What shapes eHealth literacy of an individual?

Xesfingi, Sofia and Vozikis, Athanasios

University of Piraeus

25 November 2014

What Shapes eHealth Literacy of an Individual? ☆

Sofia Xesfingi[a,]* and Athanasios Vozikis[a]

[a]Department of Economics, University of Piraeus, Piraeus, 18435, Greece

---

Abstract

This paper studies the ability of an individual in searching, analyzing and processing information from the Internet in order to address or solve health related issues, the so-called eHealth literacy and the factors that shape it. Understanding what influences eHealth in a country is particularly relevant for health markets as it provides guidelines for health marketers to develop targeted and tailored communication materials for relevant consumer segments, and further could suggest appropriate strategies for training the health illiterate part of the population. Using a unique sample based on survey data of 1064 individuals in Greece for the year 2013, we find that among demographic factors, age and education strongly affect the eHealth literacy and physical exercise among the life-style variables. Finally, other types of technology literacies such as computer skills and information obtained from the Internet further enhance the eHealth performance of an individual and have the greatest impact among all factors.

Keywords: eHealth literacy, demographic factors, life-style factors, technology literacy, Internet

JEL: I12; C83; C25

☆We are grateful to Kyriakos Drivas, Claire Economidou, Dimitris Karamanis, Eugene Moustaferi, Georgia Papadopoulou and Yiannis Pollalis for providing useful comments.

*Corresponding author.

Email addresses: xesfingi@unipi.gr (Sofia Xesfingi), avozik@unipi.gr (Athanasios Vozikis)

Tel: 2104142280, Fax: 2104142301

1. Introduction

Despite the concerns regarding the quality of on-line health information (Silence *et al.*, 2006), the advent of the Internet has drastically changed the landscape of health information, as recent estimates document that more than 80% of Internet users have searched for health-related information on-line (Fox, 2005).

With the tremendous growth of available information, searchers are faced with the challenge of how to locate, evaluate, and use effectively health information on the Internet or enable health and health care (Chan *et al*. 2009) as data safety is one of the most commonly identified barriers with respect to the effective use of Internet information. Despite the perils, studies have showed that health consumers are increasingly using the Internet not only for information, but also for communicating with peers and health professionals and purchasing health products and services (Adler, 2006).

Recently, a subfield within medical informatics that develops information and communication technology tools and applications for use in healthcare has emerged, that of eHealth, i.e., the ability of the individuals in searching, analyzing and processing information from the Internet in order to address or solve health related issues.

Consequently, understanding what shapes eHealth in a country is particularly relevant for health markets as it provides guidelines for health marketers to develop targeted and tailored communication materials for relevant consumer segments, and further suggests appropriate strategies for training the health illiterate segment of the population. Furthermore, the implementation of eHealth and health information technologies is seen by many as an effective way to address current concerns about the quality and safety of a health care system, with the rising costs of health care being another major concern that eHealth may help address (IOM, 2009).

Among the first studies in the field is the seminal study of Norman and Skinner (2006a) who examine in a systematic way attributes that contribute to eHealth literacy. The authors state that eHealth literacy could be defined by a set of factors such as a person's ability presenting health issue, educational background, health status at the time of the eHealth encounter, motivation for seeking the information, and the technologies used, and aims to empower individuals and enable them to fully participate in health decisions informed be eHealth resources.

Numerous subsequent studies have investigated the relationship between eHealth literacy and various, mainly demographic, factors. For example, the study of Adreassen *et al.* (2007) argued that the use of Internet for health purposes was positively related with youth, higher education, white-collar or no paid job, visits to the general practitioner during the past year, long-term illness or disabilities, and a subjective assessment of one's own health as good. Baker *et al.* (2003) concluded that higher education is associated with higher use of the Internet for health purposes. Cross-country evidence also emphasis the significance of general literacy level on using information technologies. For instance, as literacy skill level rise, the perceived usefulness of computers, diversity and intensity of Internet use, and use of computers for task-oriented purposes rise too, even when factors such as age, income, and education levels are taken into account (Veenhorf *et al*., 2005). The study of Rudd *et al*. (2004) further documents the importance of education, along with income, country of birth, age and race (ethnicity), for a person's eHealth performance. Finally, the study of Norman and Skinner (2006a) revealed that baseline levels of ehealth literacy were higher among males; age did not predict eHealth literacy scores at any point in time, while no significant relationship was found between eHealth literacy and use of information technology overall.

