

## ORIGINAL ARTICLE

# Chronic disease and use of online health information and online health services

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## ABSTRACT

This study examines the factors associated with computer use for the self-management of health among individuals diagnosed with chronic diseases (CD) in Israel. We distinguish between: (1) access to online health information, and (2) use of online health services (OHS). A geographic representative sample comprising 2008 individuals was contacted. 1,406 individuals (67.6%) reported using the computer for health concerns. Four conditions – heart, cancer, diabetes and hypertension – were identified (N = 225). Using a series of logit regression models it is shown that CD increases access to online health information (OHI) but its effect of use of OHS is specific to: (1) type of CD, i.e., heart condition, and (2) type of provided service, i.e., medical updates. These results indicate that while computer use increases the odds for higher empowerment this may not necessarily lead to higher use of OHS provided by the healthcare provider among individuals diagnosed with CD decreasing the likelihood for better self-management. Implications for health policy are discussed.

**Key Words:** Chronic disease, Online health information, Online health services, Health empowerment, Self-management

## 1. INTRODUCTION

The use of internet searches in Israel is on the rise<sup>[1,2]</sup> and chronic disease (CD) is considered a motivating factor for accessing health information in online health sites<sup>[3]</sup> and increased access to online health services (OHS). Accessing online health information (OHI) differs from accessing OHS in two main ways: OHI provides generalized information that does not necessarily fit the individual's medical condition<sup>[4]</sup> whereas the latter may provide a pivotal leverage for the prevention of health-related implications<sup>[5,6]</sup> early diagnosis and follow-up of a health routine introduced by the physician. Second, OHI may be of little significance for continuous health-life changes despite their potential to increase a sense of health empowerment<sup>[5,6]</sup> whereas OHS may have significant effect on the effective self-management of health.<sup>[4,7,8]</sup>

In the present study we consider the possibility that individuals with CD who use the Internet to seek generalized OHI may not necessarily actively use specific OHS inverting the potential for self-management as suggested in health empowerment models and communication models. We assume that accessing these “generalized” sites providing OHI (Google, Yahoo, Myspace etc.) will not necessarily fit the needs of the various CD groups and accessing the “specified” services supplied by Health Insurance Agents of health care to make appointments, check lab tests, follow-ups, consult with nurses and personal physician may not be an effective means to increase self-care management of health.

### 1.1 Background

OHI enables to search for medications, detailed descriptions of symptoms and cures, searching for new treatments,

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specialists, alternative therapies, new methods of diagnosis<sup>[6,9,10]</sup> attracting individuals keen to be involved in medical health decisions.<sup>[4]</sup> Ultimately, a health improvement “process” is initiated that increases the potential for the self-management of CD and the motivation to take an active part in preventing, caring and following-up on health issues.<sup>[11]</sup> Accordingly, we hypothesize that:

**H1: A CD condition will increase access to OHI.**

Health behavior according to Bandura’s self-efficacy hypothesis<sup>[12]</sup> can be promoted by social-cognitive means available on OHI<sup>[13,14]</sup> and according to the Media Dependency Hypothesis, can be further amplified by the use of OHS<sup>[10,15]</sup> increasing the advantages of self-management practices in health<sup>[16]</sup> and significant effects that OHS or lack of, may have on CD patients<sup>[4,17–19]</sup> have been reported especially among patients diagnosed with cancer,<sup>[20,21]</sup> heart condition,<sup>[22]</sup> diabetes<sup>[23]</sup> and other long-term conditions.<sup>[24,25]</sup> Use of OHS is indeed considered as significant means for self-management because it facilitates treatment and follow ups and prevents unnecessary health complications.<sup>[26,27]</sup> Recent evidence indicates though that CD patients are not likely to use OHS, lowering thereof, the odds for effective self-management of CD,<sup>[28–31]</sup> raising concerns regarding the level of ignoring or misunderstanding specific needs among CD patients<sup>[28]</sup> higher risk of hospital admission and even higher mortality rates<sup>[32]</sup> and may lower the use of preventive online and offline health services<sup>[28,29]</sup> and the likelihood for an effective self- management of health.<sup>[33,34]</sup>

