INTERNET ACCESS AND RACIAL/ETHNIC DISPARITIES IN USING INTERNET HEALTH RESOURCES

SEHSD Working Paper 2017-31

Jamie M. Lewis[1]

U.S. Census Bureau

Issued June 2017[2]

ABSTRACT

Racial/ethnic disparities in health care and outcomes persist, as do gaps in the use of eHealth resources. Increased Internet access—including through smartphones and mobile broadband—has the potential to expand use of these resources among racial/ethnic minorities. In this paper, I explore the use of eHealth materials using representative data from the 2015 Current Population Survey Computer and Internet Use Supplement. I find that racial/ethnic minorities are less likely to use eHealth resources, and that these disparities are not fully explained by differences in Internet access. Those with access through a smartphone only lag behind those with a home connection or both types of connections. I further find that various types of Internet access similarly impact eHealth resource use among different racial/ethnic groups. Policymakers interested in promoting use of these resources by minorities, thereby helping reduce broader health disparities, should emphasize the importance of both home-based and mobile Internet access.

[1] This paper is released to inform interested parties of research and to encourage discussion. The views expressed on statistical and other issues are those of the author and not necessarily those of the U.S. Census Bureau.

[2] The poster version of this paper was presented at the 2017 Annual Meeting of the Population Association of America.

INTRODUCTION

In the United States today, racial/ethnic disparities in access to health care and quality of care persist, with the greatest disparities for Blacks and Hispanics relative to Whites. However, progress is being made in some areas, including health insurance (Agency for Healthcare Research and Quality 2016). Disparities in care, in turn, lead to unequal health outcomes. Racial/ethnic minorities often experience shorter life expectancy as well as higher rates of HIV/AIDS, heart disease, stroke, diabetes, and cancer (National Institutes of Health 2010).

The Internet is a widely-available and inexpensive source for health information. More and more, the Internet is the context in which health professionals and the public pursue, comprehend, and consume health material. A majority of adults report consulting the Internet when they have health questions (Fox and Duggan 2013), and individuals rely on Internet health (eHealth) resources for both preventative and diagnostic purposes (Gray et al. 2005; Rennis et al. 2015).

Although use of the Internet to access health information is increasing in general, racial/ethnic minorities are less likely to utilize eHealth resources (Miller, West, and Wasserman 2007). Fox and Duggan (2013) found that African Americans and Hispanics are less likely than Whites to both look online for health information and go online to try to diagnose a medical condition. Yet the use of online health information by these groups has substantial potential to create positive change, as minority groups are more likely to make adjustments to foster better health after accessing these resources (Schmeida and McNeal 2009).

Increased Internet access has the potential to expand use of online health resources among racial/ethnic minorities and thereby mitigate health disparities. Smartphones and mobile broadband are an important route to Internet access, particularly for nonwhites. Blacks and Hispanics are less likely to have Internet access overall, but are more likely to own a handheld device as their only device to access the Internet (File and Ryan 2014).

In this paper, I explore the use of eHealth materials using nationally representative data from the 2015 Current Population Survey (CPS) Computer and Internet Use Supplement. I examine how race/ethnicity and type of Internet access relate to multiple facets of using online health resources, including researching health information online, communicating with a doctor or accessing health records online, and using an Internet-connected health monitoring service. In addition to looking at race/ethnicity and type of Internet access as independent factors, I assess whether and how type of Internet access moderates the relationship between race/ethnicity and use of eHealth resources.

Ultimately, the aim of the current research is knowledge that can help reduce barriers to use of Internet health information, particularly among racial/ethnic minorities.

BACKGROUND

Previous Research

A growing body of research suggests that online health information can promote positive health outcomes. By definition, health information technology is "technology that enables patients and providers to support better health and health care by providing targeted information meant to inform, educate or generally allow for improved decision making (Moiduddin and Moore 2008:5)." The Internet can support health care and health decisions in many ways: serving as a useful tool for obtaining materials about prevention, diseases, and treatment; finding health services and support networks; communicating with doctors and other medical professionals; self-managing a healthy lifestyle; and accessing health records.

Online health information supports wellness and quality of life in various ways. Such resources can potentially mitigate some of the high costs related to medical care (Rennis et al. 2015). Further, by providing patients with crucial information in a convenient and efficient way, eHealth resources can empower patients to take the right action at the right time (Moiduddin and Moore 2008). Indeed, those who seek health information online are more likely to meet recommendations for health behaviors (Redmond et al. 2010).