The present paper contributes to the aforementioned vein of literature and brings evidence on the factors that influence the eHealth literacy for the case of Greece, where, lately, government policies were focused on enabling the access to the Internet for a large part of Greece's population.

We, therefore, first construct an index for eHealth literacy, following the tradition of Norman and Skinner (2006b) and using unique survey data of 1064 individuals for the year 2013. The construction of the eHealth literacy index is based on the answers of the interviewees on eight questions about a participant's ability on using the Internet for health matters. Next, we estimate the effect of various demographic, life-style factors and levels of technology literacy on an individual's eHealth performance.

Our results demonstrate the important role of the age and education effect as well as that of physical exercise on eHealth literacy. Other types of technology literacy, such as computer skills and information obtained from the Internet, further enhance the eHealth performance of an individual and have the greatest impact among all other factors.

2. Methodology

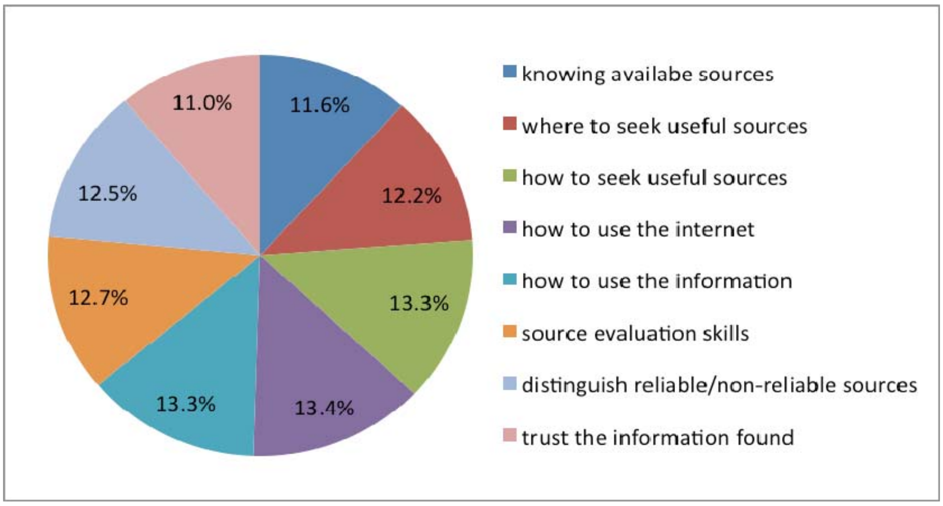
This section discusses the survey data, builds the eHealth literacy index, and presents the estimation method followed.

2.1. Data

This empirical analysis relies on data obtained from a survey, where 1,064 participants in the year 2013 were requested to answer various questions about their ability to solve health related issues using information from the Internet. The dependent variable, the *eHealth literacy* index, is defined as the ability of a certain individual to seek, find, understand and appraise health information from electronic resources and apply such knowledge to addressing or solving a health problem, according to (Norman and Skinner, 2006b). For the construction of the *eHealth literacy* index, questionnaires for the corresponding year were distributed to 1,064 survey participants. The index is based on the evaluation of eight components, namely "knowledge of available sources", "where to seek useful sources", "how to seek useful sources", how to use the internet", "how to use the information from the internet", "source evaluation skills", "distinguish reliable and non-reliable sources" and "trust the information for decision making". Each component was measured on a five-grade scale so the total summary of the *eHealth literacy* index ranges from eight to forty.

Figure 1, below, shows the distribution of each one of eight components of the *eHealth literacy* index.

Figure 1: Share of the components of the *eHealth literacy index*



A number of demographic factors were requested, such as *Gender*, *Age*, *Marital Status*, *Education* and *Income*, obtained from the participants and classified according to Hellenic Statistical Authority.

