Information technology in health promotion

T. P. Lintonen[1]*, A. I. Konu[2] and D. Seedhouse[3]

Abstract

eHealth, the use of information technology to improve or enable health and health care, has recently been high on the health care development agenda. Given the vivid interest in eHealth, little reference has been made to the use of these technologies in the promotion of health. The aim of this present study was to conduct a review on recent uses of information technology in health promotion through looking at research articles published in peer-reviewed journals. Fifteen relevant journals with issues published between 2003 and June 2005 yielded altogether 1352 articles, 56 of which contained content related to the use of information technology in the context of health promotion. As reflected by this rather small proportion, research on the role of information technology is only starting to emerge. Four broad thematic application areas within health promotion were identified: use of information technology as an intervention medium, use of information technology as a research focus, use of information technology as a research instrument and use of information technology

[1]Tampere School of Public Health and University of Tampere Centre for Advanced Study, University of Tampere, Tampere FIN-33014, Finland and Police College of Finland, PO Box 13, Espoo FIN-02151, Finland, [2]Tampere School of Public Health, University of Tampere, Tampere FIN-33014, Finland and [3]Auckland University of Technology, Akoranga Campus, Auckland, New Zealand
*Correspondence to: T. P. Lintonen.
E-mail: tomi.lintonen@pakk.poliisi.fi

for professional development. In line with this rather instrumental focus, the concepts 'ePromotion of Health' or 'Health ePromotion' would come close to describing the role of information technology in health promotion.

Introduction

The world health organization (WHO) Europe Web site on eHealth [1] www.euro.who.int/telemed states that 'Information and communication technologies (ICT) allow for innovative solutions in the reform of the organizational and managerial components of health care systems'. The term 'tele-medicine' can no longer accommodate the activities comfortably [2]. A recent review of the definitions of eHealth identified 51 published definitions [3]. Another recent scoping exercise [4] recommended two global definitions:

e-health is the use of emerging information and communications technology, especially the internet, to improve or enable health and healthcare [5]

and an adaptation from Eysenbach [6]

e-health is an emerging field of medical informatics, referring to the organization and delivery of health services and information using the internet and related technologies. In a broader sense, the term characterizes not only a technical development, but also a new way of working, an attitude, and a commitment to networked,

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global thinking, to improve health care locally, regionally, and worldwide by using information and communication technology. [4]

While eHealth seems to have inspired numerous definitions, the concept of 'health promotion' has been defined with even more enthusiasm (see Discussion in [8], p. 33–51) ranging from the all-embracing WHO definition [7] to more specific ones (e.g. [8], p. 136). A solution to this situation where no single universally acknowledged definition existed had to be made for the purposes of this present study: journals listing health promotion as a key word in the National Library of Medicine (NLM) Locator database were chosen. The resulting set of studies mostly targeted healthy people; adolescents form a particular target group. Lifestyle components, such as smoking, eating and exercise, were especially abundant.

Despite the great number of published definitions of eHealth, little reference is made to the application of these technologies in the promotion of health or in preventing disease. The aim of this present study is to review recent uses of information technology in health promotion through research publications. Furthermore, the contexts and themes of use will be identified and classified to achieve a picture of the utilization of information technology in health promotion. In addition, a reference list to health promoters wishing to learn from others' experiences of the use of information technology in health promotion will be produced.

Method

Published peer-reviewed articles on the use of information technology in connection with health promotion were analyzed to draw a summary of ways in which technology has been used. The material was acquired through a systematic review of scientific journals in the area of health promotion in four phases.

First, journals were selected using the for Health Sciences Publications, the NLM Locator (http://locatorplus.gov/). We searched for currently published journals (search performed 21 April 2005) for health promotion in any of the publication database key word fields. This first search yielded 88 highly relevant publications with health promotion in any of the database fields.

As the next step, we selected scientific journals publishing peer-reviewed research articles from the set of publications acquired in step one. This process was aided by information from the journal Web pages. The selection process yielded 15 journals.

Third phase in the process of building the data set for analyses was the extraction of the individual journal articles. This phase was conducted in July 2005; we started going backwards in time from journal issues published in June 2005. The extraction process was stopped after issues published in 2005, 2004 and 2003 had been studied. At this point, the number of selected articles had amounted to 1352.

The final step consisted of uploading the article contents. Full-text access was achieved for eight of the journals, while in the cases of the remaining seven, the analysis was performed using article abstracts.

