likelihood model, which suggests that the credibility of media is evaluated by consumers according to the information source (Petty and Cacioppo, 1986).

Source credibility has been studied intensively by communication scholars for decades. Many studies have focused on individual perceptions of media credibility (Chan *et al.*, 2006; Gantz, 1981; Meyer, 1988; Lu and Andrews, 2006). Recently, the growing reliance on internet information for health decision making has prompted scholars to investigate the relationship between perceived online information credibility and online information seeking. For example, Escoffery *et al.* (2005) surveyed university students in the USA and found that the credibility of the source

was usually carefully considered by students when using the web for information gathering. In a Taiwanese study, Hsu (2005) found that information reliability was a major consideration in the use of the web for gathering health-related information. Western scholars have also examined the impact of source credibility on information seeking by medical practitioners. The results of most studies indicated that source credibility affects information-seeking behaviour (Bennett *et al.*, 2004; Casebeer *et al.*, 2002).

Research hypotheses and questions

Based on the above discussion, this study attempted to investigate the relationship between the expectancy value of internet characteristics, the attitude towards online information seeking, the perception of online information credibility, and online information-seeking behaviour. This study also aimed to identify which predictive variable is the strongest predictor of online information seeking among all predictor variables. The following research hypothesis and question were proposed:

- H1. The expectancy value of internet characteristics, the attitude towards online information seeking and the perception of online information credibility positively predict online information-seeking behaviour.
- Q1. Which predictive variable is the strongest predictor of online information seeking by respondents?

Methods

Procedure

The Institutional Review Board of three Taiwanese hospitals approved this cross-sectional questionnaire-based survey, which was conducted from 1 January to 31 March 2007. All respondents were assured of confidentiality and anonymity.

Respondents

For this study, a representative sample of nurses was selected from three hospitals in central Taiwan. A total of 274 female nurses completed the questionnaire. Of these, 18 (6.6 per cent) were head nurses, five (1.8 per cent) were vice-head nurses, 249 (90.9 per cent) were nurses and two (0.7 per cent) did not state their positions. The average age of the respondents was 29.91 (SD = 6.35). Respondent age ranged from 20 to 55.

Instruments

The questionnaire captured age, education level, the expectancy value of internet characteristics, attitude towards online information seeking, the perception of online information credibility, and online information seeking behaviour.

Expectancy value of internet characteristics. The expectancy value of internet characteristics was assessed by the product of beliefs and evaluations of internet characteristics. Belief (b_i) measurements were obtained by asking respondents to rate the extent to which they felt the internet could be characterised by: "anonymity", "interactivity", "timeliness", "accessibility", "cost-effectiveness", "hyperlinking" and "multiple mode presentation". Responses were based on a Likert-type scale from 1 (definitely not) to 5 (definitely). For evaluation (e_i) respondents were asked to rate each internet characteristic on a Likert-type scale from 1 (very bad) to 5 (very good).

Palmgreen and Rayburn (1985) demonstrated how the evaluation of media attributes and beliefs can be evaluated using a four-item typology (negative approach, true avoidance, seeking alternative and positive approach). Scores for both beliefs and evaluation were recoded from 1 to 5, to -2 to $+2$ ($1 = -2$; $2 = -1$; $3 = 0$; $4 = 1$; $5 = +2$). Doing so captures the psychology of double negatives in which the belief that a behaviour would not have a negative outcome contributes positively to individual motives.

Finally, respondents' expectancy values of internet characteristics were then computed by first multiplying the evaluation of the internet characteristic by the belief about the characteristic (for example, if the recoded score of "belief of anonymity" was "2" and the recoded score of "evaluation of anonymity" was " -2 ", then the expectancy value regarding "anonymity" was " -4 "). Exploratory factor analysis showed that the seven items in the multiplicative scale were grouped together in a single factor, indicating that they measured a single underlying concept (Eigen value = 4.27, accounting for 61.03 per cent of the variance). The multiplicative scale also yielded a coefficient α of 0.89. Then the seven scores were summed across the multiplicative scale and divided by 7 to derive a composite measure of expectancy value of internet characteristics (mean = 0.96, SD = 0.89).

Attitude towards online information seeking. Attitude towards online information seeking was measured by statements such as: "Overall, seeking information on the internet is bad/good, unhelpful/helpful, or unpleasant/pleasant". A semantic differential-type scale was used to assess the bi-polar items, with answers ranging from 1 to 5. Exploratory factor analysis confirmed that the three items were loaded on a single factor. The single-factor solution explained 84.38 per cent of the total variance (Eigen value = 2.53). The three-item scale yielded a coefficient α of 0.91. The three items were added together and then divided by 3 to derive a composite measure of attitude towards online information seeking (mean = 3.9, SD = 0.73).