Further, the interviewees were asked to provide information about their demographic characteristics and life-style habits. Particularly, they were asked whether they are smokers or not, whether they workout more than once per week and whether they consume alcohol on a regular basis.

Finally, the participants were invited to evaluate their skills with respect to computer and information literacy. The former, measures the skills of the participant regarding the use of computers, i.e. use of search engines, send e-mails, upload messages on forums, use of the Internet for chatting or construction of web pages, while the latter measures the degree of frequency of relying on internet as a primary source of health related issues and the importance of accessing the internet in order to find health related sources.

Table 1, below, presents the correlations between the dependent variable and all the other factors.

Table 1: Correlations between all variables.

Variable	*eHealth*	*Gender*	*Age*	*Marital*	*Education*	*Income*	*Smoke*	*Exercise*	*Alcohol*	*CL*	*IL*
eHealth Literacy	1.00										
Gender	0.01	1.00									
Age	-0.29*	-0.02	1.00								
Marital Status	-0.17*	0.08*	0.57*	1.00							
Education	0.41*	0.01	-0.22*	-0.16*	1.00						
Income	0.07*	-0.07*	0.05	0.11*	0.18*	1.00					
Smoke	-0.02	-0.07*	-0.06*	0.01	-0.09*	0.04	1.00				
Exercise	0.20*	-0.11*	-0.22*	-0.22*	0.11*	-0.09*	-0.06	1.00			
Alcohol	-0.03	-0.18*	-0.01	-0.05	-0.01	-0.02	0.19*	0.01	1.00		
Computer Literacy (CL)	0.46*	-0.05	-0.45*	-0.31*	0.35*	0.13*	-0.01	0.17*	0.04	1.00	
Information Literacy (IL)	0.45*	0.04	-0.17*	-0.08*	0.27*	0.13*	-0.06*	0.12*	-0.09*	0.31*	1.00

Note: (*) indicate significance at 5% level of significance.

As Table 1 shows, the two types of technology literacy, computer and information literacy, are highly related with eHealth literacy, 0.46 and 0.45, respectively. These two variables are also positively related with each other. Further, age, education, and exercise and eHealth are also strongly related, -0.29, 0.41, and 0.20, respectively.

Next, Table 2 presents the summary statistics for all variables.

Table 2: Descriptive statistics.

Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
eHealth Literacy	1064	2.432	0.89	1	4
Gender	1064	0.552	0.497	0	1
Age	1064	2.408	1.128	1	6
Marital Status	1064	1.58	0.711	1	5
Education	1064	5.209	1.476	1	8
Income	1064	3.868	2.086	1	8
Smoke	1064	0.397	0.49	0	1
Exercise	1064	0.47	0.499	0	1
Alcohol	1064	0.221	0.415	0	1
Computer Literacy	1064	1.412	0.687	0	2
Information Literacy	1064	2.185	0.672	1	3

As the Table 2 shows, our sample participants have fair level of eHealth literacy. Further, half of the participants are men, while the majority of the interviewers are between the age of 25 and 39 years old, and belong to middle income class. Furthermore, participants appear to lead healthy life-style, as they do not smoke or consume alcohol daily and workout more than once per week.

2.2. Model

The likelihood of a certain individual being able to solve health related issue using information from the internet can be described by an ordered logit model defined as follows:

$$\Pr(Y = c|Xi) = F(Xi\beta),$$

where the endogenous variable *Y* is the degree of *eHealth literacy* and takes values from 1 to 4 (c) in accordance with the aforementioned abilities (1 for low, 2 for fair, 3 for enough, 4 for high); *F* is the standard logistic cumulative distribution function and X_i is a set of covariates defined as:

$$X_i\beta = \beta_0 + \beta_1 Gender_i + \beta_2 Age_i + \beta_3 MaritalStatus_i + \beta_4 Education_i + \beta_5 \mathrm{Income}_i + \beta_6 Smoking_i + \beta_7 Exercise_i + \beta_8 Alcohol_i + \beta_9 CI_i + \beta_{10} IL_i + \varepsilon_i,\ \varepsilon_i \sim \mathrm{Logistic}(0,1)$$

where the first five variables consist the demographic factors (set *D*): *Gender* is a dummy variable that takes the values 0 and 1 if the participant is male and female respectively; *Age* is the age of the participants clustered as follows: class 1 (15-24), class 2 (25-39), class 3 (40-54), class 4 (55-64), class 5 (65-79), class 6 (>80 years old); *MaritalStatus* represents whether a participant is single (1), married (2), divorced (3), separated (4) or widow (5); *Education* is the level of education of each participant ranging from for primary school (1) to for Ph.D (8); *Income* is the income level of the participants clustered in eight groups.

