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# Patient satisfaction, e-health and the evolution of the patient–general practitioner relationship: Evidence from an Italian survey

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## ABSTRACT

**Background:** Scientific and public interest in the use of the Internet for health-related purposes has grown considerably. Concerns regarding its impact on patient–doctor relationship and risks for patients have inflamed the debate. Literature provides scarce evidence in this field. This paper investigates whether a patient's decision to use the web also depends on previous experience and satisfaction with healthcare.

**Method:** Statistical analyses were conducted using data from a survey of more than 1700 citizens in Tuscany (Italy). The Andersen behavioural model was adopted as framework for investigating two patient behaviours: Internet use for health-related purposes; discussion of online findings with the physician. Two separate multivariate logistic models were performed to verify whether satisfaction and experience with healthcare system and general practitioners were associated with the e-health behaviours.

**Results:** Age, education and dissatisfaction with the healthcare system are the main determinant factors of e-health use. The behaviour of sharing the e-health experience with general practitioners is more diffused among those patients who are more satisfied with physicians for the involvement in the decision-making process and suggestions on life-style.

**Implications:** Whether patients choice to share information found online with the doctor depends on the ability of the doctor to engage patients in decision-making, e-health can produce a 'double-empowerment' process: experienced by the patient on the Internet, and legitimated by the doctor during encounters.

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## 1. Introduction

The expression “e-health” refers to health services and easily updated health-related information enhanced or

provided by the Internet and related technologies [1–3]. Traditionally, healthcare professionals are the patients' most reliable source of health-related information. Greater accessibility to the Internet and the broad availability of online health-related information have provided a new source of health knowledge for people. Currently, 59% of Europeans go online when looking for health-related information [4]. The growing use of e-health [5–7] and its potential contribution to the goals of prevention, promotion and protection in health-enhancing strategies [8–10] have made e-health a key issue for healthcare managers

*Abbreviations:* CATI, computer-assisted telephone interviews; CI, confidence interval; GP, general practitioner; LHA, local health authority; HD, healthcare districts; OR, odds ratio.

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and policy makers, as well as being an area of interest for the scientific community.

Doctors also need to face tackle the challenges related to e-health, particularly in light of the increasing number of informed patients. E-health can affect the physician–patient relationship, as patients become more (well or badly) informed. Furthermore, the doctor–patient relationship is changing, also in terms of the medical decision-making process. The patient's role is progressively shifting from the compliant or silent patient, to the patient who wants to take his/her own decisions. A consensual, or collaborative, decision-making process requires more than a top–down process [11]. Thus, the patient behaviour of reporting information found online to the physician could be crucial in the development of a better patient empowerment, because based on the legitimization and validation of information found online.

Currently, the evidence on these issues is somewhat conflicting. In the literature, we found agreement only on the general profile of patients who adopt these technologies of information and communication (e-patients). There is also a great fragmentation of empirical research at three levels: (i) the typology of population studied and the sampling methods; (ii) the focus of the study (i.e. different health-related purposes of Internet use or e-patient behaviours after the Internet search); (iii) the determinant factors used to analyse the focus of the study.

Our study thus focuses on two specific patient behaviours: (i) using the Internet for health-related information; (ii) sharing the information found online with the general practitioner (GP). The aim of this research is to investigate whether these two patient behaviours are affected by the previous relationship and experience with the GP and the healthcare system. Multivariate logistic models were used to estimate the associations between patient characteristics, experience and satisfaction with the physician and the healthcare system, and the two patient behaviours described above. Lastly, this work provides insights into the potential role the GP could still play in strengthening the relationship with the patient, also when e-health is used. The Andersen's behavioural model, developed and widely used for investigating patients' health-related behaviours [12], was adopted as framework for testing if and how potential influencing factors impact e-health behaviours of interest.

## 2. Background

Table 1 reports the results of our literature analysis of e-health related surveys and articles on the use of the Internet for health-related purposes. Despite the wide interest in this topic, the scientific basis of e-health behaviours determinants still needs to be established and the evidence seems limited [2,13,14]. In general, most surveys on e-health use have tended to use skewed samples [15], such as: patients with specific conditions [16–19], patients interviewed in the place where the healthcare service is provided [20–23], Internet users surveyed during the online experience [24–31], or healthcare providers [23,32].

Moreover, published studies on e-health have been conducted both at national [5,16,20,23,24,26], and local levels

[21,33–35], and most of them in the USA [25,28,35–41]. In the Italian context, we found some studies on e-health [20,33,42] that were not always able to provide population-based estimates of Internet use, its relationship to socio-economic status, and behavioural consequences associated with the relationship with GPs. Furthermore, although associations with previous satisfaction and experience with GPs and healthcare services may seem obvious, they have not been widely explored.

### 2.1. The e-health user profile

Results from empirical studies on e-health are conflicting, with the sole exception of the e-patient profile in terms of age (young adult or adult, usually between 18–45 years old) and educational level (medium–high) [5,20,21,24,33,36–39,42–46]. There is no gender-difference in most research works. Only certain studies have found that women are more likely to surf the Internet for health information [5,41,47]. Patients' health conditions (one or more chronic diseases or bad self-perception of health status) have both been found to be associated [5,20,24,45], as well as not associated with e-health use [22,38,39,48]. In a few studies, patients' bad experience and dissatisfaction with their relationship with primary care (PC) services or the healthcare system were found to be determinant in deciding to use the Internet for health-related information [20,25–28,38].

