Association of searching for health-related information online with self-rated health in the European Union

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Word Count: 3000

ABSTRACT

Background

The Internet is widely accessed for health information, but poor quality information may lead to health-worsening behaviours (e.g. non-compliance). Little is known about the health of individuals who use the Internet for health information.

Methods

Using the Flash Eurobarometer survey 404, European Union (EU) citizens aged ≥15 (n=26,566) were asked about Internet utilisation for health information ("general" or "disease-specific"), the sources used, self-rated health, and socioeconomic variables. Multivariable logistic regression was employed to assess the likelihood of bad self-rated health and accessing different health information sources (social networks, official website, online newspaper, dedicated websites, search engines).

Results

Those searching for general information were less likely to report bad health (OR=0.80; 95%CI: 0.70-0.92), whilst those searching for disease-specific information were more likely (OR=1.22; 95%CI: 1.07-1.38). Higher education and frequent doctor visits were associated with use of official websites and dedicated apps for health. Variation between EU member states in the proportion of people who had searched for general or disease-specific information online was high.

Conclusions

Searching for general health information may be more conducive to better health, as it is easier to understand, and those accessing it may already be or looking to lead healthier lives. Disease-specific information may be harder to understand and assimilate into appropriate care worsening self-rated health. It may also be accessed if health services fail to meet individuals' needs, and health status is currently poor. Ensuring individuals' access to quality health services and health information will be key to addressing inequalities in health.

INTRODUCTION

The Internet is an increasingly popular source for health-related information. Internet usage is high in the European Union, with over 78% of individuals using it in the last 3 months [1]. Indeed, the Internet is increasingly becoming the first point of information for specific diseases [2]. In 2014, three quarters (75%) of Europeans thought the Internet was a good way of finding health information, with six out of ten Europeans going online for health information [3].

With huge quantity of health-related information available online, individuals can be informed on conditions, diseases and risk factors, and perhaps adopt health-promoting behaviours [4]. Furthermore, sensitive conditions can be explored with privacy and support networks formed [5]. These have the potential for reducing demand on healthcare services, and fostering an informed patient-centred approach to healthcare [6-8]. On the other hand, health-related information is largely unregulated, meaning there is considerable variability in the content and quality of information available [9, 10]. There are potential consequences from incorrect information including non-adherence to recommended treatments [11], and adoption of unscientific practices, which in turn may be non-beneficial or harmful to health. Utilisation of health-related information may contribute to health inequities with the wealthier, better educated and health literate being able to access, understand and benefit the most from correct and high quality information [12].

There is limited evidence on the association of health information use and health outcomes – especially regarding the types of information sought. Furthermore, individual's preferences for difference sources of health information are often not explored. Using a recent survey on Europeans' use of the Internet for health and self-rated health status, we explore the association between searching for general or disease-specific health information and health status. We also assess the different sources utilised for health information by individual characteristics and explore differences between EU member states.

METHODS

Data source

We analysed data from the Flash Eurobarometer 404 [3], collected in September 2014 in all 28 member states of the European Union through computer-assisted telephone interviews. A multi-stage random sampling design was employed to collect a sample of respondents (n=26,566) aged 15 years or older. Country level data on self-reported experience of adverse events were taken from another Eurobarometer report (wave 80.2, 2013) [13]. The two Eurobarometer surveys were separate surveys preventing linkage of individuals. Data were anonymous and publicly available, hence no ethical approval was required.

Measures

Respondents were asked to report what type of health-related information they looked for on the Internet within the past 12 months. They could give up to two of the following answers: "general information on health-related topics or ways to improve your health (for example: information on nutrition, diet, sports and exercise, pregnancy, etc.)"; "information on a specific injury, disease, illness or condition (for example: when you have stomach problems, your child has broken his/her arm, your spouse has been diagnosed with cancer etc.)"; "information to get a second opinion after having visited your doctor"; and "specific information on a medical treatment or procedure (for example: how to take your medication, what to expect with a heart by-pass, etc.)". We subsequently grouped answers into two binary variables, "general information" (i.e. the first answer) and "disease-specific information" (i.e. the other three answers).

