Patient Perceptions of Electronic Health Records (EHRs) in Outpatient Healthcare Visits: A Survey of the State of Ohio

A Thesis
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by

Katherine Elizabeth Glass, MPH
Graduate Program in Allied Medicine
The Ohio State University
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Master’s Examination Committee:
Melanie Brodnik, PhD, RHIA, Advisor
Dr. Emily Patterson, PhD
Dr. Celia E. Wills, PhD, RN
Abstract

Background: The introduction of technology into the patient health care provider interaction and in particular the use of Electronic Health Records (EHRs) has revolutionized health data capture and analysis. However, electronic capture of health data has also changed the way health care communication occurs, affecting both clinicians and patients alike. Because patient satisfaction with a health care interaction is known to affect adherence to healthcare recommendations, it is important to identify the perceptions patients (or specific subgroups of patients) have of the medical encounter when the clinician uses an EHR. Positive patient perceptions of EHRs might provide health care providers with increased motivation to adopt health care technologies. Identifying any negative patient perceptions could provide health care providers with insight about how to better implement EHRs into the healthcare encounter.

Design and Methods: A sample of Ohio adults aged 21 and older (N = 481) was recruited from the U.S. National Institutes of Health-sponsored ResearchMatch health research volunteer registry. Participants completed a secure online survey (55.4% response rate) that included sociodemographic questions, EHR and encounter perception questions, and the Shared Decision-Making Questionnaire-9 (SDM-Q-9). Measures were completed based on the respondent having had an interaction with a health care provider during the 3 months prior to survey completion. Multiple linear regression analysis employing forward selection was used to model correlates of shared decision-making. A bivariate correlation matrix was utilized to model associations between age and EHR perception.

Results: Approximately two-thirds of patients in the study reported EHR use by their healthcare provider. The majority of those patients viewed EHR use favorably, and as an asset to their health. Those that reported no EHR use had mixed opinions regarding how an EHR might improve their care. Multiple linear regression demonstrated no relationship between the presence or absence of an EHR and perceived shared decision-making in health care interactions. However, patients who reported the use of an EHR in their encounter and liked how they were used saw a positive, statistically significant relationship with shared decision-making. Age was statistically associated with certain attitudes towards EHRs. Lower self-perceived skill with computers was found to be significantly associated with higher age.

Conclusion: While patients may have apprehensions or fears about EHR implementation before their health care provider uses them, patients of providers currently using EHRs appear to be satisfied with EHR use and perceive the health benefits of such use. Further, patients comfortable with EHR use appear to perceive higher shared-decision making in their health care interactions, which demonstrates potential for EHRs to support a process of healthcare that is potentially associated with patient satisfaction, adherence to treatment, and improved patient health outcomes.
Vita

May 2005..............................................Rocky River High School

May 2009..............................................B.S. Biology, John Carroll University

June 2011..............................................MPH. Epidemiology, The Ohio State University

April 2012-present ..............................Resource Planning Analyst, The Wexner Medical Center at The Ohio State University Division of Thoracic Surgery

Publications


Fields of Study

Major Field: Allied Medicine
Table of Contents

Abstract ........................................................................................................ ii
Vita ........................................................................................................... iii
List of Tables ............................................................................................... v
List of Figures .............................................................................................. vi
Chapter 1: Statement of the Problem ...................................................... 1
Chapter 2: Literature Review ................................................................. 7
Chapter 3: Methodology ............................................................................ 12
Chapter 4: Research Results ................................................................. 16
Chapter 5: Summary, Conclusions, and Recommendations.............. 35
Bibliography: ............................................................................................ 42
Appendix A: Survey Instrument .............................................................. 45
List of Tables

Table 1. Summary of Demographic Variables by Frequency and Percent................................................................. 18

Table 2. Summary of Continuous Variables for Survey Population, Demographic and Decision-Related.............................................. 23

Table 3. Summary of Autonomy Preference Scale (APS) Responses for Survey Population.......................................................... 24

Table 4. Perception of EHR Use Among Patients With Health Care Providers Utilizing EHRs................................................................. 28

Table 5. Multi-Variable Linear Regression modeling dependent variable, SDM-Q-9 score with EHR presence................................................... 30

Table 6. Multi-Variable Linear Regression modeling dependent variable, SDM-Q-9 score with EHR perception...................................................... 32

Table 7: Bivariate Correlation Matrix: Age and Patient Perception of Computer Use Questions............................................................ 33
List of Figures

Figure 1. CONSORT diagram of the sequence of study recruitment……………………………………………………………….. 17

Figure 2. Self-reported Race of Survey Respondents vs. Race of all ResearchMatch Participants and 2010 Census State of Ohio Race Estimates……………………………………………………………….. 19

Figure 3. Gender of Survey Respondents vs. Gender of all ResearchMatch Participants and 2010 Census State of Ohio Gender Estimates………………………………………………….. 21

Figure 4. Self-reported Primary County of Residents of Survey Respondents……………………………………………………… 22

Figure 5. Perceptions of EHR Use by Participants with No EHR During Health Care Encounters…………………………………….. 26
Chapter 1- Statement of the Problem

The introduction of technology into health care interactions, and in particular the use of Electronic Health Records (EHRs), has revolutionized health data capture and analysis. However, electronic capture of health data has also changed the way medical interactions are conducted, affecting both clinicians and patients alike. Clinicians must learn how to operate devices such as desktop computers, laptops, tablet devices, and smartphones, in addition to re-learning charting and documenting techniques formerly done on paper. As a result of these new technologies, the medical interview and communication with the patient during a health care interaction are also changing. The presence of an electronic device in an interaction to record patient information has the potential to alter both the verbal and non-verbal communication between the patient and the clinician. Clinicians using electronic devices to record patient information may change how or when they verbally communicate with the patient. The physical change between using an electronic device and writing on paper may also affect the physical expressions and body language of the clinician. While much research has been conducted about clinician perception of EHR use, significantly less has been conducted about how patients think and feel about it, how it might affect their perception of the healthcare interaction, and perhaps, how it might affect their health.
Shared decision-making (SDM), a concept which encourages both health care providers and patients to take a role in making health care decisions, is a relatively new approach to interaction in healthcare, with the potential to increase patient satisfaction, adherence, and improve health outcomes. If the introduction of EHRs into the health care interaction alters patient-provider communication, there may be an impact upon SDM and its positive contributions to healthcare.

Because patient satisfaction with a health care interaction is known to affect adherence to healthcare instruction and patient education, it is important to identify what kinds of perceptions patients (or specific subgroups of patients) have of the medical interaction when the clinician uses an EHR. Positive patient perceptions of EHR features might provide health care providers with ways to enhance outpatient health care visits and interaction with patients. Identifying any negative perceptions could provide health care providers with insight about how to better modify and implement EHR use into healthcare interactions.

**Study Purpose**

The purpose of this study was to assess patients’ perception of the use of EHRs by clinicians in outpatient healthcare visits, and to assess any relationship between such use and perceived SDM with a health care provider during a visit. Of special interest was to investigate any relationship between age of the patient and perspective of EHR use. The research was conducted via a brief survey sent to participants registered in a nationwide research database.
Study Significance

The significance of the study is that it has the potential to contribute to the body of knowledge about how patients perceive and are affected by the use of EHRs to capture data in outpatient health care visits. While some literature exists about the subject, most of these studies were conducted well before the 2009 Health Information Technology for Economic and Clinical Health (HITECH) Act mandating EHR use and widespread adoption of EHRs began. The use of technology has expanded rapidly, but the body of literature concerning how patients perceive these changes has not followed suit. Additionally, much of the existing literature on patient perception of electronics use is based on studies with small sample sizes, low response rates, and data collection that is limited to a few health care practices. The state-wide nature of this study might assist in better understanding how EHR use is perceived across several different health care providers and in a larger population than previously examined.