### 2.2. The e-patient behaviour and the relation with the GP

Despite the physician remaining as the most preferred and trusted source of information for patients [5,34,36,40,42,49–51], by using the Internet, the patients could occupy a new position in the relationship with the family doctor and have a different kind of power in the decision-making process [52]. The Internet is considered as a potential powerful tool for health education and empowerment [15,30,51,53–56], as well as for a positive reconsideration of the patient–doctor relationship [57]. Some studies have investigated the consequences of Internet use by patients in terms of change in general health-behaviour [5,16,20,29,58] and/or in the relationship with physicians [5,20,26,27,30,36,37,40,59].

Among the e-health related behaviours described in literature, the e-patient choice of sharing information found online with the GP is considered an important step in the patient empowerment process. In fact, some authors have described this latter not only as an individual pattern, but also as product of a complex process involving several actors, based on interactions and relationships and on a productive partnership with the family doctors [55,60–62]. In this sense, the empowerment process is thus also based on the legitimization by an expert professional of the new knowledge acquired on the Internet [29].

However, we found a great variability in the literature of the rates of e-patients who discuss the information found online with their GP: more than a third [59], almost two fifths [35,63], almost a half [26]. In a few works, the e-patients did not report any of their health-behavioural changes to the family doctor [27,50]. We were

**Table 1**

Main findings from an analysis of the literature on e-health use and e-health-related behaviours and their influencing factors. The search was restricted to papers written in English and published before May 2015.

Primary author	Year	Country	Sample	Results		
				E-health determinant factors	E-health outcomes	Determinant factors of e-health outcomes
Andreassen HK	2007	Norway, Denmark, Germany, Greece, Poland, Portugal and Latvia	Citizens	Visits to the GP during the past year, long-term illness or disabilities, and a subjective assessment of one's own health as good	Feeling reassured after using the Internet for health reasons, but also willing to change diet or lifestyle habits and discuss suggestions or queries about diagnoses with GPs	
Beck F	2014	France	French aged 15–30 years	Having a child; experiencing psychological distress; having already seen a doctor	Changes in health behaviours (e.g. frequency of medical consultations, way of taking care of one's own health)	Different factors were associated with different outcomes of change, but psychological distress, poor quality of life, and low income were the most common
Bianco A	2013	Italy, Calabria	Parents of state school students	No satisfaction with their general practitioner's health-related information, but satisfaction with information from scientific journals		
Biermann JS	2006	USA	Patients with musculoskeletal problems		Perception of e-health as a useful adjunct to traditional physician–patient interaction: patients become more expert on a given topic; clinical encounters become more efficient	
Briet JP	2014	USA	Patients who used a free consultation website	Dissatisfaction with the doctor already seen or the surgery had or with their current treatment		
Broom A	2005	Australia	Men with prostate cancer		Some medical specialists view Internet-informed patients as a challenge to their power in medical encounters and, as a result, employ disciplinary strategies that reinforce traditional patient roles and alienate patients who use the Internet	
Caiata-Zufferey M <sup>*</sup>	2010	Switzerland	Patients in medical practices	Needing: acknowledgment, reduction in uncertainty, and perspective. The three needs depend on the characteristics of the illness (length, seriousness), of the individual (tolerance to uncertainty, and so forth), of the doctor (communicative strategies, and so forth) and of the current social context		

Table 1 (Continued)

Primary author	Year	Country	Sample	Results		
				E-health determinant factors	E-health outcomes	Determinant factors of e-health outcomes
Delić D	2006	Croatia	Users of the Internet health portal	The leading reason for seeking medical information was 'unanswered questions after visiting a physician'. Most respondents went online to seek information on a specific illness or condition	Approximately half of all respondents discussed the information they found online with their physicians	Patients who feel they are given insufficient information, or simply seek more information than physicians provide, turn to using online health information which no longer seems to be reserved for those with the highest levels of education
Diaz JA	2002	USA, Providence RI	Patients enrolled in a primary care practice	The e-health users are younger (mean age = 45.8 years), more educated and with greater incomes ( $p \leq .001$ )	59% of e-health users did not discuss information with their doctor. 11% of e-health users used the Internet instead of seeing or speaking with their doctors	Neither gender, education level, nor age were associated with patients sharing or not sharing information with their doctors. The rate of health-information quality was higher among those who discussed the information than those who did not. Of those using Internet instead of an encounter with the doctor, several respondents reported additional reasons linked to the relationship with the doctor to justify this behaviour
Hesse BW	2005	USA	Adult citizens	The need for information on a specific disease (cancer)	Physicians remained the most highly trusted information source for patients	
Hou J	2010	USA	Adult citizens	Less patient-centred communication, more online health activities (for healthy lifestyles, searching for healthcare providers, and health information). Trust in online health information	Patient–physician collaboration can produce a new bidirectional or even networked model that can accelerate clinical research and improve delivery of cancer care	
Houston TK	2002	USA	General population	Internet users were mostly female, had a median age of 42 years, were white and healthy	Most individuals indicated that they "learned something new" the last time they went online	The increase in knowledge did not vary by health status. A fair/poor health was found to be associated with the communication with the healthcare provider
Katz JE	2014	Canada, Quebec	Oncology patients	Having the need to learn more about their condition, associated with the wish that the physicians provided links		
Klinar I	2011	Croatia	Users of a free Internet medical consultation service	Being pregnant; being too embarrassed to talk to a physician in person; wish to protect privacy	Considerable satisfaction with the online service	