For each of the aforementioned responses, participants were also asked to report whether they searched information for themselves or for someone else (family, friends etc.) and which sources they used to do so. In our analyses, we only considered respondents who search for information for themselves. Sources included "internet search engines"; "online newspapers

and magazines"; "specific and dedicated websites, blogs or forums/specific and dedicated apps for mobile devices like tablets or mobile phones"; "online social networks"; "websites from official health organisations like the Ministry of Health, the World Health Organisation, the European Centre for Disease Prevention and Control (ECDC), etc."; and "patient organisations' websites/other" and multiple answers could be given.

Self-rated health status was assessed with the question "How would you rate your level of health in general? Would you say it is…? Very good; fairly good; fairly bad; or very bad". Responses were recoded into two categories: good ("very good"; "fairly good") and bad ("very bad"; "fairly bad").

Data were also collected on whether people were using the Internet for private purposes often ("everyday/almost everyday"; "two or three times a week"), rarely ("approximately once a week"; "two or three times a month"; "less often") or never ("never"; "no internet access"). Moreover, respondents were asked how many times they had been to the doctor within the past 12 months ("never"; "1-2 times"; "3-5 times"; "6 times or more"), if they had a long-term disease or a health problem ("yes, one"; "yes, more than one"; "no") and whether they exercised or played sports often ("5 times a week or more"; "3 to 4 times a week"), sometimes ("1 to 2 times a week"; "1 to 3 times a month") or rarely/never ("less often"; "never").

Socio-demographic data, such as age (15-34; 35-54; 55-64; or ≥65 years), area of residence (urban; or rural), age at which they stopped full-time education (≤15; 16-19; or ≥20 years), and gender (male; or female) were also recorded.

Statistical analysis

Proportions are presented as percentages with 95% Confidence Intervals (95% CI) and logistic regression results as Odds Ratios (OR) with 95% CI. A multilevel logistic regression model was fitted to assess the association between self-rated bad health (dependent variable)

and a number of independent variables, including having searched for general health information online; having searched for disease-specific health information online; age; gender; area of residence; education; frequency of internet use; number of visits to the doctor in the past 12 months; frequency of exercise; and number of long-term health problems. To quantify the variation of the proportion of respondents who searched for general and disease-specific health information online between the EU member states, we estimated the coefficient of variation for each measure, computed as the ratio of the standard deviation to the mean. Multilevel logistic regression was also used to assess the association of having used each of the online sources (dependent variables) with a number of independent variables: age; gender; area of residence; education; long-term health problems; and number of visits to the doctor.

The association between the proportion of internet users who searched for general or disease-specific information online and the proportion of people who reported that they – or a member of their family - had ever experienced an adverse event when receiving healthcare was explored at a country-level with a linear regression. Results of this ecological analysis are presented as beta coefficients (β). We used the proportion of people who had searched for information online among internet users only and not among the entire population in this analysis in order to account for differences in internet usage between countries. All analyses were performed with Stata 13.0 and descriptive results are weighted to reflect the multi-stage sampling design.

RESULTS

A total of 10,749 people looked for health-related information online for themselves in the past 12 months. Among all respondents in the EU, 28.2% had searched for general health information within the past 12 months (ranging from 18.1% in Romania to 35.0% in Finland) and 32.9% had searched for disease-specific information (ranging from 19.4% in Greece to 47.3% in Finland) (Figure 1). Variability between countries was higher for disease-specific searches, with the coefficient of variation calculated at 22.6%, compared to 14.0% for general searches. In some countries, the proportion of respondents who had searched for health information online in both domains was high (e.g. Finland, the Netherlands and Sweden) or low (e.g. Bulgaria and Romania), but that was not true for all member states. For example, Germany was above EU average in searching for disease-specific information, but well below average in searching for general health information. Greece was above average in general information seeking, but had the lowest proportion of people who search for disease-specific information.