The next three variables form the life-style set (*H*) and are: *Smoking* is a dummy and represents whether the participants are smokers or not; *Exercise* is a dummy that takes the value 0 if the participant is not exercising more than once per week, otherwise is 1; *Alcohol* is a dummy and takes the value 0 if the participant is not drinking on a regular basis, otherwise is 1.

Finally, we also include technologicy literacy covariates, namely *CI,* which captures the computer literacy of each participant and ranges from (0) for non knowledge at all to (2) for high knowledge, and *IL* is the information literacy of the participant and takes the values (1), (2) and (3) for low, fair and high knowledge.

The selection of the variables in X_i set can be justified by relevant studies. More specifically, the demographic variables of age and education are documented in the studies of Baker et al. (2003); Petch et al. (2005); Schwartz *et al.* (2005) and Andreasen *et al*. (2007). Rudd *et al.* (2004) and Veenhorf *et al.* (2005), along with the variables of age and education, take into account the variable of income. Further, the variable of gender is explored in the study of Norman and Skinner (2006b). When it comes to life-style factors, such as smoking, they are mentioned in the study of Bodie and Dutta (2008). Finally, technology literacy, it is included in a handful of studies (Eysenback, 2001; Norman and Skinner, 2006a; Bodie and Dutta, 2008).

The model only applies to data that meet the proportional odds assumption. Suppose that the proportions of members of the statistical population who would answer Y=1, Y=2, Y=3, Y=4 and Y-5 are respectively p1, p2, p3, p4 and p5. Then the logarithms of the odds (not the logarithms of the probabilities) of answering in certain ways are:

Y=1,	log [p1/(p2+p3+p4+p5)], 0
Y=1 or Y=2,	log [(p1+p2)/(p3+p4+p5)], 1
Y=1, Y=2 or Y=3,	log [(p1+p2+p3)/(p4+p5)], 2
Y=1, Y=2, Y=3 or Y=4,	log [(p1+p2+p3+p4)/p5], 3

The proportional odds assumption is that the number added to each of these logarithms to get the next is the same in every case. In other words, these logarithms form an arithmetic sequence.

3. Results

Table 3, below, presents the odds ratios for all specifications, starting from including only some sub-sets of factors to fully-fledge model that includes all factors. One can read the odd ratios as follows: if the odd ratio, *a*, is bigger than one (a>1), then the probability of a participant being health literate, i.e. Y_{it}=4 (maximum level of eHealth literacy, increases by (a-1)*100%, whereas the probability decreases by (1-a)*100%, if the odd ratio is smaller than one (a<1).

Columns (1)-(4) present estimates of the model, where only the demographic (*D*) and literacy factors (*C*) are included. Next, columns (5)-(8) show estimates of the model, where only the indicators of the participants' lifestyle (*L*) and literacy are included. Finally, columns (9)-(12) present estimates, where the full set of covariates (*X*) are included.

Table 3: Logit estimates (odds ratios) of different specifications

(maximum level of *eHealth literacy* is the dependent variable)

