Gender Differences in Adoption and Use of a Healthcare IT Application

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INTRODUCTION

Information technology (IT) adoption and diffusion is a central concern of information systems research and practice. The most widely-accepted method in IT adoption and diffusion research, the technology acceptance model (TAM; Davis 1989), posits that perceived ease of use and perceived usefulness are fundamental determinants of user acceptance. However, TAM and its subsequent research makes little or no reference to gender effects (Adams, Nelson, & Todd, 1992; Chin & Gopal, 1995; Venkatesh & Davis, 2000), despite the fact that researchers have shown that socio-cultural factors, such as gender and ethnic differences, influence human perceptions and behaviors (Hofstede, 1980). These socio-cultural factors can result in differences in user responses to technology innovations (Gefen & Straub, 1997).

Aiming to provide theoretical extensions to the TAM model, researchers have shown that gender differences may relate to beliefs and use of IT. For instance, males and females are found to demonstrate distinct adoption behavior in use of a wide spectrum of IT applications, such as e-mail (Gefen & Straub, 1997), mobile telephony (Ling, 2000) and Internet (Kraut, Scherlis, Mukhopadhyay, Manning, & Kiesler, 1996). Nevertheless, the exact gender effect remains a controversy. Some researchers believe that females are less technology inclined, less motivated and, therefore, less competent in masculine computer and technology culture (Wilder, Mackie, & Cooper, 1985; Qureshi & Hoppel, 1995). Others, in contrast, argue that females have the ability to be proficient in adopting new technologies (Turkle, 1995). Some research results indicate that females tend to favor some technology innovations and use them more effectively than males, such as computer-mediated communication (Kraut et al., 1996; Morahan-Martin & Schumacher, 1997).

In health care, influence of physician gender has long been noted in resident education and many practice areas. Researchers find the procedural and obstetrical care pattern of practice differs between male and female residents (Chaytors, Szafran, & Crutcher, 2001), and physician gender significantly affects treatments in adult primary care practice (Boulis & Long, 2004). An understanding of these socio-cultural issues is also of vital importance towards success of health care IT applications. This study is thereby designed to assess medical residents' acceptance and adoption of a Clinical Reminder System (CRS), by examining several key user characteristics that may relate to adoption and use of the system.

BACKGROUND

CRS is a class of computerized clinical decision support systems (CDSS) that send just-in-time alerts to clinicians when potential errors or deficiencies in

patient management are detected. Beneficial outcomes of CDSS have been documented in many studies along a number of dimensions, including compliance with treatment standards, reduced costs and improved health outcomes (McDonald, Hui, Smith, Tierney, Cohen, Weinberger et al., 1995; Curtin, Hayes, Holland, & Katz, 1998). Several systematic reviews have also shown that CDSS can be an effective means of implementing medical guidelines to enhance clinical performance in wide-ranging aspects of medical care (Hunt, Haynes, Hanna, & Smith, 1998; Kaplan, 2001). However, most of these studies either focus on the accuracy and relevance of the computer-aided recommendations, or use experimental or randomized controlled clinical trials (RCCT) designs to assess system or clinical performance. Very few studies of CDSS involve a naturalistic design in routine settings with real patients (Kaplan, 2001). It is not clear whether a CDSS that has been shown to be effective in a laboratory setting will be fully utilized by end-users in clinical environments, and whether these users will adapt their practice style to efficiently accommodate computer-generated reminders.

Clinical users also differ in many ways. It has been recognized that individual users' experiences and their opinions or reactions to a technology make a difference in whether or not the technology will be adopted (Straub, Limayem, & Karahanna-Evaristo, 1995). Nevertheless, few studies have used individual-level data to measure the magnitude of user differentiation and the impact of such differentiation on technology adoption.

The present study aims to address some of these limitations. First, the system under evaluation, CRS, has been integrated into the daily operations of an ambulatory clinic. Second, longitudinal usage data for an evaluation period of 10 months were collected from computer logs, providing an objective and non-intrusive measure of the actual use over time. Third, a novel developmental trajectory method is applied to the usage data to identify groups that demonstrate distinct adoption behaviors, and to relate estimated group configurations to a variety of user characteristics.

The next section describes CRS and its basis in principles of evidence-based medicine. The study site and data collection procedures are then discussed, followed by a presentation of the trajectory analysis method for analyzing the usage data. The findings are presented next, and the final section presents some concluding remarks.

CRS AND EVIDENCE-BASED MEDICINE

Evidence-based medicine is the distillation of a large volume of medical research and standards into treatment protocols for diseases and preventive care procedures that represent the most accurate knowledge available (Sackett, Rosenberg, Muir Gray, Haynes, & Richardson, 1996). Evidence-based medicine has been widely applied to systematically review, appraise and use clinical research findings to aid the delivery and provisioning of optimum clinical care to patients.

The clinical decision support application that we developed, CRS, incorporates evidence-based medicine principles to assist in patient management decisions. It integrates the hospital's administrative, laboratory and clinical records systems into a single application, and uses patients' current medical status to provide reminders to clinicians at the point of care that reflect evidence-based medicine guidelines. Reminders generated by CRS take the form of recommendations to have tests scheduled and performed, receive vaccinations, alert clinicians to review abnormal test results or closely monitor patients with medical conditions that require unscheduled intervention. The CRS deployed at the time of this study is a distributed windows application based on client-server architecture. The clients are written in Visual Basic and communicate with an Oracle database server via the hospital's internal computer network. Evidence-based medicine guidelines are programmed in Oracle PL/SQL procedures.

STUDY SITE AND DATA COLLECTION

The study was conducted in the primary care clinic of an urban teaching hospital offering comprehensive health care services. Given the availability in every exam room of desktop computers installed with CRS, residents used the system during patient encounters.