A looming digital divide? Group differences in the perceived importance of electronic health records

Denise L. Anthony & Celeste Campos-Castillo

Routledge
Taylor & Francis Group

A looming digital divide? Group differences in the perceived importance of electronic health records

Denise L. Anthony[a,b*] and Celeste Campos-Castillo[c]

[a]Department of Sociology, Dartmouth College, Hanover, NH, USA; [b]Institute for Security, Technology, and Society, Dartmouth College, Hanover, NH, USA; [c]Department of Sociology, University of Wisconsin-Milwaukee, 736 Bolton Hall, Milwaukee, WI 53201-0413, USA

Electronic health records (EHRs) are expected to bring a variety of health benefits, including reducing disparities in health-care access, but only if they are valued by all patient populations. We used the 2007 Health Information and National Trends Survey to characterize which health-care users report that electronic access to their health records is important for themselves and their providers. Respondents from populations that generally experience health-care disparities (Blacks, Latina/os, and patients with psychological distress) were among the most likely to report that the EHR was very important for themselves. Women were less likely than men to deem the EHR very important for their providers. Findings remained consistent after controlling for respondents' socioeconomic status, health status, and health care. By identifying the characteristics of current health-care users who see electronic access to records as important for themselves and providers, we can better understand potential barriers as well as motivators to adoption that could contribute to equitable usage across groups or a digital divide.

Keywords: digital divide; electronic health records; health disparities; health information technology

Introduction

Information and communication technologies (ICTs) have spread to nearly every industry in modern society, with one major exception, health care. Though a relative latecomer to the Information Age, new ICTs such as electronic health records (EHRs) are now being widely implemented by health-care providers in the United States (DesRoches et al., 2013; Hsiao et al., 2013), in large part spurred by the federal government's more than $40 billion dollar investment through legislation such as the 2009 Health Information Technology for Economic and Clinical and Health (HITECH) Act. EHRs are expected to play a key role in improving the quality of US health care in part by facilitating information exchange and enabling better coordination of care (Buntin, Jain, & Blumenthal, 2010; Institute of Medicine [IOM], 2001; Langley & Beasley, 2007). New ICTs that enable patients' electronic access to health information and medical records appear to support more active involvement in their own care and to facilitate enhanced communication with care givers (Delbanco et al., 2012; Ralston, Revere, Robins, & Goldberg, 2004; Reti, Feldman, Ross, & Safran, 2010; Walker et al., 2011).

---

*Corresponding author. Email: denise.anthony@dartmouth.edu

While the benefits of health ICTs like EHRs are becoming clear, we do not know whether those benefits will be equitably distributed across the population or result in a digital divide for health technologies. Recently, the National Healthy People 2020 objectives recommend using 'health information technology to improve population health outcomes and health care quality, *and to achieve health equity*' (US Department of Health & Human Services, 2012, emphasis added). However, the use of new information technologies by some groups but not others, i.e. the 'digital divide' (Mossberger, Tolbert, & Stansbury, 2003; Norris, 2001; Ono & Zavodny, 2008), can lead to subsequent inequality in the resources and skills created by those technologies, i.e. a 'second-level digital divide' (Hargittai & Hsieh, 2013). That is, the digital divide focuses on differences across groups in effective use of computers, mobile technologies, and the Internet, for communication and information (Rochet, 2007). For example, racial and ethnic minorities, those with lower education, and older people have lower access to information technology and also have lower computer literacy (Chang et al., 2004; Fox, 2011). If the digital divide in ICTs also exists for health ICTs, it means not only will they not facilitate achieving health equity, but may indeed exacerbate existing disparities in health and health care.

Studies among specific cohorts of patients have found some evidence of different rates of enrollment and use of health ICTs across groups (Goel et al., 2011; Mesch, Mano, & Tsamier, 2012; Roblin, Houston, Allison, Joski, & Becker, 2009; Sarkar et al., 2011). Given that disparities in health-care access already exist in the United States, particularly by race/ethnicity (LaVeist, Isaac, & Williams, 2009; Whetten et al., 2006), and also among disease and disability groups such as those with mental health disorders (Kessler et al., 2005; Ye & Shim, 2010; Young, Klap, Sherbourne, & Wells, 2001), it is not clear whether new ICTs will replicate existing disparities in health care or offer a means to reduce disparities by enabling alternative tools for accessing care. If inequality in the offline world translates into differential resources online that affect health over time, new technologies like EHRs could further exacerbate health disparities across groups, consistent with theories about the diffusion of innovations that sustain the fundamental social causes of health (Link & Phelan, 1995), as well as patterns of digital divide (Hargittai & Hsieh, 2013).

While studies of patient cohorts who use health ICTs are important (and reviewed in more depth in the next section), they not only are limited to particular providers and regions, but they also fail to reveal people's opinions about such tools more generally. Though it may be the case that usage of health ICTs indicates perceived importance and value of such tools, non-usage cannot be assumed to indicate perceived *un*importance because many factors, including attitudes and beliefs about technology, affect access to and use of ICTs (Karahanna, Straub, & Chervany, 1999; Norris, 2001; Ono & Zavodny, 2008). A vast research literature (described briefly below) documents disparities in health care by race and ethnicity, and also gender, and such factors may similarly affect utilization of health ICTs. In order to better understand possible group differences in health ICTs, we examine a nationally representative sample of health-care users' opinions about the importance of electronic access to health records for themselves and for their providers. We examine these attitudes in a national survey from prior to the period of increased attention and investment in EHRs across the United States (i.e. prior to the HITECH Act). Findings of how socio-demographic factors, particularly race/ethnicity and gender, as well as health status and health care, are associated with opinions about the importance of electronic access to records, prior to widespread implementation of EHRs, may help shed light on the factors associated with support of, and possibly barriers to, the use of EHRs. Given that ICTs in health care could provide tools to expand access to care, or alternatively, to exacerbate disparities, it is important to understand how to ensure equitable access to these tools.