		Demographic (*D*)				**Life-style (*L*)**				**Full Set (*X*)**			
		(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**
Demographic (*D*)	Gender	1.022	1.108	0.951	1.021					1.059	1.138	1.005	1.069
		(0.12)	(0.133)	(0.114)	(0.125)					(0.127)	(0.139)	(0.123)	(0.133)
	Age	**0.617*****	**0.752*****	**0.643*****	**0.752*****					**0.635*****	**0.770*****	**0.663*****	**0.771*****
		(0.043)	(0.054)	(0.046)	(0.055)					(0.044)	(0.056)	(0.048)	(0.058)
	MaritalStatus	1.081	1.187	1.064	1.169					1.121	**1.227***	1.098	**1.201***
		(0.113)	(0.125)	(0.113)	(0.126)					(0.118)	(0.131)	(0.118)	(0.131)
	Education	**1.698*****	**1.576*****	**1.616*****	**1.526*****					**1.686*****	**1.569*****	**1.616*****	**1.530*****
		(0.077)	(0.074)	(0.076)	(0.073)					(0.077)	(0.742)	(0.07)	(0.074)
	Income	1.020	0.976	0.984	0.950					1.033	0.986	0.993	0.958
		(0.030)	(0.029)	(0.029)	(0.029)					(0.030)	(0.030)	(0.030)	(0.029)
Life-style (*L*)	*Smoke*					0.956	0.967	1.071	1.070	1.024	1.046	1.140	1.157
						(0.112)	(0.117)	(0.129)	(0.133)	(0.126)	(0.13)	(0.143)	(0.147)
	Exercise					**2.083*****	**1.740*****	**1.907*****	**1.638*****	**1.704*****	**1.638*****	**1.585*****	**1.540*****
						(0.239)	(0.207)	(0.225)	(0.198)	(0.208)	(0.203)	(0.197)	(0.194)
	Alcohol					0.877	0.779	1.072	0.926	0.868	0.819	1.004	0.929
						(0.121)	(0.112)	(0.151)	(0.136)	(0.126)	(0.122)	(0.148)	(0.14)
Literacy (*C*)	*ComputerLiteracy*		**3.035*****		**2.584*****		**4.019*****		**3.246*****		**3.011*****		**2.568*****
			(0.320)		(0.282)		(0.382)		(0.321)		(0.319)		(0.281)
	InformationLiteracy			**3.493*****	**3.102*****			**4.121***	**3.273*****			**3.465*****	**3.072*****
				(0.353)	(0.318)			(0.407)	(0.332)			(0.353)	(0.318)
	Observations	1064	1064	1064	1064	1064	1064	1064	1064	1064	1064	1064	1064
	Likelihood Ratio	260.45	375.96	428.70	506.93	42.88	276.42	272.29	424.24	280.79	393.84	443.25	519.79
	Pseudo-R^2	0.097	0.140	0.160	0.189	0.016	0.103	0.102	0.158	0.105	0.147	0.165	0.194

Note: Numbers in parenthesis are standard errors; (***), (**), (*) indicate significance at 1%, 5%, and 10%, respectively.

As Table 3 shows, among the demographic factors (*D*) presented in columns (1)-(4), only *Age* and *Education* have a statistical significant effect on the probability of being eHealth literate. More specifically, when it comes to the *Age* effect, there is a negative relationship between eHealth literacy and aging. We find that as the participants grow older, the likelihood of being eHealth literate at the maximum level decreases by 38%, as column (1) indicates. By including other literacy factors (*C*), namely *ComputerLiteracy* and *InformationLiteracy* (columns 2-4) the *Age* effect decreases, ranging from to 25% (columns 2 & 4) to 35% (column 3). The opposite finding emerges with respect to the *Education* effect, which is positively related to the eHealth literacy. Particularly, the higher the level of education of the participant is, the higher the likelihood of the eHealth maximum level of literacy of the participant, ranging from 70% increase (excluding literacy factors, column 1) to 53% (when literacy factors are included, column 4). The literacy factors in all specifications (1-4) are found to greatly affect the eHealth literacy performance of the participants. For example, when we control for both literacy factors in column (4), results show that the higher the *ComputerLiteracy* and the *InformationLiteracy* are, the probability of a participant's maximum level of eHealth literacy increases by 116% and 210%, respectively. The inclusion of these factors slightly decreases the role of the demographic variables, with the former still to pertain their significance.