Also unique to this study is its aim to identify how SDM might be impacted during an electronically-based health care visit. SDM is a relatively new type of healthcare interaction, and while a substantial body of literature exists on the subject, it is by no means complete. It is important that patient-centered care methods like SDM continue to grow with the rapid changes in health technology, and few studies exist examining how SDM and EHR might be implemented together to compliment the other. Discerning exactly what pieces of shared decision-making work well with EHR use could greatly benefit health care
outcomes, and add to the body of knowledge surrounding shared decision-making.

In addition, the study might also provide insight into statewide adoption rates of EHRs in health care visits. Because the U.S. Department of Health and Human Services strives to have all health data collection be electronic by 2015 under the HITECH Act, estimates of adoption could contribute to better understanding of the preparedness of the state of Ohio.

**Research Questions**

Three research questions guided the study effort.

1.) What are patient perceptions of clinician use of EHRs during outpatient healthcare visits?

2.) What is the relationship between EHR use during an outpatient healthcare visit and patient perception of involvement in shared decision-making (SDM)?

3.) What is the relationship between patient perceptions of EHRs to age?

As technology use in health care has grown at an explosive rate, research regarding how it is perceived by consumers of healthcare has not kept pace. It is of public health interest to have a basic understanding of how patients as a larger population perceive the care they receive. A prior study observed a preliminary relationship between EHR use and increased patient perception of involvement in decision-making. It is of particular interest to investigate if different age groups
have different sensitivities regarding technology usage. Prior research has indicated that age and concerns about use of technology may be correlated. It is hypothesized that older age groups, who have previously been shown to have more anxiety and less knowledge about technology use, will have a more negative perception of EHRs.

**Definitions of Terms**

**Electronic Medical Record/Electronic Health Record (EHR)** - a computerized medical record that allows storage, retrieval and modification of patient treatment information and history.

**Electronic Data Collection** - The use of any type of electronic device (desktop computer, laptop, I-Pad or tablet, Blackberry, etc.) to collect data in a patient-clinician encounter.

**Health Information Technology (HIT)** - the application of information processing involving both computer hardware and software that deals with the storage, retrieval, sharing, and use of health care information, data, and knowledge for communication and decision making.

**Shared Decision-Making (SDM)** - broadly defined as an interactive, collaborative process between patients and health care providers that is used to make health care decisions, that is characterized by several features of the patient-provider interaction: (a) eliciting and acknowledging patients’ preferences for participation;
(b) giving choices as to how the decision-making process will proceed; and, (c) mutually respecting and adhering to choices.

**Limitations**

The study was conducted on a state-wide level using a volunteer-based, online registry of individuals who, upon request, self-selected to participate in research studies. The nature of the registry may introduce sampling bias into the study. It can also be anticipated that the survey population obtained will not be fully representative of the state of Ohio’s population. In part, this has to do with the fact that as an online registry, the database is somewhat limited to individuals who have regular, dependable internet/computer access, which is associated with higher socioeconomic status.

The second source of potential bias may come from the fact that those who feel comfortable enough to complete an electronic-based survey already have a great deal of comfort with electronic devices, and may be more likely to have positive perceptions of technology.

Recall bias may also be present to a small degree in the study, as patients will be asked to evaluate a visit with their clinician retrospectively. It is possible that events since their visit may influence how they now feel about it- for example, a patient who followed the medical advice they were given may now be feeling better, and therefore they now recall the visit positively, but felt less favorably at first.
Chapter 2- Literature Review

As EHR implementation increases in U.S., in part due to the impetus from the HITECH Act, it remains somewhat unclear how U.S. patients feel about and react to EHR use in their health care visits. Few studies have been conducted about patient perceptions, and those that have were on a small scale and may already be outdated due to the rapid growth of technology. Age may or may not be a factor in technology and EHR acceptance. Conflicting evidence about the impact of the EHR in the healthcare visit exists, with some literature indicating negative effects on patients, and some indicating positive effects, such as increased shared decision-making.

The HITECH Act and EHR Usage in the U.S.

The use of electronics to collect patient data in healthcare visits is becoming pervasive in the U.S., vitalized in part by The HITECH Act of 2009. The HITECH Act set EHR adoption in the U.S. health care system as a critical national goal, and incentivized EHR adoption by tying Medicare and Medicaid payments to their successful implementation [1]. The ultimate goal of the HITECH Act is not simply adoption of EHRs, but 'meaningful use' of them, meaning that their use by health care providers should considerably improve patient outcomes [2]. The Act calls for all health care organizations in the United States to use EHRs in a meaningful manner by 2015. Organizations and providers who do not comply will face
penalties in the form of reduced Medicare/Medicaid reimbursements. EHRs and other forms of electronic data collection are advocated on the basis of enhanced data collection and subsequently, improved patient care. Electronic data collection and management have the potential to improve short-term preventative care, chronic disease management, and increase patient compliance with provider lifestyle recommendations [3].

**EHR Use and Patient Perception**

The U.S. Department of Health and Human Services (HHS) reports that the percentage of physicians who have adopted basic EHRs in their practice has doubled from 17 to 34 percent between 2008 and 2011, with the percent of primary care doctors using this technology nearly doubling from 20 to 39 percent [4]. While the number of health care providers using EHRs is bound to increase in the near future, it appears that patients have mixed feelings about the matter. Patients who reported their doctors did not use a computer were split on their doctor adopting the technology. Of these respondents, 38.4 percent wanted their doctor to “go digital,” while 32.7 percent did not and 28.9 percent were not sure [5]. Of those patients whose health care providers have already implemented an EHR, one recent study reported 20% of patient respondents having a negative perception of using electronics to record information. Over 80% were concerned with the security and privacy of medical records being stored electronically [6].

There is some evidence that patient age may be a factor in the perception of EHR usage. While there is acknowledgement of a “digital divide” between age groups, there is little research exploring acceptance of digital systems by the
elderly [7], which is particularly concerning in the era of the increased presence of EHR usage in the health care visit. Of the literature that does exist, much of it is dated as a result of the rapid and ubiquitous growth of technology. Dyck and Smither [8] found that adults 55 and older have less computer experience than younger adults, and less computer confidence. Similarly, a study by Laguna and Babcock [9] indicated that older adults had significantly higher anxiety and different perceptions of computers than younger adults. More recently, a European study found seniors’ negative perceptions of electronics to be based on private access possibilities, motivational indifference, and deficient knowledge [10]. A 2003 study by Beckers and Schmidt [11] came to the conclusion that it is difficult to pinpoint whether age or experience was the major cause of computer anxiety; but still, a relationship between age and fear or resistance to technology has been constantly found to be an important factor.

**EHR use and the Patient-Clinician Interaction**

Previous research has indicated that the introduction of computers into the consultation had a significant impact on the communication between patient and doctor [12]. This is noteworthy in view of research indicating that compliance, health outcomes, perception of physician competence, and malpractice suits are all related to physicians’ interpersonal skills and patient satisfaction [13]. The importance of even small changes in communication during medical visits as a result of electronic usage may be greater than it initially seems. In terms of changing verbal communication, Makoul, Curry, and Tang [14] found that physicians using EMRs were less likely to explore psychosocial/emotional
issues, such as how health problems affect a patient’s life, than their
counterparts using paper records. EHR use may also cause a disruption in the
temporal sequence in the way in which patients explain their illnesses, a
chronology that may be important for diagnosis [15]. On the non-verbal side of
interactions, the importance of communication in a medical visit—both verbal and
non-verbal—has been well-documented even before the use of advanced
technology to capture health data. Physicians’ nonverbal skills have been
associated with outcome variables such as patient satisfaction, patient recall of
medical information, and patient compliance [16].

