



Which Approaches and Methods Are Most Appropriate for Exploring Health Information Behaviour?

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Abstract. The aim of this paper is to establish the approaches preferred in studies focusing on online health information seeking behaviour (OHISB). Based on the content analysis of 70 articles on OHISB retrieved from *EBS-COhost databases*, five larger groups of studies were identified: (1) quantitative approach (39%), (2) qualitative research (25%), (3) mixed methods design (9%), (4) meta-analysis and bibliometric aspect (10%) and (5) other studies (e.g., theoretical aspect, online health information quality). Thus, quantitative research does dominate, but only to a degree. The qualitative aspect has grown considerably over time. Subject to the analysed literature, it may be concluded that the mixed methods seem to have generated the most comprehensive approach for studying OHISB in all its variety and complexity. However, this design was in fact least used in the analysed studies compared to quantitative and qualitative research.

Keywords: Health information · Online health information behaviour · Methods · Approaches · Studies

1 Introduction

In a contemporary society people tend to value their health more highly than ever before. We all are expected to make adequate decisions regarding our health [1, 2]. For this, relevant information is needed. The Internet has proven to be a readily accessible source for retrieving health information with ease and anonymity [3, 4]. Thus, it no wonder, that millions of people worldwide have turned to the Internet for health information [5, 6], and it is the most important health information channel for Estonians as well [7].

In Estonia, where the majority of the adult population is avid users of the Internet, the number of health issues caused by wrong lifestyle choices has never been more apparent [8]. The rise in the average life expectancy of Estonians has slowed down and, instead of a growth and there is a decrease in healthy life years. Also younger people are beset with health conditions adversely affecting the quality of their everyday life. This raises a justified question – if the Internet boasts an abundance of health information, then why is it not used to improve one’s health? And even though top quality

information is retrieved, it is still not acted upon in the interest of promoting healthier lifestyles.

In order to make adequate interventions to improve public health, patterns of online health information seeking behaviour should be rigorously monitored. This is imperative for improving information services too. But which should be the preferred methods? Which are fruitful methods in enabling identification of trends in OHISB and which ones provide a deeper insight into people's information behaviour? OHISB is a complex notion involving people's motives and preferences in information retrieval, how they retrieve and assess information and many other aspects. OHISB is related to various societal and individual factors of the information seeker as well as culture and community components. Thus, there is every reason to believe that in order to get a complex picture one should incorporate various aspects of OHISB.

The aim of this paper is to provide an overview of the approaches and methods in studying OHISB. It will focus on the following aspects: (1) how studies on OHISB could be grouped subject to the approaches and methods used and (2) which approaches/methods enable exploration of OHISB in all its complexity? (That is, what are the ways to explore OHISB in an integrated and comprehensive manner taking into account various aspects and factors, thus enabling provision of an overview of major trends and offering deeper insight into people's behavior).

Although OHISB has been researched by many scholars from different disciplines (information scientists, health experts, sociologists, psychologists, and others), there is lack of studies providing a clear overview of applicable methods in this field. This study intends to fill the gap.

The next section of this paper provides a brief overview of the sample and methods used in the study followed by a discussion of findings. The paper ends with a summary and conclusions.

2 Sample and Method

Using a method of content analysis, the study focused on 70 most relevant articles on OHISB published and entered in the EBSCO databases during the last ten years (See Appendix A for list of EBSCO databases searched).

The inclusion criteria that a potential source had to meet were the following: (1) the article was intended to focus on online health information seeking behaviour; (2) it had to be written in English; (3) only those articles which were published within the last 10 years were included; (4) the article was supposed to be peer reviewed and (5) the database included the full text of the article.

To find relevant papers this study employed the EBSCO Discovery search engine in January 2018, and used phrases "online health information behaviour", "online health information seeking behaviour", "health information behaviour AND internet" and "health information seeking behaviour AND internet". The searches resulted in thousands of matches (e.g., just the phrase "online health information seeking behaviour" produced 4103 matches). Articles that appeared first in the result list were included in the study.

The content analysis consisted of several categories: author(s) of the article; country; sample size; topic; approach used; method; limits of study. All the articles were encoded and analysed using the SPSS program. With respect to assessing appropriateness of studies the study took into consideration whether or not the authors expressed satisfaction with their chosen methods and what they considered the main advantages and disadvantages of their study, as well as whether the approach took into account various aspects of OHISB.

3 Outcomes

The multidimensional and complex nature of research on OHISB has given rise to a variety of methodologies and approaches. Subject to the applied approaches/methods, five larger groups were identified in those studies (see Fig. 1).

