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The divided communities of shared concerns: Mapping the intellectual structure of e-Health research in social science journals

L. Crystal Jiang^a, Zhen-Zhen Wang^b, Tai-Quan Peng^c, Jonathan J.H. Zhu^{b,*}

^a Department of Media and Communication, City University of Hong Kong, Kowloon, Hong Kong Special Administrative Region

^b Web Mining Lab, Department of Media and Communication, City University of Hong Kong, Kowloon, Hong Kong Special Administrative Region

^c Wee Kim Wee School of Communication and Information, Nanyang Technological University, Singapore

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ABSTRACT

Purpose: Social scientific approach has become an important approach in e-Health studies over the past decade. However, there has been little systematical examination of what aspects of e-Health social scientists have studied and how relevant and informative knowledge has been produced and diffused by this line of inquiry. This study performed a systematic review of the body of e-Health literature in mainstream social science journals over the past decade by testing the applicability of a 5A categorization (i.e., access, availability, appropriateness, acceptability, and applicability), proposed by the U.S. Department of Health and Human Services, as a framework for understanding social scientific research in e-Health.

Methods: This study used a quantitative, bottom-up approach to review the e-Health literature in social sciences published from 2000 to 2009. A total of 3005 e-Health studies identified from two social sciences databases (i.e., Social Sciences Citation Index and Arts & Humanities Citation Index) were analyzed with text topic modeling and structural analysis of co-word network, co-citation network, and scientific food web.

Results: There have been dramatic increases in the scale of e-Health studies in social sciences over the past decade in terms of the numbers of publications, journal outlets and participating disciplines. The results empirically confirm the presence of the 5A clusters in e-Health research, with the cluster of applicability as the dominant research area and the cluster of availability as the major knowledge producer for other clusters. The network analysis also reveals that the five distinctive clusters share much more in common in research concerns than what e-Health scholars appear to recognize.

Conclusions: It is time to explicate and, more importantly, tap into the shared concerns cutting across the seemingly divided scholarly communities. In particular, more synergy exercises are needed to promote adherence of the field.

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* Corresponding author. Tel.: +852 34427186.

E-mail address: j.zhu@cityu.edu.hk (J.J.H. Zhu).

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1. Introduction

The continuous development of new information and communication technologies (ICTs) has greatly changed the ways in which people interact with health information, health professionals and healthcare systems [1,2]. As an emerging field of medical informatics, e-Health refers to the organization, delivery, and consumption of health services and information via the Internet and related technologies. In particular, the concept goes beyond technical development to include “a new way of working, an attitude, and a commitment for networked, global thinking, to improve health care locally, regionally, and worldwide by using information and communication technology” [3]. In keeping up with the burgeoning of e-Health practices in global scale, scholars and practitioners have progressed from debating what e-Health is to examining the technical, human, organizational as well as social factors that influence e-Health practices [4–6]. In the past decade, e-Health research has emerged as an active interdisciplinary field where biomedical science, information science and technology, and social sciences work together synergistically to address issues of common interest [7,8].

Unlike biomedical sciences, computer science and information technology which presumably have close connections with e-Health (i.e., the term “e-Health” heuristically links to biomedical sciences, computer science and information technology), the contributions of social sciences have been overlooked. Very few reviews of e-Health literature have included social science databases except for the one conducted by Pagliari et al. [9]. In fact, driven by the increasing recognition for social and behavioral factors in public health sciences [10,11], there has been substantial attention paid to “merging the science of evidence-based medicine with the practice of user-centered research” [12] including information science, psychology, economics, communication and other social sciences [4]. In the past decade, e-Health research from the social scientific perspectives has grown in magnitude and strength. For example, a recent review of 27,000+ Internet studies published in social science journals found that 27% of the studies were devoted to e-Health issues between 2000 and 2009, which makes e-Health the second most popular research domain in Internet studies, ranked only behind Human–Technology Interactions (34%), but ahead of e-Society (21%) and e-Business (18%) [13]. There is no doubt that the social scientific approach provides an important angle to look at e-Health. However, the questions remain unanswered on which topics are pursued by this approach, how these foci are rising or falling in popularity, and what the observable and hidden relationships exist between these research concerns.

Early attempts that seek to map out the scope of the e-Health field have proposed several taxonomies of e-health research. For example, Eng came up with a 5C model and Eysenbach used 10 essential Es to characterize e-Health [3,14]. Richardson discussed the development of e-Health in Europe and claimed clinical applications, healthcare professional continuing education, public health information, and health policy development as four main pillars for e-Health practices [15]. The U.S. Department of Health and Human Services (DHHS) proposed a category of 5A research categories as an

analytical framework for the social aspect of e-Health research [16]. However, these taxonomies suggested by field leaders and national agencies are more like normative guidelines of what they think the field should be than the empirical reality of what the field of e-Health actually looks like. There is no clear-cut evidence that the taxonomies sufficiently capture the knowledge inquiry in e-Health. Until recently, several critical reviews and scoping exercises (e.g., special issue of American Journal of Preventive Medicine on e-Health research in 2007) take the initiative to critically examine what the field has already become [4,7,9,17–19]. These reviews have provided qualitative evaluations of the field regarding its research themes, perspectives, methodology and practical implications.

This study expands previous efforts to systematically analyze the research scale, key themes, intellectual structure and knowledge production pattern of e-Health related studies in social sciences for the past decade. It particularly investigates whether this field has converged a set of originally disconnected colonies into a disciplinary structure. Such convergence directly reflects the maturity of a field and has been seen in a number of emerging interdisciplinary fields such as artificial intelligence, nanotechnology, entrepreneurship, communication studies, and innovation studies [20,21].

The study tests the applicability of DHHS’s 5A category as a framework for understanding social research in e-Health. The 5As include acceptability, access, applicability, appropriateness, and availability. The 5As, although not explicitly stated in the original framework, are framed as sequential steps of implementation in e-Health practices [16]. The convergence of the e-Health field should be reflected in a recognizable knowledge structure with studies on each A integrally connected to one another (see Fig. 1). Specifically, the *access* theme focuses on the technical access of e-Health systems, such as digital divided and adoption of general information and communication technologies. This issue underlies all e-health practices and is the necessary but insufficient factor for e-Health effectiveness [22]. The *availability* theme addresses the development of meaningful access (i.e., having the tools people want and need), mainly concerning information accessibility and information seeking pattern related to a variety of e-Health tools. Given that different population groups experience disproportionate amounts of diseases and health issues, it is important to design and deploy e-Health access and availability in accordance to population characteristics [5,22,23]. The *appropriateness* theme considers the objective fit between diverse user needs and the e-Health practices, and specific foci include cultural appropriateness, users’ perceptions of content credibility, information quality and readability, and the use of tailoring. The theme of *acceptability*, by contrast, is concerned with users’ subjective evaluations of tools, including ease of use, satisfaction, usage over time and usability. Last but not least, the *applicability* theme builds on the previous four As and attends to impact and outcomes of e-Health practices, promoting changes in knowledge, beliefs and attitudes, social support and health behaviors in different health contexts.

Unlike previous qualitative, top-down reviews, this study adopts a quantitative, bottom-up approach to examine the body of e-Health literature in social sciences, which minimizes the influence of a priori assumptions and arbitrarily-defined

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