**EHR use and Shared-Decision Making (SDM)**

Conversely, the use of EHRs has also been shown to play a positive role
within the patient-clinician relationship. In particular, EHR use shows promise in
increasing shared decision-making (SDM) in healthcare visits encounters. SDM
is broadly defined as an interactive, collaborative process between patients and
health care providers that is used to make health care decisions, that is
characterized by several features of the patient-provider interaction: (a) eliciting
and acknowledging patients’ preferences for participation; (b) giving choices as
to how the decision-making process will proceed; and, (c) mutually respecting
and adhering to choices [17]. SDM is receiving increasing attention as a solution
to better meet patient decision support needs by improving the quality of patient-
provider health care decision-making processes. SDM is advocated on premises
that patients have a right of self-determination, as well as an expectation that
patient involvement in shared decision-making can increase the likelihood of
treatment adherence [18]. Because EHRs provide healthcare providers with their patients’ complete medical histories, they might be better equipped for SDM by knowing more about the patient. EHRs can also encourage patients to take a more active role in their own healthcare by producing educated consumers with easier access to their personal records and a more complete platform on which to record and build their thoughts and beliefs about their own healthcare [19]. As one of the goals of EHR implementation from the HITECH Act is improved patient health outcomes, a positive association between EHRs and SDM may prove to be important.

EHR-using physicians have been observed to produce increased patient perception of shared decision-making within a visit [20]. Physicians using EHRs were also more likely to adopt a role in clarifying information and asking questions of the patient, [14], and high EHR use interviews were associated with patients asking more questions than they did in low EHR use interviews [16].
Chapter 3- Methodology

This cross-sectional survey study was conducted via ResearchMatch [21]. ResearchMatch is a national registry that was created by several academic institutions and is funded by the National Institutes of Health as part of the Clinical Translational Science Award (CTSA) program. Researchmatch works by allowing individuals to enroll in the registry at any time, free of charge. By doing so, they indicate they are willing to be contacted about participating in research studies. The purpose of ResearchMatch is to connect volunteers with researchers from participating schools and medical centers by providing a mechanism through which researchers can contact persons that might be eligible for their studies. ResearchMatch has large populations of both healthy volunteers and volunteers with a variety of health conditions. ResearchMatch categorizes research volunteers by state, and allows study coordinators to conceptualize the viability of a study by allowing access to de-identified patient demographics such as age, gender, race, ethnicity, and any reported health conditions before providing identifying and contact data.

An invitation to participate in the study was sent to all participants registered to the ResearchMatch database living in the state of Ohio over the age of 21 over a week-long period. A ResearchMatch volunteer who received the invitation for study participation was required to check “YES” on
the ResearchMatch study invitation, whereupon they were sent a link to the online study survey. Both the study invitation and the survey asked the respondent to confirm that s/he met study eligibility criteria by: (a) being age 21 or older; and, (b) having had a consultation with a health care provider within the past 3 months related to a personally-experienced health issue. After the survey links were sent to potential participants, they had approximately one month to take the survey before the link was disabled. While responses were anonymous, the REDCap survey software used to collect data prevented participants from taking the survey more than once. No follow-up emails were sent to potential participants to remind them to take the survey.

The access to send email to individuals was available via the ResearchMatch server and the investigator did not download or save email addresses. Data were collected in fully de-identified electronic form via the OSUMC secure network using REDCap Health Survey software. Individual participants were thus identifiable only by a unique study identification number that could not be linked to individual identifiers in ResearchMatch.

Data Collection Instrument

The survey consisted of measures of participant characteristics, questions about patient perceptions of EHRs and their experience during their health care visit, and measures related to the process of decision-making in regard to the reference consultation with the health care provider (Appendix A). For personal characteristics, participants were asked to self-report age, race, gender, state of
residence, ethnicity, health insurance status, education level, and their perception of their own skill with computers.

The survey began with a question that asked the participant to select from six choices the statement that best described the extent to which the respondent wished to be involved in making health-related decisions. This measure is the Autonomy Preference Scale (APS), a single-item measure rated on a 1 to 5 ordinal scale, with equally shared decision-making rated as a 3 [22]. This was followed by nine shared decision making statements, the SDM-Q-9. The SDM-Q-9 was adopted from previously validated studies in both German and U.S. populations [23, 24]. Respondents were asked to indicate on a six point scale that ranged from 'strongly agree' to 'completely disagree' how they felt about each decision making statement. The statements assessed a patient’s perception of shared decision-making in a healthcare visit.

The next section of the survey was comprised of fourteen questions related to the respondents’ perception of the use of an electronic health record (EHR) by the healthcare provider. The questions were adopted from a study by Hsu et. al’s 2005 study [20] and were modified from the Medical Interview Satisfaction Scale [25]. Three questions on the survey were author generated and not previously tested or utilized in another scale.

### Analysis

Patient perception of clinician use of EHRs during outpatient healthcare visits were assessed by comparing percentage of the sample’s responses to each question regarding EHR use. Range of answers and visualization of the
data through graphs and charts were used to better describe the opinions of the study population. Frequencies and distributions of demographic variables were constructed. The SDM-Q-9 total score, the only scored scale in the survey instrument, was standardized on a 0-100 scale per the Kriston et al scoring procedure [23]. APS score was averaged for the sample. Because the fourteen questions related to EHR by the healthcare provider were not a standardized measure or scale, the answers to each question were analyzed by frequency of response.

Multiple linear regression analysis employing forward selection was used to model the relationship between EHR use during an outpatient healthcare visit and patient perception of involvement in shared decision-making (SDM), at a .05 level of significance. IBM SPSS Statistics 20 was utilized to perform the regression analysis. Measures that were not already dichotomous were converted to be so. For example, race, a measure with 6 choices originally was dichotomized into “white” and “not white,” and education level (originally with 7 choices) was dichotomized as “high school education or less” and “greater than high school education.” The outcome of interest for the regression was SDM-Q-9 total score.

A bivariate correlation matrix was used to analyze patient perceptions of EHRs and the socio-demographic variable of age. In this analysis, The Patient Perception of Computer Use questionnaire questions, self-perceived skill with computers, and age were compared for significant correlation.
Chapter 4- Research Results

Research Population and Sample Representativeness

At the time sampling began, 3,420 individuals were registered in the ResearchMatch database living in the state of Ohio. Sampling was done over a week long period, in order to allow the researcher time to send the survey to all individuals indicating they wished to participate. Figure 1 shows the study flow diagram.
An invitation to was sent to all ResearchMatch participants living in Ohio who were 21 years and older. Of the 3,082 Ohio residents who reported to ResearchMatch that they were 21 or older, a total of 868 people selected “YES” in response to the invitation to participate in the study. The overall response rate to the survey invitation was 28.2%. Of the 868 who received the survey, 481
completed the survey, for a response rate of 55.4%. Of the 3,082 total individuals sent an initial invitation, 481 returned a completed survey, for an overall total response rate of 15.6%.