The ecological analysis showed that the proportion of Internet users who had searched for disease-specific information online was positively associated with the proportion of people who reported experience of an adverse event (β=0.227; 95% CI: 0.023 to 0.431). On the contrary, there was no significant association between the proportion of Internet users who had searched for general health information and the proportion of those who had experienced an adverse event (β= -0.039; 95% CI: -0.170 to 0.091) (Supplementary Figure 1).

Those who had searched for general information were less likely to report fairly or very bad health (OR=0.80; 95% CI: 0.70 to 0.92), but those who had searched for disease-specific information, were more likely to report bad health (OR=1.22; 95% CI: 1.07 to 1.38). Participants who were younger, more educated and frequent Internet users were less likely to rate their health as bad. On the contrary, those who reported one or more long-term diseases

and those who had visited a doctor three or more times the past year had significantly higher odds of rating their health as bad (Table 1).

Among those who had looked for health-related information online for themselves, 87.1% used search engines to find information, 56.7% used dedicated websites or apps, 35.8% visited websites of official organisations, 24.4% websites of newspapers and magazines, 22.3% used social networks and 18.4% visited patients' organisations websites or something else.

Males were significantly less likely to have used social networks (OR=0.73; 95% CI: 0.66 to 0.81), online newspapers or magazines (OR=0.85; 95% CI: 0.77 to 0.94), dedicated websites and apps (OR=0.88; 95% CI: 0.81 to 0.96) and other online sources (OR=0.84; 95% CI: 0.75 to 0.94) compared to women. Similarly, older participants were less likely to use social networks, dedicated websites/apps, websites of official organisations and search engines compared to those aged 15-34 years. More years of education were associated with higher odds of using official websites, online newspapers/magazines, dedicated websites/apps and other online sources, but with lower odds of using social networks. Those with one (OR=1.12; 95% CI: 1.01 to 1.24) or multiple long-term health problems (OR=1.19; 95% CI: 1.04 to 1.36) were more likely to have used dedicated websites/apps and those with multiple long-term diseases more likely to have used patient organisations' websites or other sources (OR=1.39; 95% CI: 1.18 to 1.64) compared to those with no health problems. Finally, multiple visits to the doctor in the past 12 months were associated with higher odds of using official websites, dedicated websites/apps and other online sources, but with lower odds of visiting websites of online newspapers/magazines (Table 2).

DISCUSSION

We found there was great variation in searching for health information behaviours between EU countries, especially regarding disease-specific information. Sources of information also varied by socio-demographic characteristics. Moreover, those seeking general health information had better self-rated health, whilst those searching for disease-specific information had worse self-rated health.

Explaining these findings rests on the differences between the types of information and reasons for searching for this information, and the differences between individuals. General health information is likely to include broad advice for better health – e.g. physical activity, quitting smoking, diet and weight management – and so individuals with interest in this may use this information to improve their health. Despite the abundance of unsubstantiated and potentially harmful advice for better general health online [14, 15], few websites would be promoting smoking or inactivity as a healthy lifestyle. Conversely, disease-specific information is likely to be more complicated and harder to comprehend or assimilate into a healthy lifestyle by non-professionals. Additionally, there may be inaccuracy or debate over the information [16] leading to confusion, non-compliance or unscientific practices. Overall, individuals searching for disease-specific information may have worse self-rated health, as the information gleaned may serve no benefit to them personally or actually worsen health outcomes.

Nonetheless, it is quite likely – even after controlling for covariates – that individuals seeking general information may be more health-literate looking for further information, and lead, or are actively looking to change to, healthier lifestyles, compared to those who look for disease-specific information. They might also have socio-demographic profiles (e.g. higher income, better diet) conducive to better self-rated health not captured in this analysis. This is in line with a previous study which showed that French young adults with higher education level were more likely to seek general health information [17]. Those searching for disease-specific information may be receiving poor care or management prompting them to search online for

alternatives. Whilst we recognise the potential for differences between individuals to explain our findings, we controlled for many socio-economic and demographic covariates likely to capture at least part of these differences.