Table 1 (Continued)

Primary author	Year	Country	Sample	Results		
				E-health determinant factors	E-health outcomes	Determinant factors of e-health outcomes
Lemire M	2008	Canada	Users of a well-established Canadian Web site		E-health use develops feelings of competence and control. This implies: doing what is prescribed, making choices based on personal judgment, and mutual assistance	
Martinez CH	2014	USA	COPD patients	Perception of needs insufficiently met by the healthcare system, including diagnostic delay, feeling poorly treated, insufficient physician time, and feeling their physician did not listen to them		
Mehrotra A	2013	USA	Patients who used "eVisit" website	Having sinusitis or an urinary tract infection, or a longer travel distance to clinic		
Peña-Purcell N	2008	USA	Hispanics in the US		Perception of improvement in understanding medical conditions and treatments, and more confidence talking to doctors about health concerns. Perception of worsening of physician–patient relationship	
Rice RE	2006	USA	General population		The e-health outcome found in this research works are improvement of way of obtaining information on healthcare, and of health and medical information services received. In addition, the Internet played a role in how patients treat themselves with a major illness or other health condition. If the Internet was used for health information both for the personal use and for others, it affects decisions about health treatments or the way people take care of others or of themselves. In fact, e-health affects how to deal with health condition or health and leads to ask doctor new questions, or opinion from 2nd doctor	The e-health outcomes are determined by the typology of Internet activity, the health seeking behaviour, education, race, and sex. Also the own (or other's) health conditions, such as having multiple specific health reasons of Internet use (including self-diagnosis), a major illness or a disability/handicap, affect the e-health outcomes. This study also found to be determinant the presence of online support groups and the credibility of a website
Siliquini R	2011	Italy	Patients in hospital	Medical malpractice associated with gender	A change in the health behaviours and relationships with their medical providers: in particular "self-medication" and "negative behaviours" ('to start a therapy not prescribed' and/or 'to change or suspend the therapy recommended by the doctor')	A significantly higher risk of negative behaviours was found with increasing age up to 53 years, while the absence of chronic diseases decreased the risk of negative behaviours
Valero-Aguilera B	2014	Spain, Granada	Patients with urological cancer or breast cancer during the oncology appointment	The patient's active role in the decision-making process, and undergoing more aggressive treatment		

unable to identify in the literature the most likely profile of the e-patients who engage with their general practitioner regarding their e-health experience [64]. In addition, having a poorer health status is a characteristic both of those who discusses e-health findings with family doctors [41,47], and of those who take health-related decisions autonomously after the online experience [20].

The current literature focuses on different aspects of the e-health phenomenon, but fails to cover some elements that may affect online patient empowerment. There is still insufficient empirical evidence on the e-health consequent behaviour of discussing Internet health-related information with the family doctor, on the type of patients who usually decide to share the information found online with the physician, and on what factors influence this behaviour [13,64].

### 3. Aims and hypotheses

The aim of this research is to investigate whether an individual's use of e-health is affected by his/her previous relationship and experience with the GP and the healthcare system, both in relation to the decision to use the Internet to meet their information needs, and to discuss what they found on the Internet with their family doctor. The influencing factors related to the e-health users and to the e-patient behaviour are selected considering the previous empirical studies and the possible relations are investigated adopting the Andersen model as the reference framework [12].

In particular, according to the empirical evidence, we formulated three basic hypotheses that we verified performing statistical models. According to the first hypothesis, those individuals who feel less satisfied or have a bad experience of (a) their GP or (b) the healthcare system, use the Internet for health-related purposes more frequently. In fact, because a good relationship with the GP is assumed as the basis of a doctor–patient partnership, we expected to find a negative association between satisfaction and good experience with the physician and the decision to use the Internet for health. On the other hand, we hypothesized that sharing health-related information found on the Internet with the GP is positively associated with a higher satisfaction and better experience with the same family doctor.

### 4. Methods

#### 4.1. Context of the research

The context of the research is Tuscany Region, in Italy. Italy has a public healthcare system, which provides universal coverage for health services, through general taxation. The health care system is managed at a regional level; local health authorities (LHAs) and organize health care services and are composed of healthcare districts (HDs). The HDs are responsible for primary care services for their area, and integrate healthcare activities into welfare services [65,66]. GPs have a gatekeeping role in the healthcare system, usually being the first contact between patients and specialist care.

Although the Internet penetration is below the European average (58.5% in Italy; 70.5% in Europe; 76.5% in the European Union–2014) [4,67], Italy presents a similar pattern of Internet use for health-related information searching [4].