Next, columns (5)-(8) include only the health lifestyle (*L*) factors along with the literacy factors (*C*). Results demonstrate all health habit factors carry the expected sign with respect to their impact on eHealth literacy; however, only physical *Exercise* is found to be statistically important. If a participant works-out more than once per week, his eHealth literacy increases by 108% (column 5). In addition, if the participant has high computer and information literacy, then the effect of physical exercise reduces to 64%, as column (8) indicates.

Finally, columns (9)-(12) show estimates of various combinations of all sets of variables. Particularly, last column presents the fully-fledge specification with all demographic, life-style and literacy variables included. As before, the same variables appear to be statistically significant, maintaining the expected sign according to the theory. For instance, among the demographic factors, the probability of a participant's eHealth literacy decreases by 23% when the participant ages, while the probability increases by 53% when the participant acquires higher level of education. There is also a positive *Marital* effect, significant at 10%, on participant's eHealth literacy; however it's difficult at this stage of analysis to draw concrete conclusions about the marital effect on eHealth literacy. The reason is that the movement from one class to the next one would not be necessarily the case in reality (e.g. a divorced person who belongs to class 3 does not necessarily become separated, meaning being member of class 4). Therefore, we can not compare whether there is an improvement (or deterioration), of any sort, by changing classes, as it is the case with the rest of the variables which follow an order.[1] With respect to the life-style variables, again physical exercise appears to have a positive and statistical significant effect on a participant's eHealth literacy, which is about 54%. Literacy factors, relating to computers and information, also document their strong association with eHealth literacy and range from 157% (*ComputerLiteracy*) to 207% (*InformationLiteracy*).

In sum, estimates do not alter neither in sign, nor in statistical importance across all specifications of Table 3, and remain robust. Overall, our findings strongly support that the age and education are important contributors to eHealth literacy of an individual. The (negative) effect of age ranges from 23% (column 12) to 37% (column 1), while the (positive) effect of education varies from 70% (column 1) to 53% (column 12). Marital status, only in some cases has a statistically borderline significant role (at 10% level of significance), while the two other remaining demographic variables, i.e., income and gender, play no role at all. Physical exercise is the only factor among the life-style set of habit indicators that has a positive and significant effect that ranges from 108% (column 5) to 54% (column 12). Smoking and alcohol consumption have no impact on eHealth. In addition, high level of computer and information literacy is positively associated with high probability of eHealth status: 302%-157%, for computer literacy, and 312%-207%, for information literacy. Finally, as diagnostics of bottom part of Table 2 demonstrate, all specifications have a satisfactory fitness. For the last column, in particular, the fitted values and the actual values are related by 60%.

At this point, we are able to compare our findings with those of other related studies. For example, our findings are in line with all studies that document an association between age and level of education with eHealth literacy (Baker *et al*., 2003; Rudd *et al.*, 2004; Petch *et al,.* 2005; Schwartz *et al.,* 2005; Veenhorf *et al.,* 2005; Andreasen *et al*., 2007). In contrast, we do not particularly align with studies that find strong association between income and gender with eHealth literacy (Rudd *et al.*, 2004; Schwartz *et al.,*

---

[1] The marital effect on eHealth literacy requires a marginal effect analysis which is performed in Table 4 in this section.

2005; Veenhorf *et al.*, 2005; Norman and Skinner, 2006). The linkage between life-style factors and eHealth literacy is mentioned in the study of Bodie and Dutta (2008), but the positive association of those two is not supported. Finally, our results are in accordance with the studies supporting a positive and strong association between technology literacy and eHealth literacy (Eysenback, 2001; Bodie and Dutta, 2008).

Next, in Table 4 below, we perform a marginal effect analysis, which captures the effect on maximum eHealth literacy level when an individual changes within variable classes, e.g. (low to high income, primary to high-school, etc.) at the data means. The analysis is performed for the last column of Table 3, which is the fully-fledged specification and only for the statistical significant variables.[2]

Table 4: Marginal Effects Analysis

(maximum level of *eHealth literacy* is the dependent variable)

Variables	Marginal	Std. Err.
Age		
1 (15-24)	0.069	0.012
2 (25-39)	0.052	0.007
3 (40-54)	0.044	0.008
4 (55-64)	0.038	0.011
5 (65-79)	0.028	0.008
6 (>80)	0.003	0.004
MaritalStatus		
1 (single)	0.046	0.006
2 (married)	0.053	0.007
3 (divorced)	0.008	0.005
4 (separated)	0.095	0.032
5 (widow)	0.364	0.326
Education		
1 (primary)	0.016	0.007
2 (high school-3 first years)	0.009	0.004
3 (technical education)	0.021	0.008
4 (high school-3 last years)	0.029	0.005
5 (post high school-excl. university)	0.025	0.007
6 (university)	0.066	0.008
7 (master)	0.103	0.019

[2] Marginal effect analysis results for the rest of the specifications are also available upon request.

