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Abstract - Preventive Health Care (PHC) is the awareness and efforts a person undertakes to enhance and preserve physical, mental, and emotional health for today and the future. This research examines the importance of online delivery systems as sources of PHC information. It examines how health care consumers respond to various online PHC delivery systems, with a special emphasis on social media (SM). Specifically different demographic groups are compared to determine the importance each group places on various online delivery systems. The results of a survey showed the 35-44 year old group placing the greatest importance of retrieving PHC information online. Older consumers indicated less importance for online delivery systems. Better-educated consumers indicated greater importance for formal online sources of PHC information. Likewise women considered formal sources more important than men. Among ethnic groups, Hispanics considered online sources most important.

INTRODUCTION

There is an information and communication revolution taking place in the world today. With the development of broad band Internet, social media, and the proliferation of wireless communication devices, people can access and compare

information more than ever before (Natesan, 2005). This research examines this revolution in the context of preventive health care information; in particular, the ability to access and apply PHC information either for personal reasons or on the behalf of somebody else.

Preventive Health Care (PHC) is the awareness and efforts a person undertakes to enhance and preserve physical, mental, and emotional health for today and the future. At the broadest level, preventive healthcare includes everything from over-the-counter products designed to help users curb smoking or overeating to advanced-genetic testing to identify a predisposition to certain cancers or other health problems (Cangelosi and Markham, 1994).

As the US healthcare system continues to restructure itself, an increased emphasis on PHC is likely to be a very important component. This includes a fundamental change in the way individuals perceive and access the system as well as the way care is delivered. The new healthcare has the potential to provide substantial benefits to the health consumer (Laeffer and Mickelberg, 2006).

In order for such a system of PHC to work, more people must utilize the information to improve their health. Several factors account for why persons may seek or ignore PHC information. These include attitudes about preventive health, difference in age, income and educational level, and cultural background (Dutta-Bergman, 2005; Satcher and Higginbotham, 2008). In addition, consumers respond differently to the various ways in which PHC information is delivered (Bloch, 1984; Cline and Haynes, 2001; Dutta-Bergman, 2004; Thomas, 2009).

The Internet is rated as the single most important means of accessing PHC information (Cangelosi, Ranelli and Kim, 2012). An increasing number of health consumers are using the internet for medical information including diet and exercise. Overall, the internet provides convenience, access to a wealth of information, a variety of perspectives on the same topic, continual updates, and anonymity (Skinner, Biscope, Poland, and Goldberg, 2003). Persons utilizing the internet for health information are better informed and more willing to ask their doctors questions. Although most acquire information from the Web to address symptomatic issues, the quest for PHC information is becoming increasingly more prevalent (Bulled 2011; Natesan 2005).

Traditional internet search and browsing has been greatly facilitated and expanded by Social Media (SM). SM is a vehicle for people to share ideas, content, thoughts, and relationships online. It differs from traditional print, audio and video media in that anyone can create, comment on, and add to SM content (Luxton, June, and Fairall, 2012; Scott, 2011). The potential for SM to deliver PHC information cannot be overlooked, if for only the sheer scale and unprecedented growth. It is estimated that the number of subscribers to Facebook, a SM network, will top one billion worldwide by the end of 2012.

Demographically, the greatest growth rates have come from users over age 35, with the growth in the 50-65 age range more than doubling from 2008-2010 (Finn, 2011). Long before the arrival of SM, research had suggested that purchase preferences would be affected much more by recommendations from personal networks (friends, family and peers) than by traditional advertising (Direct Marketing News, 2011).

This research examines the importance of online delivery systems as sources of PHC information. It examines how health care consumers respond to various online PHC delivery systems, with a special emphasis on SM. Specifically, different demographic groups are compared to determine the importance each group places on various online delivery systems. Our topic is exploratory in nature, and this is reflected in the hypotheses development and conclusion.

SOCIAL MEDIA VARIABLES

The following list of SM networks is not comprehensive, as the list of possibilities grows continually. In addition to traditional online delivery systems, the following SM networks were chosen for this study: Facebook, Twitter, Blogs, Health-related Listserv's, Online Health Forums, Wiki Health Dictionaries, Podcasts, and WebMD. These SM networks are the most popular, and hold promise for PHC information delivery as described below.

Facebook is regarded as the most widely used SM vehicle. The number of Facebook users worldwide is projected at 1 billion by the end of 2012 (Serrano, 2012). People utilize Facebook multiple times per day, perhaps more than any of the other social networks (Finn, 2011; Miniwatts Marketing, 2001-2012).