Perception of online information credibility. To assess how respondents perceived the credibility of online information, this study employed a modified version of the four-item credibility scale developed by Lo *et al.* (2003), which included the statements: "it is accurate", "it can be trusted", "it is objective", and "it clearly shows the information source". Respondents were asked to rate the perceived credibility of each online information source on a Likert-type scale from 1 (strongly agree) to 5 (strongly disagree). Exploratory factor analysis indicated that the four items were grouped in a single factor, indicating that they measured a single underlying concept (Eigen value = 2.75, accounting for 68.63 per cent of the variance). Additionally, the credibility scale yielded a coefficient α of 0.84. The four items were added together and divided by 4 to create a composite measure of perceived credibility of online information (mean = 3.16, SD = 0.62).

Online information seeking behaviour. Online information seeking was measured by asking respondents to rate how well the following statements described their online information-seeking behaviour: "I seek academic information about the nursing profession on the internet", "I seek information about patient medications on the internet", "I seek information about patient diseases on the internet", "I seek information about epidemics on the internet", "I seek information about patients' psychological responses on the internet", and "I seek information about health education on the internet". Patients were encouraged to add a brief explanation of the

rationale for selecting these. Respondents were also asked to rate online information seeking on a Likert-type scale from 1 (strongly agree) to 5 (strongly disagree). An exploratory factor analysis revealed that the six items were grouped in a single factor, indicating that they measured a single underlying concept (Eigen value = 4.25, accounting for 70.90 per cent of the variance). Additionally, the online information-seeking scale yielded a coefficient α of 0.92. The six items were added and divided by 6 to create a composite measure of online information seeking (mean = 3.66, SD = 0.64).

Control variables. Respondents were asked to indicate their age (mean = 29.91, SD = 6.35) and their education level.

Data analysis

The data were analysed using Statistical Package for the Social Sciences for Windows, Version 14.0. A simple regression analysis was employed to test the research hypothesis. Multiple hierarchical regression analysis was used to clarify which predictive variable was the strongest predictor of online information seeking after controlling for other variables. A p -value of <0.05 was considered statistically significant.

Results

The *H1* aimed to explore the relationship between the expectancy value of internet characteristics, attitude towards online information seeking, perceived credibility of information, and online information seeking behaviour. A simple linear regression analysis showed that the expectancy value of internet characteristics positively predicted online information seeking by respondents ($\beta = 0.37$, $p < 0.001$), and 13.4 per cent of variance in online information seeking could be explained by the expectancy value.

This study then aimed to determine if attitude affects online information seeking behaviour. A simple linear regression analysis showed that the more positive the attitude of respondents towards online information, the more likely they were to seek information on the internet ($\beta = 0.30$, $p < 0.001$). Attitude accounted for 8.4 per cent of variance in online information seeking.

Regarding the relationship between perceived credibility of internet information and online information seeking, a simple regression analysis indicated that whether respondents perceived online information to be credible positively predicted their online information seeking ($\beta = 0.43$, $p < 0.001$). The 18.1 per cent of variance in online information seeking could be explained by perceived credibility of online information. Therefore, *H1* was supported.

The *RQ1* attempted to clarify which predictive variable is the strongest predictor of outcome variables (online information seeking). A multiple hierarchical regression analysis was therefore performed. Demographics (age and education level) were entered first, followed by the expectancy value of internet characteristics, attitude and information credibility.

The results in Table I show all correlations between the predictive and control variables. As the analytical results of the multiple hierarchical regression analysis in Table II show, information credibility ($\beta = 0.31$, $p < 0.001$) was the strongest predictor of online information seeking among all predictor variables, followed by the

expectancy value of internet characteristics ($\beta = 0.22$, $p < 0.001$) and the attitude towards online information seeking ($\beta = 0.12$, $p < 0.05$). Age, education level, expectancy value of internet characteristics, attitude and information credibility accounted for 24 per cent (total adjusted $R^2 = 0.24$) of variance in online information seeking. It was clear that information credibility was the strongest predictor of online information seeking among all predictor and control variables.

Discussion

The literature shows that a wide range of internet characteristics may affect information-seeking behaviour in internet users. Central here is that the findings from this study confirm the relationship between the expectancy value of internet characteristics and online information seeking. As Tang and Lee (2006) indicated, although the Uses and Gratifications perspective has been criticised as a theoretical,

Table I.
Correlation analyses
of predictor and control
variables

	Age	Education level	Expectancy value	Attitude
Education level	0.26***			
Expectancy value	-0.01	0.14*		
Attitude	0.11	0.13*	0.25***	
Information credibility	0.05	0.04	0.32***	0.36***

Notes: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table II.
Multiple hierarchical
regression analyses
between age, education
level, expectancy value of
internet characteristics,
attitude, information
credibility and online
information seeking