8 (Ph.D.)	0.174	0.062
Exercise		
0 (once per week)	0.040	0.006
1 (more than once per week)	0.061	0.008
ComputerLiteracy		
0 (low)	0.005	0.001
1 (fair)	0.048	0.008
2 (high)	0.078	0.009
InformationLiteracy		
1 (low)	0.016	0.003
2 (fair)	0.035	0.005
3 (high)	0.120	0.014

Holding all variables at their mean value, the probability of an individual being eHealth literate at the maximum level is 7% among those who are 15-24 years old, 5% among the class age of 25-39 years old, 4% among those who are 40-54- years old, 4% among those of next category (55-64 years old), 3% among those who are between the age of 65 and 79 years old, and 0.3% among those who are above the age of 80 years old. For example, as an individual grows old and moves to class 8 (above 80 years old), her probability of being eHealth literate at the maximum level decreases by 2.5% (=[0.028-0.003]*100%). The marginal effect analysis of the effect of various age classes on eHealth literacy confirms the finding from Table 2 that the age effect on eHealth literacy increases as participants becomes older.

The marginal effect analysis of the marital status on e-heath literacy can be read as follows: the probability of an individual being eHealth literate at the maximum level is about 5% among the singles, 5% among the married, 0.8% among the divorcees, 9% among the separated, and 36% among the widows.

The education effect on eHealth literacy is also consistent with findings from Table 2 as the marginal effects indicate. Overall, as the level of education of the participant is getting higher, the larger is the effect on eHealth literacy. For example, when a master holder participant (group 7) obtains his Ph.D. and moves to group 8, there is a 7% (=[0.174-0.103]*100%) higher probability in being eHealth literate.

With respect to the impact of physical exercise on eHealth literacy, the marginal effect indicates that if someone is physically active more than once per week (group 1) has a 20% more chances to be eHealth literate.

Finally, when it comes to the technology literacy effects on eHealth literacy again we find that the higher the computer literacy the higher the eHealth performance. Particularly, we find no big difference when an individual moves from one computer literacy class to the next higher one. In contrast, there is a twofold and a fourfold effect when a participant increases his abilities on information literacy moving from class (1) to (2) and (2) to (3), respectively.

Overall, the marginal effect analysis is in accordance with the odds ratio analysis and strengthens even further the robustness of our results.

4. Conclusion

The widespread of Internet across countries and population age, has considerably improved the life of the individuals. This paper aimed at studying whether certain factors such as demographic, life-style and types of technology literacy, shape the ability of the individuals in searching, analyzing and processing information from the Internet in order to address or solve health related issues.

Using unique survey data of 1,064 individuals in Greece for the year 2013, we constructed an eHealth literacy index, based on eight questions, as it has been proposed in the literature, relating a participant's ability on using the internet for health matters. Then, we estimated the effect of various factors on an individual's eHealth performance.

Our results demonstrated the important role of the age and education effect as well as that of physical exercise on eHealth literacy. Other types of technology literacy, such as computer skills and information obtained from the Internet, further enhance the eHealth performance of an individual having the greatest impact among all others factors.

References

Adler K.G. (2006). Web portals in primary care: an evaluation of patient readiness and willingness to pay for online services. Journal Medical Internet Res, vol. 8 (4), e26

Adreassen H.K., Bujnowska-Fedak M.M., Chronaki C.E., Dumitru R.C., Pudule I., Santana S., Voss H., Wynn R. (2007). BMC Public Health, vol. 7, pp. 53-59.