The research papers were analyzed for information technology use in the context of health promotion. Computers are widely used in most research processes e.g. in analyzing data—this kind of use was excluded. The way in which information technology was used was evaluated from the articles. The analysis encompassed seven consecutive steps:

(i) familiarization through reading the abstracts and articles;
(ii) compilation, identifying the most significant (in relation to the research question) elements;
(iii) condensation, identifying central parts from longer descriptions of information technology use;
(iv) the grouping step, to classify similar themes into categories;
(v) preliminary comparison of categories, when the categories were demarcated, examined and revised;

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(vi) naming of the categories according to content and

(vii) contrastive comparison of the categories; the unique character of each category was described.

The procedure described above was executed in a consensus process involving two researchers to decrease the role of subjective evaluations. The identification and condensation addressed themes of factual nature—this made achieving consensus relatively straightforward. The result of the analysis is a pattern of descriptive categories generated from the data. Initially, the number of small clusters was rather big, but as the analysis progressed, similar overriding characteristics of use led to broader clusters.

Results

The final set of journals selected for analysis is shown in Table I. Altogether 56 of the 1352 articles

contained material related to the use of information technology in the context of health promotion.

A commonly reported role of information technology was characterized by 'computer tailoring', i.e. the use of a computer to select and construct health messages based on information supplied by the user. The World Wide Web (WWW) hosted several applications of this type, e.g. aiding smoking cessation or giving advice on physical exercise. A subgroup of papers reported that information technology had been used mainly to distribute health information, while in another group, the aim of behavior change was clear. The common theme in information technology use in health promotion within this category was labeled 'intervention medium' (Fig. 1). From the total of 56 articles, 20 were placed in this category, making it the most widely reported role.

Two subgroups of papers reported on studies where the use of information technology in health promotion was the 'research focus' (a total of 12 articles). In the first subgroup, the quality or usability of health information presented using information

Table I. *Journals included in the review, the number of articles analyzed and the number with information technology-related content*

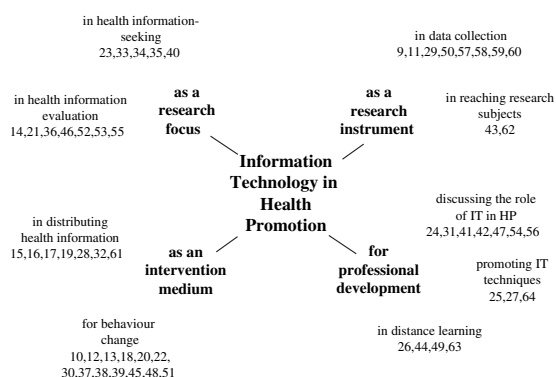| Journal name	Issues analyzed	Number of articles	Number with information technology content
Health promotion practice	2003–05 (2)	130	12
Health education research	2003–05 (3)	151	11
Journal of health communication	2003–05 (3)	97	10
American journal of health behavior	2003–05 (3)	155	5
Preventing chronic disease	2004–05 (2)	63	5
The international electronic journal of health education	2003–05 (article 11)	19	5
American journal of health promotion	2003–05 (5)	188	3
Promotion and education	2003–04	31	2
Health promotion international	2003–05 (1)	80	1
Journal of holistic nursing	2003–05 (2)	56	1
Public health nutrition	2003–05 (3)	226	1
American journal of health studies	2003–04	37	0
BMC International health and human rights	2003–05 (article 5)	10	0
Health promotion journal of Australia	2003–05 (1)	76	0
The international journal of mental health promotion	2003 (3), 2004–05 (1)	33	0

in health information-
seeking
23,33,34,35,40

in data collection
9,11,29,50,57,58,59,60

in health information
evaluation
14,21,36,46,52,53,55

**as a
research
focus**

**as a
research
instrument**

in reaching research
subjects
43,62

**Information
Technology in
Health
Promotion**

in distributing
health information
15,16,17,19,28,32,61

discussing the role
of IT in HP
24,31,41,42,47,54,56

**as an
intervention
medium**

**for
professional
development**

promoting IT
techniques
25,27,64

for behaviour
change
10,12,13,18,20,22,
30,37,38,39,45,48,51

in distance learning
26,44,49,63

Fig. 1. The use of information technology in health promotion—analysis of published research articles. The numbers refer to references.

technology was evaluated. The studies in the other subgroup explored the ways in which people use information technology to seek information on health issues.