Disparities in health care

The 2002 Institute of Medicine (IOM) Report *Unequal Treatment* documented that Blacks and other minorities receive fewer and less optimal health-care services compared with Whites (Smedley, Stith, & Nelson, 2002). Blacks and Hispanics are less likely than non-Hispanic White patients to receive intensive treatments such as cardiac procedures (Epstein et al., 2003), and knee and hip arthroplasty (Skinner, Weinstein, Sporer, & Wennberg, 2003), as well as some preventative services, such as influenza vaccines (Fiscella, 2005; Herbert, Frick, Kane, & Marshall, 2005) and cancer screening (Schneck, Klabunde, & Davis, 2006; Swan, Breen, Coates, Rimer, & Lee, 2003). Inequalities in health care have also been found by gender (Bird & Rieker, 2008) in which women are less likely than men to receive recommended tests and treatments for heart disease (Mark, 2000). In contrast, women are more likely than men to have doctor visits and to have contact with a general practitioner (Bertakis, Azari, Helms, Callahan, & Robbins, 2000; Xu & Borders, 2003). Some disparities in care can be explained by barriers to access due to socioeconomic and health insurance status (Betancourt, 2006; James, Thomas, Lillie-Blanton, & Garfield, 2007), but others stem from aspects of the health-care system. For example, minority group members are less likely to have a physician as a usual source of care (Collins et al., 2003; Gaskin et al., 2007). It is important to take such factors into account when examining health-care services, including not only utilization but also attitudes about services such as the perceived importance of electronic access to medical records, as done in this paper.

Health ICTs and disparities

Surveys find that many people desire online access to their medical records and e-mail communication with clinicians (Markle Foundation, 2011; Walker et al., 2011), and both the public and physicians believe that it is important for doctors to share information electronically to better coordinate care (Markle Foundation, 2011). Yet a number of studies among specific cohorts of patients find evidence of disparities in the enrollment and use of health ICTs that enable electronic access to medical records (Goel et al., 2011; Roblin et al., 2009; Sarkar et al., 2011). Roblin et al. (2009) found that Black patients in Kaiser Permanente were less likely than White patients to enroll in a patient portal that allowed them electronic access to their medical records. Similarly, Goel et al. (2011) found that both Blacks and Latina/os were less likely than Whites to enroll in patient portals. In the same study, Goel et al. (2011) found that women were somewhat more likely than men to *use* the portal after enrollment to seek advice from their providers; however, there was no gender difference in enrollment rates. In a study of usage among patients already enrolled in an electronic portal, Sarker et al. (2011) found that Black and Latina/o patients were significantly less likely than Whites, and women were less likely than men, to use the portal. Tenforde, Nowacki, Jain, and Hickner (2012) also found that among portal enrollees at the Cleveland Clinic, women were somewhat less likely than men to use a portal.

While such patient cohort studies offer important findings about current patients who enroll or use electronic portals, they tell us only about patients from specific practice groups and geographic regions. As such, these studies fall short of characterizing how groups across the population think about the importance of electronic access more generally. These studies also control for only limited patient characteristics rather than the spectrum of relevant factors that have been found to be associated with health-care disparities, and thus may also affect opinions. One of these is health status. For example, in some studies of online health information seeking, online information seekers were more likely than offline seekers to self-report excellent or good health status (Cotten & Gupta, 2004). Conversely, other studies find a positive association between online health information seeking and poor health (Drentea, Goldner, Cotten, & Hale, 2008; Houston

& Allison, 2002). In a study by the Pew Internet and American Life project, those with chronic diseases report lower rates of Internet access overall, but among those who have Internet access those with chronic diseases are more likely to seek out health information online and to discuss it with their providers, compared with those Internet users without a chronic condition (Fox, 2013). Others have found that those with diagnosed conditions or greater health risks are more likely than low-risk patients to enroll in patient portals (Roblin et al., 2009). Some evidence from early studies of specific patient populations suggests that sicker patients may benefit more than healthier populations from new health IT tools (Houston & Allison, 2002; Tenforde et al., 2012).

Here, we examine whether socio-demographic factors, particularly race/ethnicity and gender, as well as health status, health care, and technology, are associated with whether health-care users view electronic access to medical records as important for themselves and for their providers. We seek to understand if groups already at risk of health-care disparities are more or less likely to identify electronic access to health records as important. Documenting group differences in these opinions has implications for understanding the potential adoption and usage of health ICTs, which may either limit or exacerbate health-care disparities.

Methods

Study design

The Health Information National Trends Survey (HINTS) is a population-based survey of non-institutionalized US adults conducted by the National Cancer Institute ($N = 7674$). Survey procedures have been described elsewhere (Cantor et al., 2009), but we describe them briefly here. The field period for the 2007 iteration of HINTS used in this analysis was January through April of 2008, 8–12 months prior to the passage of the HITECH Act. Respondents were recruited using one of two sampling frames: random digit-dialing (RDD, $N = 4092$) and random sample of US addresses ($N = 3582$). With few exceptions, the latter completed a mail-in paper survey and the former completed a telephone survey. Data included in the analysis came from both sampling frames.

Sample

Our analytic sample ($n = 4819$) is composed of respondents who reported making at least one non-emergency room visits in the 12 months prior to the survey. We determined who made a non-emergency room visit with the item, 'During the past 12 months, not counting times you went to an emergency room, how many times did you go to a doctor, nurse, or other health professional to get care for yourself?' We restricted the sample to health-care users in order for the consideration of electronic access to medical records to have salience.

Measures

The two outcomes of interest were respondents' perceived importance of the EHR for themselves and their providers. We measured the degree to which respondents believed that EHRs are important for themselves with the item, 'How important would it be for you to get your own medical information electronically?' Perceived importance of the EHR for their providers was measured with the item, 'How important is it to you that your healthcare providers are able to share your medical information with each other electronically?' Three response categories were offered for each question, which we dichotomized into a binary variable (1 = 'very important', 0 = 'somewhat important', or 'not at all important') because of skewness. It is important to note that these two questions do not ask respondents to consider various types of tools or modes of access that

exist for accessing medical records electronically, for either themselves or their providers. Questions about specific tools or systems, or about actual experiences with electronic portals to EHRs, may have led to different kinds of responses. However, we think that there is value in even these more general questions to capture health-care users' opinions about the perceived importance of electronic access to medical records for themselves and for their providers.

