Mobile Phones in Data Collection: A Systematic Review

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ABSTRACT

Mobile phones are increasingly popular tools not only for daily use but also for research purposes. The authors systematically searched related literature using mobile phones as a tool for data collection and found 171 publications consisting of review, empirical, methodological, and theoretical studies in various disciplines such as medicine, engineering, and education. After reviewing contributions of previous review studies, the authors presented a description of data collection process consisting of four steps and used these four steps as a framework to review the existing empirical literature. The authors then reviewed contributions of methodological and theoretical studies, and end with a summary of current practices of collecting mobile data. Current challenges and future directions were also mentioned.

Keywords: Cell Phone, Cellular Phones, Data Collection, iPhone, Literature Review, Mobile Data, Mobile Phone, Smart Phone

The history of science has witnessed that major breakthroughs in data collection (e.g., radioactivity, brain images, and green fluorescent protein) and data analysis (e.g., method of least squares, genome analysis, and neural networks) often lead to major breakthroughs in a specific discipline of science (e.g., physics, statistics, chemistry, biology, and neuroscience). For the science of mobile phone use in particular (Yan, Chen, and Yu, 2013) and behavioral sciences in general, how to best use mobile phones to collect behavioral data is extremely important to further advance its research methodology and theoretical foundation. Thus, one of the first and foremost tasks at present is to examine both breadth and depth of the existing knowledge of using mobile phones in collecting data.

To respond to the present need of the literature review, this review is our effort to systematically search and synthesize the research literature that has existed as early as the mid-90s of last century (e.g., Zito, D’Este, & Taylor. 1995) but is scattered among a wide variety of disciplines in behavioral sciences.

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such as medicine, psychology, and education. After a summary of methods used to search the literature, we reviews four types of the exiting literature, review, empirical, methodological, and theoretical, especially the empirical literature in detail. It concludes with a brief presentation of present challenges and future directions.

**METHOD**

**Literature Search Strategies**

The search for relevant literature was conducted in three stages. First, electronic databases were searched for peer-reviewed journal articles, including theoretical, review, and empirical ones. Second, we used a “rolling-snowball” method to search more articles by manually checking references of journal articles identified in the first stage. Finally, we expanded our search by visiting websites of core journals and leading experts and by consulting with reference librarians and experts in the field.

Specifically, various phrases such as phone, cellular phones, cell phone, smart phone, mobile phone, IPhone, data, data collection, collecting data, and their different combinations were searched in keyword, title, or abstract of an article. Particular databases used were: PsycINFO, PubMed, Scopus, Applied Science and Technology, Communication, Computers and Applied Sciences Complete, Education Full Text, Education Research Complete, Educational Administration Abstracts, ERIC, Film and Television Literature Index, Health Source, Psychology and Behavioral Sciences Collection, Social Sciences Full Text, Academic Search Complete, Library Information Science and Technology, Medline, Primary Search, and Professional Development Collection.

**Exclusion and Inclusion Criteria**

We used four criteria for exclusion. First, studies using mobile phones as an intervention medium without collecting data were eliminated since it is not the focus of this study. Second, studies related to both collecting data about cell phone usage and developing cell phone software were also excluded. Third, studies using personal digital assistants (PDA) as the mobile data collection tool were excluded because PDAs do not have the function of a regular phone. Fourth, studies that examined general phones or landline phones were excluded, while we did not exclude studies dealing with both landline and mobile phones so that we might compare these two tools in data collection.

We employed inclusion criteria based on language and participants. First, studies published only in English from various disciplines were included. Second, studies were included regardless of either collecting data from human participants or retrieved data from a database without any human interaction. Note that most articles found were published after 2000, although we did not use the publication year for either inclusion or exclusion.

On the basis of the criteria specified above, as of April of 2013, 171 relevant articles were found in four broad categories: (a) review, (b) empirical (c) methodological, and (d) theoretical. These categories were created depending on the aims of article to better identify literature-integrative, empirical, methodological, or theoretical contributions of each article. Articles reviewing multiple empirical studies or multiple research cases were considered as review articles. We found 26 review articles as a result of our literature search. An article aiming at presenting an empirical study that reported collecting data with mobile phones was coded as an empirical study. We found 115 empirical studies (see the references for examples). Articles that aimed at evaluating the use of mobile phones as a methodological method for data collection were considered as methodological articles. We identified 27 methodological articles (see References section for details). Lastly, articles aiming at narrating general mobile data collection process and discussing general concerns were categorized as theoretical articles. We found three theoretical articles (Berg & Modi, 2010; Mourão & Okada, 2010; Shilton, 2009).
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