A listserv is an online meeting place where people meet to discuss topics of interest. Before an online meeting, registered persons of the listserv are sent messages informing of the upcoming discussion. Similar to a listserv, Online Health Forums provide a meeting place for the discussion of healthcare topics. These forums may be ongoing or may be one-time events focusing on a particular topic. Wikis are websites that anyone can edit and update. Wiki Health Dictionaries can be updated easily. Podcasts are shows that have a creator who controls the content. Podcasts can specialize by topic depending upon audience interest, and has the potential of a worldwide audience, allowing anyone to create shows and listen to them (Rothman, 2009; Ruiz, 2009; Scott, 2011).

WebMD is a medical search engine and is one of the most widely used sites for healthcare information such as diseases and medical conditions. WebMD also provides a symptom checklist, pharmacy information, drugs information, blogs of physicians with specific topics, and a place to store personal medical information (Bodkin and Miaoulis, 2007; Delamothe and Smith, 1999).

With respect to health care consumers, Fox and Jones (2009) note the following: 12% of healthcare subscribers used Twitter to pass along a healthcare

update about them or somebody else; 41% that go online read comments from a blog, but only 5% ever post a comment on a healthcare blog site; 6% of online healthcare consumers have participated in listserv facilitated healthcare discussions; 6% have posted comments on online health forums; and 13% of online have listened to healthcare content via a podcast. Healthcare Institution blogs are becoming more common with the Mayo Clinic perhaps best well-known (Ruiz, 2009).

DEMOGRAPHIC VARIABLES

The following demographic variables do not constitute an exhaustive list, but are those most commonly measured in PHC studies (e.g., Cangelosi, Ranelli and Voss, 2009). The following summarizes some of the research findings regarding the demographics and consumer responses to PHC information.

Age: The percentage of adults using a social networking service increased from 26% in 2008 to 47% in 2010 with the greatest growth found among those over age 35 (Finn, 2011). This trend continues to be contrary to the need for health care (HC) information, as need increases with age. The pro-active PHC movement is among younger cohorts. They are more likely to seek alternatives to inpatient care, less likely to have a family doctor and more willing shop around when healthcare is needed (Leaffer and Mickelberg, 2006; Thomas, 2009). This is consistent with the trend in SM usage, where the greatest participation is among young users. Although elderly Americans (65 and older) sharply increased their information seeking, they still trail younger Americans in using internet information sources (Tu and Cohen, 2008).

Educational Attainment: Educational attainment is a strong predictor of the usage of SM to secure PHC information (Diaz et al., 2002). Between 2001 and 2007, education stood out as being most strongly associated with the tendency to seek HC information. Compared to those without high school degrees, those with graduate degrees were almost twice as likely (72% to 42%) to seek HC information from all sources, and four times as likely (52% to 10%) to get information online (Tu and Cohen, 2008). This trend tends to be pretty linear across all categories of educational attainment. Finally, better educated persons perceive HCI as more beneficial than those less educated (Cangelosi, Ranelli and Voss, 2009).

Household Income: Diaz, et al. (2002) found that those with higher incomes were more likely to use the internet to research information pertaining to diet and nutrition, which is preventive in nature. Given the strong correlation between educational attainment and income level, one would expect higher income individuals to make greater use of online sources of PHC information.

Gender: Generally and traditionally, women are family caretakers. Compared to men, they take greater responsibility for their well-being and seek help more often, part of which involves greater use of PHC information

(Cangelosi, Ranelli and Markham, 2009; Cangelosi, Ranelli and Voss, 2009). In a similar vein, women are expected to make greater usage of the Internet for finding PHC information.

Ethnic Background: Prior research has had mixed results regarding the search for PHC information and ethnic background (see Cangelosi, Ranelli and Kim, 2012). However, with regard to usage of SM networks, there is a definite tendency for Caucasians to have greater utilization per capita than other races for LinkedIn, Facebook and Twitter (Finn, 2011).

Marital Status: Traditional analysis of the search and usage of PHC information has shown a distinct trend towards greater usage by married couples. Married individuals tend to be healthier and make greater usage of PHC. They also smoke less and have less stress than widows, divorcees or singles (Cangelosi, Ranelli and Markham, 2009; Thomas, 2009) and place greater importance on informal, clinical and printed sources of PHC information (Cangelosi, Ranelli and Kim, 2010; Cangelosi, Ranelli and Kim 2012).