Our independent variables of interest reflect our primary concern with potential disparities in health care. We measured race and ethnicity with a categorical variable (White, Black, and Latina/o), and coded gender as women = 1 and men = 0.

Our models control for respondents' socioeconomic status and demographic background. We generated measures for respondents' age (years), education level completed (high school or less (referent), some college, college, and graduate), employment status (1 = currently employed and 0 = not currently employed), marital status (1 = currently married and 0 = not currently married), and annual household income (less than $20,000 (referent); $20,000–34,999; $35,000–49,999; $50,000–74,999; and greater than or equal to $75,000). We also include a control for respondents' use of technology with the question, 'Do you ever go on-line to access the Internet or World Wide Web, or to send and receive e-mail?'

Additional controls captured the respondents' health status. Self-rated health, a robust indicator of morbidity and mortality (Idler & Benyamini, 1997; Manor, Matthews, & Power, 2001), is measured on a five-point Likert scale that we coded so that higher values indicated better health (1 = 'Poor' and 5 = 'Excellent'). Psychological distress was measured as the average of the Kessler-6 non-specific psychological distress scale (Kessler et al., 2002). The scale asked respondents for the frequency in the past 30 days that they experienced 6 manifestations of psychological distress (nervous, hopeless, restless, fidgety, so sad, or depressed such that nothing could cheer respondent up, feeling that everything is an effort, and worthless). For each manifestation, frequency is measured on a five-point scale (0 = 'None of the time' and 4 = 'All of the time').

In addition to health status, we also measured aspects of respondents' health care. We generated variables for health insurance status (1 = has health insurance and 0 = does not have health insurance), and for having a regular provider, determined with the item, 'Not including psychiatrists and other mental health professionals, is there a particular doctor, nurse, or other health professional that you see most often?' (1 = Yes and 0 = No). We included the respondent's perception of the quality of care received in the 12 months prior to the survey, using a standard five-point Likert scale (Hargraves, Hays, & Cleary, 2003) that we coded so that higher values indicated greater quality (1 = 'Poor' and 5 = 'Excellent'). Finally, we created a three-category nominal variable that reflected whether the respondent knew if their provider offered an EHR (yes (referent), no, and don't know).

Statistical analysis

In a preliminary analysis not shown, we found that the sampling frame used during survey data collection was significantly related to the outcome variables. We included a binary variable in the multivariate analysis to account for the sampling frame and included combined (RDD and address) sampling weights (Cantor et al., 2009). The sampling weights adjust for non-response and known population totals for key demographic variables. Analysis of correlations among the variables (data not shown) showed no issues with multi-collinearity. We conducted nested binary logistic regression models to determine the relationship between socio-demographic variables, health status, and health-care utilization on the respondents' likelihood of perceiving an EHR to be very important for themselves and their providers. Results are presented as odds ratios (ORs). We used two-tailed significance tests.

Results

Table 1 presents the descriptives for our study measures. Just about half of the sample believed that an EHR is very important (vs. somewhat or not at all important) for themselves and for their providers. The sample included 54% women. The majority of the sample is White (78%), and the mean age is 45.5 years. Close to two-thirds of the sample has completed at least some college, while about one-third of the sample reported an annual household income of at least $50,000. The majority of the sample uses the Internet (76%), has some form of health insurance (89%), has a usual source of care (78%), and reports that their provider has an EHR (59%).

The ORs given in Table 2 show that across all three nested models, Blacks and Latina/os are significantly more likely than Whites to perceive the EHR as very important for themselves. The significant associations remain even after adjusting the estimates for respondents' health status and health-care characteristics. The addition of health status and health-care context variables in Models 2 and 3, respectively, increased the significant difference in odds between both Latina/os and Blacks and Whites, suggesting that controlling for the important differences between racial groups in health status and health-care access and quality reveals even stronger

Table 1. Weighted descriptives for study measures.

Measure	M	SD
Rates EHR as 'very important' for self	0.53	–
Rates EHR as 'very important' for providers	0.50	–
Women	0.54	–
Race/ethnicity		
White (referent)	0.78	–
Latina/o	0.12	–
Black	0.10	–
Age (years)	45.5	17.5
Education level completed		
≤High school (referent)	0.37	–
Some college	0.35	–
College	0.18	–
Graduate	0.10	–
Currently employed	0.60	–
Annual household income		
<$20,000 (referent)	0.31	–
$20,000–34,999	0.14	–
$35,000–49,999	0.20	–
$50,000–74,999	0.14	–
≥$75,000	0.21	–
Currently married	0.57	–
Uses Internet	0.76	–
Self-rated health (1–5)	3.39	0.97
Avg. psychological distress (0–4)	1.85	0.77
Has health insurance	0.89	–
Has usual source of care	0.78	–
Quality of care (1–5)	3.95	0.99
Provider has EHR		
Yes (referent)	0.59	–
No	0.25	–
Don't know	0.16	–

Note: $N = 4819$.
Source: 2007 Health Information National Trends Survey.

Table 2.   Binary logistic regression estimating the association between perceiving EHR to be very important to self and selected independent variables ($n = 4819$).