Racial/ethnic minorities are less likely to access Internet health information, meaning they are less able to take advantage of the benefits it can offer (Moiduddin and Moore 2008; West and Miller 2006). The digital divide, or gulf between those who have and lack ready access to computers and the Internet, is a key barrier for use of eHealth resources by racial/ethnic minorities (West and Miller 2009). Indeed, Fox and Duggan (2013) found that although there is a racial/ethnic gap in seeking health information online when looking at all adults, among Internet users, a similar proportion of Whites, Blacks, and Hispanics access these resources. This suggests that differences in Internet adoption, rather than interest in health information, could explain the racial/ethnic gap in seeking health materials online. Beyond the importance of Internet access overall, those with a longer history of Internet use are more likely to go online to access health materials (Fox and Fallows 2003).

Individuals access the Internet in different ways, most notably through a home connection and/or a data plan for a smartphone. Smartphone access is particularly important for racial/ethnic minorities, as African Americans and Hispanics are more likely than Whites to be smartphone-dependent (Smith 2015). Higher rates of handheld ownership among racial/ethnic minorities have the potential to mitigate the racial gap observed for Internet use overall (File and Ryan 2014). In addition, minorities more commonly seek health information on their phones (Fox and Duggan 2013).

For these reasons, some have noted the potential for mobile technology to bridge the digital divide and expand the use of eHealth resources among racial/ethnic minorities (e.g., Littlefield et al. 2014; Zach et al. 2012). Although many smartphone-only users report they lack home broadband because their device lets them do all they need to do (Horrigan and Duggan 2015), smartphone-only Internet access can pose limitations. Financial constraints and technical limits can cause irregular connection for those reliant on their phones. Smith (2015) determined that the smartphone-dependent, compared with other smartphone owners, more frequently have had to cancel phone service for a period because the cost posed difficult. Smartphone-dependent users are also more likely to reach the maximum data allowed on their plan. These constraints are more common for Blacks and Hispanics versus Whites.

Current Study

In the current paper, I expand research on the use of online health resources, focusing on important factors of race/ethnicity and type of Internet access. I investigate three aspects of using the Internet as a health resource—researching health information online, communicating with a doctor or accessing health records online, and using an Internet-connected health monitoring service. Whereas prior studies have often limited analysis to two or three groups, I assess use of eHealth resources among a number of racial/ethnic groups. In particular, I address two research questions:

- **How does the use of online health resources vary by race/ethnicity?**
- **Does type of Internet access—no private access, home only, smartphone only, or both—relate to racial/ethnic disparities in the use of online health resources?**

In exploring these questions, the current study aims to learn more about the conditions under which racial/ethnic minorities access Internet health resources. It further considers whether the adoption of

smartphone and mobile broadband technology mitigates or maintains gaps in the use of eHealth materials. Results inform strategies encouraging the use of these resources and help address overall racial/ethnic health disparities.

METHODOLOGY

Data

I used data from the 2015 CPS Computer and Internet Use Supplement.[3] The basic CPS is sponsored jointly by the Bureau of Labor Statistics (BLS) and Census Bureau, and the supplement is sponsored by the National Telecommunications and Information Administration (NTIA). About 56,000 households were selected via probability sampling, with the supplement data collected by the Census Bureau in July 2015. The supplement was interviewer-administered via an automated Computer-Assisted Telephone Interviewing/Computer-Assisted Personal Interviewing (CATI/CAPI) instrument.

The 2015 CPS Computer and Internet Use Supplement collected household-level information from all eligible CPS households as well as person-level information from household members 3 years old and over. The supplement contains questions about a household's computer and Internet use and household members' use of the Internet from any location in the past year. Within each household, information about a random respondent's use of the Internet was collected. Note that analysis was only conducted for household members 15 years old and over, as younger members did not receive items on use of online health resources.

Measures

Dependent variables. I used three separate yes-or-no questions to capture use of online health resources:

1. [Do you/Does NAME] research health information online, such as with WebMD or similar services?

[3] For complete technical documentation on the 2015 CPS Computer and Internet Use Supplement, see http://www2.census.gov/programs-surveys/cps/techdocs/cpsjul15.pdf.

2. [Do you/Does NAME] communicate with a doctor or access health records or health insurance records online?
3. [Do you/Does NAME] use a health monitoring service that connects to the Internet?[4]

Independent variables. The primary variables of interest were race/ethnicity and type of Internet access. The mutually exclusive racial/ethnic groups examined were White alone, non-Hispanic; Black alone, non-Hispanic; Asian alone, non-Hispanic; other, non-Hispanic (including those who identify with multiple races); and Hispanic (of any race).[5] Type of Internet access was categorized as no private access, home only, smartphone only, or both.