**H2: A CD condition will increase access to OHS.**

While CD increases the odds to seek OHI<sup>[4,6,18]</sup> it does not necessarily enhances individuals to use OHS and hence internalize the need for of the self-care management of health.<sup>[5,35]</sup> On the positive side some studies point that use OHS increases the odds for monitoring a health problem in time due to delayed face-to-face appointments or timely access to the results of lab tests.<sup>[10,18,30,36,37]</sup> In a recent study among small samples of white females with diabetes, for example participants reported greater self-efficacy for managing their disease<sup>[23]</sup> the benefits of communicating with health care providers and/or website moderators to receive feedback and social support and tracking (e.g., graphical displays of uploaded personal data) were shown to particularly useful for self-management support but less so for improvements in medication adherence, biological outcomes and health care utilization.<sup>[38]</sup> On the negative side some studies suggest that use of OHS may fall behind the intended purposes and fail in providing effective health services.<sup>[28,30,39,40]</sup> Rise et al.<sup>[41]</sup> for example came to the conclusion that more research is needed to determine whether

the long-term effectiveness of these services for more diverse samples of CD patients in order to translate new knowledge, social technologies and engagement techniques into “effective novel approaches for empowering, engaging, and educating older adults with CD” (p.265). Accordingly, we hypothesize that:

**H3: Differences in access to OHS will be related to type of CD.**

## 2. METHODS

### 2.1 Research design

The sample was taken from the list of localities in Israel based on landline phone numbers for 361 geographic locations. The number of individuals included in the sample is representative of the size of the local population groups speaking one of the three languages of the survey (Hebrew, Russian or Arabic).

### 2.2 Sample

In a telephone survey 1,406 individuals Internet users ranging 18-75 years old were contacted. Two hundred and twenty-five individuals reporting a CD diagnosis were identified.

### 2.3 Variables

**Use of OHI:** frequency of searching for OHI about vaccines, high blood pressure, hospitals and doctors, quitting smoking, diet and healthy food and sun protection ranging from 1 = never to 5 = very frequently (Alpha Cronbach  $\alpha = 0.73$ ). Responses to the items were converted into a single scale by summing responses.

**Use of OHS:** frequency of accessing online services for appointments with doctors, appointments with nurses, lab tests, diet and nutrition, pregnancy and birth, medication information. Likert scale ranging from 1 = not at all to 5 = to a great extent. Two groups were identified (CFA): (1) make online appointments (Alpha Cronbach  $\alpha = 0.75$ ); (2) access tests results and medical updates ( $\alpha = 0.72$ ). *CD:* A set of dummy variables for: (1) hypertension, (2) diabetes, (3) cancer, and (4) heart disease (1 = yes; 0 = no).

### 2.4 Control variables

Differences in access and use of OHI and OHS reflect differences in demographic and socioeconomic factors.<sup>[27]</sup>

**Age** is a proxy for internet skills. Literature on health-information seeking indicates that elderly people are less likely to know how to use the internet and search engines.<sup>[42]</sup> Since health usually deteriorates with age,<sup>[43]</sup> age provides an important clue for seeking online health-related information and participating in health-group discussions.<sup>[37]</sup>

**Gender:** Women’s role as caregivers, apparently developed in early childhood<sup>[44]</sup> affects women to apply health information in their daily activities. The Pew Internet Project<sup>[45]</sup> provides evidence that women are more likely than men to turn to the internet for diagnoses.

**Education:** Understanding medical information and conforming to prescriptions and instructions necessitate appropriate educational skills and require comprehension of online information as well as cognitive skills and language related to the search itself.<sup>[46,47]</sup>

**Income:** Differences in searching for OHI are inversely related to income.<sup>[19]</sup>

### 3. RESULTS

First, the differences between the CD and the non-CD groups regarding Internet access are provided (see Table 1).