Variable	Model 1		Model 2		Model 3	
Women	0.997	(0.079)	0.988	(0.079)	1.001	(0.082)
Race/ethnicity (vs. White)						
Latina/o	1.361	(0.207)*	1.402	(0.216)*	1.416	(0.226)*
Black	1.410	(0.249)+	1.466	(0.259)*	1.455	(0.255)*
Education level completed (vs. ≤high school)						
Some college	0.987	(0.110)	1.004	(0.114)	1.001	(0.112)
College	0.887	(0.124)	0.923	(0.128)	0.928	(0.129)
Graduate	0.859	(0.115)	0.880	(0.119)	0.908	(0.124)
Age (in years)	0.995	(0.003)	0.997	(0.003)	0.997	(0.003)
Currently married	0.898	(0.083)	0.904	(0.084)	0.912	(0.085)
Uses Internet	1.249	(0.165)+	1.295	(0.178) +	1.349	(0.188)*
Self-rated health (1–5)			1.006	(0.055)	1.046	(0.061)
Average psychological distress (0–4)			1.290	(0.084)***	1.249	(0.083)***
Has usual source of care					0.806	(0.098)+
Number of health-care visits (vs. one)						
2–4					1.059	(0.128)
5–9					1.003	(0.148)
10 or more					1.535	(0.244)**
Quality of care					0.867	(0.042)**
Provider has EHR (vs. yes)						
No					0.602	(0.060)***
Don't know					0.741	(0.097)*

Notes: ORs are presented with standard errors in parentheses. All three models control for respondent's annual household income, health insurance status, and employment status, none of which were statistically significant in any model.
Source: 2007 Health Information National Trends Survey.
+$p < .10$ (two-tailed test).
*$p < .05$ (two-tailed test).
**$p < .01$ (two-tailed test).
***$p < .001$ (two-tailed test).

differences in opinions between groups. Compared to research discussed above showing less usage of electronic portals by racial and ethnic minorities, these findings suggest that it is not because minorities value electronic access less. These findings, coupled with research on lower rates of portal use by minorities, may suggest that barriers other than interest in technology are at work. Beliefs and interest in new technologies are only one factor in the adoption and usage of new technologies, with accessibility, cost, and other factors also playing an important role (Hargittai & Hsieh, 2013; Karahanna et al., 1999; Wejnert, 2002). Preventing a digital divide in the use of health ICTs will mean identifying and reducing such barriers.

In addition to race and ethnicity, Models 2 and 3 show that a number of other factors are also significantly associated with thinking EHRs are personally important. Respondents with higher levels of psychological distress are more likely to perceive the EHR as important for themselves. The statistical significance of this association decreases slightly in Model 3, where we introduced adjustments for respondents' health-care characteristics. Most of the change in significance of the OR for psychological distress is due to ratings of care quality. Prior research suggests that psychological distress is negatively related to quality of care ratings, which explains the patterns observed here (Kessler et al., 2005; Ye & Shim, 2010; Young et al., 2001).

Model 3 in Table 2 shows that other aspects of health care are also associated with perceptions that EHRs are personally important. Those with 10 or more health-care visits are more likely to

see EHRs as important, indicating that people with more health-care needs value access to their records. It may seem surprising that the quality of care rating is negatively associated with perceiving EHRs as personally important, but it suggests that health-care users who think that their care is already of high quality are less likely to value additional tools for access. Given the evidence that racial and ethnic minorities are more likely to receive lower quality care (Baicker, Chandra, Skinner, & Wennberg, 2004), this finding suggests that minorities may be even more likely than Whites to value electronic access to their records.

Finally, Model 3 in Table 2 shows that technology variables also matter. Respondents who report using the Internet are more likely than non-users to perceive EHRs as personally important. In contrast, those with providers who do not currently use an EHR, or if the respondent does not know if his/her provider has an EHR, are significantly less likely to say EHRs are personally important. These findings suggest that access to technology, by both patient and provider, is a crucial factor in valuing EHRs. Racial and ethnic differences in access to technology thus have implications for potential divides in both access to and opinions of health ICTs. Taken together, the results given in Table 2 suggest the potential for new technologies like EHRs to play a role in addressing health and health-care disparities, which we revisit further in the discussion.

We repeated the analysis for our second outcome, the perceived importance of EHRs for providers. As Table 3 presents, the patterns of statistical significance are different for opinions about

Table 3. Binary logistic regression estimating the association between perceiving EHR to be very important to providers and selected independent variables (*n* = 4819).

Variable	Model 1		Model 2		Model 3	
Women	0.774	(0.067)**	0.769	(0.066)**	0.744	(0.064)**
Race/ethnicity (vs. White)						
Latina/o	1.164	(0.197)	1.186	(0.202)	1.354	(0.239)+
Black	1.049	(0.170)	1.068	(0.176)	1.121	(0.188)
Education level completed (vs. ≤high school)						
Some college	0.934	(0.106)	0.937	(0.107)	0.922	(0.105)
College	1.017	(0.121)	1.028	(0.123)	1.026	(0.124)
Graduate	1.083	(0.167)	1.084	(0.166)	1.104	(0.171)
Age (in years)	1.017	(0.003)***	1.018	(0.003)***	1.016	(0.003)***
Currently married	1.016	(0.088)	1.021	(0.089)	1.012	(0.087)
Uses Internet	0.933	(0.118)	0.940	(0.118)	1.003	(0.123)
Self-rated health (1–5)			1.040	(0.055)	1.028	(0.058)
Average psychological distress (0–4)			1.119	(0.072) +	1.127	(0.075)+
Has usual source of care					0.936	(0.118)
Number of health-care visits (vs. one)						
2–4					0.959	(0.117)
5–9					1.208	(0.170)
10 or more					1.404	(0.236)*
Quality of care					1.126	(0.057)*
Provider has EHR (vs. yes)						
No					0.436	(0.044)***
Don't know					0.632	(0.097)**

Notes: ORs are presented with standard errors in parentheses. All three models control for respondent's annual household income, health insurance status, and employment status, none of which were statistically significant in any model.
Source: 2007 Health Information National Trends Survey.
+*p* < .10 (two-tailed test).
*p < .05 (two-tailed test).
****p* < .01 (two-tailed test).
******p* < .001 (two-tailed test).

providers electronically sharing information than for personal importance of EHRs. In contrast to Table 2, race and ethnicity are not significantly associated with odds of perceiving EHRs as very important for their providers. Unlike in the analysis of the respondents' perceived importance of the EHR for themselves, however, gender is a significant predictor across the three models given in Table 3. Compared to men, women have lower odds of rating EHRs as 'very important' for their providers. In addition, age is positive and significant indicating that older respondents are more likely to perceive EHRs as important for their providers.