Control variables. A number of control variables were included in the models to account for demographic and economic factors related to the dependent and/or independent variables. These consisted of sex, age, educational attainment, family income, and metropolitan status.

Method of Analysis

First, descriptive statistics addressed the research questions on bivariate relationships between each independent/control variable and the dependent variables. Next, I used logistic regression models predicting the likelihood of each of the three measures of accessing Internet health information—researching health information online, communicating with a doctor or accessing health records online, and using an Internet-connected health monitoring service. Logistic regression is appropriate given the binary outcome variables.

Model 1 assessed overall racial/ethnic disparities in the use of online health resources and included race/ethnicity (reference=White alone, non-Hispanic) only. Model 2 looked at the overall relevance of type of Internet access (reference=no private access) for use of eHealth materials. Model 3 included race/ethnicity and the control variables, evaluating whether the magnitude of racial/ethnic disparities changes when accounting for demographic and economic factors. Finally, Model 4 contained race/ethnicity, type of Internet access, and the control variables. This step determined whether the size

[4] This question was designed to capture use of connected medical devices that collect and send data to a health care provider, rather than self-monitoring devices such as fitness bands. Examples include devices that monitor vital statistics, blood glucose levels, or blood pressure.

[5] Elsewhere in the text, I refer to White alone, non-Hispanics as Whites, Black alone, non-Hispanics as Blacks, Asian-alone, non-Hispanics as Asians, and other, non-Hispanics as another race.

of racial/ethnic disparities is altered when controlling for type of access. I additionally tested a model including race/ethnicity by type of access interaction terms to examine whether racial/ethnic disparities in the use of Internet health resources vary according to type of access.

RESULTS

Descriptive Statistics

Table 1 contains descriptive statistics on use of Internet health information, by characteristics. Looking first at overall use of eHealth resources, in 2015, researching health information online was the most common use (48 percent), followed by communicating with a doctor or accessing health records online (26 percent). Using an Internet-connected health monitoring service (6 percent) was least common.

Consistent with prior research, Blacks and Hispanics are less likely than Whites to use each type of eHealth resource examined. For example, 40 percent of Blacks and 39 percent of Hispanics researched health information online in 2015, compared with 51 percent of Whites. Accessing these tools is also less common for Blacks and Hispanics compared with Asians. The pattern for those of another race is less straightforward, as they exhibited higher levels of researching health information online and using an Internet-connected health monitoring service, but lower levels of going online to communicate with a doctor or check health records.

Turning to type of Internet access, it is important to note that although those without private access use eHealth resources at low levels, some do use these resources, likely by connecting to the Internet at work or in a public place. Those who are more connected to the Internet, with both a home connection and a data plan, are more likely to use Internet health resources. In 2015, although those with smartphone-only access looked similar to those with home-only access regarding use of an Internet-connected monitoring service (5 percent), those connected via a smartphone alone were less likely to research health information online (41 percent vs. 47 percent) or use the Internet to contact a doctor or view health records (20 vs. 25 percent).

Table 1. Percentage Using Online Health Resources, by Characteristics

Characteristic	Research health information	Communicate with doctor or access health records	Use Internet-connected monitoring service
Total	**48.0**	**26.0**	**5.7**
Race/Ethnicity			
White alone, non-Hispanic	51.3	28.2	6.0
Black alone, non-Hispanic	40.2	20.0	4.4
Asian alone, non-Hispanic	46.9	30.4	6.9
Other, non-Hispanic	47.1	22.9	5.8
Hispanic	39.1	19.4	5.0
Type of Internet access			
No private access	29.0	12.2	2.4
Home only	46.7	24.7	4.9
Smartphone only	41.1	20.5	4.7
Both	56.3	32.7	7.6
Sex			
Male	43.7	23.8	5.4
Female	52.0	28.1	6.1
Age			
15 to 24 years	34.5	13.0	3.8
25 to 34 years	51.7	29.4	7.2
35 to 44 years	52.4	30.2	7.2
45 to 64 years	51.1	29.1	5.9
65 years and over	48.7	27.1	4.3
Educational attainment			
Less than high school	23.9	7.9	2.4
High school graduate	37.0	15.3	3.2
Some college or associate's degree	51.1	27.2	6.0
Bachelor's degree or more	60.3	38.1	8.4
Family income			
Less than $25,000	40.6	17.5	3.2
$25,000 to $49,999	44.0	20.8	4.0
$50,000 to $74,999	47.7	26.6	5.9
$75,000 to $99,999	52.4	29.9	7.2
$100,000 and over	56.5	36.4	8.9
Metropolitan status			
Metropolitan	48.7	27.3	6.1
Nonmetropolitan	43.9	18.7	3.8

Source: U.S. Census Bureau, Current Population Survey Computer and Internet Use Supplement, 2015.