These results allude to potential inequity in health literacy and health information use, confirming previous findings [12], even though the design of the study limits our ability to draw conclusion regarding the role of health literacy in the differences we detected. Studies explicitly assessing health literacy would be useful in exploring this domain, which can have major implications for policy within the EU and beyond. More educated individuals used sources including official organisations, online newspapers/magazines, and dedicated websites/apps, which are likely to be of higher quality than social networks due to the nature of information generated (e.g. from health professionals or journalists) and the regulatory and legal requirements of such providers [18]. If those of low education attainment are seeking health information through social networks – where information is presumed to be of lower quality [19, 20]– inaccurate health information may be obtained which may worsen health and exacerbate existing health inequities. This may also apply to women, who were more likely to look for information through social networks, suggesting a different information-seeking behaviour between males and females.

The association of increased doctor visits with increased use of official websites and dedicated websites/apps, and decreased use of online newspapers/magazines may highlight the role health professionals have in steering individuals to more appropriate sources of health information. Doctors need to be well-informed about online sources of information and guide their patients appropriately, so as to avoid confusion by conflicting information that could be disseminated through unreliable websites or social networks.

Our analysis also found that the proportion of respondents who had searched for health information online varied between member states, notably more with regards to disease-

specific than general information. The overall variation may reflect different levels of Internet access at the population level between European countries, but responses in the two domains (general and disease-specific information) were not necessarily consistent. Hence, other factors, such as cultural characteristics, prevalence of and interest in healthy lifestyles, ease of access to and trust in health professionals, as well as availability of information online in the local language may partly explain some of the variation. The fact that differences in searching disease-specific information were greater than for general information, may indicate that country-specific factors may determine this behaviour to a larger extent. For example, long waiting times or lack of trust in the health system may encourage patients to look for information on their disease or treatment online. This is supported by the ecological analysis we conducted, which showed that national experience of adverse events within the healthcare system may be associated with more disease-specific online searches. Self-reported experienced adverse events may more accurately reflect the perception of safety rather than the actual number of adverse events, but perceptions might shape individuals' trust in health professionals and motivate them to look for information related to their condition from alternative sources. Aggregate data analysis is subject to ecological fallacy though, so this hypothesis should be explored further with individual level data. Beyond these factors, doctors' attitudes towards publicly available information may also differ between countries and this might affect patients' behaviours. This, as well as potential associations between availability of information online and information-seeking behaviours, would also be topics of interest for future research.

Strengths and Limitations

We used a robust survey with a large sample representative of the European population. However, self-reported responses – especially regarding health and Internet usage - may be poor reflections of the truth with those in lower socio-economic status likely to under-report [21]. Moreover, those actively engaged in searching for health information may be already unwell or stressed leading to lower reported health than actually is the case.

Regarding the health information reported, we obtained only limited insights into the types and sources of information, and reasons for access. We could only draw limited conclusions, and further research is required into the exact nature of why individuals are looking for health information and the association with health outcomes. We did exclude individuals searching information for others (e.g. family members or friends) to provide a clearer association between individual health and utilisation of health information.

We formed general conclusions about health status and Internet usage for health information across Europe. Internet use across the European Union varied - In Romania and Bulgaria respectively 42% and 41% of individuals had never used the Internet in 2013 [1], and it is unlikely the sources individuals are accessing and their reasons for doing so will be the same. Further research could explore differences between countries, as well as different population and cultural groups.

Lastly, whilst we offer likely explanations for the associations found here between searching for health information online and self-rated health, we cannot causally explain them, instead only suggest potential pathways. Further research – especially on how and why worse health status is associated with specific-disease searching – is necessary to inform appropriate interventions to address this.

Implications

Health professionals, policy-makers and researchers need to be aware that those seeking health information online are likely to be of varying social profiles, with the exact relationship between information provision and individuals unclear. It may be the case that inaccurate information is exacerbating poor health outcomes of some individuals, who are not receiving appropriate treatment through traditional healthcare services. Promoting official channels for health information and expanding individuals' understanding of the quality of information is

important. Websites, such as the UK's NHS Choices, offer a centralised place for individuals to obtain information that is in line with clinical guidelines and professional recommendations. Developing and promoting platforms such as these are important for all countries.