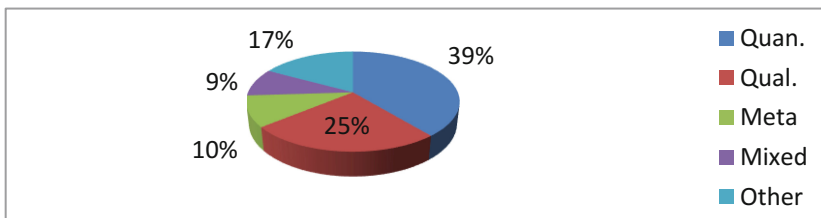


Fig. 1. Groups of studies on OHISB based on the approaches and methods used

Over the past ten years, the bulk of academic papers related to this topic in EBSCO databases originate in the U.S (39%), UK (23%); China (21%) and Germany (7%). The studies could be grouped into three larger sets: (1) studying associations between OHISB and various determinants (incl. health literacy), (2) focusing on information retrieval practices and (3) dealing with other aspects (source criticism, overview of earlier research etc.). Thematically, the variety of underlying issues was wide, including gender and ethnicity aspects, e-Health literacy, exclusion of certain groups (e.g., elderly), logic and motivation of information retrieval. Information and computer scientists, and psychologists were the most prolific researchers to publish articles on online health information seeking.

Following is an overview of the results of this research divided into five broad categories subject to the approach used.

3.1 Quantitative Research on OHISB

The largest group of studies resulted from quantitative research, comprising 39% of the articles analysed (see Fig. 1). Such studies relied on big datasets and used statistical analysis. They focused on the associations of various determinants and the context of OHISB.

The online survey was the most popular method (76%) followed by questionnaires, face-to-face surveys, and structural equation modelling. Quantitative analysis using SPSS was often conducted, and linear and binary logistic regressions were completed.

The data were often derived from national trends surveys and cross-sectional nationally representative surveys. For example, Gonzales and colleagues used the adult population file of the 2011–2012 California Health Interview Survey, analysing Internet use, online health information-seeking behaviour, and confidence in filling out online forms using binary logistic regression among 27 289 Latinos [9]. In a study conducted by Faith and colleagues [10] the data from 7674 people from all over the US were derived from the Health Information National Trends Survey. Te Poel [11] from the Netherlands conducted a 4-wave longitudinal survey study among 5322 respondents aged 16–93. Usually the sample size was smaller, for instance, an online cross-sectional survey conducted by McCrabb *et al.* [12] used data obtained from 819 orthopaedic trauma patients.

In quantitative research, no theme was prevalent. The studies could be categorised into four groups:

- (1) demographic factors affecting OHISB (gender, age, ethnicity aspects) (29%)
- (2) physical and psychological determinants (e.g., users' health condition, type of illness and social engagement) of information seekers (28%)
- (3) e-Health Literacy and OHISB (17%)
- (4) impact of online information on health behaviour and patient-physician relationship (20%).

In many instances, a study covered various aspects. For instance, scholars identified associations between OHISB and eHealth Literacy (eHL) and various demographic factors, such as gender, age and ethnicity and other aspects. In addition, Tennant *et al.* [13] from the US explored the extent to which sociodemographic, social determinants, and electronic device use influence eHealth literacy and use of Web 2.0 for health information among baby boomers and older adults. Baumann and colleagues [6] focused on gender specific determinants, daily Internet use and socio-economic aspects among Germans. They revealed that age and degree of satisfaction with one's general practitioner were gender-specific determinants of access to OHISB. Daily Internet use and a strong interest in health topics were revealed to be more important predictors than socio-economic status. Cao [14] tested part of Wilson's second model of information behaviour, including source characteristics and activating mechanisms, and to identify the relationships among perceived access, perceived expertise credibility, reward assessment, Internet self-efficacy, and online health information-seeking behaviour in China.

Articles on the quantitative component were most often published in the *Journal of Medical Internet Research* (29%). Furthermore, the journals *International Journal of Medical Informatics*, *Health Education Journal*, *Computers in Human Behaviour*, and *Health Communication* published more than one article on OHISB.

The quantitative approach enabled development of a better understanding of trends in information behaviour and full grasp of the wider issues in question; however, this design does not allow an in-depth exploration of OHISB. Some quantitative studies explicitly emphasized the need to explore OHISB as well from a qualitative point of

view [11, 15]. The studies failed to produce compelling arguments, as the data presented was not illustrated with concrete examples. However, this approach enabled detection of certain trends, for instance, which factors affect information behaviour and which are the most popular searches.

The quantitative aspect declined over time, constituting the bulk of the analysed studies (81% in 2008, but only 49% in 2017).

3.2 Qualitative Studies

The qualitative research comprised a quarter (25%) of analysed articles on OHISB. The main aim of this kind of research was to assess people's logic, beliefs, deep motives for using the Internet, values, skills and difficulties in finding relevant information, and to explore perceptions and experiences with OHISB.