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Race</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>409</td>
<td>86.8</td>
</tr>
<tr>
<td>Non-white</td>
<td>62</td>
<td>13.2</td>
</tr>
<tr>
<td>Total</td>
<td>471</td>
<td></td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>20</td>
<td>4.2</td>
</tr>
<tr>
<td>Non-Hispanic</td>
<td>458</td>
<td>95.8</td>
</tr>
<tr>
<td>Total</td>
<td>478</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>104</td>
<td>78.0</td>
</tr>
<tr>
<td>Female</td>
<td>375</td>
<td>21.6</td>
</tr>
<tr>
<td>Total</td>
<td>481</td>
<td></td>
</tr>
<tr>
<td>Education Level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High School or less</td>
<td>14</td>
<td>2.9</td>
</tr>
<tr>
<td>Greater than high school</td>
<td>465</td>
<td>96.7</td>
</tr>
<tr>
<td>Total</td>
<td>479</td>
<td></td>
</tr>
<tr>
<td>Health Insurance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Health Insurance</td>
<td>25</td>
<td>5.2</td>
</tr>
<tr>
<td>Health Insurance</td>
<td>455</td>
<td>94.8</td>
</tr>
<tr>
<td>Total</td>
<td>480</td>
<td></td>
</tr>
</tbody>
</table>

Table 1: Summary of Demographic Variables by Frequency and Percent

Table 1 provides a summary of selected demographic variables by frequency and percentages. It highlights the distribution of the survey sample in terms of gender, race, and ethnicity, as well as information about other demographic variables of interest. The average age of the survey respondents was 39.6 years (SD 13.7), which is comparable to the median age of the state of Ohio, 38.8 years [26]. For comparison purposes the race/ethnicity and gender were also compared to the State of Ohio 2010 census data and the ResearchMatch participant demographic data (see Figure 2).
Figure 2: Self-reported race of Survey Respondents vs. Race of all ResearchMatch Participants and 2010 Census state of Ohio Race Estimates

Comparisons reveal that the majority of the survey respondents were white (86.8%), which is slightly higher than both the Ohio ResearchMatch (82.8%) and State of Ohio percentages (82.7%) for race [26]. In regard to non-
white respondents, 8.3% were African-American compared to 10.9% found in the Ohio ResearchMatch population and 12.2% reported in the State of Ohio census data. For Asian, American Indian/Alaskan Native, and other racial groups, however, the survey sample roughly matched the Ohio ResearchMatch database and/or the State of Ohio 2010 census data. The survey population also had a slightly higher proportion of Hispanics represented (4.2%) than the Ohio ResearchMatch database, where 2.3% of the population reported themselves as Hispanic. In comparison, the 2010 Census estimated that approximately 3.1% of the Ohio population was Hispanic [27]. In regard to gender, Figure 3 shows that, while the distribution of gender in the State of Ohio is approximately even for male (48.8%) and females (51.2%), both the sample population (78%) and the Ohio ResearchMatch population (73.3%) have a larger proportion of women than men, 21.6% sample and 26.7% for the ResearchMatch population.

The majority of respondents had greater than a high school educational level, (n=465, 96.7%). In addition the majority also had some form of health insurance (n=455, 94.8%).
Figure 3: Gender of Survey Respondents vs. Gender of all ResearchMatch Participants and 2010 Ohio Census Data
Figure 4: Self-reported Primary County of Residence of Survey Respondents

Figure 4 shows the geographic distribution of study participants throughout Ohio by county. The largest concentration was focused around the Columbus area, with dense population groups around the Cleveland area as well. 57.4% of respondents reported living in Franklin County, and 14.0% reported living in Cuyahoga County.
Participant Computer Skill Level and Personal Health Record

Study participants were asked to rate their skill level with computers on a scale of Very High (1) to very low (5). The majority of respondents reported they had an above average to very high level of skill with computers \((\text{mean}=1.90, \ SD=0.72)\) (Table 2). Study participants were also asked if they maintained their own personal health record and if so to select the statement that best described their personal health record. 38.1% of participants indicated that they maintained some sort of personal health record. Of those, 11.0% maintained a purely electronic personal health record, 41.4% maintained a paper personal health record, and 47.5% maintained a combination of electronic and paper copies of their personal health record.

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autonomy Preference (APS)</td>
<td>481</td>
<td>2.23</td>
<td>0.68</td>
</tr>
<tr>
<td>Self-Rated Skill with Computers</td>
<td>477</td>
<td>1.90</td>
<td>0.72</td>
</tr>
<tr>
<td>Shared Decision Making (SDM-Q-9)</td>
<td>373</td>
<td>67.42</td>
<td>21.21</td>
</tr>
</tbody>
</table>

Table 2: Summary of Continuous Variables for Survey Population, Demographic and Decision-Related
Shared Decision-Making (SDM)

The concept of shared decision making was addressed in two ways. First, the respondents were asked to select from six choices the statement that best described the extent to which they wished to be involved in making health-related decisions in the APS scale. **Table 3** provides a summary of the respondents’ choices.

<table>
<thead>
<tr>
<th>Decision Choice</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>I should make the decision, but take others’ opinions into account</td>
<td>305</td>
<td>63.4</td>
</tr>
<tr>
<td>I and others should make the decision together, on an equal basis</td>
<td>107</td>
<td>22.2</td>
</tr>
<tr>
<td>I should make the decision on my own</td>
<td>44</td>
<td>9.1</td>
</tr>
<tr>
<td>Others should make the decision</td>
<td>25</td>
<td>5.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>481</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

**Table 3**: Summary of Autonomy Preference Scale (APS) Responses for Survey Population

The majority of respondents reported that they should make the healthcare decision on their own, but take others’ opinions into account (n= 63.4%) APS for the entire population averaged 2.23. It is easy to see where the average APS comes from when analyzing the population responses to the APS question. The majority (63.4%) indicated that their autonomy preference in decision making was a 2.0 on the scale, corresponding with the belief “I should make the decision on my own, but take others’ opinions into account.” About one-fifth (22.2%) of the population indicated their preference was 3.0: “I and others should make the decision together, on an equal basis”.

The second analysis of SDM consisted of nine statements related to shared decision-making during the healthcare visit, whereby the respondent was
given a six-point rating scale and asked to indicate a level of agreement with 9 statements, part of the SDM-Q-9 scale. The mean SDM-Q-9 score, 67.4, was the sum of the score of each of the nine SDM-Q-9 items, standardized on a scale of 0 to 100. The score indicates that the population was above the midpoint of the scale in terms of perception that shared decision-making was present in their visit with a health care provider.

**Patient Perception of EHRs**

Participants were asked if the health care provider used an EHR during their visit. 65.8% of participants reported their health care provider used an EHR during their health care visit while 20.0% reported the health care provider did not. 12.1% were not sure and 2.1% did not recall. Of the 104 who responded that an EHR was not used during their visit, weren’t sure, or didn’t recall, the question was asked “Do you feel that the use of an EHR would improve your care?” Responses to this question were mixed with about one third indicating yes, one third not sure, and one third indicating no or having no opinion (see Figure 5).
If your health care provider did NOT use an EHR during your health care visit, do you feel that the use of an EHR would improve your care?

![Bar Chart](image)

