

# **Beyond the news content: Exploring the relationship between online sources of information and perception of CAM therapies among digital natives in Spain**

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## *Introduction*

According to the European Federation for Complementary and Alternative Medicine (EFCAM), complementary and alternative medicine (CAM) refers to “a diverse range of autonomous healthcare practices used for health maintenance, health education, health promotion, disease prevention and for the treatment of ill-health” (EFCAM, 2016). CAM therapies and products can be used together with conventional medicine (complementary) or instead of conventional medicine (alternative). From a comparative point of view, CAM practices seem to receive greater support from government authorities in the U.S. than in E.U. While the US National Center for Complementary and Alternative Medicine is part of the National Institutes of Health under the Department of Health and Human Services, the European Parliament has not taken any actions in relation to the resolution on “non-conventional medicine” adopted in 1997. As a result of this legal gap regarding CAM therapies in Europe, some challenges have emerged. The first one has to do with the lack of a regulatory framework to govern both health practices and professionals in this field. Secondly, this situation has consequently led to the rise of a public debate on the matter, powered by uncertainties and controversies, what makes difficult for citizens to be properly informed when making decisions on undergoing CAM therapies as complement or alternative to conventional medical treatments. Furthermore, distrust and medical encroachment of roles and competencies have also emerged. Finally, this controversial situation also involves social groups in favor and against CAM regulation that stand up for their respective points of view through traditional media and online social networks.

The main objective of this study is therefore to analyze the association between perceived effectiveness of a set of complementary and alternative medicine therapies (CAM) and the use of different types of sources of information, paying particular attention to the online information sources, the reasons why they are selected, and its advantages for people seeking scientific information.

## *Literature review*

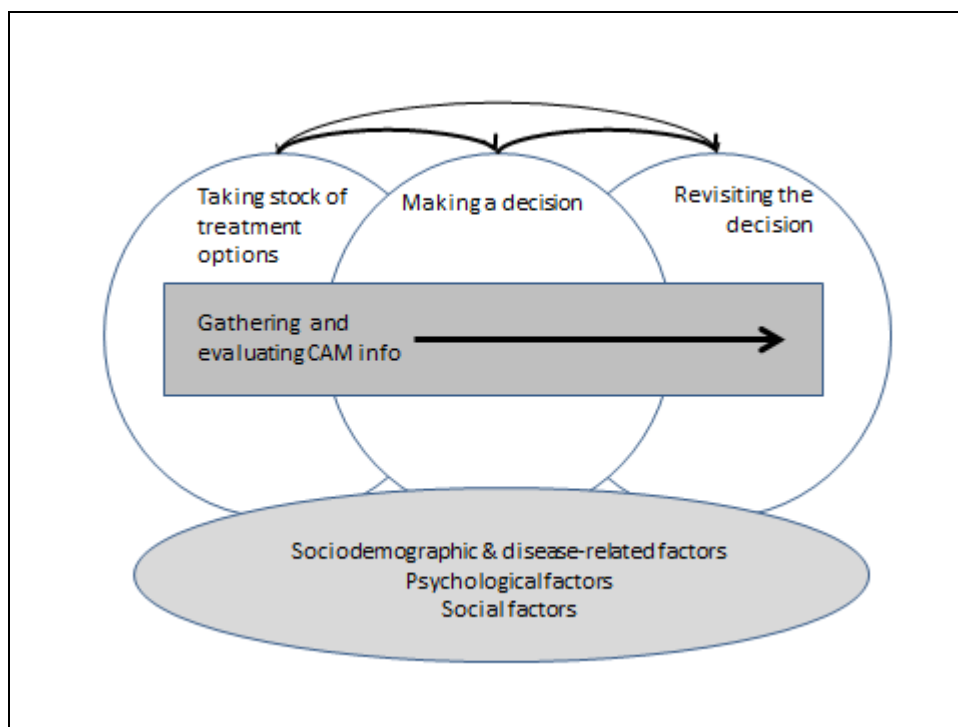
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A recent study aimed at mapping the concept of e-health literacy concluded that one of its domains is the ability of individuals to process information (Norgaard et al., 2015). Within this domain, “the processing of information has several steps, from recognizing the need for and finding information, through reading and understanding, to the process of appraising and applying information to one’s own situation” (Norgaard et al., 2015: 531).