Tuscany is a 3,7 ml inhabitants region in central Italy that shows characteristics of e-health diffusion and performance of the healthcare system in terms of quality and user satisfaction which are in line with both the national and the European contexts [68]. In Tuscany, the number of families with broadband Internet access is almost 67% [69], which is analogous to the European penetration rate [67]. In addition, the rate of Internet searches for health-related purposes in our sample is consistent with the national samples in Italy [20,33,42], as well as in other European countries [3,5,20,45,70,71], thus suggesting that e-health use is similar throughout Europe [20].

#### 4.2. Design of the study

We carried out an analysis on the results of a population-based cross-sectional survey on satisfaction and experience with the healthcare system and services in Tuscany Region (Italy). The sample was randomly extracted, and was representative of the whole population of Tuscany. The sampling method was chosen to maximise the representativeness of the population and the different experiences with several different settings of the healthcare system. The sampling had a statistical significance level of 95% and a precision level of 7%.

The survey was composed of four main sections: (i) satisfaction and experience with GPs; (ii) satisfaction and experience with the healthcare system; (iii) health-information and communication-related behaviours; (iv) socio-economic conditions. The structured questionnaire was validated by a pilot test and administered through computer-assisted telephone interviews (CATI), which are used extensively in quantitative research [50–52,72].

#### 4.3. Statistical analysis

We explored two different multivariate logistic models for evaluating the relationship between patients' characteristics, experiences and satisfaction with both GP and healthcare systems, and their two behaviours objects of our study (e-health use and the behaviour after the e-health use), thus verifying the hypotheses described above.

##### 4.3.1. Dependent variables

Considering the aims of the research, people were asked: 'When you need health-related information, do you use the Internet?', categorised into two dichotomous behaviours: 'I use/I do not use the Internet for health-related purposes'. Respondents were identified as e-health users if they answered the question affirmatively.

The behaviour after the e-health experience was explored by asking e-health users: 'After you used the Internet for health-related purposes, did you return to your physician to talk about your online findings?'. Also in this case, the behaviours were dichotomous and mutually exclusive: 'I share/I don't share e-health findings with my GP'.

Consequently, the two behaviours are represented by binary variables, which indicate the absence or presence of a certain behaviour by taking the value 0 (no) or 1 (yes).

#### 4.3.2. Independent variables

The independent variables were selected considering the previous empirical studies.

As described in Table 3, gender and chronic illness were dichotomous factors: respectively, male (0) vs female (1), and chronic patients (1) vs not chronic patient (0). All the other independent variables were categorical and interval-based. In particular, questions on satisfaction and experience were based on a Likert type scale with 3 or 5 intervals. Table 3 describes in the first two columns each independent variable and the relative scales. Moreover, in order to avoid collinearity in the models, we also examined the correlation matrix between all the variables. With the aim of eliminating mutual correlated independent variables from the model, we considered strong a correlation with  $r \geq .7$ .

#### 4.3.3. Models of analysis

Relations between dependent and independent variables were investigated, according to the behavioural models for investigating patients health-related behaviours. Indeed, based on the Andersen's model of patient health-related behaviour [12], we consider 'predisponent' factors, 'enabling' factors, and 'health needs' at the individual level. We integrated several 'relational' determinant factors among 'predisponent' factors, as described in Table 2. We defined 'relational' the factors related to the interactions with the healthcare system and the general practitioners, in terms of both patients' experience and satisfaction. In fact, the 'relational' factors linked to the healthcare system can affect both the delivery of primary care services, and the patients' behaviour [48]. The 'relational' factors related to the GP were incorporated in the model, due to their potential positive influence on patients' behaviours of e-health use, as well as behaviours that are consequent to the online experience [73].

For investigating the correlations between the two behaviours and the selected variables, two multivariate logistic models were generated separately using a stepwise selection procedure, whereby groups of variables were progressively dropped from the model, if not significantly correlated with the dependent variables. Consequently, this procedure leave only the independent variables with statistical significant correlations with the dependent variable.

For each independent variables, we calculated and reported odds ratios (OR) with 95% confidence intervals (95% CI) and p values. Statistical significance was set at  $p < .05$ . By reporting the OR, we quantitatively described the association between an exposure (represented by the independent variables, for example being a chronic patient) and an outcome (represented by the e-health behaviour) [74].

We reported the pseudo-R<sup>2</sup> and the results of the Likelihood ratio test, as indication of the goodness of fit of each multivariate logistic model [75].

All analyses were performed with SAS software (version 9.2).

## 5. Results

### 5.1. Sample analysis

A total of 1793 citizens answered all four sections and were studied; of which, 629 (35% of the total sample) said they had used the Internet for health-related purposes. Table 3 reassumes the results of the analysis for each variable in association with the two dichotomous behaviours of interest (chi square test).

The most likely profile of the e-patient was someone between 18 and 45 years old ( $n = 283$ ; 45% of the sub-sample of e-patients), or someone between 46 and 65 years old ( $n = 289$ ; 46%) ( $p < .0001$ ), with at least a middle school diploma ( $n = 485$ ; 77%;  $p < .0001$ ). Obviously, having an ADSL connection is an important facilitator factor also for the specific behaviour of health-related online information-seeking: in fact, the 96.5% of e-patients had such type of Internet connection at home ( $n = 607$ ; 96.5%;  $p < .0001$ ). The Internet users for health-related purposes were more likely to be healthy people, with a health status reported as good or excellent ( $n = 599$ ; 95%;  $p < .001$ ), and not affected by chronic diseases ( $n = 415$ ; 66%;  $p < .001$ ). E-health users appeared to be high users of GP services: most of them visited the physician more than three times during the last year ( $n = 319$ ; 50.8%;  $p < .001$ ). In contrast, they were less satisfied with the quality of the healthcare system in general terms: less than an half of them had a good or very good opinion of the healthcare system ( $n = 288$ ; 47.8%); 17.7% ( $n = 111$ ) thought that the healthcare services were poor or very poor ( $p < .001$ ).