Key points:

- Adults who were searching for general information online were less likely to report bad health in the European Union.
- On the contrary, those searching for disease-specific information were more likely to report bad health.
- The preference for different sources of information online varied by socio-demographic characteristics.
- Guidance towards reliable health information online may be important to addressing inequalities in health.

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Table 1. Factors associated with rating health as fairly bad or very bad in the EU.

		Crude OR (95% CI)	Adjusted OR (95% CI)
Has searched for general health information online			
	No		
	Yes	0.38 (0.34 - 0.42)	0.80 (0.70 - 0.92)
Has searched for disease-specific health information online			
	No		
	Yes	0.79 (0.72 - 0.86)	1.22 (1.07 - 1.38)
Gender			
	Female		
	Male	0.63 (0.58 - 0.68)	1.01 (0.92 - 1.11)
Age (in years)			
	15-34		
	35-54	2.57 (2.18 - 3.02)	1.43 (1.16 - 1.76)
	55-64	5.15 (4.38 - 6.06)	1.39 (1.13 - 1.73)
	65+	7.91 (6.77 - 9.23)	1.19 (0.96 - 1.48)
Education (age that stopped full-time education)			
	≤15		
	16-19	0.42 (0.38 - 0.46)	0.69 (0.61 - 0.78)
	≥20	0.27 (0.24 - 0.30)	0.58 (0.51 - 0.66)
Area of residence			
	Urban		
	Rural	1.09 (1.01 - 1.17)	0.98 (0.89 - 1.08)
Internet use			
	Never/ no access		
	Rarely	0.39 (0.35 - 0.45)	0.55 (0.47 - 0.66)
	Often	0.22 (0.21 - 0.24)	0.42 (0.37 - 0.48)

Health problems			
	None		
	One	9.07 (7.99 - 10.29)	5.71 (4.94 - 6.59)
	More than one	36.10 (31.80 - 40.98)	17.60 (15.15 - 20.44)
Visits to the doctor in past 12 months			
	Never		
	1-2 times	1.40 (1.17 - 1.68)	1.06 (0.86 - 1.30)
	3-5 times	3.84 (3.22 - 4.58)	1.57 (1.28 - 1.92)
	>5 times	13.86 (11.71 - 16.41)	3.56 (2.92 - 4.35)
Exercise			
	Never/rarely		
	Sometimes	0.26 (0.23 - 0.29)	0.44 (0.39 - 0.50)
	Often	0.33 (0.30 - 0.35)	0.45 (0.41 - 0.50)

Table 2. Factors associated with having used different online sources to look for health information among those who have looked for health information online in the past 12 months in the EU.

		Social networks OR (95% CI)	Official websites OR (95% CI)	Online newspapers and magazines OR (95% CI)	Dedicated websites and apps OR (95% CI)	Search engines OR (95% CI)	Other OR (95% CI)
Gender							
	Female						
	Male	**0.73 (0.66 - 0.81)**	0.91 (0.83 - 1.01)	**0.85 (0.77 - 0.94)**	**0.88 (0.81 - 0.96)**	1.03 (0.91 - 1.16)	**0.84 (0.75 - 0.94)**
Age (in years)							
	15-34						
	35-54	**0.82 (0.72 - 0.93)**	1.03 (0.91 - 1.17)	0.99 (0.87 - 1.12)	**0.71 (0.64 - 0.80)**	1.08 (0.93 - 1.26)	0.97 (0.84 - 1.12)
	55-64	**0.65 (0.56 - 0.76)**	0.90 (0.78 - 1.04)	0.95 (0.82 - 1.11)	**0.51 (0.44 - 0.58)**	**0.82 (0.69 - 0.99)**	0.91 (0.77 - 1.09)
	65+	**0.47 (0.39 - 0.57)**	**0.61 (0.51 - 0.72)**	0.94 (0.80 - 1.12)	**0.39 (0.34 - 0.46)**	**0.65 (0.53 - 0.79)**	0.84 (0.70 - 1.02)
Education (age that stopped full-time education)							
	≤15						
	16-19	**0.72 (0.57 - 0.90)**	1.06 (0.85 - 1.33)	1.17 (0.91 - 1.50)	**1.34 (1.10 - 1.64)**	1.05 (0.80 - 1.37)	1.25 (0.96 - 1.62)
	≥20	**0.63 (0.51 - 0.79)**	**1.47 (1.18 - 1.82)**	**1.51 (1.19 - 1.92)**	**1.52 (1.25 - 1.85)**	1.19 (0.91 - 1.55)	**1.31 (1.02 - 1.69)**