**Figure 5:** Perceptions of EHR Use by Participants with No EHR During Health Care Visits
Table 4 summarizes the perception of EHR use in healthcare visits by those respondents who indicated that an EHR was a part of their most recent health care visit. The vast majority of respondents viewed EHR use during their healthcare visit positively. In particular, participants indicated that EHR use helped health care providers know about all the things happening in the patient’s medical care, and allowed health care providers to look into all the problems mentioned by the patient. Furthermore, a high percentage of participants felt that even despite EHR use, health care providers paid attention when the patient was speaking, and spent enough time with them. Of particular note is the number of respondents (n=232, 75.4%) who disagreed or neither agreed nor disagreed with the statement “I am concerned about the security and privacy of my medical records being stored electronically”.
<table>
<thead>
<tr>
<th>Survey Question</th>
<th>N</th>
<th>Totally Agree or Agree (%)</th>
<th>Neither Agree nor Disagree (%)</th>
<th>Disagree or Totally Disagree (%)</th>
<th>N/A (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The EHR use helped me better understand what happened at my visit.</td>
<td>315</td>
<td>95 (30.1)</td>
<td>129 (41.0)</td>
<td>71 (22.6)</td>
<td>20 (6.3)</td>
</tr>
<tr>
<td>The EHR use helped my health care provider know about all the things happening in my medical care.</td>
<td>315</td>
<td>260 (82.6)</td>
<td>36 (11.4)</td>
<td>16 (4.8)</td>
<td>4 (1.3)</td>
</tr>
<tr>
<td>The EHR helped my health care provider make my care more personalized.</td>
<td>313</td>
<td>196 (62.6)</td>
<td>83 (26.5)</td>
<td>30 (9.6)</td>
<td>4 (1.3)</td>
</tr>
<tr>
<td>The EHR helped the visit run in a more timely manner.</td>
<td>313</td>
<td>203 (64.8)</td>
<td>78 (24.9)</td>
<td>30 (9.6)</td>
<td>2 (.6)</td>
</tr>
<tr>
<td>The EHR fit well into the overall flow of the visit.</td>
<td>312</td>
<td>253 (81.0)</td>
<td>34 (10.9)</td>
<td>24 (7.7)</td>
<td>1 (.3)</td>
</tr>
<tr>
<td>Overall, I liked the way that my health care provider used the EHR.</td>
<td>314</td>
<td>253 (80.5)</td>
<td>42 (13.4)</td>
<td>18 (5.8)</td>
<td>1 (.3)</td>
</tr>
<tr>
<td>My health care provider seemed to pay attention as I described my condition or problem.</td>
<td>314</td>
<td>277 (88.3)</td>
<td>18 (5.7)</td>
<td>17 (5.4)</td>
<td>2 (.6)</td>
</tr>
<tr>
<td>My health care provider looked into all the problems I mentioned.</td>
<td>313</td>
<td>266 (85.0)</td>
<td>17 (5.4)</td>
<td>22 (7.0)</td>
<td>8 (2.6)</td>
</tr>
<tr>
<td>My health care provider spent enough time with me.</td>
<td>315</td>
<td>270 (85.7)</td>
<td>19 (6.0)</td>
<td>26 (8.3)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>I felt involved in the decision-making about my condition or problem.</td>
<td>315</td>
<td>237 (75.3)</td>
<td>33 (10.5)</td>
<td>31 (9.8)</td>
<td>14 (4.4)</td>
</tr>
<tr>
<td>I believe that EHRs will improve my quality of care.</td>
<td>313</td>
<td>238 (76.0)</td>
<td>67 (21.4)</td>
<td>7 (2.2)</td>
<td>1 (.3)</td>
</tr>
<tr>
<td>I am concerned about the security and privacy of my medical records being stored electronically.</td>
<td>313</td>
<td>77 (24.6)</td>
<td>50 (16.0)</td>
<td>186 (59.4)</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>

*Table 4:* Perception of EHR Use Among Patients With Health Care Providers Utilizing EHRs
**Relationship Between SDM and EHR Use**

To address the question of whether there was a relationship between EHR use during an outpatient healthcare visit and patient perception of involvement in shared decision-making (SDM), a multiple linear regression analysis was conducted. The variables employed in the model were race, gender, ethnicity, education level, age, health insurance status, autonomy preference (APS), personal skill with computers, and EHR use by health care provider. Characteristics considered non-modifiable were controlled by grouping them together in a block. These non-modifiable variables were race, gender, ethnicity, education level, health insurance status, age, and APS. Personal skill with computers and EHR use by health care provider were considered modifiable variables, and were added to the model only after controlling for the non-modifiable variables. EHR use by health care provider was transformed into a dichotomous variable. The standardized SDM-Q-9 score was the dependent variable.

The final linear regression model demonstrated that the presence of an EHR in a health care visit was not a statistically significant predictor of SDM (Table 5). However, age did exhibit a positive relationship with SDM in the model, at a p-value of 0.001. In interpreting the standardized Beta coefficient, a one standard deviation increase in age would result in a 0.181 standard deviation increase in perceived SDM in a healthcare visit, holding all other variables constant. The adjusted R² value for the complete model was 0.019, indicating that 1.9% of the variation in SDM score can be explained by the model. VIF
values for all variables in the model were at or around 1, suggesting little
collinearity between them.

<table>
<thead>
<tr>
<th>Model Variables</th>
<th>Standardized Beta</th>
<th>Standard Error</th>
<th>T</th>
<th>Significance (p)</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(constant)</td>
<td></td>
<td>8.573</td>
<td>2.139</td>
<td>0.033</td>
<td></td>
</tr>
<tr>
<td>Race (Dicot)</td>
<td>.075</td>
<td>1.566</td>
<td>1.414</td>
<td>0.158</td>
<td>1.017</td>
</tr>
<tr>
<td>Education Level (Dicot)</td>
<td>.046</td>
<td>3.414</td>
<td>.873</td>
<td>0.383</td>
<td>1.020</td>
</tr>
<tr>
<td>Age in Years</td>
<td>.171</td>
<td>.038</td>
<td>3.202</td>
<td>0.001</td>
<td>1.040</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>.039</td>
<td>2.636</td>
<td>.722</td>
<td>0.471</td>
<td>1.046</td>
</tr>
<tr>
<td>Health Insurance</td>
<td>-.019</td>
<td>2.124</td>
<td>-.360</td>
<td>0.719</td>
<td>1.042</td>
</tr>
<tr>
<td>Gender</td>
<td>-.009</td>
<td>1.253</td>
<td>-.163</td>
<td>0.870</td>
<td>1.052</td>
</tr>
<tr>
<td>Autonomy Preference (APS)</td>
<td>-.044</td>
<td>.722</td>
<td>-.831</td>
<td>0.407</td>
<td>1.008</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(constant)</td>
<td></td>
<td>8.941</td>
<td>2.427</td>
<td>0.016</td>
<td></td>
</tr>
<tr>
<td>Race (Dicot)</td>
<td>.073</td>
<td>1.569</td>
<td>1.384</td>
<td>0.167</td>
<td>1.020</td>
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<tr>
<td>Education Level (Dicot)</td>
<td>.036</td>
<td>3.456</td>
<td>.665</td>
<td>0.506</td>
<td>1.045</td>
</tr>
<tr>
<td>Age in Years</td>
<td>.182</td>
<td>.039</td>
<td>3.349</td>
<td>0.001</td>
<td>1.074</td>
</tr>
<tr>
<td>Ethnicity</td>
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<td>2.652</td>
<td>.816</td>
<td>0.415</td>
<td>1.058</td>
</tr>
<tr>
<td>Health Insurance</td>
<td>-.024</td>
<td>2.133</td>
<td>-.438</td>
<td>0.661</td>
<td>1.050</td>
</tr>
<tr>
<td>Gender</td>
<td>-.008</td>
<td>1.265</td>
<td>-.154</td>
<td>0.878</td>
<td>1.071</td>
</tr>
<tr>
<td>Autonomy Preference (APS)</td>
<td>-.049</td>
<td>.726</td>
<td>-.927</td>
<td>0.355</td>
<td>1.018</td>
</tr>
<tr>
<td>Self-Rated Skill with Comp.</td>
<td>-.071</td>
<td>.749</td>
<td>-1.311</td>
<td>0.191</td>
<td>1.077</td>
</tr>
<tr>
<td>EHR in visit (dicot)</td>
<td>-.008</td>
<td>1.092</td>
<td>-.144</td>
<td>0.885</td>
<td>1.054</td>
</tr>
</tbody>
</table>