Ten papers reported on the use of information technology as a 'research instrument', either in data collection or in reaching research subjects. Application of electronic survey forms to gather health-related data in the WWW is becoming popular as Internet access has become widespread in the industrialized world. One paper [9] reported a Delphi [65] study utilizing both e-mailed and WWW-based electronic forms.

Yet another area of information technology utilization was labeled 'professional development'; this category contained 14 papers. Theoretical and conceptual issues related to the use of information technology in promoting health were studied and discussed in several papers.

Discussion

The use of information technology in health care has grown exponentially for several years [4]. However, as reflected by the rather small proportion of research papers found in the reviewed publication series, utilization within health promotion is only starting to emerge. While there may well be a lot of health promoting information provided over

the Internet, relatively little research has been published on the issue. It must also be noted that studies critical on the use of technology have been especially few.

Four broad thematic application areas within health promotion were identified: use of information technology as an intervention medium, use of information technology as a research focus, use of information technology as a research instrument, and use of information technology for professional development.

The public increasingly turns to the Internet for information on health issues [66]. Making information more readily available simultaneously breaks certain professional and official 'monopolies' over issues in health. Concern has been raised over what is 'right' and what is 'wrong' information, and how the user can make the distinction [67–69].

Several limitations of the study are worth noting. First, only research papers published in scientific journals were studied. The decision to exclude more practically oriented journals and publications aimed at the general public has restricted the view presented in this paper. The decision was made on two grounds: an emphasis on research-based knowledge on the issue and the foreseen practical problems in selecting which other publications to analyze. The decision also has another important justification: scientific papers have been evaluated for quality. Second, it is possible that our review missed some articles in cases where the role of information technology was not mentioned in the abstract. This applies to the seven journals where full-text articles could not be accessed. However, in the full-text papers analyzed, the use of information technology was always mentioned in the abstract as well. This is probably due to the novelty value of information technology in health promotion. In any case, it is likely that some relevant papers have been missed and, as a result, the observed extent of information technology use is an underestimate. Furthermore, the search strategy had other potential weaknesses, including the use of a single database (NLM) for publications, and a rather narrow time frame: from year 2003 until the summer of 2005. Despite the fact that the number of articles

reviewed was quite large, the selection may have been skewed. Specific application areas such as computer-tailored interventions may have been insufficiently covered due to articles being published in series not classified under health promotion in the NLM Locator. In the analysis process, a certain amount of subjective component was unavoidable, although efforts were made to control it by making use of a consensus process involving two researchers. It is worthy of noticing that, in some cases, several papers included in the study report on the same research program (e.g. papers #15 and #17) so caution must be exercised when comparing the numbers of studies.

Summing up the experiences of information technology use in health promotion interventions, the main use seems to have been to support interventions targeting individual persons. Practical examples of such use can be found e.g. in papers by Mas *et al.* [54, 56]. Only one paper [64] reported on an intervention with an ecological approach to health promotion (e.g. [70], p. 470–501) addressing the physical and social environments. Studies are called for on interventions focusing on the contexts and environments, both physical and social, where people live and work in [7, 71]. Likewise, studies assessing possible advantages/disadvantages with Web-based health promotion compared with a traditional approach are also suggested.

Information technology has considerable potential for acquiring data (both from the public and the professionals), for distributing information and for making health promotion and decision-making processes more transparent. Internet-based survey tools with automated analysis processes can be used locally to assess and develop health and well-being in diverse settings [72]. Tools for assessing the quality of Internet-derived information have been developed [e.g. 14], but less has been done in the arena of facilitating rich health information mining so that people would gain as wide a perspective on health issues as possible.

The technology to enable informed and open discussion of any and all health promotion projects already exists [73]—it is only a matter of time before health promotion initiatives will be openly discussed (and approved or disapproved) on the Internet by their potential recipients. Deliberative democracy on the Internet will also enable citizens to propose their own health promotion initiatives, potentially causing a radical shift in power in the health promotion policy setting.

Rather than suggesting a 'definition' for 'eHealth Promotion', the aim of this review was to illuminate the current diversity of information technology usage within health promotion. Conceptually, 'ePromotion of Health' or 'Health ePromotion' would come closer to describing the instrumental role of information technology in health promotion work.

Conflict of interest statement

None declared.

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