Other demographic and economic characteristics also relate to use of eHealth materials. Women are more inclined than men to use such tools, and their use is less common at younger and older ages. Lower adoption at younger ages may be due to less engagement with the health care system in general, whereas less use among older Americans may relate to reduced comfort with technology. As educational attainment and family income increase, so does access of Internet health resources. For example, 60 percent of those with at least a bachelor's degree researched health information online in 2015, compared with only 24 percent of those who had not completed high school. Finally, those residing in metropolitan areas are more likely than those in nonmetropolitan areas to use eHealth materials.

Logistic Regression

Table 2 presents results from the first logistic regression model, which examines the impact of race/ethnicity on the likelihood of individuals using eHealth resources in the following ways: 1) researching health information, 2) communicating with a doctor or accessing health records, and 3) using an Internet-connected monitoring service. These findings provide information on racial/ethnic disparities in the use of online health resources.

Racial/ethnic disparities are observed for each eHealth resource examined. Compared with Whites, the likelihood of using the Internet to research health information in 2015 was 36 percent lower among Blacks, 16 percent lower among Asians, and 39 percent lower for Hispanics.[6] Regarding online communication with a doctor or access to health records, this activity was less common among those who identified as Black or Hispanic or with some other race including multiple races. Those of some other race were 24 percent less likely than Whites to use the Internet in this way, whereas Blacks were 36 percent less likely and Hispanics were 38 percent less likely.[7] Finally, Blacks were 72 percent as likely as Whites to use an Internet-connected monitoring service.

[6] The difference between Blacks and Hispanics was not statistically different.
[7] The likelihood among Blacks, Hispanics, and those of some other race did not differ.

Table 2. Logistic Regression Predicting Likelihood of Using Online Health Resources, Model 1

	Research health information			Communicate with doctor or access health records			Use Internet-connected monitoring service		
	Estimate	*Standard Error*	*Odds Ratio*	*Estimate*	*Standard Error*	*Odds Ratio*	*Estimate*	*Standard Error*	*Odds Ratio*
Race/Ethnicity *(reference category is White alone, non-Hispanic)*									
Black alone, non-Hispanic	-0.4480 ***	0.06	0.64	-0.4474 ***	0.06	0.64	-0.3251 **	0.11	0.72
Asian alone, non-Hispanic	-0.1737 *	0.08	0.84	0.1070	0.08	1.11	0.1547	0.15	1.17
Other, non-Hispanic	-0.1678	0.12	0.85	-0.2780 *	0.14	0.76	-0.0362	0.26	0.96
Hispanic	-0.4936 ***	0.06	0.61	-0.4863 ***	0.06	0.62	-0.1893	0.12	0.83
Intercept	0.0510 *	0.02		-0.9364 ***	0.02		-2.7493 ***	0.04	
N	41,528			41,528			41,528		

Significance is noted as follows: *(p<0.05); **(p<0.01); ***(p<0.001).
Source: U.S. Census Bureau, Current Population Survey Computer and Internet Use Supplement, 2015.

Table 3. Logistic Regression Predicting Likelihood of Using Online Health Resources, Model 2

	Research health information			Communicate with doctor or access health records			Use Internet-connected monitoring service		
	Estimate	*Standard Error*	*Odds Ratio*	*Estimate*	*Standard Error*	*Odds Ratio*	*Estimate*	*Standard Error*	*Odds Ratio*
Type of Internet access *(reference category is No private access)*									
Home only	0.7615 ***	0.08	2.14	0.8612 ***	0.10	2.37	0.7478 ***	0.20	2.11
Smartphone only	0.5357 ***	0.08	1.71	0.6206 ***	0.11	1.86	0.7003 **	0.21	2.01
Both	1.1483 ***	0.08	3.15	1.2569 ***	0.11	3.52	1.2124 ***	0.20	3.36
Intercept	-0.8936 ***	0.07		-1.9767 ***	0.10		-3.7036 ***	0.19	
N	41,528			41,528			41,528		

Significance is noted as follows: *(p<0.05); **(p<0.01); ***(p<0.001).
Source: U.S. Census Bureau, Current Population Survey Computer and Internet Use Supplement, 2015.