**Table 5**: Multi-Variable Linear Regression modeling dependent variable, SDM-Q-9 score with EHR presence
Although the presence or absence of an EHR during a health care visit exhibited no relationship with SDM, it was of interest to examine how participants who had experienced EHR use felt about it, and how their attitude about EHRs affected perceived SDM. Thus, a second multiple linear regression was run, substituting the EHR use by health care provider variable with the statement “Overall, I liked the way my health care provider used the EHR”. In this model, the statement was negatively associated with SDM, at a p-value < 0.000 (Table 6). Because the EHR perception question was reverse-scored, the relationship is actually a positive one: participants who liked the way their health care provider used the EHR (lower scores) were associated with higher perceived SDM. In this model, age and race were marginally significant (p=0.047 and 0.057, respectively), and the adjusted R² value indicated that 7.9% of the variation in SDM score can be explained by the model.
<table>
<thead>
<tr>
<th>Model Variables</th>
<th>Standardized Beta</th>
<th>Standard Error</th>
<th>t</th>
<th>Significance (p)</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(constant)</td>
<td></td>
<td>11.194</td>
<td>1.294</td>
<td>0.197</td>
<td></td>
</tr>
<tr>
<td>Race (Dicot)</td>
<td>.143</td>
<td>2.095</td>
<td>2.188</td>
<td>0.30</td>
<td>1.033</td>
</tr>
<tr>
<td>Education Level (Dicot)</td>
<td>.035</td>
<td>4.062</td>
<td>.548</td>
<td>0.584</td>
<td>1.014</td>
</tr>
<tr>
<td>Age in Years</td>
<td>.139</td>
<td>.049</td>
<td>2.090</td>
<td>0.038</td>
<td>1.069</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>.048</td>
<td>4.158</td>
<td>.722</td>
<td>0.471</td>
<td>1.063</td>
</tr>
<tr>
<td>Health Insurance</td>
<td>-.004</td>
<td>2.592</td>
<td>-.058</td>
<td>0.954</td>
<td>1.054</td>
</tr>
<tr>
<td>Gender</td>
<td>.050</td>
<td>1.727</td>
<td>.740</td>
<td>0.460</td>
<td>1.085</td>
</tr>
<tr>
<td>Autonomy Preference (APS)</td>
<td>-.057</td>
<td>.916</td>
<td>-.873</td>
<td>0.384</td>
<td>1.031</td>
</tr>
<tr>
<td>(constant)</td>
<td></td>
<td>11.564</td>
<td>2.237</td>
<td>0.026</td>
<td></td>
</tr>
<tr>
<td>Race (Dicot)</td>
<td>.122</td>
<td>2.041</td>
<td>1.917</td>
<td><strong>0.057</strong></td>
<td>1.043</td>
</tr>
<tr>
<td>Education Level (Dicot)</td>
<td>.017</td>
<td>4.008</td>
<td>.267</td>
<td>0.790</td>
<td>1.051</td>
</tr>
<tr>
<td>Age in Years</td>
<td>.130</td>
<td>.048</td>
<td>2.001</td>
<td><strong>0.047</strong></td>
<td>1.092</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>.044</td>
<td>4.035</td>
<td>.677</td>
<td>0.499</td>
<td>1.065</td>
</tr>
<tr>
<td>Health Insurance</td>
<td>.011</td>
<td>2.530</td>
<td>.174</td>
<td>0.862</td>
<td>1.068</td>
</tr>
<tr>
<td>Gender</td>
<td>.030</td>
<td>1.679</td>
<td>.461</td>
<td>0.645</td>
<td>1.091</td>
</tr>
<tr>
<td>Autonomy Preference (APS)</td>
<td>-.102</td>
<td>.901</td>
<td>-1.593</td>
<td>0.113</td>
<td>1.063</td>
</tr>
<tr>
<td>Self-Rated Skill with Comp.</td>
<td>-.050</td>
<td>.951</td>
<td>-.777</td>
<td>0.438</td>
<td>1.084</td>
</tr>
<tr>
<td>“Overall, I liked the way that my health care provider used the EHR”</td>
<td>-.253</td>
<td>.714</td>
<td>-3.924</td>
<td><strong>0.000</strong></td>
<td>1.070</td>
</tr>
</tbody>
</table>

**Table 6**: Multi-Variable Linear Regression modeling dependent variable, SDM-Q-9 score with EHR perception
**Relationship Between Age and EHR Perception**

Table 7 displays the results of the bivariate correlation matrix. Of the Patient Perception of Computer Use questions, two questions demonstrated a statistically significant relationship with age: “The EHR use helped make my care more personalized” and “The EHR helped my health care provider make my care personalized” (p=0.020). Both demonstrated negative Pearson correlations, indicating that disagreement with the statement is associated with an increase in age. Also statistically significant was self-rated skill with computers (p=0.033 and 0.001, respectively). Self-perceived skill with computers was also negatively associated with age (p=0.000).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Age</th>
<th>The EHR use helped me better understand what happened at my visit</th>
<th>The EHR use helped my health care provider know about all the things happening in my medical care.</th>
<th>The EHR helped my health care provider make my care more personalized.</th>
<th>The EHR helped the visit run in a more timely manner.</th>
<th>Overall, I liked the way that my health care provider used the EHR.</th>
<th>How would you rate your own skill with computers?</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is your age?</td>
<td></td>
<td>Pearson Correlation</td>
<td>Sig (1-tailed)</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td></td>
<td>.104</td>
<td>.033</td>
<td>477</td>
<td>311</td>
<td>311</td>
<td>309</td>
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<tr>
<td>Sig (1-tailed)</td>
<td></td>
<td>.065</td>
<td>.126</td>
<td>.001</td>
<td>.057</td>
<td>.129</td>
<td>.055</td>
</tr>
<tr>
<td>N</td>
<td></td>
<td>.171</td>
<td>.017</td>
<td>.090</td>
<td>.065</td>
<td>.091</td>
<td>.192</td>
</tr>
<tr>
<td>How would you rate your own skill with computers?</td>
<td></td>
<td>.065</td>
<td>.129</td>
<td>.055</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
</tbody>
</table>

**Table 7:** Bivariate Correlation Matrix: Age and Patient Perception of Computer Use Questions
**Summary**

Approximately two-thirds of patients in the study reported EHR use by their healthcare provider. The majority of those patients viewed EHR use favorably, and as an asset to their health. Those that reported no EHR use had mixed opinions regarding how an EHR might improve their care. Multiple linear regression demonstrated no relationship between the presence or absence of an EHR and perceived shared decision-making in health care visits; however, patients that had EHRs in their visit and liked how they were used saw a positive, statistically significant relationship with SDM. Race and age demonstrated borderline significance with SDM as well. Age was statistically associated with select attitudes towards EHRs making care more personalized. Lower self-perceived skill with computers was found to be significantly associated with higher age.
Chapter 5- Summary, Conclusions, and Recommendations

Discussion

Additions to the body of knowledge about patient perceptions of EHR use during outpatient visits were garnered from this study. Ohio patients reported higher EHR implementation throughout the state than the US Department of Health and Human Services national estimate (65.8% and 39.0%, respectively). While the national estimate is an estimate of primary care providers and the study population saw a variety of kinds of providers, including therapists, dentists, and dieticians, the high rate of EHR implementation in the state is encouraging in the face of the 2015 ‘deadline’ for EHR implementation mandated by the federal government.

Ohio was selected as the state to sample for the survey based on author interest of the area and relative representativeness of the U.S. population. Because it was not feasible to perform a nationwide survey, Ohio was used. Of note, Franklin County (which is oversampled in the study) is one of the most representative cities for the entire United States [28].