Of the e-patients, only a small number said they had never discussed their Internet findings with their GP ( $n = 106$ ; 17%): the majority reported the e-health experience to their GP. Their significant socio-demographic characteristics showed that the sharing e-patient is mainly an adult between 18 and 65 years old (18–45 years:  $n = 212$ ; 46%; 45–65 years:  $n = 261$ ; 45%;  $p < .0001$ ), with a higher education level ( $n = 401$ ; 76.8%;  $p < .001$ ) and an ADSL connection at home ( $n = 503$ ; 96.3%;  $p < .001$ ); and without health-related problems (good or excellent declared health status:  $n = 493$ ; 54.4%;  $p < .001$ ; not affected by chronic diseases:  $n = 337$ ; 64.5%;  $p < .001$ ). In contrast with results about people who surfed the Internet for health-related purposes, who decided also to share the e-health findings with the GP appeared significantly more satisfied with his/her GP. In fact, the 81.7% of them was fully satisfied in terms of overall satisfaction with the GP ( $n = 427$ ;  $p < .01$ ); 77% fully satisfied with the involvement by the GP in the decision making processes ( $n = 403$ ;  $p < .001$ ); 81% fully satisfied with time spent in the encounters with the GP ( $n = 423$ ;  $p < .01$ ). In terms of significant experiences with GP reported by the interviewed e-patients, who shared with the GP what was found online had a higher frequency of visits in the last year (2–3 times:  $n = 192$ ; 34%; more than 3 times:  $n = 280$ ; 53.6%;  $p < .01$ ). In addition, these e-patients also reported a significantly worst experience in

**Table 2**

Percentage distribution of the samples' characteristics and results of the chi square test for each independent variable (first column) in relation to each of the two patient behaviours of interest. Asterisks indicate significant associations.

Variables	Categories (scale)	Total sample (n = 1793)	Chi square test			
			Use of the Internet for health-related purposes		Sharing of e-health findings with the GP	
			No (n = 1165)	Yes (n = 629)	No (n = 106)	Yes (n = 522)
Age group <sup>***</sup>	18–45 (1)	29.11	20.52	45.06	40.57	45.99
	46–65 (2)	46.12	46.09	46.18	50	45.23
	Over 65 (3)	24.76	33.39	8.76	9.43	8.78
Sex	Male (0)	30.73	30.47	31.21	38.68	29.58
	Female (1)	69.27	69.53	68.79	61.32	70.42
Education <sup>***</sup>	Low (1)	43.95	55.28	22.93	27.36	22.14
	Medium (2)	41.27	33.99	54.78	53.77	54.77
	High (3)	14.78	10.73	22.29	18.87	23.09
ADSL <sup>***</sup>	No (0)	27.00	39.74	3.5	2.83	3.63
	Yes (1)	73.00	60.17	96.5	97.17	96.37
Health status <sup>*</sup>	Low (1)	5.91	6.52	4.78	.94	5.53
	Medium (2)	49.69	51.59	46.18	50.94	45.04
	High (3)	44.39	41.89	49.04	48.11	49.43
Chronic illness <sup>*</sup>	No (0)	61.52	58.97	66.24	73.58	64.5
	Yes (1)	38.48	41.03	33.76	26.42	35.5
Explanations of GP recommendation	Not satisfied (1)	2.51	2.15	3.19	4.72	2.87
	Quite satisfied (2)	13.18	12.9	13.72	16.98	13
	Fully satisfied (3)	84.3	84.95	83.09	78.3	84.13
Participation in decision with GP <sup>^^</sup>	Not satisfied (1)	6.03	5.42	7.18	16.04	5.35
	Quite satisfied (2)	16.2	15.91	16.75	12.26	17.59
	Fully satisfied (3)	77.77	78.68	76.08	71.7	77.06
Time spent during the visit with the GP <sup>^</sup>	Not satisfied (1)	4.13	4.3	3.83	10.38	2.49
	Quite satisfied (2)	15.53	14.27	17.86	24.53	16.44
	Fully satisfied (3)	80.34	81.43	78.31	65.09	81.07
Overall satisfaction with GP <sup>^</sup>	Not satisfied (1)	3.69	3.69	4.94	8.49	4.2
	Quite satisfied (2)	13.91	13.91	15.92	24.53	14.12
	Fully satisfied (3)	82.4	82.4	79.14	66.98	81.68
Number of GP visits per year <sup>*** ^</sup>	Never or once (1)	10.09	8.58	12.9	15.09	12.4
	2–3 times (2)	31.96	29.61	36.31	48.11	33.97
	More than 3 times (3)	57.95	61.8	50.8	36.79	53.63
Suggestions about life style <sup>^</sup>	Never (1)	40.4	40.83	39.62	50.48	37.28
	Sometimes (2)	25.8	25.06	27.16	30.48	26.77
	Always (3)	33.8	34.11	33.23	19.05	35.95
Overall satisfaction about the RHS <sup>**</sup>	Not satisfied at all (1)	2.23	1.63	3.34	8.49	9.16
	Not very satisfied (2)	13.5	13.05	14.33	36.79	35.31
	Quite satisfied (3)	31.62	30.04	34.55	45.28	49.24
	Very satisfied (4)	48.35	49.96	45.38	9.43	5.15
	Fully satisfied (5)	4.29	5.32	2.39	0	1.15
Knowledge about RHS services	Not satisfied at all (1)	10.21	10.82	9.08	4.72	3.05
	Not very satisfied (2)	37.42	38.37	35.67	12.26	14.69
	Quite satisfied (3)	46.4	45.24	48.57	39.62	33.4
	Very satisfied (4)	4.91	4.46	5.73	41.51	46.18
	Fully satisfied (5)	1.06	1.12	.96	1.89	2.67
Return to RHS offices due to malpractice	Always (1)	2.01	1.63	2.71	1.89	2.86
	Sometimes (2)	14.5	13.48	16.4	13.21	17.18
	Never (3)	83.49	84.89	80.89	84.91	79.96