Results from Model 2 examining type of Internet access are provided in Table 3. Access is clearly important for the use of eHealth resources, impacting each use examined. Compared with those who had no private Internet access, the odds of using online health resources in 2015 were higher for those with a home connection only, a data plan only, or both a home and smartphone connection. In keeping with descriptive results, having both types of connections had a greater impact on use of eHealth resources than a home-only or smartphone-only connection. For example, in contrast to individuals who lacked private access, the likelihood of researching health information online was 71 percent higher among those with a data plan only, 2.1 times as large for those with a home connection only, and 3.2 times as great for those with both connections. With the exception of connected-device monitoring, those with only a home connection made greater use of eHealth resources than those who depended on a smartphone for access.

Table 4 presents results from Model 3, which evaluates the impact of race/ethnicity on the likelihood of using online health resources while also controlling for demographic and economic factors. Although the magnitude of differences vary from those observed when looking at race/ethnicity alone in Model 1, racial/ethnic disparities in researching health information and communication/access remain. Researching health information online remains less likely for Blacks, Asians, and Hispanics relative to Whites, although there no longer are significant differences between these minority groups. When adding controls, Blacks and Hispanics continue to have lower odds than Whites of communicating with a doctor or accessing health records online.[8] However, the coefficient for other race is no longer significant. Regarding use of an Internet-connected monitoring service, the coefficient for Blacks is also no longer significant.

[8] Similar to Model 1, the difference between Blacks and Hispanics was not statistically different.

Table 4. Logistic Regression Predicting Likelihood of Using Online Health Resources, Model 3

	Research health information			Communicate with doctor or access health records			Use Internet-connected monitoring service		
	Estimate	*Standard Error*	*Odds Ratio*	*Estimate*	*Standard Error*	*Odds Ratio*	*Estimate*	*Standard Error*	*Odds Ratio*
Race/Ethnicity *(reference category is White alone, non-Hispanic)*									
Black alone, non-Hispanic	-0.3474 ***	0.06	0.71	-0.2892 ***	0.07	0.75	-0.1776	0.11	0.84
Asian alone, non-Hispanic	-0.3162 ***	0.09	0.73	-0.0746	0.09	0.93	-0.0438	0.15	0.96
Other, non-Hispanic	-0.0236	0.12	0.98	-0.0725	0.14	0.93	0.0936	0.26	1.10
Hispanic	-0.2326 ***	0.07	0.79	-0.1575 *	0.07	0.85	0.0404	0.13	1.04
Female *(reference category is Male)*	0.3555 ***	0.03	1.43	0.2656 ***	0.04	1.30	0.1776 *	0.08	1.19
Age *(reference category is 15 to 24 years)*									
25 to 34 years	0.4054 ***	0.07	1.50	0.6734 ***	0.09	1.96	0.3706 **	0.14	1.45
35 to 44 years	0.3907 ***	0.07	1.48	0.6430 ***	0.09	1.90	0.2897 *	0.15	1.34
45 to 64 years	0.3424 ***	0.06	1.41	0.6215 ***	0.08	1.86	0.1020	0.13	1.11
65 years and over	0.2369 ***	0.07	1.27	0.5679 ***	0.09	1.77	-0.1448	0.15	0.87
Educational attainment *(reference category is Less than high*									
High school graduate	0.4752 ***	0.07	1.61	0.5248 ***	0.11	1.69	0.2306	0.22	1.26
Some college or associate's degree	1.0265 ***	0.07	2.79	1.2076 ***	0.11	3.35	0.8234 ***	0.20	2.28
Bachelor's degree or more	1.2827 ***	0.08	3.61	1.4828 ***	0.12	4.41	0.9733 ***	0.21	2.65
Family income *(reference category is Less than $25,000)*									
$25,000 to $49,999	0.0413	0.05	1.04	0.0861	0.06	1.09	0.1662	0.14	1.18
$50,000 to $74,999	0.0572	0.05	1.06	0.2574 ***	0.06	1.29	0.4767 ***	0.13	1.61
$75,000 to $99,999	0.1978 **	0.06	1.22	0.3575 ***	0.07	1.43	0.6416 ***	0.14	1.90
$100,000 and over	0.2478 ***	0.05	1.28	0.5182 ***	0.06	1.68	0.7865 ***	0.13	2.20
Metropolitan *(reference category is Nonmetropolitan)*	0.1243 *	0.06	1.13	0.3627 ***	0.07	1.44	0.3065 *	0.13	1.36
Intercept	-1.5579 ***	0.09		-3.3218 ***	0.15		-4.4618 ***	0.25	
N	41,528			41,528			41,528		

Significance is noted as follows: *(p<0.05); **(p<0.01); ***(p<0.001).