**Table 1.** Likelihood of access to the internet according to type of CD

Medical Condition	No access to the Internet	Internet Access
Hypertension	.37	.23**
Diabetes	.17	.06**
Heart condition	.19	.09**
Cancer	.06	.05
Other medical condition	.47	.27**

\*\*  $p < .01$

The findings in Table 1 indicate that individuals diagnosed with CD are all (except for cancer) more likely to access the Internet supporting the importance of increased motivation among CD individuals for higher health literacy. Next, we examine to what extent CD individuals are likely to access the Internet to look for health information (see Table 2).

**Table 2.** O.L.S. regression estimates predicting searching OHI

	B	S.E.	$\beta$
Jews	.28	.17	.05
Age	-.02	.006	-.17**
Gender (1 = women)	-.57	.13	-.11**
Marital Status (1= married)	.11	.21	.02
Education	.06	.02	.07**
Chronic Illness	.32	.12	.07*
Constant	2.84	.80	
Adjusted R square	.27		

\*  $p < .05$ ; \*\*  $p < .01$

The findings in Table 2 indicate that a CD condition affects the level of OHI searches ( $\beta = .32$ ) controlling for the effect of relevant socio economic variables. More specifically,

individuals with CD are basically affected by the negative effect of age ( $\beta = -.22$ ) and being a man ( $\beta = -.57$ ) whereas education increases OHI ( $\beta = .06$ ).

Next, we distinguished between the four types of CD included in the analysis and a multivariate test modeling to predict OHI.

**Table 3.** O.L.S. regression estimates of the factors associated with OHI

	B	S.E.	$\beta$
Age1 (up to 40)	.027	.011	.453**
Age2 (40+)*	.000	.000	-.566**
Gender (1 = women)	.40	.05	.20**
Marital Status(1 = married)	.19	.07	.08**
Education (years)	.03	.01	.12**
Hypertension	.05	.07	.02
Diabetes	.18	.09	.05*
Heart	.14	.09	.04
Cancer	.10	.12	.03
Constant	-.83	.24**	
Adjusted R Square	.10		

\*  $p < .05$ ; \*\*  $p < .01$

The findings indicate that controlling for the same socio economic effects presented above, individuals diagnosed with diabetes are more likely than the remaining CD groups to look for OHI ( $\beta = .18$ ) whereas differences between CD types for the remaining groups are not statistically significant in the prediction of OHI.

The results from Tables 1-3 indicate that while accessing the Internet is a feasible means for CD individuals to increase their health literacy levels, this effect is somehow limited probably because not all OHI is or considered as necessarily relevant or complete to attract all individuals coping with CD. As a result the tables provide a limited confirmation of H1 and H2 linking the use of OHI to all types of CD. Next, we used a log-linear model to predict the likelihood of CD effects on use of OHS to: (1) make appointments and (2) get updates.

The findings indicate that three socioeconomic factors predict the use of OHS for appointments and updates. Gender is important (Wald = 5.308), as is the negative effect of age (Wald = 6.035) but mainly for getting updates. Education is also significant for making appointments (Wald = 5.962) as well as getting lab results (Wald = 1.539). However, CD has a very limited effect on OHS and mainly with respect to getting updates. The only group motivated to use OHS is the one diagnosed with heart conditions. For this group CD significantly increases OHS use, mostly for getting updates (3.168). A diagnosis of diabetes (Wald = .766) or cancer

(Wald = .885) had a limited effect on getting updates. These results enable a “restrained” confirmation of H2 linking the

use of OHS to a CD, since only a small percentage of individuals diagnosed with CDs were likely to use OHS.