Many aspects related to CAM use or decision making have been extensively studied in the case of cancer patients, and the role played by the sources of information is a key issue. Previous researches has already revealed that the most important sources of information on CAM for cancer patients seem to be family and friends, media -including Internet-, and health care providers (Molassiotis et al., 2006; Vapiwala et al., 2006). In the case of female breast cancer patients in Germany, predictors for CAM use were a higher degree of education and being of a younger age (Tautz et al., 2012), although generally these patients were reluctant to ask for information about CAM within the oncology care unit. Instead, they tend to rely on family and friends (49%), on general practitioners (40%), or on media sources for seeking information.

Fig. 1 represents the CAM decision making process across the cancer trajectory resulting from unique personal, social and cultural contexts (Balneaves et al., 2008). Regardless of the nature of these contexts, the process consists of four iterative overlapping steps: 1) taking stock of treatment options; 2) gathering and evaluating CAM information; 3) making a decision; and 4) revisiting the decision.



**Fig. 1:** CAM decision-making model (Balneaves et al., 2008).

As the present study is aimed at measuring the relationship between the type of sources of information and the perceived effectiveness of CAM therapies, our interest is focused on the actions to gather and evaluate CAM information represented in Fig. 1. Following the framework of Balneaves et al. (2008), actions addressed to gathering and evaluating information take place throughout the dynamic and iterative model and are highly variable across individuals, with a passive or active role. After a cancer diagnosis, the CAM information needs cover potential risks and benefits of CAM use, the likelihood of negative interactions of specific CAM therapies (typically

natural health products) with conventional treatments (chemotherapy, radiation, hormone therapy), the appropriate timing of CAM use in the conventional cancer treatment, and the availability and costs of these therapies. Before making decision on CAM, cancer patients look for verification in professional advice and in scientific literature, but also in anecdotes about CAM use in social networks and on the Internet. Apart from anxiety emerging from the fear of making “wrong” treatment decision, other relevant problem of this process is the often contradictory information about CAM and the lack of consensus between and among CAM and conventional health professionals (Balneaves et al., 2008).

According to the latest survey on social perception of science and technology (S&T) in Spain, the role played by Internet as main source of access to S&T information has been tripled in the last decade, rising from 13.9% in 2004 to 39.8% in 2014 (Revuelta y Corchero, 2015). This figure may further increase for the next years especially as compared with other Western countries such as the United States, where the equivalent figure reached 60% in 2012 (National Science Board, 2014).

Moreover, in the Spanish case the choice of source of information on S&T is also influenced by socio-demographic variables such as age and educational level. Revuelta and Corchero (2005) reveal that by age-range the highest use of Internet takes place between 15 and 24 years (65.5%) and between 25 and 34 years (60%); a higher educational level also results in a greater use of Internet as main source of information. But the Internet world is an extensive platform where online exclusive channels, such as Wiki sites (57.7%), coexist with the online version of traditional media (55.8%) and the social networks (54.3%). Following the aforementioned authors, some of the online contents and resources -that were not originally created following journalism norms and routines- are competing with traditional news outlets as providers of information on S&T, “though the criteria behind the selection and presentation of that content does not have to do with journalistic rules, but with algorithms or business strategies that are not always known or transparent” (Revuelta y Corchero, 2015: 128).

Over the past few years, scholars on the field of S&T communication have been paying attention to the implications and consequences of these new trends in information sources when the Internet use has increased (Brossard y Scheufele, 2013). From a positive angle, it is considered that online S&T sources may be helping to narrow knowledge gaps generated partly by science coverage in traditional media targeted to well-educated people. But in the Spanish case, the use of the Internet as S&T source of information is also particularly higher among high educational level population and young people (Revuelta y Corchero, 2015). Anyhow, the development of research related to online use and science journalism will help to understand the new realities in the interface between science community and the public; particularly within medicine and health issues since these topics are the most frequent in online science journalism (Olvera-Lobo y López-Pérez, 2015).

