

Missed Opportunity? Leveraging Mobile Technology to Reduce Racial Health Disparities

Rashawn Ray

University of Maryland

Abigail A. Sewell

Emory University

Keon L. Gilbert

Saint Louis University

Jennifer D. Roberts

University of Maryland

Abstract Blacks and Latinos are less likely than whites to have health insurance access and utilize health care. One way to overcome some of these racial barriers to health equity may be through advances in technology that allow people to access and utilize health care in innovative ways. Yet, little research has focused on whether the racial gap that exists for health care utilization also exists for accessing health information online and through mobile technologies. Using data from the Health Information National Trends Survey (HINTS), we examine racial differences in obtaining health information online via mobile devices. We find that blacks and Latinos are more likely to trust online newspapers to get health information than whites. Minorities who have access to a mobile device are more likely to rely on the Internet for health information in a time of strong need. Federally insured individuals who are connected to mobile devices have the highest probability of reliance on the Internet as a go-to source of health information. We conclude by discussing the importance of mobile technologies for health policy, particularly related to developing health literacy, improving health outcomes, and contributing to reducing health disparities by race and health insurance status.

Keywords health disparities, race, minority health, mobile phone technology, health policy

Blacks and Latinos are more likely to live in poor neighborhoods, have higher rates of mortality, and suffer from chronic diseases (Gilbert et al. 2016; Gilbert, Ray, and Langston 2014; Massey and Denton 1993; Sewell

Funding for this project was provided by the Robert Wood Johnson Foundation Health Policy Research Program.

Journal of Health Politics, Policy and Law, Vol. 42, No. 5, October 2017
DOI 10.1215/03616878-3940477 © 2017 by Duke University Press

2010). Wealth and economic segregation is of import for thinking about racial differences in health outcomes, considering that the high level of obesity among blacks is explained away by their likelihood of living in poverty (Boardman et al. 2005; Diez-Roux 2001, 2011; Hajat et al. 2010; Kawachi and Berkman 2003). As a result, scholars consider racial residential segregation as a fundamental cause of health disparities (Kwate et al. 2009; Williams and Collins 1995).

In addition to housing segregation, blacks and Latinos face labor market discrimination that restricts their access from jobs that provide quality health insurance (Stainback and Tomaskovic-Devey 2012). Consequently, blacks and Latinos are less likely to utilize health care and face a daunting health insurance gap. As of 2014, nearly 30 percent of adults who are Latino or living in poverty, as well as over 15 percent of adult blacks, compared to around 10 percent of adult whites, did not have health insurance coverage.¹ Besides the insurance gap, blacks are less likely to trust physicians. Due to a lack of communication between minority patients and health care providers, compared to white patients, and the fact that health care personnel mistakenly perceive blacks as having higher pain thresholds, minorities often receive fewer services and lower quality care. Even when blacks and Latinos have adequate health insurance, they still face barriers to high-quality care in the patient-provider relationship.

One way to overcome some of these racial barriers to health care equity is through advances in technology that allow people to utilize health care in new ways. Yet, little research has focused on whether the racial gap that exists for health care utilization also exists for accessing health information online and through mobile technologies. Recent research suggests that the racial technology gap may be less prominent once mobile technologies are examined (Ray, Gilbert, and Sewell 2016). Missing, however, is whether mobile technologies can help provide access to health information to reduce health disparities.

In this article, we use data from the Health Information National Trends Survey (HINTS) to examine racial differences in obtaining health information online via mobile devices. We first provide an overview of research on the racial gap in health care access and utilization. Second, we discuss why mobile technologies may be useful for bridging the racial gap in health care access. Third, we describe our data and methods. Then, we present our findings and conclude by discussing the policy implications our findings

1. See www.census.gov/content/dam/Census/library/publications/2015/demo/p60-253.pdf.

have for federally funded programs such as Medicaid, the Obama Phone Program,² and the Healthy Food Financing Initiative Bill.

Background

The Racial Digital Divide: Issues of Access

“Segregation concentrates economic disadvantage with racial disadvantage” (Ray, Gilbert, and Sewell 2016). Roughly 8 million Americans live in extreme poverty neighborhoods, with 40 percent of the local residents living below the poverty line. Due to housing segregation and discrimination, blacks and Latinos are more likely to live in segregated, poor neighborhoods (Charles 2003). Poor neighborhoods are often isolated from technological infrastructure that becomes useful for taking advantage of advances in health care. Mobile technologies allow for the use of health devices that require wireless technology (Wiehe et al. 2008). For example, pacemakers have wireless capabilities that alert physicians when a patient’s heart goes into atrial fibrillation. People who live in a poor neighborhood without access to wireless Internet in their homes cannot take advantage of this technological advancement to monitor their arrhythmias, and have a higher likelihood of stroke and heart disease (Go et al. 2001).