Source: U.S. Census Bureau, Current Population Survey Computer and Internet Use Supplement, 2015.

Confirming descriptive results, demographic and economic controls matter for use of eHealth tools. For each resource examined, use in 2105 was more likely among women than men, as well as among those aged 25 to 34 or 35 to 44 compared to those aged 15 to 24.[9] In addition, those aged 45 to 64 or 65 years and over had higher odds than those aged 15 to 24 of researching health information online and using the Internet to communicate with a doctor or access health records.[10] Use of online health resources is positively related to educational attainment, although there were exceptions for Internet-connected monitoring services. For this use, high school graduates did no differ from those who did not complete high school, and those with at least a bachelor's degree did not differ from those who completed some college or an associate's degree.

Across all eHealth tools, those in the higher income brackets, with a family income of $75,000 to $99,999 or $100,000 and over, had higher odds of use than those in the lowest bracket, less than $25,000.[11] The likelihood of communicating with a doctor or accessing health records online, as well as using an Internet-connected monitoring service, was also greater for those with a family of income of $50,000 to $74,999 versus under $25,000.[12] Lastly, metropolitan residents are advantaged over nonmetropolitan residents in terms of using online health resources.

[9] The odds for those aged 25 to 34 and 35 to 44 did not differ.
[10] Regarding online health research, the difference between those aged 45 to 64 and 65 years and over was statistically different. Also, the likelihood of online research for those aged 65 years and over, but not those aged 45 to 64, was statistically lower than for those aged 25 to 34 or 35 to 44. The odds of online communication/records access among the 25 to 34, 35 to 44, 45 to 64, and 65 and over age groups did not differ.
[11] The difference between the $75,000 to $99,999 and $100,000 and over brackets was statistically different for online communication/records access, but not for online health research or monitoring.
[12] The likelihood for the $50,000 to $74,999 bracket was statistically different from the $100,000 and over but not the $75,000 to $99,999 bracket.

Table 5. Logistic Regression Predicting Likelihood of Using Online Health Resources, Model 4

	Research health information			Communicate with doctor or access health records			Use Internet-connected monitoring service		
	Estimate	*Standard Error*	*Odds Ratio*	*Estimate*	*Standard Error*	*Odds Ratio*	*Estimate*	*Standard Error*	*Odds Ratio*
Race/Ethnicity *(reference category is White alone, non-Hispanic)*									
Black alone, non-Hispanic	-0.2901 ***	0.06	0.75	-0.2360 ***	0.07	0.79	-0.1364	0.11	0.87
Asian alone, non-Hispanic	-0.3143 ***	0.09	0.73	-0.0679	0.09	0.93	-0.0336	0.15	0.97
Other, non-Hispanic	-0.0047	0.12	1.00	-0.0578	0.14	0.94	0.1055	0.26	1.11
Hispanic	-0.2003 **	0.07	0.82	-0.1307	0.07	0.88	0.0603	0.13	1.06
Type of Internet access *(reference category is No private access)*									
Home only	0.5296 ***	0.08	1.70	0.5152 ***	0.11	1.67	0.4297 *	0.21	1.54
Smartphone only	0.3897 ***	0.08	1.48	0.3964 ***	0.11	1.49	0.4485 *	0.22	1.57
Both	0.8915 ***	0.08	2.44	0.8566 ***	0.11	2.36	0.7616 ***	0.21	2.14
Female *(reference category is Male)*	0.3656 ***	0.03	1.44	0.2729 ***	0.04	1.31	0.1816 *	0.08	1.20
Age *(reference category is 15 to 24 years)*									
25 to 34 years	0.4146 ***	0.07	1.51	0.6812 ***	0.09	1.98	0.3731 **	0.14	1.45
35 to 44 years	0.4095 ***	0.07	1.51	0.6608 ***	0.09	1.94	0.3024 *	0.14	1.35
45 to 64 years	0.3827 ***	0.06	1.47	0.6590 ***	0.08	1.93	0.1322	0.13	1.14
65 years and over	0.2977 ***	0.07	1.35	0.6326 ***	0.09	1.88	-0.0818	0.15	0.92
Educational attainment *(reference category is Less than high*									
High school graduate	0.4630 ***	0.08	1.59	0.5113 ***	0.11	1.67	0.2188	0.22	1.25
Some college or associate's degree	0.9869 ***	0.07	2.68	1.1673 ***	0.11	3.21	0.7861 ***	0.20	2.20
Bachelor's degree or more	1.2321 ***	0.08	3.43	1.4313 ***	0.12	4.18	0.9251 ***	0.21	2.52
Family income *(reference category is Less than $25,000)*									
$25,000 to $49,999	-0.0071	0.05	0.99	0.0424	0.06	1.04	0.1293	0.14	1.14
$50,000 to $74,999	-0.0354	0.05	0.97	0.1764 **	0.06	1.19	0.4098 **	0.13	1.51
$75,000 to $99,999	0.0877	0.06	1.09	0.2623 ***	0.07	1.30	0.5632 ***	0.14	1.76
$100,000 and over	0.1213 *	0.05	1.13	0.4082 ***	0.06	1.50	0.6942 ***	0.13	2.00
Metropolitan *(reference category is Nonmetropolitan)*	0.0829	0.06	1.09	0.3264 ***	0.07	1.39	0.2741 *	0.13	1.32
Intercept	-2.0643 ***	0.11		-3.8328 ***	0.17		-4.9283 ***	0.29	
N	41,528			41,528			41,528		