Variables for health status included in Model 2 have no statistical relationship to perceived EHR importance for providers, while findings for women and age remain significant. There are some significant effects of health-care variables in Model 3, though note that findings for gender and age remain unchanged. As given in Table 2, those with 10 or more visits are more likely than those with fewer visits to view EHRs as important for their providers. Given that women have more visits than men, we might have expected the significant findings for number of visits to influence the association between gender and perceived importance for providers. However, as can be seen in Model 3, while the coefficient decreases somewhat, the relationship between women and perceived importance of EHRs for their providers is still strongly negative and significant. In contrast to the findings for EHRs' personal importance, those who report higher quality ratings are more likely to report that EHRs are important for providers. This difference in effect of care quality may indicate that those with high-quality care expect their providers to use new tools like EHRs but that they do not see the value to use the tools themselves since they already receive high-quality care.

Finally, some of the technology variables are also statistically significant. Respondents with providers who do not use an EHR, and those who do not know if their provider uses an EHR have significantly lower odds of perceiving EHRs as very important for their providers. These findings suggest an opportunity to educate this segment of the population about potential benefits of EHRs.

Discussion

We examined the likelihood of perceiving an EHR to be very important in a national sample of adults who made at least one non-emergency room clinical visit in the 12 months prior to the data collection, in a period approximately 1 year prior to the implementation of the 2009 HITECH Act. We found that racial and ethnic minorities were more likely than Whites to believe that an EHR was very important for themselves. We also found that respondents' level of psychological distress is positively associated with perceiving EHRs as personally important. Unexpectedly, we found women to have lower odds of perceiving EHRs to be very important for their providers. In general, the patterns suggest that expectations about the value of EHRs may be associated with health and health-care disparities in both positive and negative ways.

These findings suggest factors that may be related to the potential for health ICTs to narrow health and health-care disparities. The perceived importance of EHRs for racial and ethnic minorities suggests that members of such groups are likely willing to use new information tools that they think can be helpful for their health and health care. These findings are consistent with Wen, Kreps, Zhu, & Miller (2010), who used the 2007 HINTS data to show that Hispanics, respondents younger than 65 years of age, and Internet users all were more likely to rate electronic access to their health records as important.

For groups who regularly experience barriers to care, such technologies may provide an alternative pathway to access care, or possibly a means to overcome suboptimal quality of care. The statistically significant racial and ethnic differences were strengthened with the systematic introduction of controls for health status and health care in the nested models. Previous research on racial and ethnic disparities in health and health care has shown that these disparities

often remain after the inclusion of measures that reflect an individual's socioeconomic position, health status, or health-care access (Kirby, Taliaferro, & Zuvekas, 2006). The fact that the association between being a racial and ethnic minority and believing that an EHR was important remained stable across models suggests that health ICTs like patient portals for access to EHRs could be used to increase access and engagement with health care for currently disadvantaged groups.

The finding that psychological distress is related to believing an EHR is important also speaks to the issue of health-care disparities. Individuals with serious psychological distress often report poorer patient–provider communication than those who do not (Ye & Shim, 2010). Our finding of a slight decrease in statistical significance in the coefficient for psychological distress when quality of care was introduced in Model 3 is consistent with these previous findings. As is the case for racial and ethnic minorities, these findings suggest that patients who may experience poor health care because of their psychological distress may benefit from access to their EHR. The social distance that patients with psychological distress experience with their health-care providers (Corrigan, 2004) may be reduced through the use of these technologies.

Unlike in research showing disparities by race/ethnicity and psychological distress in health care generally and in the use of patient portals specifically, we do not find evidence of differences in opinions about the personal importance of EHRs. On the contrary, we find that disadvantaged groups believe that electronic access is personally important and thus appear eager to use ICTs. Evidence from other research shows that lower rates of portal usage for racial and ethnic minorities may be because of other barriers such as technology access, lack of education about the portal, or possibly even because of lack of trust. Trust in a physician is the belief that the physician has the patient's best interest in mind (Mechanic, 1998). Racial and ethnic minorities tend to have less trust in physicians than Whites (Boulware, Cooper, Ratner, LaVeist, & Powe, 2003; LaVeist, Nickerson, & Bowie, 2000; Schnittker, 2004; Stepanikova, Mollborn, Cook, Thom, & Kramer, 2006). This lower trust could impact attitudes toward EHRs in two ways. First, racial and ethnic minority patients may view EHRs as a means for direct access to their medical records so that they can monitor their physicians and care, possibly to allay concerns related to low trust. Alternatively, to the degree that trust in a physician transfers to the EHR system used by that physician, lower trust could decrease the perceived importance of the EHR for patients with low trust. Our findings that racial and ethnic minorities believe that electronic access to their medical records is personally important suggest that it may be a way to overcome low levels of trust, so long as other barriers to use of the technology are removed. Regardless of whether it is trust or another mechanism, our findings also support ideas related to what is known as the social diversification hypothesis in which ICTs expand access to services for underserved groups (Mesch, Mano, & Tsamir, 2012).