Based on the above information, the following hypotheses are developed:

H_1: Younger consumers are more likely to use SM to secure their PHC information.

H_2: Persons with higher educational attainment are more likely to access PHC information online.

H_3: Persons with higher incomes are more likely to access PHC information online.

H_4: Women are more likely than men to search for PHC information online.

H_5: Caucasians are more likely to make use of online sources of PHC information.

H_6: Married persons are more likely to make use of online sources of PHC information.

METHOD

The target population for this study was the United States. The sample frame consisted of a 2 million member online panel from a database-email panel vendor. The questionnaire was posted by the online host and the online vendor downloaded the email addresses. The survey resulted in 404 usable responses. The demographics of the survey conformed closely to the demographics of a true national sample.

Eighty-five percent of the respondents had health insurance; 51% of respondents were married; 67% Caucasian with 13% Hispanic and 12% African-American; and over 50% had some kind of degree, ranging from a two year to a

doctoral degree. The percentage age breakdown was as follows: 19-34 (29.5%), 35-44 (19.3%). 45-64 (32.9%), and 65 and over (18.3%).

The comprehensive PHC questionnaire contains attitudinal and behavioral items referring to the awareness and efforts a person undertakes to enhance and preserve their health. The items from the questionnaire were demographic characteristics, measures of the importance of various SM, and other online methods of obtaining PHC information. Respondents were asked to indicate "how important each of the following sources or delivery systems had been in their search for PHC information." The degree of importance was measured on a four point balanced itemized rating scale where 1=Very Important, 2=Somewhat Important, 3=Somewhat Unimportant, and 4=Very Unimportant.

DATA ANALYSIS

Frequencies for the online delivery systems measured in this study are contained in Table 1. The traditional Internet search engines are the preferred method of accessing PHC information from the Internet. Basically, healthcare consumers prefer to type in the topic in their preferred Web browser or search engine and then react to the results. The popular SM networks (Podcasts, Facebook and Twitter) were not perceived as important as the traditional online delivery systems.

Table 1. Frequencies for the Importance of Online Delivery Systems for PHC Information

Online Delivery System	Very Important or Somewhat Important	Somewhat Unimportant or Very Unimportant	Average Response
Internet Search Engines	69.6%	30.4%	2.13
WebMD	65.8%	34.2%	2.23
Online Health Forums	65.6%	34.3%	2.24
Health-Related Blogs	53.7%	46.3%	2.50
Wiki Health Dictionaries	43.5%	56.6%	2.74
Health-Related Listserv	40.0%	60.0%	2.84
Podcasts	31.8%	68.2%	3.02
Facebook	27.0%	73.0%	3.12
Twitter	22.8%	77.3%	3.25
NOTE: Average Responses -- smaller values indicate greater importance.			

To provide a more meaningful analysis, the nine online delivery systems were factor analyzed. To test for their suitability for factor analysis the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity were run. This resulted in the KMO value of 0.891, which is above the minimum of 0.7 regarding the data's suitability for principal components analysis.

The Bartlett's test was significant (chi-square of 1903.457, df=28, p=.000) which enables us to assume that there is sufficient correlation between the variables for factor analysis (Meyers, Gamst and Guarino, 2006). The Varimax rotation method of factor analysis produced two significant components: C1 and C2. C1 refers to informal and more flexible online delivery sources (Twitter, Wiki Health Dictionaries, Podcasts, Facebook) and C2 refers to formal and less flexible online delivery sources (online health forums, health-related blogs, WebMD, Internet Search Engines). The composite variables accounted for about the same amount of variation (C1 = 38% and C2=35%).

Table 2 provides a summary of the composite variables from factor analysis. The average respondent value for each of the composite variables was as follows: C1=3.03 and C2=2.28.   That is, in the aggregate respondents placed greater importance on formal, but less flexible online sources (C2) than the more flexible online sources (C1).

Table 2. Summary of Composite Variables from Factor Analysis

Composite Variable	Factors in the Composite Variable	Composite Factor Loading	Percent of Variance Explained	Mean Score
C1: informal, flexible online sources	Twitter, Wiki Health Dictionaries, Internet Podcasts, Facebook	.816	38.7%	3.03
C2: formal, but less flexible online sources	Online Health Forums, Health-related Blogs, WebMD, Internet Search Engines (Yahoo, Google, etc.)	.767	35.3%	2.28

NOTE: Lower Mean Scores indicate greater importance.

Table 3 provides the results from an Analysis of Variance (ANOVA) which tests for significant relationships between the two composite factored variables, C1 and C2, and each of the six demographic variables (e.g., gender: men vs. women). Table 3 shows the results of significant relationships from the ANOVA.