Interviews (semi-structured or in-depth) were used in most qualitative studies (70%), whereas the think-aloud technique, deemed highly efficient in information behaviour research, was adopted in only three instances [16–18].

Scholars from various countries have conducted qualitative research on OHISB (USA, UK, Poland, Portugal, China). For example, Mendes and colleagues [19] from Portugal explored the health information-seeking practices of healthy young adults and how they assessed and ranked sources of information. Fifteen interviews were conducted and these included the collection of basic sociodemographic data. Fergie [20] from the UK studied young adults' experiences of seeking online information about diabetes and mental health in the age of social media. They conducted 40 semi-structured interviews with young adults, with experience of diabetes and other diseases.

In qualitative studies aspects affecting OHISB were assessed. For example, Wu and Li from China [3] explored the behavioural patterns of Chinese elderly people when searching for online health information, and revealed that education and familiarity with Internet searching were found to significantly affect task performance. Health, Internet search experience, and information credibility influenced the decision to seek information online. Primary challenges were lack of technical skills, Internet search skills, and medical knowledge.

This approach enabled study of OHISB in more detail and collection of useful information. One of the drawbacks of this method that could be established was the inability to make generalisations. As Mendes [19] noted: "...the limited size of the sample restricts the scope to generalize the findings of information-seeking practices more broadly, but it provided us with very interesting meta-themes to contribute to literature. Although our aim was not to make generalizable empirical claims, rather to understand the data qualitatively, data collected from larger samples might reveal additional insights on the topic; mostly, it allows comparisons taking into consideration socioeconomic and demographic variables." Thus no wonder that the use of the qualitative approach has expanded in time.

The qualitative research was published in *Health Communication*, *Qualitative Health Research*, *Library and Information Science Research*, and in some other journals.

3.3 Mixed Methods Design (MMD)

In the mixed method design and combined studies (9%) various methods were applied. This approach enabled researchers to explore the object in a multidimensional setting and to study the phenomenon in all its complexity. For instance, the research carried out by Morrison and colleagues [21] examined the specific effect on engagement of providing two different design features - tailoring and self-assessment. A qualitative study explored participants' engagement with each version of the intervention and a larger quantitative study systematically compared participants' use of the intervention and self-reported engagement using a partial factorial design.

Most often surveys and interviews were used. For example, the study conducted by Yi [4] aimed to examine users' self-perceived health information behaviour according to their health literacy ability. The study conducted self-administered surveys with 131 public library users and semi-structured intensive interviews with 20 users as a follow-up. Surveys found that most participants had proficient levels of health literacy, and there was an association between health literacy and some demographic characteristics such as gender and educational level. The majority assessed their health information behaviour as high. Interviewees identified critical barriers to seeking, evaluating, and using health information delivered by public libraries.

The Parks [23] made a semantic network analysis on breast cancer information. The study used online discussion forums whose participants were Korean Americans living in the USA. A mixed methodology of both content and semantic network analyses was used for data analysis.

Despite the fact that for instance Mueller and her colleagues were even critical towards their outcomes, to some extent stating that they had to be cautious in generalizing from their purposive interview sample to the wider population [24], scholars in general seemed to be satisfied with the mixed methods approach. As Mayoh [22] wrote: "Findings indicate that if the study had used a single research method in isolation, something would have been lost or misunderstood regarding the phenomenon...".

Articles using mixed design were published, for instance, in *Health Communication*, *Journal of Communication in Healthcare*, *British Journal of Health Psychology*, and *Journal of Applied Gerontology*.

3.4 Meta-Analysis, Overviews and Bibliometric Aspect

Meta-analysis and overviews comprised 10% of articles analysed. Their aim was to systematically review existing research on OHISB. For example, bibliometric analysis based on PubMed was conducted to investigate the publication trends of research on Internet health information seeking behaviour [25]. The study revealed ten research hot spots:

- (1) behaviour of Internet health information seeking about HIV infection or sexually transmitted diseases
- (2) Internet health information seeking behaviour of students
- (3) behaviour of Internet health information seeking via mobile phone and its apps
- (4) physicians' utilization of Internet medical resources
- (5) utilization of social media by parents

- (6) Internet health information seeking behaviour of patients with cancer (mainly breast cancer)
- (7) trust in or satisfaction with Web-based health information by consumers
- (8) interaction between Internet utilization and physician-patient communication or relationship
- (9) preference and computer literacy of people using search engines or other Web-based systems
- (10) attitude of people (especially adolescents) when seeking health information via the Internet.

van Genugten and colleagues [26] from the Netherlands were interested in which combinations of techniques and modes of delivery in Internet-based interventions effectively changed health behaviour. Their review included effect sizes from 52 online interventions targeting a variety of health behaviours. The research also developed a taxonomy for coding the usability of interventions. They found that factors related to usability of the interventions influenced their efficacy. Specifically, subgroup analyses indicated that more efficient interventions (those that take little time to understand and use) were more likely to be more effective than less efficient interventions. They found that the interventions that take little time to understand and use were more effective than those that required more time.