Unexpectedly, we found women to have a lower likelihood than men of reporting EHRs to be very important for their providers. This finding appeared in our simplest model and remained as we adjusted estimates for respondents' health status and health care to control for potential confounding factors such as women's higher utilization and general better health than men (Gorman & Read, 2006; Verbrugge, 1985). Given men's general propensity to adopt technologies at a faster rate than women (Venkatesh, Morris, & Ackerman, 2000), it may be that men more than women view EHRs as very important because they highly value technology. By such reasoning, however, we also would have expected men to rate EHRs as very important for themselves (but we found no statistically significant difference between men and women). Our findings indicate that more than half of men believe that EHRs are very important for their providers but fewer than half of women do, even in the multivariate models adjusting for all of our control variables (data not shown). In contrast, as mentioned above, Goel et al. (2011) found that men were less likely than women to use the portal to seek provider advice. Once again a potential intervening

factor may be trust. While lower levels of trust by minorities may be the reason why they believe that personal access to records is very important, the reverse may be true for believing EHRs are important for providers. There is some evidence that women have higher levels of trust in physicians than men (Schnittker, 2004), which may be related to a lower perceived importance for providers to use EHRs. Future research should adjudicate between these interpretations and monitor a potential gendered digital divide in health ICTs.

This study is not without limitations. The survey design for HINTS is cross-sectional; therefore, definitive conclusions about causal associations are not appropriate. Limitations are also inherent in the use of RDD telephone methods and self-report measures. The use of a dual-mode survey design helps adjust for the former, but not the latter. Another important limitation is the wording of the dependent variable, which does not allow us to measure attitudes toward different types of ICTs for health care, or to evaluate actual usage of such ICTs. Future research should consider ways to measure such issues. Finally and most importantly, we cannot be certain the degree to which the attitudes assessed in our dependent variables are reflective of respondents' actual intentions to support or use these new technologies.

Conclusion

EHRs are expected to play a key role in improving the quality of US health care (Appari, Johnson, & Anthony, 2013; US Department of Health & Human Services, 2012). Patients with electronic access to their records show increased levels of engagement with their own care and enhanced communication with providers (Delbanco et al., 2012; Ralston et al., 2004; Walker et al., 2011). To the extent that health disparities stem from and may be exacerbated by differential diffusion of new technologies that affect health (Link & Phelan, 1995), the distribution and use of new information technologies that provide electronic access to health records have the potential to affect disparities, either positively or negatively. There is some suggestive evidence that a gendered digital divide in the value of EHRs in health care may materialize based on women's much lower opinion of the importance of providers electronically sharing information. In contrast, we find little evidence of a digital divide in opinions about the value of EHRs by race/ethnicity or by health status, suggesting that attitudes toward technology are not a barrier to adoption of ICTs in health care. In fact, it may be the case that EHRs could enhance access to medical services for underserved groups, as hoped by many (US Department of Health & Human Services, 2012), and consistent with the diversification hypothesis (Mesch, Mano, & Tsamir, 2012). By identifying the characteristics of current health-care users who see electronic access to records as important for themselves and providers, we can understand the preferences of likely users and better identify potential benefits as well as barriers to the use of such tools, particularly for groups who experience disparate access to high-quality care.

Acknowledgments

Disclosure statement

Funding

Notes on contributors

Denise Anthony is Professor of Sociology and Vice Provost for Academic Initiatives at Dartmouth College. Her work explores issues of cooperation, trust and privacy in a variety of settings, from health care delivery to micro-credit borrowing groups to online environments. Professor Anthony's work has been funded by the *National Science Foundation* and others, and published in sociology, health policy and computer science journals.

Celeste Campos-Castillo received a PhD in sociology from the University of Iowa. She is an assistant professor in sociology at the University of Wisconsin-Milwaukee. Her current research examines how patients manage concerns over the privacy of their health information, how information technologies may narrow or widen inequalities, the formation and resiliency of interpersonal trust, and how message framing persuades intended audiences.

References

Appari, A., Johnson, M. E., & Anthony, D. L. (2013). Meaningful use of EHR systems and process quality of care: Evidence from a panel data analysis of US acute-care hospitals. *Health Services Research*, *48*, 354–375. doi:10.1111/j.1475-6773.2012.01448.x

Baicker, K., Chandra, A., Skinner, J. S., & Wennberg, J. E. (2004). Who you are and where you live: How race and geography affect the treatment of medicare beneficiaries. *Health Affairs Web Exclusive*. doi:10.1377/hlthaff.var.33

Bertakis, K. D., Azari, R., Helms, L. J., Callahan, E. J., & Robbins, J. A. (2000). Gender differences in the utilization of health care services. *Journal of Family Practice*, *49*, 147–52.

Betancourt, J. R. (2006). *Improving quality and achieving equity: The role of cultural competence in reducing racial and ethnic disparities in health care*. The Commonwealth Fund. Retrieved January 5, 2014, from http://www.commonwealthfund.org/Publications/Fund-Reports/2006/Oct/Improving-Quality-and-Achieving-Equity–The-Role-of-Cultural-Competence-in-Reducing-Racial-and-Ethni.aspx

Bird, C., & Rieker, P. P. (2008). *Gender and health*. New York, NY: Cambridge University Press.

Boulware, L. E., Cooper, L. A., Ratner, L. E., LaVeist, T. A., & Powe, N. R. (2003). Race and trust in the health care system. *Public Health Reports*, *118*, 358–365.

Buntin, M., Jain, S. H., & Blumenthal, D. (2010). Health information technology: Laying the infrastructure for national health reform. *Health Affairs*, *29*, 1214–1219.

Cantor, D., Coa, K., Crystal-Mansour, S., Davis, T., Dipko, S., & Sigman, R. (2009). *Health Information National Trends Survey (HINTS) 2007: Final report*. Rockville, MD: Westat.

Chang, B. L., Bakken, S., Brown, S. S., Houston, T. K., Kreps, G. L., Kukafka, R., … Stavri, P. Z. (2004). Bridging the digital divide: Reaching vulnerable populations. *Journal of the American Medical Informatics Association*, *11*, 448–457.

Collins, K. S., Hughes, D. L., Doty, M. M., Ives, B. L., Edwards, J. N., & Tenney, K. (2003). *Diverse communities, common concerns: Assessing health care quality for minority Americans* (The Commonwealth Fund Report 523). Retrieved from http://www.commonwealthfund.org/usr_doc/collins_diversecommun_523.pdf

Corrigan, P. (2004). How stigma interferes with mental health care. *American Psychologist*, *59*, 614–625.