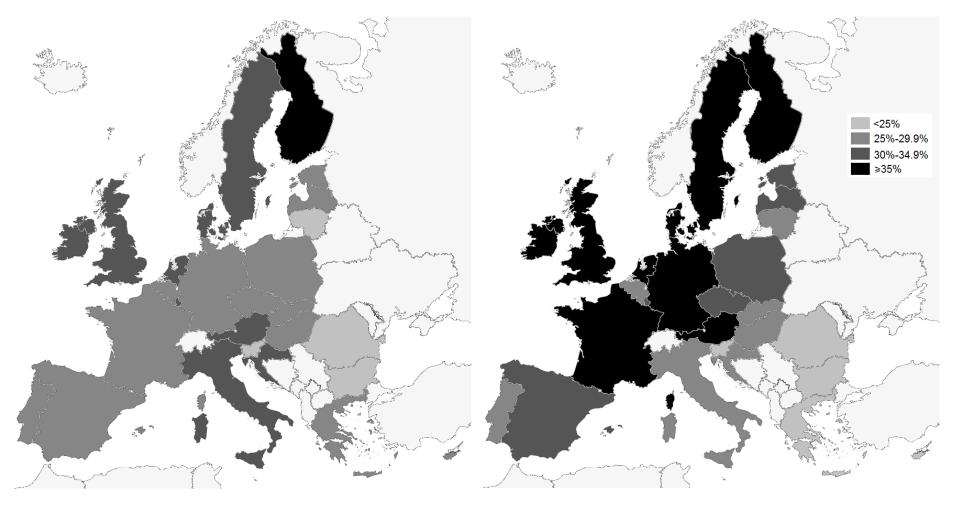|						
Area of residence						
	Urban					
	Rural	**1.16 (1.03 - 1.29)**	0.92 (0.83 - 1.02)	0.94 (0.84 - 1.05)	0.97 (0.89 - 1.07)	**0.85 (0.74 - 0.97)**	0.96 (0.85 - 1.09)
Health problems						
	None					
	One	1.09 (0.97 - 1.23)	1.00 (0.90 - 1.12)	1.04 (0.93 - 1.17)	**1.12 (1.01 - 1.24)**	0.99 (0.86 - 1.14)	1.24 (1.08 - 1.41)
	More than one	1.16 (0.99 - 1.36)	1.12 (0.97 - 1.30)	1.07 (0.92 - 1.25)	**1.19 (1.04 - 1.36)**	0.97 (0.81 - 1.17)	**1.39 (1.18 - 1.64)**
Visits to the doctor in past 12 months						
	Never					
	1-2 times	1.00 (0.84 - 1.19)	**1.25 (1.06 - 1.47)**	**0.81 (0.69 - 0.94)**	1.05 (0.91 - 1.21)	0.85 (0.70 - 1.04)	1.15 (0.94 - 1.41)
	3-5 times	1.03 (0.86 - 1.25)	**1.40 (1.17 - 1.66)**	**0.84 (0.71 - 0.99)**	1.14 (0.98 - 1.33)	1.02 (0.82 - 1.26)	**1.51 (1.22 - 1.87)**
	>5 times	1.15 (0.94 - 1.40)	**1.44 (1.19 - 1.73)**	**0.75 (0.63 - 0.91)**	**1.27 (1.08 - 1.50)**	0.86 (0.69 - 1.09)	**1.78 (1.43 - 2.23)**

Figure 1. Proportion of respondents who searched for general (left) and disease-specific (right) health information online in the past 12 months.

Supplementary Figure 1. Association between the proportion of internet users who searched for general or disease-specific information online and the proportion of people who had experience of an adverse event when receiving healthcare in the EU.