Baker L., Wagner T.H., Singer S., Bundorf M.K. (2003). Use of the internet and e-mail for health care information. JAMA, vol. 289, pp. 2400-2046.

Basu A., Dutta Jyoti M. (2008). The Relationship Between Health Information Seeking and Community Participation: The Roles of Health Information Orientation and Efficacy. Health Communication, vol. 23, pp. 70-79.

Bodie G.D., Dutta M.J. (2008). Understanding health literacy for strategic health marketing: ehealth literacy, health disparities and the digital device. Health Marketing Quarterly, vol 25 (1-2), pp. 175-203.

Bodkin C. and Miaoulis G. (2007). EHealth information quality and ethics issues: an explotary study of consumer perceptions. International Journal of Pharmaceutical and Healthcare marketing, vol. 1 (1), pp. 27-42.

Chan J., Leung A., Chiang V.C.L., Li H.C.W., Wong E.M., Liu A.N.C., Chan S.S.C. (2009). A pilot project to build eHealth literacy among university students in Hong Kong. Proceedings of the 10th International Congress on Medical Librarianship (ICML).

Collins S.A., Currie L.M., Bakken S., Vawdrey D.K., Stone P. W. (). Health literacy screening instruments for eHealth applications: A systematic review. Journal of Biomedical Informatics, vol. 45 (3), pp. 598-607.

Demiris G., Afrin L.B., Speedie S., Courtney K.L.Sondhi M. Vimarlund V. (2008). Patient-centered Applications: Use of Information technology to promote disease Management and Wellness. Journal of the American medical Informatics Association, vol. 15 (1), pp. 8-13.

Dutta-Bergman M.J. (2004). An alternative approach to social capital: Exploring the linkage between health consciousness and community participation. Health Communication, vol. 16, pp. 393-409.

Dutta-Bergman M.J. (2004). Developing a profile of consumer intention to seek out additional health information beyond the doctor: Demographic, communicative, and psychographic factors. Health Communication, vol. 17, pp. 1-16.

Eysenbach G. (2001). What is eHealth. Journal of Medical internet Research.

Fox S. (2005). Health information online: Eight in then internet users have looked for health information online, with increased interest in diet, fitness, drugs, health insurance, experimental treatments, and particular doctors and hospitals. Washington, DC: Pew Internet & American Life Project.

Hemming H.E., Langille L. (2006). Building Knowledge in Literacy and Health. Journal of Canadian Public Health, vol. 97, pp. 31-36.

Institute of Medicine, 2009. Health Literacy, eHealth, and Communication: Putting the Consumer First: Workshop Summary. Washington, DC: The National Academies Press.

Karp S., Monroe A.F. (2002). Quality of healthcare information on the internet: caveat emptor still rules. Manag Care Q., vol. 10 (2), pp. 3-8.

Norman C.D., Skinner H.A. (2006). eHeals: The eHealth Literacy Scale. J Med Internet Res, vol. 8 (4), e27

Norman C.D., Skinner H.A. (2006). eHeals: The eHealth Literacy Scale. J Med Internet Res, vol. 8 (2), e9.

Petch E., Levitt N., Levitt A. (2005). People who rate: Community Involvement in Development of Health Education Materials and Messages.

Rudd R.E., Kirsch I. and Yamamoto K. (2004). Literacy and health in America. Princeton, NJ: Educational Testing Service.

Schwartz L.M., Woloshin S. and Welch G.H. (2005). Cal Patients Interpret Health Information? An assessment of the Medical Data Interpretation Test. Medical Decision Making, vol. 25, pp. 290-300.

Silence E., Briggs P., Harris P., Fishwick L. (2006). Going online for health advice: Changes in usage and trust practices over the last five years. Interacting with Computers, vol. 19, pp. 397-406.

Tang H., Ng J.H. (2006). Googling for a diagnosis - use of Google as a diagnostic aid: internet based study. BMJ, vol. 333, pp. 1143-1145.

Veenhof B., Clermont Y., Sciadas G. (2005). Literacy and Digital Technologies: Linkages and Outcomes. Ottawa, ON: Statistics, Canada.