Brossard y Scheufele (2013: 40) state that online “audiences turn more a more to blogs and other online-only media sources for information about specific scientific issues and much less to online version of traditional news outlets”. In the Spanish context, Wikipedia is the first online information source for S&T topics, but closely followed by online versions of traditional media and social networks (Muñoz van den Eynde y Lopera Pareja, 2014; Revuelta y Corchero, 2015).

### *Method*

The study relies on data from PIKA Online Survey on Science; the acronym PIKA comes from Perception, Information, Knowledge and Attitudes. The design of this questionnaire was guided by

the aim of studying some key processes on scientific culture such as the relationship between perception, information, knowledge and attitudes (Muñoz van den Eynde y Lopera Pareja, 2014). The data were collected from a convenience sample of college students from six Spanish universities (Madrid, Salamanca, Valencia, Oviedo, Valladolid and Balearic Islands) who received the questionnaire by email and accepted to fill it out. Students enrolled in sciences, engineering, humanities and health science degrees were invited to take part in this survey. The questionnaire was circulating for a month and a half beginning on March 2014 and it was completed by 2,138 college students.

The questionnaire featured 41 items and it took around 50 minutes to fill it out. The participant age ranged from 17 to 67 with 91% falling in the 18 to 32 years range. The mean age was 23.64 years. The sample consisted of 1369 (64%) females and 769 (36%) males. According to the official government data about gender students at the Spanish universities (Ministerio de Educación Cultura y Deportes, 2016), females are over-represented in the sample in a 7% and males are under-represented in -7%.

For the present study, we have selected eight questions: One question about their perception of the effectiveness of a set of CAM therapies on a four-point scale ranging from nothing to highly effective, and seven multiple choice questions about sources of information (Tab. 1). Particular attention was given to explore the use of online sources of information, why are they used and perceived advantages, as well as to the search of significant relationships between these variables and the perceived effectiveness of CAM therapies.

- Perception of the effectiveness of CAM therapies

1-Q6: *According to the World Health Organization, the use of complementary and alternative medicine therapies is increasing rapidly in developed countries. Do you think the following therapies -acupuncture, phytotherapy, homeopathy, hypnosis, aromatherapy, chi kung, Bach flower remedies- are effective?*

- Use of sources of information: specific and interesting topic, science and technology (S&T) and scientific and technological risks

2-Q31: *Thanks to the Internet, we have quick access to huge amounts of information available through different sources. Which of them you select when looking for information on a specific topic you find interesting?*

3-Q32: *What sources you select for information about S&T?*

4-Q32c (With regard to the previous question): *If you turn to the Internet for information about S&T, what are the online sources you use?*

5-Q34: *In a situation or event which clearly shows the negative consequences and risks of scientific and technological development, for example, contaminated water discharges from the plant in Fukushima, what sources of information do you select?*

6-Q34a (With regard to the previous question): *If you turn to the Internet, what are the online sources you use?*

7-Q34b (With regards to the previous question): *Why do you choose these online sources of information?*

8-Q35: *What are the advantages provided by Internet compared to other sources of information?*

Crosstabs analysis (SPSS 22) was applied to survey data to identify associations between perceived effectiveness of CAM therapies (1-Q6) and the use of information sources when seeking information about specific and interesting issues, S&T issues, and scientific and technological risks, paying special attention to the use of online information sources (see detailed questions in Tab. 1 and Tab. 2).

Questions	Sources of Information	On
2-Q31	Online	Specific and interesting topics
3-Q32	General	S&T topics
4-Q32c	Online	
5-Q34	General	Scientific and technical risks
6-34a	Online	
7-Q34b	Online: Why are they used?	
8-Q35	Online: Perceived advantages of using them	

**Tab. 1:** Analyzed questions by perceived effectiveness of CAM therapies

<b>General</b>	Friends Family Online Books & other publications Free newspapers Radio TV I don't look for info		
	<b>Online</b>	<b>Why are they used?</b>	<b>Advantages</b>
	Social networks Blogs Online press, radio & TV Search engines Institutional websites Info provided by friends Wikis I don't look for info	Information is compiled by the best experts.  First-hand information is available.  It's trusted.  It's independent.  It coincides with my point of view.  It reflects the general opinion.  No applicable, I don't seek info.	Easy access to the info.  Plurality to compare several versions.  Comment from other users can be of help.  Information easy to be understood.  Information is always updated.  I don't trust other information sources.  I can participate adding or correcting useful information.  I don't think Internet is better than other information sources.