**Table 4.** Logistic regression estimates predicting likelihood of use of OHS for (a) appointments and (b) updates including and excluding CD

	OHS for appointments			OHS for updates		
	B	S.E.	Wald	B	S.E.	Wald
<b>Not including chronic diseases</b>						
Jews	.674	.291	5.342	.826	.322	6.589
Gender	.128	.216	.351	.541	.226	5.721***
Age	-.275	.079	12.143	-.124	.083	2.241*
Education	.370	.149	6.170	.201	.154	1.695
Marital Status	-.320	.359	.797	-.211	.372	.321
Constant	-5.250	1.304	16.202	-6.113	1.375	19.759
<b>Including chronic diseases</b>						
Jews	.647	.293	4.879	.884	.327	7.284
Gender	.071	.223	.101	.545	.237	5.308**
Age	-.254	.089	8.167	-.235	.096	6.035***
Education	.368	.151	5.962	.196	.158	1.539
Marital Status	-.310	.359	.745	-.160	.382	.175
Hypertension	-.167	.254	.434	-.001	.270	.000
Diabetes	.069	.385	.032	-.370	.422	.766
Heart	-.242	.340	.509	.588	.330	3.168**
Cancer	.116	.366	.101	.339	.361	.885
Constant	.096	.244	.155	.551	.255	4.682

\*p < .05; \*\*p < .01; \*\*\*p < .001

#### 4. DISCUSSION

Use of online health communication to access health services is increasing among individuals. In this study we asked whether the diagnosis of a CD affects: (1) access to generalized online health information, and (2) specific OHS provided by health insurance agents. We assumed CD will increase the likelihood to access OHI but not necessarily the access to specific OHS. Our findings in Israel indicate that access to OHI is on the rise but variations in the use of OHS varies according to: (1) type of CD, and (2) type of OHS provided. More specifically, heart condition increases the use of OHS whereas hypertension decreases the use of OHS and diabetes has no effect, whatsoever. Moreover, the CD link to OHS is effective mainly for getting lab results but not for making appointments. These findings enable a partial confirmation of hypotheses H1 and H2 but a full support for hypothesis H3 suggesting variations in use of OHS according to CD type. Interpreting these findings suggests individuals with a CD do not fully capitalize on the online health resources decreasing the odds for an effective self-management. The results are similar to recent studies,<sup>[28,31,41]</sup> prompting the improvement of OHS. It is nonetheless important to keep in mind that these expected yet intriguing results indicate that the possibility of over-diagnosis is high.

Clearly, the study could not address a larger number of indi-

viduals with a CD and we could not control for additional variables, including the individuals’ level of skills or severity of CD. Recently published studies have raised the problem of over-diagnosis or insufficient literacy to fully understand the information provided on the health sites causing high risk of possible harm. Similarly, other studies have pointed to the possibility that the internet may serve well individuals with low risk changes such as a diet, but at the end of the day they will always consult the physician for more serious concerns. This is possibly the reason why a diagnosis CD necessitates a closer and face to face interaction with the physician and the formal providers of health care.

#### 4.1 Policy implications and recommendations

Health care providers invest considerable resources in promoting the use of OHS because these provide an effective tool to increase the self-management of health. The extent that these virtual platforms are effective has important implications for the quality of health and wellbeing among individuals diagnose with a CD but their effectiveness has been doubted recently because: (1) searching for online information about new treatments and medication does not translate into better health management, and (2) OHS effects are not equally suitable for all types of CD. As new solutions replace older health struc-

tures in the health care system to facilitate increased access to healthcare that is both cost-effective and high in quality, addressing issue of disparities in access to health services and achieving equity become essential factors to ensure high value healthcare. In order to do so healthcare organizations that aim to be progressive need to carefully consider how the new healthcare system offers equitable practices to all and is well within reach and use of all social groups.

#### 4.2 Limitations and directions for future research

The study has limitations in two areas: first, the results are limited to internet users, hitherto identified as a privileged group with higher education and socioeconomic status than

non-internet users. Second, our cross-sectional sample did not allow investigation of changes in accessing OHS over time. An important question to be addressed in future research is the extent to which accessing OHI and participation in internet forums over time is associated with increased use of online health care facilities and services. Finally, more subtle categorization of OHS should be developed to capture the variety of OHS available to individuals diagnosed with a CD in institutional health care centers.

#### CONFLICTS OF INTEREST DISCLOSURE

There are no competing interests in this paper.

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