Cotten, S. R., & Gupta, S. S. (2004). Characteristics of online and offline health information seekers and factors that discriminate between them. *Social Science & Medicine*, *59*, 1795–1806.

Delbanco, T., Walker, J., Bell, S. K., Darer, J. D., Elmore, J. G., Farag, N., … Leveille, S. G. (2012). Inviting patients to read their doctors' notes: A quasi-experimental study and a look ahead. *Annals of Internal Medicine*, *157*, 461–470.

DesRoches, C. M., Charles, D., Furukawa, M. F., Joshi, M. S., Kralovec, P., Mostashari, F., … Jha, A. K. (2013). Adoption of electronic health records grows rapidly, but fewer than half of US hospitals had at least a basic system in 2012. *Health Affairs*, *32*, 1478–1485.

Drentea, P., Goldner, M., Cotten, S., & Hale, T. (2008). The association among gender, computer use and online health searching, and mental health. *Information, Communication & Society*, *11*, 509–525.

Epstein, A. M., Weissman, J. S., Schneider, E. C., Gatsonis, C., Leape, L. L., & Piana, R. N. (2003). Race and gender disparities in rates of cardiac revascularization: Do they reflect appropriate use of procedures or problems in quality of care? *Medical Care*, *41*, 1240–1255.

Fiscella, K. (2005). Commentary – Anatomy of racial disparity in influenza vaccination. *Health Services Research*, *40*, 539–549.

Fox, S. (2011). *The social life of health information, 2011. Pew Research Center's internet & American life project*. Retrieved from http://www.pewinternet.org/2011/05/12/the-social-life-of-health-information-2011/

Fox, S. (2013). *The diagnosis difference. Pew Research Center's internet & American life project*. Retrieved from http://pewinternet.org/Reports/2013/The-Diagnosis-Difference.aspx

Gaskin, D. J., Arbelaez, J. J., Brown, J. R., Petras, H., Wagner, F. A., & Cooper, L. A. (2007). Examining racial and ethnic disparities in site of usual source of care. *Journal of the National Medical Association*, *99*, 26–30.

Goel, M., Brown, T. L., Williams, A., Hasnain-Wynia, R., Thompson, J. A., & Baker, D. W. (2011). Disparities in enrollment and use of an electronic patient portal. *Journal of General Internal Medicine*, *26*, 1112–1116.

Gorman, B. K., & Read, J. G. (2006). Gender disparities in adult health: An examination of three measures of morbidity. *Journal of Health and Social Behavior*, *47*, 95–110.

Hargittai, E., & Hsieh, Y. P. (2013). Digital inequality. In W. H. Dutton (Ed.), *The Oxford handbook of internet studies* (pp. 129–150, Chapter 7). Oxford: Oxford University Press.

Hargraves, J. L., Hays, R. D., & Cleary, P. D. (2003). Psychometric properties of the consumer assessment of health plans study (CAHPS®) 2.0 adult core survey. *Health Services Research*, *38*, 1509–1528.

Herbert, P., Frick, K., Kane, R., & Marshall, M. (2005). The causes of racial and ethnic differences in influenza vaccination rates among elderly medicare beneficiaries. *Health Services Research*, *40*, 517–538.

Houston, K. T., & Allison, J. J. (2002). Users of internet health information: Differences by health status. *Journal of Medical Internet Research*, *4*(2), e7.

Hsiao, C. J., Jha, A. K., King, J., Patel, V., Furukawa, M. F., & Mostashari, F. (2013). Office-based physicians are responding to incentives and assistance by adopting and using electronic health records. *Health Affairs*, *32*, 1470–1477.

Idler, E. L., & Benyamini, Y. (1997). Self-rated health and mortality: A review of twenty-seven community studies. *Journal of Health and Social Behavior*, *38*, 21–37.

Institute of Medicine. (2001). *Crossing the quality chasm. A new health system for the 21st century*. Washington, DC: National Academy Press.

James, C., Thomas, M., Lillie-Blanton, M., & Garfield, R. (2007). *Key facts: Race, ethnicity, and medical care*. The Henry J Kaiser Foundation. Retrieved from http://kaiserfamilyfoundation.files.wordpress.com/2013/01/6069-02.pdf

Karahanna, E., Straub, D. W., & Chervany, N. L. (1999). Information technology adoption across time: A cross-sectional comparison of pre-adoption and post-adoption beliefs. *MIS Quarterly*, *23*, 183–213.

Kessler, R. C., Andrews, G., Colpe, L. J., Hiripi, E., Mroczek, D. K., Normand, S. T., … Zaslavsky, A. M. (2002). Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychological Medicine*, *32*, 959–976.

Kessler, R. C., Demler, O., Frank, R. G., Olfson, M., Pincus, H. A., Walters, E. E., … Zaslavsky, A. M. (2005). Prevalence and treatment of mental disorders, 1990 to 2003. *New England Journal of Medicine*, *352*, 2515–2523.

Kirby, J. B., Taliaferro, G., & Zuvekas, S. H. (2006). Explaining racial and ethnic disparities in health care. *Medical Care*, *44*, I64–I72.

Langley, J., & Beasley, C. (2007). *Health information technology for improving quality of care in primary care settings* (AHRQ Publication No. 07-0079-EF). Rockville, MD: Agency for Healthcare Research and Quality.

LaVeist, T. A., Isaac, L. A., & Williams, K. P. (2009). Mistrust of health care organizations is associated with underutilization of health services. *Health Services Research*, *44*, 2093–2105.

LaVeist, T. A., Nickerson, K. J., & Bowie, J. V. (2000). Attitudes about racism, medical mistrust, and satisfaction with care among African American and white cardiac patients. *Medical Care Research and Review*, *57*, 146–161.

Link, B., & Phelan, J. (1995). Social conditions as fundamental causes of disease. *Journal of Health and Social Behavior*, *35*(Extra Issue), 80–94.