**Tab. 2:** List of general and online sources of information, reasons to use them and advantages.

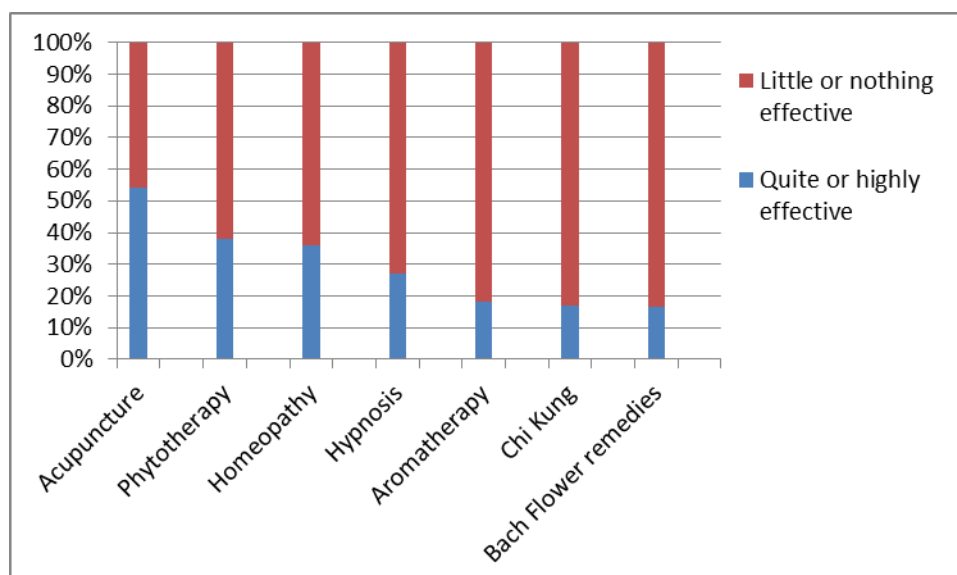
The statistic Cramer's V was obtained to quantify the magnitude of the association between variables. A p value <0.05 associated with Cramer's V also allows to reject the null hypothesis of independence between variables. Standardized Adjusted Residuals (SAR) facilitate the interpretation of the relationship between variables. A SAR value inferior to -1.96 or higher than 1.96 identifies cells with significant statistical differences between observed and expected frequencies taking into account that with samples large enough, SAR can be identified with z-scores.

## Results

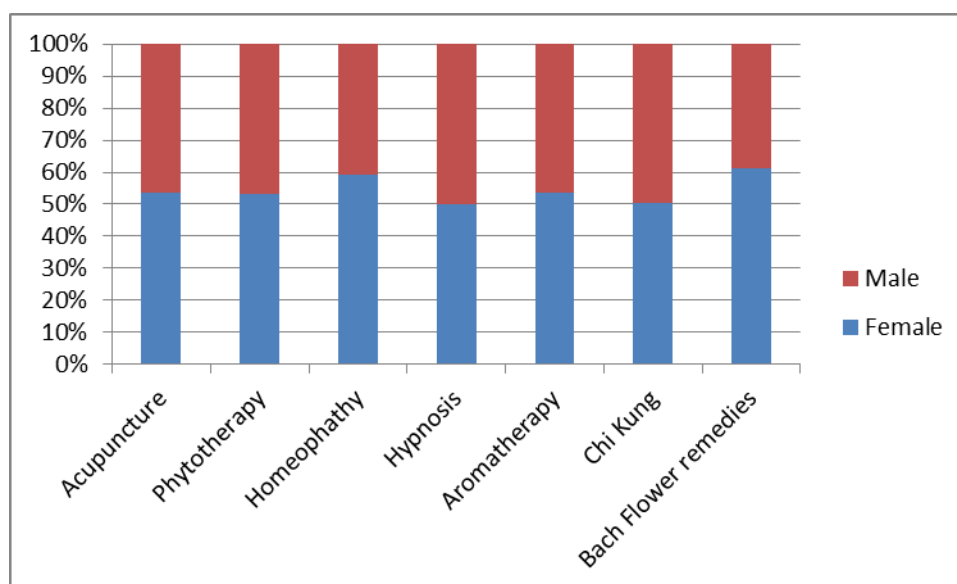
Firstly, data represented in Fig. 2 show that there are big differences among perceived effectiveness of CAM therapies. On the contrary, differences by gender only affect to homeopathy and Bach flower remedies (Fig. 3); female students tend to perceive homeopathy and Bach flower remedies as more effective than male students ( $p < 0.01$ ). Generally, considering the degree of perceived effectiveness as a three-step stairway, acupuncture is placed on the top step, (quite or highly) effective for more than 50% of the respondents; phytotherapy, homeopathy and hypnosis stand on an intermediate step, effective for between 27% and 37% of the respondents; aromatherapy, chi kung and Bach flower remedies are situated on the bottom step, effective for less than 20% of the respondents.