The ANOVA produced 6 (out of 12) significant results. Significant demographic variables were Age (younger for both C1 and C2), Gender (women for C2), Ethnicity (Hispanics for C1 and C2) and Education (better educated for C2). There were no significant associations between Marital Status or Income for either C1 or C2.

Table 3. ANOVA: Analysis between the Composite Factored Variables and Demographic Variables[a]

(C1) Informal, flexible online sources	(C2) Formal, but less flexible sources
Age 19-34 (2.83) 35-44 (2.77) 45-64 (3.11) 65 and over (3.45) $F=11.058$; $p=.000$[c]	Age 19-34 (2.13) 35-44 (2.14) 45-64 (2.38) 65 and over (2.47) $F=4.002$; $p=.000$
Ethnicity Caucasian (3.16) African-American (2.73) Hispanic (2.63) Other (3.01) $F=7.986$; $p=.000$	Ethnicity Caucasian (2.38) African-American (2.02) Hispanic (1.93) Other (2.37) $F=6.403$; $p=.000$
	Education Less than High School (2.43) Some College, or 2 yr degree (2.22) Bachelor's (2.22) Master's and/or Doctorate (2.18) $F=2.751$; $p=.043$
	Gender Women (2.16) Men (2.39) $F=8.525$; $p=.004$
[a]Only significant results shown [b]Mean values in parentheses [c]Significance: $p < .05$	

Age H1: The 35-44 year old group placed the greatest importance of retrieving PHC information online. Older consumers predictably indicated less importance. The results for C2 were almost perfectly linear, as less importance was indicated for more traditional online delivery systems for the older age categories (C1: F=11.058, p=.000). H1 is therefore accepted. Educational attainment H2: Better educated consumers indicated greater importance for C2, but not C1 (C2: F=2.751, p=.043). Therefore, H2 is partially accepted. Income H3: There were no significant differences across the different income groups for either C1 or C2. Therefore H3 is rejected. Gender H4: Women considered C2 more important than men, but there were no significant differences for C1 (C2: F=8.525, p=.004). Therefore, H4 is partially accepted. Ethnic Background H5: For C1 and C2, Hispanics considered online sources most important. For Caucasians, online sources were least important. Therefore H5 is rejected. Marital Status H6: There were no significant differences regarding marital status for either C1 or C2. Therefore H6 is rejected.

DISCUSSION

This research explores the information and communication revolution as it pertains to preventive health care. This involves one's ability to access and apply PHC information either for personal reasons or on the behalf of somebody else. It examined how health care consumers respond to various online PHC delivery systems with a special emphasis on social media.

The popular SM networks (Podcasts, Facebook and Twitter) were not perceived as important as the traditional online delivery systems. It might be a matter of time before the SM methods become more popular, or the anonymous and private nature of a generic search might be more preferred when it comes to researching PHC issues (Direct Marketing News, 2011).

Younger healthcare consumers place more importance on both traditional and social media forms of online delivery systems supporting the results of an earlier study (Finn, 2011). Contrary to hypothesis, Hispanics and African-Americans consider online retrieval of PHC information of greater importance than Caucasians. This was surprising given their lower propensity to use online delivery systems, especially social media. As expected, women and better educated healthcare consumers put more importance on online delivery of PHC information. No significant relationships were established for marital status or income category.

This research is largely exploratory. Related literature of this study was mostly sponsored research or syndicated statistical compilation charting the trends of various social media. The results indicate that there is some utilization of social media for the retrieval of PHC information. The results also suggest that either social media will not be a major vehicle for the dissemination of PHC information due to the healthcare consumer's desire for privacy and

autonomy, or it is simply a matter of time before these new technologies become a commonplace alternative for answering their healthcare questions.

Given that the SM delivery systems for PHC are new but growing, a longitudinal replication of this study is in order. Further research should also examine PHC information from online and SM sources and describing them in terms of their attitudinal and behavioral characteristics. Such a sequence would follow how marketing researchers have tracked and described various modes of behavior in the past. Further research might also consider the impact of experienced vs. non-experienced internet users, or accessibility of high speed connection on the utilization of SM (Leaffer and Mickelberg, 2006). Finally, future studies might re-examine how the use of SM for medical advice may impede or delay professional medical care for those who need it, or how the medical information may be used inappropriately for prevention, diagnosis, or treatment (Bulled 2011; Cline and Haynes 2001)

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