\*\*\* p value < .0001 for e-health use.

\*\* p value < .001 for e-health use.

\* p value < .01 for e-health use.

~ p value < .001 for e-health information sharing.

^ p value < .01 for e-health information sharing.



terms suggestions by GP about a better life-style (never: n = 195; 37.3%; sometimes: n = 140; 26.7%; p < .01).

### 5.2. Multivariate analysis

After a collinearity analysis to identify mutually correlated factors, the following variables were eliminated: (ii.1) ADSL connection at home, co-linear with the socio-cultural features (i.1) age and (i.3) education; (iv.5) general satisfaction with GP, co-linear with its components (iv.1; iv.2); (v.2) duration of GP visit, co-linear with other components of satisfaction and experience with GP (iv.1; iv.2; iv.3; v.1; v.3).

Results of the multivariate logistic analysis with stepwise selection are reported in Table 4 for the general e-health behaviour, and in Table 5 for the e-patient behaviour after e-health use.

#### 5.2.1. E-health user profile

As highlighted by the statistics above, those who generally use the Internet for health-related purposes in Tuscany were mainly young (p < .0001) with a medium–high educational level (p < .0001) (Table 2).

The variable related to the overall satisfaction with the healthcare system appeared to be significantly associated with e-health use (Table 4). The higher the general satisfaction with the healthcare system, the lower the tendency to use the Internet for health purposes. In particular, those who were quite satisfied (OR = .48; p = .03), very satisfied (OR = .4; p = .008) and fully satisfied (OR = .28; p = .005) used the Internet less than those who were not at all satisfied. In contrast, our results suggest that variables related to satisfaction and experience with GPs were not associated with e-health use, and therefore these variables were excluded from the logistic model by the stepwise selection process.

#### 5.2.2. Behaviour after e-health use

When performing the logistic analysis for the e-health behaviour, 'I discuss/I don't discuss what I find on the Internet with my GP', a significant change was found in the typology of variables influencing health-related behaviour (Table 5).

The socio-demographic variables were not found to be significantly associated with the decision to share online findings with the GP, and were excluded from the model by the stepwise selection procedure.

The analysis showed a significant and positive association between the positive behaviour 'I discuss' and two variables related to satisfaction and experience with the GP. Patients talked to their GP after their e-health experience more frequently if they felt more satisfied with their involvement in their GP's decisions concerning their health ('quite satisfied': OR = 2.6, p = .005; 'fully satisfied': OR = 4, p = .0001). The perception of their GP's interest in their general health status also positively affects the behaviour of e-health users: those who received always the GP's suggestions regarding their life-style shared their e-health findings with their GP more (OR = 2.3, p = .005).

**Table 3** List of independent variables selected on the base of the literature, for each of the two multivariate logistic models: use of the Internet for health related purposes (model 1); sharing with the GP the information found online (model 2).

Main category	Typology of factors	Level	Independent variables	Use of Internet for health information (model 1)	Sharing with GP the information found online (model 2)		
Individual factors	(i) Predisponent factors	///	(i.1) Age	x	x		
			(i.2) Gender	x	x		
			(i.3) Education	x	x		
Relational factors	(ii) Enabling factors	///	(ii.1) ADSL connection at home				
			(iii) Health needs	///	(iii.1) Health status	x	x
					(iii.2) Presence of chronic illness	x	x
Relational factors	(iv) Predisponent factors: level of satisfaction	GP	(iv.1) Explanations offered by the GPs regarding treatment and care	x	x		
			(iv.2) Level of participation in the decision-making process	x	x		
			(iv.3) Overall satisfaction with the GP				
			(iv.4) Overall satisfaction with the healthcare system	x			
			(iv.5) Level of knowledge of healthcare system	x			
Relational factors	(v) Predisponent factors: experience	GP	(v.1) Number of GP visits per year	x	x		
			(v.2) Time spent with the GPs	x	x		
			(v.3) Suggestions by the GPs regarding life style	x	x		
			(v.4) Return to administrative healthcare offices again for the original purpose due to inefficiency or malpractice	x	x		
Relational factors	(v) Predisponent factors: experience	Healthcare system					

**Table 4**

Internet use for health-related purposes, according to socio-demographic features and variables of satisfaction and experience with GP and healthcare system: results of the multivariate logistic regression with stepwise selection (n = 629).