Significance is noted as follows: *(p<0.05); **(p<0.01); ***(p<0.001).

Source: U.S. Census Bureau, Current Population Survey Computer and Internet Use Supplement, 2015.

Findings from Model 4, which includes race/ethnicity and type of Internet access as well as controls, are shown in Table 5. Both race/ethnicity and type of Internet access remained significant, indicating that they independently relate to use of eHealth resources. That is, racial/ethnic disparities in use are not fully explained by Internet access, nor are they fully explained by education, income, and the other controls included in this model. The odds for online health research in 2015 by race/ethnicity were similar to what was observed for Model 3. This likelihood was 25 percent lower for Blacks, 27 percent lower for Asians, and 18 percent lower for Hispanics relative to Whites.[13] The likelihood of communicating with a doctor or accessing health records online for different racial/ethnic groups was also similar to results from Model 3. Blacks remained less likely than Whites to use the Internet in this way, with 21 percent lower odds. Although the magnitude of the coefficient for Hispanics was similar when comparing Models 3 and 4, it was no longer significant once controlling for type of access.

Focusing on the relevance of type of Internet access, the pattern was the same as that observed in Model 2, which assessed type of access alone, although the coefficients were smaller in size. Again, this indicates that type of Internet access impacts use of eHealth resources independently of race/ethnicity and demographic and economic controls. Having both a home connection and data plan had a greater effect than either home-only or smartphone-only access, and, aside from connected-device monitoring, a home-only connection had a larger impact than a smartphone-only connection.

Overall, the impact of demographic and economic controls was similar when considering both race/ethnicity and type of Internet access. There was some evidence of a shift in the coefficients of education and family income. However, they remained significant predictors of using eHealth resources.

Finally, I tested a logistic regression model including race/ethnicity by type of access interaction terms. Because none of the interaction terms were significant, I do not show results from this model. The lack of significant interaction terms indicates that racial/ethnic disparities in the use of eHealth resources do not vary according to type of access. That is, different types of Internet access impact the online health practices of various racial/ethnic groups in similar ways. In particular, there is no added benefit of smartphones and mobile broadband for minorities relative to Whites.

[13] The odds for Blacks, Asians, and Hispanics did not differ.

CONCLUSION

Increasingly, both the public and health professionals are using the Internet to obtain and exchange health information. Expanded access to Internet health resources can promote wellness (Moiduddin and Moore 2008; Redmond et al. 2010), and greater use of these materials by racial/ethnic minorities in particular has the potential to reduce broader health disparities. A key prerequisite for the use of eHealth resources is reliable Internet access, and the digital divide contributes to racial/ethnic differences in seeking health information online (Fox and Duggan 2013). Mobile technology holds promise for expanding Internet connectivity for and increasing use of online health materials by minorities, although smartphone-only access is not without limitations (Smith 2015).

In this paper, I used data from the 2015 CPS Computer and Internet Use Supplement to study how race/ethnicity and type of Internet access are linked with using eHealth resources. Consistent with prior research (Fox and Duggan 2013; Miller, West, and Wasserman 2007), I find evidence that racial/ethnic minorities are less likely to use online health tools. Blacks, Asians, and Hispanics are all less likely than Whites to use the Internet to research health information, and Blacks additionally are less likely than Whites to go online to communicate with a doctor or access health records.

Analysis also suggests that type of Internet access is important for understanding use of online health resources. Use of these resources is greatest among those who connect to the Internet through both a home connection and a data plan, followed by those with a home-only connection and lastly by those with smartphone-only access. Thus, although those with access through a smartphone only are more likely to use eHealth tools than those lacking private Internet access, they lag behind those with a home connection or both types of connections. Likely, the limitations associated with smartphone-only access, such as data limits and a tendency to periodically cancel service (Smith 2015), affect smartphone-dependent users' access to Internet health resources.