Of the participants who did not have an EHR used during their visit or did not know, their thoughts about if an EHR would improve their care were varied. While 32.5% thought it would, but 33.8% were not sure and 24.0% did not believe they would. These results are similar to Sage Software’s 2011 poll of
patients who reported their care provider wasn’t using an EHR: in that study, 38.4% viewed an EHR positively, 28.9% were not sure, and 32.7% did not wish for their care provider to implement an EHR. In light of the high self-assessed skill level with computers that the survey population reported, it is of interest that a large segment of the population is still unsure about or negatively inclined toward EHRs. When asked to rate their level of agreement with the statement “I believe that EHRs will improve my quality of care”, a question similar to that asked of non-EHR patients, 76.0% of EHR users agreed or strongly agreed that an EHR would improve their care. It appears that while those who are not exposed to EHR use in health care visits may not be able to predict the benefits of such a system, those patients whose providers have implemented an EHR have observed positive outcomes as a result of their implementation.

There is further evidence of this in the way that the patients who reported EHR use were much more likely to agree that the EHR improved their care. 11 of the 12 questions about EHR perception were answered positively, and between 59.6-85.7% of those who had EHRs during their visit answered favorably when asked about potential benefits, interaction with the provider, and security of EHRs. The only statement this was not the case for was “The EHR use helped me better understand what happened during my visit”. Where 41.0% of respondents neither agreed nor disagreed, and 22.6% of respondents disagreed or totally disagreed. Surprisingly, 59.4% of patients were not concerned about the security and privacy of their medical records, contrary to the Sage Electronics study, where over 80% were concerned with the security and privacy of medical
records being stored electronically. This may imply some inherent differences in the populations for each study, as Sage’s study was also conducted very recently (2011).

In terms of SDM and EHR use, it was of particular interest that the mere presence or absence of an EHR during a health care visit displayed no statistical significance with perceived SDM. At an adjusted $R^2$ value of 1.9%, it is possible that this model has a spurious finding based on the high statistical power of the analysis. However, when known EHR-use patients and their overall opinion of EHR use in the visit was substituted into the model, a statistically significant relationship was observed. This provides evidence to corroborate Hsu et. al’s 2005 study where there was also a preliminary relationship between EHR use and increased patient perception of involvement in decision-making. However, this study adds to Hsu’s by with statistical analysis of the relationship. While the adjusted $R^2$ for the model is somewhat low at 7.9%, there was an increase between the adjusted $R^2$ from the first model ($R^2$ of 1.9%), which at the very least, indicates that the goodness of fit of the model is better explained in the second model.

The final research question addressed the relationship between age and EHR perception. While the model could have been stronger to evidence that age is associated with a more negative perception of EHRs, this result still supports the initial hypothesis of a relationship between age and EHR perception to a degree.
Also of interest was the statistically significant relationship between self-perceived skill with computers and age, implying that lower self-perception of skill is associated with higher age. This result is of particular relevance to the 2003 study by Beckers and Schmidt which postulated that it is difficult to pinpoint whether age or experience was the major cause of computer anxiety. This model provides evidence that both age and experience may be related to computer anxiety, as age and experience initially appear to be related.

The biased sample is, in part, a result of the ResearchMatch database. ResearchMatch is still a relatively new platform for recruiting research participants, having been developed in 2007. It is limited in terms of a database of volunteers that are fully representative of the U.S. population characteristics (and for the purposes of this study, Ohio population characteristics), but this is because it is still in the process of being discovered by the population at large. Because mainly academic and high-profile medical institutions use ResearchMatch, those individuals currently in the database reflect those primarily with high education and health insurance levels, among other characteristics, and like the survey population, are slightly different from the general population at large. Individuals registered to ResearchMatch also tend to be in higher density around institutions that use ResearchMatch. This is probably why concentration of the study population was predominately around Columbus (The Ohio State University) and to a lesser degree, Cleveland (The Cleveland Clinic). While it can be conceded that the factors discussed make the study less applicable to the Ohio state population, the results are still based on data from a
population seeking health care in this country. As such, this study adds knowledge to a rapidly expanding area of healthcare where large scale studies have not been implemented.

**Implications**

One implication of the study is that while patients may have apprehensions or fears about EHR implementation before their health care provider uses them, patients of providers currently using EHRs appear to be satisfied with EHR use and perceive the health benefits of such use. Thus, health care providers who might feel that a change in systems might upset their patients have some evidence to the contrary. Further, patients comfortable with EHR use report perceived high extent of shared-decision making in their interactions, which demonstrates potential for EHRs to improve patient satisfaction, adherence to treatment, and improve patient health outcomes. Older patients appear to have at least some reservations about EHRs and technology use in general, but feeling more confident with their own ability to use technology may benefit elderly populations. This issue may not be as much about comfort in one’s ability to use technology, and could be more related to concerns or fears about the unknown aspects of technology.
Recommendations

Based on the outcomes of this study, it is recommended that more work is done to educate patients about EHRs before, during, and after implementation. In doing so, patients whose health care providers have yet to implement them may be able to help their patients understand how using an EHR will benefit their health, and how they might actively participate. Special attention should be paid to older patients, and patients who might have poor computer skill- keeping in mind that these populations are not mutually exclusive. Health systems providing classes for patients who want to learn more about EHRs and technology might provide an excellent opportunity to educate patients, as well as help them improve their own skills with technology. Additionally, more research should be done to discern precisely what dislikes or fears about EHRs patients have pre-implementation.

More research about shared decision-making and how it may be accomplished in tandem with EHR use is also recommended. While the health benefits of shared decision-making have been demonstrated in the literature, it is important that this method of delivering health care continues to grow with the rapid changes in health technology. Discerning exactly what pieces of shared decision-making work well with EHR use could greatly benefit health care delivery. For example, researching how shared decision-making might work with a patient health record tied to an EHR (like The Ohio State University Medical Center’s MyChart) could provide enhanced, innovative, and effective health care
delivery. Equally important is discerning what elements of SDM do not work well with EHRs- Arkes et. al’s 2007 research on the negative effects of electronic diagnostic support systems is an example of how EHRs can also be detrimental to decision-making in a healthcare visit [29].

In order for ResearchMatch to be successful, it is recommended that its drive for membership continue, especially in socioeconomically disadvantaged areas and for male participants. It is also recommended that ResearchMatch work with institutions to help those who don’t have regular access to the internet still be able to participate in research studies. One suggestion might be bringing portable, internet capable computers to free clinics on a regular basis, to register patients for the database and be a consistent source of internet use for low socioeconomic individuals. Because ResearchMatch has liaisons at each institution that has access to the database, this could be performed by one or several local liaisons.

In conclusion, the study was successful in identifying perceptions of EHRs in patients across Ohio, and specifically, factors associated with shared-decision making and age. As EHRs become the standard, it is important that health care consumers are comfortable with the ever-changing technology, and more importantly, that their health is improved. As health care technology continues to advance and improve, so must health care, while always maintaining excellent communication with patients. By making efforts to better understand patient perceptions about their healthcare, we may create a better system by which to provide care to them.
Bibliography


[16] McGrath JM, Arar NH, Pugh JA. The influence of electronic medical record usage on nonverbal communication in the medical interview. Health Informatics Journal 2007; 13(2): 105-118.


Appendix A: Survey Instrument
Patient Opinion of Health Care Visits Study

Online Verbal Consent Script

This survey study is being conducted by Melanie Brodnik, PhD, RHIA, and Katherine Glass, MPH, a Master’s™ student at The Ohio State University School of Allied Medical Professions.

The purpose of the survey is to describe people’s™ opinions of their health care visits and learn their thoughts about communicating with their health care professional. This information will contribute to general scientific knowledge on health care appointments, and how they may be improved in the future.

This survey is expected to take 10-15 minutes to complete. You will be asked a series of questions about yourself and your opinions about your most recent health care appointment.

Your responses to the survey will be held in the strictest confidence. No names or other information that could identify you as an individual will be collected on the survey itself. There is a very small risk of a breach of privacy. Although every effort to protect privacy will be made, no guarantee of Internet survey security can be given. While unlikely, transmissions can be intercepted. There are no other expected risks of participation.