Socio-demographics and health needs			OR	95% CI		p-Value
Individual predisponent factors	Age group	Over 65	Reference			
		46–65	3.002	3.756	7.514	<b>&lt;.0001</b>
		18–45	5.312	2.165	4.162	<b>&lt;.0001</b>
	Education	Low	Reference			
		Medium	2.955	2.312	3.776	<b>&lt;.0001</b>
High		3.838	2.791	5.279	<b>&lt;.0001</b>	
Satisfaction with the healthcare system			OR	95% CI		p-Value
Relational predisponent factors	Overall satisfaction	Not satisfied at all	Reference			
		Not very satisfied	.524	.258	1.068	<b>.0491</b>
		Quite satisfied	.481	.244	.948	<b>.0345</b>
		Very satisfied	.406	.207	.796	<b>.0087</b>
		Fully satisfied	.284	.116	.695	<b>.0058</b>

Pseudo R2 .171. Likelihood ratio test 307.31. p-Value <.001.  
The bold values are statistically significant values.

**Table 5**

Behaviour (after the Internet use) of sharing the information found online with the GP, according to socio-demographic features and variables of satisfaction and experience with GP: results of the multivariate logistic regression with stepwise selection (n = 522).

Satisfaction with the GP			OR	95% CI		p-Value
Relational predisponent factors	Participation	Not satisfied	Reference			
		Quite satisfied	2.621	1.321	5.254	<b>.0057</b>
		Fully satisfied	4.002	1.366	5.209	<b>.0014</b>
Experience with the GP			OR	95% CI		p-Value
Relational predisponent factors	Suggestions about life style	Never	Reference			
		Sometimes	1.070	.711	1.571	.7842
		Always	2.352	1.197	2.766	<b>.0051</b>

Pseudo R2 .1003. Likelihood ratio test 58.78. p-Value <.001.  
The bold values are statistically significant values.

## 6. Discussion

This study provides a better understanding of two specific patient behaviours related to e-health: (i) using the Internet for health-related purposes; (ii) sharing online findings with their GP.

The profile of the e-health user described by this article (young person with a medium-to-high level of education) is in accordance with the literature [5,20,21,24,33,36–39,42–46]. Our results confirm that there is still a “digital divide” between online and offline health information seekers: elderly people and people with a lower level of education are less likely to use the Internet for health-related purposes. This reflects a general model of people’s Internet use, as well as the lower incidence of Internet access in older people’s homes, which should be an “enabling e-health resource” [76]. With regard to disadvantaged patients in terms of health conditions, we did not find any significant association.

According to the results of our study, only ‘predisponent factors’, both at individual and relational levels, were found to be statistically significant associated with the two patient behaviours of interest. One of the main findings of our research was that e-health use is, in general, significantly determined only by the satisfaction with the healthcare system, in addition to socio-demographic features. Our hypothesis that patients who were less satisfied

with the healthcare system used e-health more was confirmed by our results, in contrast to the findings of another recent study [21]. These findings suggest that patient satisfaction with local healthcare system have an influence on the complex process of patient health literacy online, by representing a lever to refer to the Internet for obtaining health-related information.

This study indicates that neither satisfactory nor unsatisfactory relationships with the GP are necessarily associated with the decision of whether or not to use the Internet. These results contradict our hypothesis that the satisfaction and experience with a GP influences e-health use and are not in accordance with the literature [28,33].

Although there is no association between e-health use and satisfaction with GPs, the role of the GP remains significantly important in the patient behaviour after e-health experience. According to the relational perspective of patient empowerment [29,55,60], a productive partnership with the family doctor, encompassing his/her legitimation of information found online, could support a ‘better’ health literacy (preventing the e-health risk related to inaccurate information), and a more ‘appropriate’ empowerment (filling the gap between patient health education achieved online and positive health-related decisions) [29,55,60–62,77,78]. Our results related to the behaviour of sharing online information with the GP showed that e-patients involve their GP in the e-health experience more, if

they feel more involved by their GP in the decision-making processes. This seems to confirm the idea that the empowered e-patient needs a stronger relationship with their GP [79].

In relation to those studies that emphasise a reduction in the physicians' influence on patients' decisions as a consequence of Internet use [15,80], our findings also indicate that GPs could have a role in the impact of e-health, if they treat not only the patient's illnesses, but also meet the patient's information needs (for example, offering suggestions on the life-style of the patient) and build on the relationship during the encounters (for example, involving patients in the decision making process).

## 7. Policy implications

The results of our study emphasise that e-health is widely diffused and may have an important role in health-care change. We found that Internet use for health-related purposes is not universal and does not influence the use of healthcare services and health information-seeking behaviours of the whole population [59]. Equal access to online health information and literacy cannot be taken for granted. Indeed, successful empowering interventions cannot be "standard" [81], but should be tailored to target groups. Specific forms of communication and information may be developed by taking into consideration specific information-seeking behaviours, health skills, educational level and e-skills of potential patients. Our analysis highlighted two main groups: older people and/or people with a lower level of education; younger people and/or more literate people.