I find that race/ethnicity and type of Internet access independently relate to use of eHealth resources. Thus, unlike Fox and Duggan (2013), my research indicates that racial/ethnic disparities are not fully explained by differences in Internet access. I further find that various types of Internet access similarly impact the online health practices of different racial/ethnic groups. Indeed, there does not appear to be a silver bullet for promoting use of Internet health tools among minorities. Although some have suggested that mobile technology may reduce racial/ethnic disparities in use of eHealth resources (e.g., Littlefield et al. 2014; Zach et al. 2012), the current paper indicates that there are limitations to

such a narrow approach. Instead, policymakers interested in promoting use of these resources by minorities, thereby helping to alleviate broader racial/ethnic health disparities, should continue to emphasize the importance of home-based as well as mobile Internet access.

REFERENCES

Agency for Healthcare Research and Quality. 2016. *2015 National Healthcare Quality and Disparities Report and 5th Anniversary Update on the National Quality Strategy*. AHRQ Pub. No. 16-0015. Rockville, MD: Agency for Healthcare Research and Quality.

File, Thom and Camille Ryan. 2014. "Computer and Internet Use in the United States: 2013." *American Community Survey Reports*, ACS-28. Washington, DC: U.S. Census Bureau.

Fox, Susannah and Maeve Duggan. 2013. *Health Online 2013*. Washington, DC: Pew Research Center.

Fox, Susannah and Deborah Fallows. 2003. *Internet Health Resources*. Washington, DC: Pew Research Center.

Gray, Nicola J., Jonathan D. Klein, Peter R. Noyce, Tracy S. Sesselberg, and Judith A. Cantrill. 2005. "Health Information-seeking Behavior in Adolescence: The Place of the Internet." *Social Science & Medicine* 60(7):1467-1478.

Horrigan, John B. and Maeve Duggan. 2015. *Home Broadband 2015*. Washington, DC: Pew Research Center.

Littlefield, Melissa B., Lorece Edwards, and Timothy Akers. 2014. "A Campus-Community Partnership to Disseminate Health Internet Technology Resources among African Americans." *Journal of Social Work Education* 50(4):648-659.

Miller, E. A., D. M. West, and M. Wasserman. 2007. "Health Information Websites: Characteristics of US Users by Race and Ethnicity." *Journal of Telemedicine and Telecare* 13(6):298-302.

Moiduddin, Adil and Jonathan Moore. 2008. *The Underserved and Health Information Technology-Issues and Opportunities*. Chicago, IL: National Opinion Research Center.

National Institutes of Health. 2010. *Fact Sheet – Health Disparities*. Bethesda, MD: National Institutes of Health.

Redmond, Nicole, Heather J. Baer, Cheryl R. Clark, Stuart Lipsitz, and LeRoi S. Hicks. 2010. "Sources of Health Information Related to Preventive Health Behaviors in a National Study." *American Journal of Preventive Medicine* 38(6):620-627.

Rennis, Lesley, Gloria McNamara, Erica Seidel, and Yuliya Shneyderman. 2015. "Google It!: Urban Community College Students' Use of the Internet to Obtain Self-care and Personal Health Information." *College Student Journal* 49(3):414-426.

Schmeida, Mary and Ramona McNeal. 2009. "Demographic Differences in Telehealth Policy Outcomes." Pp. 500-508 in *Handbook of Research on Distributed Medical Informatics and E-health*, edited by Athina A. Lazakidou and Konstantinos M. Siassiakos. Hershey, PA: IGI Global.

Smith, Aaron. 2015. *U.S. Smartphone Use in 2015*. Washington, DC: Pew Research Center.

West, Darrell M. and Edward Alan Miller. 2006. "The Digital Divide in Public E-Health: Barriers to Accessibility and Privacy in State Health Department Websites." *Journal of Health Care for the Poor and Underserved* 17(3):652-667.

West, Darrell M. and Edward Alan Miller. 2009. *Digital Medicine: Health Care in the Internet Era*. Washington, DC: Brookings Institution.

Zach, Lisl, Prudence W. Dalrymple, Michelle L. Rogers, and Heather Williver-Farr. 2012. "Assessing Internet Access and Use in a Medically Underserved Population: Implications for Providing Enhanced Health Information Services." *Health Information and Libraries Journal* 29(1):61-71.