Variables	<i>B</i>	SE <i>B</i>	β
<i>Step 1</i>			
(1) Age	0.01	0.01	0.02
(2) Education level	0.16	0.08	0.14*
Total adjusted $R^2 = 0.01$			
<i>Step 2</i>			
(1) Age	0.01	0.01	0.04
(2) Education level	0.10	0.07	0.09
(3) Expectancy value of internet characteristics	0.25	0.04	0.35***
Total adjusted $R^2 = 0.13$			
<i>Step 3</i>			
(1) Age	0.01	0.01	0.02
(2) Education level	0.08	0.07	0.07
(3) Expectancy value of internet characteristics	0.21	0.04	0.29***
(4) Attitude	0.18	0.05	0.21**
Total adjusted $R^2 = 0.16$			
<i>Step 4</i>			
(1) Age	0.01	0.01	0.01
(2) Education level	0.10	0.07	0.08
(3) Expectancy value of internet characteristics	0.16	0.04	0.22***
(4) Attitude	0.10	0.05	0.12*
(5) Information credibility	0.32	0.06	0.31***
Total adjusted $R^2 = 0.24$			

Notes: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

the assumptions of the Uses and Gratifications Theory (that media users are active) are still appealing for analysis of online information seeking. That is, intention to use the internet and source selection by users is based on their beliefs and evaluations of different internet characteristics.

Understanding expectancy value in this context allows one to determine if there are opportunities to increase expectancy value among nurses seeking information via the web. For instance, it might be reasonable to design continuing education courses to include elements that illustrate the usefulness of certain sources *vis-à-vis* specific nursing tasks that require external information.

The findings of this study are also consistent with the assumptions of the Theory of Planned Behaviour and support the hypothesis that the attitude of respondents towards online information seeking is significantly and positively predictive of such behaviour. A positive relationship between attitude and behaviours has been demonstrated in a range of behaviours from condom use (Godin *et al.*, 2005) to breastfeeding (Kloeblen-Tarver *et al.*, 2002). In this study, attitude towards online information seeking reflected behavioural beliefs concerning the consequences of a behaviour. As Oliver (1981) put it, attitude is the individuals' enduring affective orientation for an object, behaviour or process. Thus, it was not surprising to find that if the attitude of nurses towards online information seeking is that it is good (e.g. authoritative), helpful (e.g. supportive to the task) and pleasant (e.g. without unnecessary frustration), they are more likely to seek information on the internet.

This study also found that the perceived credibility of online information affected the online information seeking behaviour of respondents, which is consistent with numerous previous studies (Bennett *et al.*, 2004; Casebeer *et al.*, 2002). Nurses' health care decisions may have fatal consequences; a fact which has led to studies (McCaughan *et al.*, 2005) that have found that nurses sometimes confirm their decisions by accessing medical information online. The rational expectation is that they are educated and capable enough to "look for credible institutional sites, verify with that from other sources and sites, remain open-minded, and use common sense" (Tang and Lee, 2006, p. 119). Unfortunately, little training in assessing the credibility of information has been provided to users by health institutions or medical libraries (Shachak *et al.*, 2007). An important future task for professional health organisations or medical libraries is to develop and promulgate guidelines for evaluating the reliability of online information, as well as to design continuing education programs to educate nurses in accessing medical information via the web. It is becoming even more imperative that medical libraries continue to seek better understanding of nurses' information needs, particularly the factors affecting behaviour so as to match these with an increasingly complex information environment (Urquhart *et al.*, 2007).

There is fairly extensive literature on the information behaviours of health professionals and it can be argued that information behaviour studies do not always lead to changes in systems or services for particular user groups. Still, nursing seems to be somewhat under-studied, particularly regarding specific information behaviours. Yet, nurses play a critical role in patient care and in the support of clinical decision making throughout the care continuum. As nurses increasingly look to outside authoritative resources increasingly available via the web, it has become crucial to support their information needs and better facilitate specific behaviours. Previous studies have focused on sources and needs (Cogdill, 2003;

Rasch and Cogdill, 1999), but the results discussed here show a vital different dimension – understanding behaviours from an expectancy value perspective. As such, this study could be used in helping to inform educational efforts geared towards training nurses to become more efficacious online searchers. These might even be training specifically targeted at enhancing expectancy value levels in certain nursing populations (e.g. intensive care unit nurses). Also, as nursing informatics continues to grow in importance, applications linking knowledge-based resources with decision making or other patient care systems may benefit from our findings.

Limitations and suggestions

This study was designed to address the lack of research in the factors influencing online information seeking among nurses. However, nurses were sampled from only three hospitals in central Taiwan; therefore, its results cannot be inferred to the larger population of nursing professionals. A nationwide sample needs to be surveyed in future research.

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