Our results indicate that dissatisfaction with the health-care system affect the patient's decision to choose e-health to improve their health knowledge. This may result in increasing the distance between the patient and the health-care system, or a decrease in the trust in the healthcare system as source of health-related information. Public policies could follow a double strategy, in order to prevent antagonism and to improve convergence among these two potential instruments of health-literacy: (i) consensus regarding health knowledge and its organisation and collection online, or its legitimisation, by selecting reliable health-related websites; (ii) analysis of the levels of patient satisfaction with the health-care system and services, aimed at identifying weaknesses and at improving health-care services, their patient-centeredness and responsiveness.

The role of the general practitioners appears to be very important. A 'double-empowerment' process is needed: by the patient on the Internet and by the GP during encounters. The patient-Web-physician [55] triangulation can impact on the dynamics of the doctor-patient relationship and on the empowerment process. In this triangulation, the role of the GP (and the preceding relationship built up with the patient) could determine whether the behaviour after the e-health experience will be positive or negative, or whether or not the e-health experience will lead to an 'appropriate' empowerment. If patients are satisfied with the GP's willingness and ability to involve them, then they will return to their family doctor to discuss the

information found on the Internet and, possibly, apply it properly. Thus, the virtuous circle of appropriate empowerment through the Internet requires GPs to play an active role. Currently, the use of the Internet is quite diffused among physicians, but for responding to information needs of the clinicians more than to explore the potential sources of health-related information for patients [82]. In contrast, physicians should know what online resources are available, be a mentor for more informed or curious patients, guiding them to reliable and accurate websites, and discuss the information they find online [36,83,84]. This 'net-friendly' behaviour of the physician "can be effective for a genuine partnership with patients" [55].

Effective empowerment strategies should build on and reinforce participation [81], and thus establish a balance between increased patient autonomy in decision-making and trust in the physician. This practice could avoid the e-health risks related to misinformation due to the inaccurate and/or non-scientific knowledge available online, and related to the potential inability of e-health users to understand or appropriately use health information found online [55,85,86]. Furthermore, GPs could empower patients in their daily practice, by responding to their health information needs according to their e-skills and health competences, and by building a relationship according to patient preferences regarding participation or delegation in decision-making.

## 8. Conclusions

Our study explored the correlations between two patients' behaviours (to go online for health-related purposes and to share online findings with the GP) and several variables related to socio-demographic characteristics and health needs of the patients and their satisfaction and experience with the healthcare system and the general practitioner.

Our findings demonstrate that the recourse to the Internet for health-related purposes by patients is positive associated with being young, literate and dissatisfied with the overall healthcare system. In contrast, the behaviour of sharing health-related information found online with the physician is positively statistical significant associated with the satisfaction for the level of participation in the decision making process and with the frequency of GP's suggestions on life-style.

In general, the trust and satisfaction for the health-care system appeared good levers for orientating patients towards a health-related information source. On the other hand, our findings demonstrate that e-patients need a strong partnership with the physician for involving him/her in their e-health experience. It emerged the importance of shared decision-making process and mutual engagement in the digital era.

## 9. Limitations and future research

Our survey questions did not focus on the quality of the information found online. However, concerns remain about the quality of information available on the Internet and the quality measuring methods. Future research should be

undertaken to investigate the potential influence of different sources of online information on e-patient behaviour.

The study was a “snapshot” survey and cannot identify trends in the use of e-health. We were therefore able to examine associations between dependent and independent variables.

Another limitation in this study is that the survey was conducted only in Tuscany. Although our research describes a local experience, results could also be generalized with caution at the international level. It could be compared to other similar contexts with analogous characteristics. Furthermore, our study is population-based: the sample was composed of more than 1700 adults (over 18 years) of any age. The analysis and the methodology have an internal viability and can be replicated both in terms of the survey and statistical models.

However, the data source for this study was information self-reported by respondents. The information provided was not validated by an objective source. Recall bias is a possibility because the evaluation of self-reported information and behaviour patterns was retrospective. Thus, the respondents might have forgotten some of their experiences and previous visits to healthcare facilities. However, there is little evidence in the literature of more data loss or distortion in telephone interviews compared to face-to-face interviews, or that the interpretation or quality of findings can be compromised when interview data is collected by telephone.

Despite these constraints, we believe that the study has advanced the knowledge on e-health, integrated with the issues of patient–doctor relationship and patient empowerment paradigms. Future research should broaden this analysis, according to other cultural and organisational backgrounds. Other patient behaviours should be investigated, which could result from e-health experiences, in order to deepen the understanding of how e-health affects the dynamics of healthcare organisations.

### Conflict of interest

The authors declare that they have no competing interests or conflict of interest.

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### Authors' contributions

SDR and SB participated in the study design and interpreted the results. SB participated in acquiring the data and

performed the analyses. SdR and SB wrote hypotheses and analysis framework, methods, results and limitations of the manuscript. SDR wrote literature review and discussions. All authors read, revised and approved the final manuscript.

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