### a) General sources of information and perceived effectiveness of CAM therapies

Crosstabs analysis and Standardized Adjusted Residuals results show an array of significant relationships. There is significant relationship between perceived effectiveness of CAM therapies and the use of general sources of information both in the case of S&T topics and scientific and technological risks. Specifically a higher perceived effectiveness of acupuncture is positively associated with a more frequent use of Internet and TV; on the contrary, a higher perceived effectiveness of Bach flower remedies is negatively associated with the Internet use (see Tab. 3).



**Fig. 2:** Perceived effectiveness of CAM therapies.



**Fig. 3:** Perceived effectiveness of CAM therapies by gender.

*b) Online sources of information and perceived effectiveness of CAM therapies*

Whatever the nature of the sought topic, a greater use of search engines as information source is positively associated with a high perceived effectiveness of acupuncture (Tab. 4). Also inside the online universe, a high perceived effectiveness of hypnosis shows a positive relationship with a more frequent use of blogs and forums as long as the search is unrelated to scientific and technological risks. Finally, a high trust on the effectiveness of Bach flower remedies is negatively associated with the use of Wikis and online press, radio and TV although it is positively associated with searches on blogs and forums.

GENERAL INFORMATION SOURCES			
On S&T topics			
	Acupuncture	Bach flowers	Phytotherapy
Internet	3.1	-3.1	
TV	3.2		
On scientific and technological risks			
Family			3.1
TV	3.7		
I don't look for info		3.9	

**Tab. 3:** Significant relationships between CAM perceived effectiveness and use of general sources of information (SAR:  $\pm 1.96$  by cell;  $p < 0.05$ ).

*c) Reasons and advantages to use online sources of information and perceived effectiveness of CAM therapies*

This section of the results is aimed at offering a deeper exploration of the motivation and advantages reported by the audience who turns to online sources of information as well as the relationships of these variables with perceived effectiveness of different CAM therapies. After asking respondents about the reasons they use online sources of information, independence is the only attribute included in Tab. 2 showing a significant positive association with a high perceived effectiveness of acupuncture, hypnosis and chi kung (Tab. 5). In this context, the adjective

‘independent’ refers to sources of information deemed as neutral and without any trace of vested interests. Concerning the advantages of using online sources, there were not found any significant positive associations. The results reveal instead that those CAM therapies perceived as less effective—Bach flowers, chi kung and aromatherapy- show a significant negative association with the belief that online sources of information offer an easy access to the information (Tab. 6).

ONLINE INFORMATION SOURCES			
On specific and interesting topics			
	Acupuncture	Hypnosis	Bach flowers
Blogs		3.2	
Search engines	3.2		
On S&T topics			
Blogs		3.3	3.1
Search engines	3.1		
Wikis			-3.2
On scientific and technological risks			
Online press, radio&TV			-3.1
Search engines	3.2		

**Tab. 4:** Significant relationships between CAM perceived effectiveness and use of online sources of information (SAR:  $\pm 1.96$  by cell;  $p < 0.05$ ).

ONLINE INFORMATION SOURCES			
Why are they used?			
	Acupuncture	Hypnosis	Chi kung
It's independent	2.9	3.1	3.0

**Tab. 5:** Significant relationships between CAM perceived effectiveness and the reasons to use online sources of information (SAR:  $\pm 1.96$  by cell;  $p < 0.05$ ).