Chebli et al. from Australia conducted a systematic literature review of the effectiveness and treatment outcomes of Internet-based interventions for smoking cessation, problematic alcohol use, substance abuse and gambling [27]. All the sixteen studies analysed demonstrated positive treatment outcomes for their respective addictive behaviours. The review concluded that Internet-based interventions are effective in achieving positive behavioural change through reducing problematic behaviours.

This kind of research was very useful, because it enabled quick understanding of what has been done in this field in the past. 55% of articles in this field were published in *Journal of Medical Internet Research*.

3.5 Other Studies

The fifth group consisted of articles with research that did not correspond to any of the clusters mentioned above. For example, this study classified articles on source characteristics, goal orientation of individuals, and information seeking via mobile phones into this group, which represented an intermediate version of quantitative research and MMD.

For example Deng, Liu and Hinz studied health information seeking and usage behaviour intention of Chinese consumers through mobile phones. They used a two-step approach of structure equation modelling based on testing the measurement model and hypothesis model. The outcomes revealed that information quality, perceived value, and trust had positive effects on both the intention to seek and to use health information, and that the intention to seek affects the intention to use [28]. Zhan and his colleagues studied predictors of the authenticity of Internet health rumors. They found that there are measurable differences between true and false health rumours on the Internet. [29] Sadasivam and colleagues from the US were interested in what is the next frontier for computer-tailored health communication (CTHC) research [30]. Various methods enabled them to describe limitations of current CTHC systems and make future predictions in this field.

4 Summary

This study looked at the approaches and methods used in online health information behaviour by analysing the content of 70 articles in EBSCO databases of the past 10 years. On the basis of the analysis conducted, five larger groups of studies could be distinguished, of which, quantitative research accounted for the largest group (39%). Quantitative research was the most preferable approach when authors wanted to identify the main trends in OHISB and to explain the role of different socioeconomic and individual factors affecting people's information behaviour.

Qualitative methods were used in the quarter of studies analysed. This approach enabled provision of deeper insight into people's information practices, how they conduct their information searches and why they use certain search logic. It seems that nowadays, scientists tend to favour the qualitative aspect when studying health information behaviour considerably more than a decade ago. The most common method used in qualitative research was an interview. The think-aloud method, which is also an effective knowledge elicitation approach, was seldom employed.

Thus one cannot say that one approach is better than another in OHISB research area. This depends on the research focus, aims and research questions as to which methods to prefer. It is obvious that when trying to provide a big picture about the research object it is more relevant to use quantitative methods, and that the qualitative approach enables focus on concrete aspects in a more profound way.

Taking into consideration that OHISB is a dynamic and multifaceted concept including how people retrieve, assess and use health information, and bearing in mind that OHISB is related to different factors (societal and individual components of the information seeker as well culture and community norms), it is obvious that a multi-dimensional approach enables description of the object in its complexity. Researchers using MMD expressed explicitly their satisfaction with the selected methods while scholars exploiting a single method expressed some criticism with respect to their outcomes, and pointed out the need to explore the object further using some other methods. It seemed that mixed methods enabled study of OHISB in the most exhaustive way. Taking into account the advantages of the MMD, this researcher will follow this design as well in a study of patterns of OHISB among Estonians.

With this study, a bit of clarity has become apparent in the field, regarding which approaches and methods are used in studies of OHISB, and which ones enable exploration of it in its complexity.

A Appendix

The EBSCO Discovery of the Library of the Tartu University I conducted the search consists of the following databases: MEDLINE, Science Citation Index, Complementary Index, Academic Search Complete, Scopus®, ScienceDirect, Supplemental Index, British Library Document Supply Centre Inside Serials & Conference Proceedings, Health Source: Nursing/Academic Edition, Directory of Open Access

Journals, OpenAIRE, Dentistry & Oral Sciences Source, J-STAGE, SciELO, Social Sciences Citation Index, MasterFILE Premier, JSTOR Journals, PsycINFO, Health Source - Consumer Edition, SPORTDiscus, GreenFILE, Business Source Complete, BioOne Complete, Central & Eastern European Academic Source, IEEE Xplore Digital Library, Oxford Reference, ELibrary.RU, Digital Access to Scholarship at Harvard (DASH), Regional Business News, McGraw-Hill Medical, HeinOnline, PsycARTICLES, Communication & Mass Media Complete, ERIC, Arts & Humanities Citation Index, Oxford Scholarship Online, Library, Information Science & Technology Abstracts, eArticle, Cairn.info International Edition, Teacher Reference Center, Philosopher's Index, ProjectMUSE and MathSciNet via EBSCOhost.

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