Manor, O., Matthews, S., & Power, C. (2001). Self-rated health and limiting longstanding illness: Interrelationships with morbidity in early adulthood. *International Journal of Epidemiology*, *30*, 600–607.

Mark, D. B. (2000). Sex bias in cardiovascular care: Should women be treated more like men? *Journal of American Medical Association*, *283*, 659–661. doi:10.1001/jama.283.5.659

Markle Foundation. 2011. *Markle survey on health in a networked life 2010*. Retrieved from http://www.markle.org/sites/default/files/20110110_HINLSurveyBrief_0.pdf

Mechanic, D. (1998). The functions and limitations of trust in the provision of medical care. *Journal of Health Politics, Policy & Law*, *23*, 661–686.

Mesch, G., Mano, R., & Tsamir, J. (2012). Minority status and health information search: A test of the social diversification hypothesis. *Social Science & Medicine*, *75*, 854–858.

Mossberger, K., Tolbert, C. J., & Stansbury, M. (2003). *Virtual inequality: Beyond the digital divide*. Washington, DC: Georgetown University Press.

Norris, P. (2001). *Digital divide: Civic engagement, information poverty and the Internet worldwide*. Cambridge: Cambridge University Press.

Ono, H., & Zavodny, M. (2008). Immigrants, English ability and the digital divide. *Social Forces*, *86*, 1455–1479.

Ralston, J. D., Revere, D., Robins, L. S., & Goldberg, H. I. (2004). Patients' experience with a diabetes support programme based on an interactive electronic medical record: Qualitative study. *British Medical Journal*, *328*, 1159.

Reti, S. R., Feldman, H. J., Ross, S. E., & Safran, C. (2010). Improving personal health records for patient-centered care. *Journal of the American Medical Informatics Association*, *17*, 192–195.

Roblin, D. W., Houston, T. K., Allison, J. J., Joski, P. J., Becker, E. R. (2009). Disparities in use of a personal health record in a managed care organization. *Journal of the American Medical Informatics Association*, *16*, 683–689.

Rochet, L. R. (2007). The 'data slant': Why lack of media generated by minority users online is an offline problem. *Harvard Journal of Hispanic Policy*, *19*: 39–51.

Sarkar, U., Karter, A. J., Liu, J. Y., Adler, N. E., Nguyen, R., López, A., & Schillinger, D. (2011). Social disparities in internet patient portal use in diabetes: Evidence that the digital divide extends beyond access. *Journal of the American Medical Informatics Association*, *18*, 318–321.

Schneck, A., Klabunde, C., & Davis, W. (2006). Racial differences in colorectal cancer test use by medicare beneficiaries. *American Journal of Preventive Medicine*, *30*, 320–326.

Schnittker, J. (2004). Social distance in the clinical encounter: Interactional and sociodemographic foundations for mistrust in physicians. *Social Psychology Quarterly*, *67*, 217–235.

Skinner, J., Weinstein, J., Sporer, S., & Wennberg, J. (2003). Racial, ethnic and geographic disparities in rates of knee arthroplasty among medicare patients. *New England Journal of Medicine*, *349*, 1350–1359.

Smedley, B. D., Stith, A. Y., & Nelson, A. R. (2002). *Unequal treatment: Confronting racial and ethnic disparities in health care*. Washington, DC: National Academy Press.

Stepanikova, I., Mollborn, S., Cook, K. S., Thom, D. H., & Kramer, R. M. (2006). Patients' race, ethnicity, language, and trust in a physician. *Journal of Health and Social Behavior*, *47*, 390–405.

Swan, J., Breen, N., Coates, R., Rimer, B., & Lee, N. (2003). Progress in cancer screening practices in the United States: Results from the 2000 national health survey. *Cancer*, *97*, 1528–1540.

Tenforde, M., Nowacki, A., Jain, A., & Hickner, J. (2012). The association between personal health record use and diabetes quality measures. *Journal of General Internal Medicine*, *27*, 420–424. doi:10.1007/s11606-011-1889-0

US Department of Health & Human Services. (2012). *Health communication and health information technology*. Healthy People 2020. Retrieved from http://healthypeople.gov/2020/

Venkatesh, V., Morris, M. G., & Ackerman, P. L. (2000). A longitudinal field investigation of gender differences in individual technology adoption decision-making processes. *Organizational Behavior and Human Decision Processes*, *83*, 33–60.

Verbrugge, L. M. (1985). Gender and health: An update on hypotheses and evidence. *Journal of Health and Social Behavior*, *26*, 156–182.

Walker, J., Leveille, S. G., Long, N., Vodicka, E., Darer, J. D., Dhanireddy, S., … Delbanco, T. (2011). Inviting patients to read their doctors' notes: Patients and doctors look ahead. *Annals of Internal Medicine*, *155*, 811–819.

Wejnert, B. (2002). Integrating models of diffusion of innovations: A conceptual framework. *Annual Review of Sociology*, *28*, 297–326.

Wen, K. Y., Kreps, G., Zhu, F., & Miller, S. (2010). Consumers' perceptions about and use of the internet for personal health records and health information exchange: Analysis of the 2007 health information national trends survey. *Journal of Medical Internet Research*, *12*(4), e73. doi:10.2196/jmir.1668

Whetten, K., Leserman, J., Whetten, R., Ostermann, J., Thielman, N., Swartz, M., & Stangl, D. (2006). Exploring lack of trust in care providers and the government as a barrier to health service use. *American Journal of Public Health*, *96*, 716–721.

Xu, K. T., & Borders, T. F. (2003). Gender, health, and physician visits among adults in the United States. *American Journal of Public Health*, *93*, 1076–1079.

Ye, J., & Shim, R. (2010). Perceptions of health care communication: Examining the role of patients' psychological distress. *Journal of the National Medical Association*, *102*, 1237–1242.

Young, A. S., Klap, R., Sherbourne, C. D., & Wells, K. B. (2001). The quality of care for depressive and anxiety disorders in the United States. *Archives of General Psychiatry*, *58*, 55–61.