ONLINE INFORMATION SOURCES			
Advantages			
	Bach flowers	Aromatherapy	Chi kung
Easy access to the info	-3.5	-3.1	-3.0

**Tab. 6:** Significant relationships between CAM perceived effectiveness and the advantages of using online sources of information (SAR:  $\pm 1.96$  by cell;  $p < 0.05$ ).

### Discussion

This study investigated the relationship between the use of general information sources and the Internet when seeking information about topics characterized by the lack of consensus and the emergence of controversy in the public arena, taking as a case study the issue of CAM therapies. It is known that citizens facing dramatic and particular situations –for instance, after a diagnosis of cancer- tend to seek information about complementary and alternative therapies more actively (Vapiwala et al., 2006). The selected source of information may play a relevant role in shaping



attitudes and behaviors when individuals have to face decision making in health-related critical situations.

Firstly, our findings reveal that respondents who consider that acupuncture –the most trusted CAM according to our results- is quite or highly effective are the most likely to seek information about S&T topics online and on TV, showing statistically significant differences. On the contrary, it was also found a negative association between the least trusted CAM –Bach flower remedies- and the Internet use. Furthermore, respondents who perceived Bach flowers as quite or highly effective, chose more frequently the option “I don’t look for info” on scientific and technological risks.

Among those respondents who selected Internet to be informed, two groups can be distinguished as a result of the significant associations found between the different options chosen by Internet users (traditional news outlets, search engines, blogs, etc.) and their perception on the effectiveness of CAM therapies:

- Group 1. Respondents who rely on CAM therapy perceived as the most effective - acupuncture- reported a greater use of search engines.
- Group 2. Respondents who rely on some CAM therapies perceived as the least effective – hypnosis and Bach flowers- reported a greater use of blogs and forums.

Particular attention has to be paid to the mediation role played by search engines since there are usually discrepancies between the information the user is looking for and the information he/she finally encounters on the reference topic. The search results and its order may influence both the knowledge gain and opinion on this topic. Generally, the mediation role of search engines would depend on the nature of the subject being searched. This dependence is stronger in the case of controverted topics unfamiliar to many people and involving potential risk associated with scientific and technological development (for instance, emerging technologies), as Brossard y Scheufele (2013) stated. And in other emerging topics no catastrophic but also debated that increasingly attract more attention. This latter is the case of CAM therapies explored in this study.

Additionally, the findings concerning search engines seem to confirm a new and challenging reality both for the audience, the journalists, and the scholar community. As Brossard and Scheufele pointed out, “researchers are only beginning to understand how the nearly 5 billion Web searches through the search engine Google everyday can shape the way we make sense of all the new information we encounter” (Brossard y Scheufele, 2013: 41). This is why one of the challenges for future research on online science communication should be to assess how Internet use might be changing not only the format and devices we use to keep us informed but also what content we read and how we think about it (Revuelta y Corchero, 2015).

### *Conclusions*

This paper presents the finding of significant relationships between the use of sources of information (traditional and online) and the perception of CAM therapies among digital natives in Spain. Given that a great dissimilarity on perceived effectiveness depending on each CAM therapy was firstly found, the analysis was addressed on a case-by-case basis. While acupuncture was perceived as quite or highly effective by more than 50% of the respondents, this figure decreased below 20% in the case of aromatherapy, chi kung and Bach flowers.

Our results highlight certain patterns related to the use of sources of information in controversial and debated issues as may be the case in the perceived effectiveness of CAM therapies. On the

one hand, respondents who trust the most popular CAM –acupuncture and phytotherapy- and distrust the least popular –Bach flowers- were the ones seeking information on S&T topics online, on TV, and within the family. On the other hand, the exploration of the specific sources of information online also showed that individuals trusting the most popular CAM admitted an extensive use of search engines when looking for information about interesting and scientific topics or technological risks. Finally, blogs and forums were selected as source of information by respondents trusting the least popular CAM.

Regardless the level of perceived effectiveness of CAM therapies, the main reported reason to use these online sources is independence, understood in terms of objectivity and neutrality. But, given the fact that search engines results are selected and ordered by non-transparent and unknown algorithms, this supposed attribute of independence represents a subject of concern that should be addressed in future studies.

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