Participation is voluntary. If you decide not to participate, there will be no penalty or loss of benefits to which you are otherwise entitled. There are no specific benefits to you as an individual based on completing the survey. You may choose to not do this survey at all. You may skip answering any questions that you do not want to answer.

If you have any questions about your study participation, or if you feel you have been harmed by participation, you may telephone Dr. Brodnik at 614.292.3465. For questions about your rights as a participant in this study or to discuss other study-related concerns or complaints with someone who is not part of the research team, you may contact Ms. Sandra Meadows in the Ohio State University Office of Responsible Research Practices at 1.800.673.0251.

Below you will be asked two questions to confirm your eligibility to do the survey. Please complete the survey only if you are eligible to do the survey. Your completion of the survey assumes that you have consented to do the survey.

Please confirm your eligibility to do this survey by checking an answer for each of the following questions:

1. I am over 21 years of age. □ Yes □ No

2. I have had a health care appointment within the past 3 months. □ Yes □ No
Visit Perceptions

A health-related decision refers to a choice that you or a health care provider (such as a doctor, nurse, etc.) might make about your health. A health-related decision could be about the diagnosis or treatment of a health problem, or a referral for you to see another health care professional. For example, a decision might be made about whether or not to try a medication, or to wait and see if a health problem goes away on its own.

3 Please check one box that best describes the extent to which you wish to be involved in making health-related decisions:

- I should make the decision on my own
- I should make the decision, but take others’ opinions into account
- I and others should make the decision together, on an equal basis
- Others should make the decision, but consider my opinion
- Others should make the decision for me
- Don’t Know

For this survey, your health care provider is the “main” person you saw at your last visit. Many times this is a doctor, but might also include a physician’s assistant, nurse or nurse practitioner, therapist, or a dietitian, for example.

4 What type of health care provider did you see at your last health care appointment?

- Doctor/Physician
- Nurse or Nurse Practitioner
- Physician’s Assistant
- Therapist (Physical Therapist, Occupational Therapist, Mental Health Therapist)
- Dietitian
- Other
- Don’t Recall

If “other”, please specify: ________________________________

5 During your most recent health care appointment, were any health-related decisions made by you or the health care provider you were seeing?

- Yes
- No
- Don’t Recall

6 What type of health-related decision was made?

- Treatment
- Diagnosis
- Referral
- Other
- Don’t Recall
- Wellness/Preventative Health

If “other”, please specify: ________________________________

Nine statements related to the decision-making during your appointment are listed below. For each statement, please indicate how much you agree or disagree.
7a My health care provider made it clear that a decision needs to be made.

7b My health care provider wanted to know exactly how I want to be involved in making the decision.

7c My health care provider told me that there are different options for treating my medical condition.

7d My health care provider precisely explained the advantages and disadvantages of the treatment options.

7e My health care provider helped me understand all the information.

7f My health care provider asked me which treatment option I prefer.

7g My health care provider and I thoroughly weighed all of the different treatment options.

7h My health care provider and I selected a treatment option together.
7. My health care provider and I reached an agreement on how to proceed.

- Completely Disagree
- Strongly Disagree
- Somewhat Disagree
- Somewhat Agree
- Agree
- Strongly Agree

An Electronic Health Record, or EHR, is an electronic version of a patient’s medical record. It contains information on the patient’s medical history, diagnoses, treatments, examinations, x-rays and other health-related information. The EHR is used in addition to, or in place of, a paper medical record or chart. The EHR is used by health care providers to write down and store information about you, your health, and health care.

8. Did your health care provider use an EHR during your health care visit?
   - Yes
   - No
   - Not Sure
   - Don’t Recall

9. If your health care provider did NOT use an EHR during your health care visit, do you feel that the use of an EHR would improve your care?
   - Yes
   - No
   - Not Sure
   - No Opinion

Listed below are six statements related to your health care provider using an EHR during your visit. For each statement, please indicate how much you agree or disagree.

10a. The EHR use helped me better understand what happened at my visit.

- Totally Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Totally Disagree
- Not Applicable

10b. The EHR use helped my health care provider know about all the things happening in my medical care.

- Totally Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Totally Disagree
- Not Applicable

10c. The EHR helped my health care provider make my care more personalized.

- Totally Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Totally Disagree
- Not Applicable

10d. The EHR helped the visit run in a more timely manner.

- Totally Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Totally Disagree
- Not Applicable
10e The EHR fit well into the overall flow of the visit.  
☐ Totally Agree  
☐ Agree  
☐ Neither Agree nor Disagree  
☐ Disagree  
☐ Totally Disagree  
☐ Not Applicable

10f Overall, I liked the way that my health care provider used the EHR.  
☐ Totally Agree  
☐ Agree  
☐ Neither Agree nor Disagree  
☐ Disagree  
☐ Totally Disagree  
☐ Not Applicable

Please rate your level of agreement with the following statements.

11 My health care provider seemed to pay attention as I described my condition or problem.  
☐ Totally Agree  
☐ Agree  
☐ Neither Agree nor Disagree  
☐ Disagree  
☐ Totally Disagree  
☐ Not Applicable

12 My health care provider looked into all the problems I mentioned.  
☐ Totally Agree  
☐ Agree  
☐ Neither Agree nor Disagree  
☐ Disagree  
☐ Totally Disagree  
☐ Not Applicable

13 My health care provider spent enough time with me.  
☐ Totally Agree  
☐ Agree  
☐ Neither Agree nor Disagree  
☐ Disagree  
☐ Totally Disagree  
☐ Not Applicable

14 I felt involved in the decision-making about my condition or problem.  
☐ Totally Agree  
☐ Agree  
☐ Neither Agree nor Disagree  
☐ Disagree  
☐ Totally Disagree  
☐ Not Applicable

15 I believe EHRs will improve my quality of care.  
☐ Totally Agree  
☐ Agree  
☐ Neither Agree nor Disagree  
☐ Disagree  
☐ Totally Disagree  
☐ Not Applicable

16 I am concerned about the security and privacy of my medical records being stored electronically.  
☐ Totally Agree  
☐ Agree  
☐ Neither Agree nor Disagree  
☐ Disagree  
☐ Totally Disagree  
☐ Not Applicable
17 What is your age?

☐ 21
☐ 22
☐ 23
☐ 24
☐ 25
☐ 26
☐ 27
☐ 28
☐ 29
☐ 30
☐ 31
☐ 32
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☐ 89
☐ 90
18. What is your race?
- American Indian/Alaskan Native
- Asian
- Black/African Descent
- Native Hawaiian/Other Pacific Islander
- White
- Other

If "other", please specify: ___________________________________________________________

19. Is your ethnic background Hispanic or Latino?
- No
- Yes

20. What is the highest level of education you have completed?
- Grade School
- Some High School (>9th grade, >12th grade)
- High School (12th grade)
- Some college/technical training
- College (completed degree)
- Some graduate/professional
- Graduate/professional (post-baccalaureate degree)

21. Do you have health insurance?
- No
- Yes

22. What is your gender?
- Female
- Male
- Other
23 In which Ohio county is your PRIMARY residence?

24 How would you rate your own skill with computers? □ Very High □ Above Average □ Average □ Below Average □ Very Low

25 Has your healthcare provider offered you the opportunity to communicate with his or her office or service using the Internet (or patient portal) for any of the following? Check all that apply. □ Schedule appointments □ Ask health-related questions via e-mail □ See lab, X-ray, or other exam results □ Not sure □ None of the above □ Other

If “other”, please specify: _______________________________________

26 Do you maintain your own personal health record? □ Yes □ No

27 Please select the statement that best describes your personal health record. □ I maintain an electronic version of my personal health record □ I maintain paper copies of my personal health record □ I maintain a combination of electronic and paper copies of my health information.