In many ways, racial segregation operates as a structural barrier to health information. Structural barriers constrain the formation of interpersonal relationships with other residents and local and national organizations that connect local residents with trusted health care providers. Consequently, the diffusion of health information into poor and minority communities that can increase health care utilization by taking advantage of cutting-edge policy prescriptions is inhibited (Szreter and Woolcock 2004). This is important considering research that shows that blacks and Latinos are more likely to seek neighborhood resources than individuals in more affluent neighborhoods (Barnes 2003, 2004). This line of research suggests that access is key rather than individual motivation.

Mobile Technologies to Circumvent Issues of Health Information Access

Mobile technologies are different from e-health technologies and may lend themselves to different groups across race and social class in nuanced ways that need to be assessed. Recent research shows that blacks and Hispanics may be less likely to have a landline but more likely to have a mobile

2. See www.obamaphone.com/obamaphone-providers.

phone (Ray, Gilbert, and Sewell 2016). They also may be less likely to have home-based Internet but more likely to use the Internet on their mobile phones than whites. How and/or for what purposes people use mobile phone technologies are important questions that have yet to be addressed by extant research. Although many individuals may use mobile technologies for work and leisure, those who are cut off from broadband services may use these technologies for accessing government services, identifying places to deal with food insecurity, and searching the Internet for health information to circumvent the lack of access to health care services and information from health care professionals.

We propose that mobile technologies can serve as central nodes in a network to connect poor, minority, or rural individuals with information that can improve their health. For example, there is an abundance of research on mobile technology applications used to increase physical activity and reduce obesity (Cavallo et al. 2012; Keller et al. 2014; Tate, Jackvony, and Wing 2003, 2004). We believe giving individuals similar access to health information via mobile technologies is vital considering that over 40 percent of US households do not have landline phones (Blumberg and Luke 2014) and instead only have a mobile phone. However, having a mobile phone does not mean that a person has access to the Internet with that mobile phone. A sizable percentage of the US population, who are also more likely to be poor and minority, do not have access to online resources in the same way as others.³

Bridging the Access and Health Information Divide

So, how do mobile technologies help reduce racial health disparities? First, mobile technologies allow health care providers to maintain regular contact with their patients. Similarly, mobile technologies provide researchers a low-cost opportunity to keep participants informed and engaged about research studies (Ray, Gilbert, and Sewell 2016). Second, mobile technologies allow for more real-time health information to be gathered and used. For example, patients with diabetes can take their blood sugar and enter it into a mobile technology application to receive how much insulin to administer.⁴ This is important considering that the US Pharmacopeia Medication Errors Reporting Program finds that roughly “50 percent of all medication errors involve insulin.”⁵ Half of these errors occur among individuals who are 60 years of age or older. This program reports that

3. See www.pewInternet.org/2015/04/01/us-smartphone-use-in-2015/.

4. This information was obtained from Vanderbilt University radiologist Dr. Laveil Allen.

5. See www.diabetesincontrol.com/a-review-of-insulin-errors/.

these errors add nearly \$2,000 to a patient's total health care costs. As of 2014, over 29 million Americans had diabetes.⁶ Without the use of these technologies, individuals on insulin continue to run the risk of giving themselves the wrong amounts of insulin. These errors can have grave implications for the patient by increasing morbidity and mortality, but also for state and federal budgets if the patient is on Medicaid or Medicare. This example illuminates how mobile technologies can increase communication between patients and health care providers, reduce costs, and improve overall health.

Third, mobile technologies may allow for patients with limited mobility and trouble accomplishing activities of daily living to interact with their health care providers without having to leave their homes (Vandelanotte et al. 2007). This type of technology is already being used for new mothers who have C-sections and may be limited in their ability to travel in the first month after birth. These technologies also decrease health care costs by reducing the number of days that patients may stay in the hospital. Furthermore, this type of mobile technology is being used by residents in Hawaii who may live on a different island from their health care provider. These types of technological advancements would be very useful for poor residents who have access issues due to limited public transportation routes or distance from health care providers.

With evidence documenting that blacks and Latinos are more likely to use mobile phone technology, coupled with individuals in economically disadvantaged neighborhoods aiming to access more social capital resources (Barnes 2011), there is reason to believe that blacks and Latinos may also use mobile technologies to access health information. We examine whether the digital divide exists for mobile technologies and whether such technologies lead individuals across racial and class divides to access health information in similar ways. While we do understand that accessing health information online is different from interacting with health care providers via mobile technologies, this examination is still fruitful as it may hold insights into ways to further circumvent racial disparities in health care access.

Methods

Data

We analyzed data from the Health Information National Trends Survey (HINTS) 4, Cycle 3. A cross-sectional, mail-administered survey, HINTS

6. See www.cdc.gov/diabetes/pubs/statsreport14/national-diabetes-report-web.pdf.

is designed to collect nationally representative data about the US population's health communication practices. Data were collected between September and December of 2013 with a response rate of 35.2 percent. A total of 3,165 respondents completed the portion of the survey that included the measures of interest. The sample was further restricted to include only respondents ages 18 to 59 who provided data on key independent variables (racial group membership, insurance type, mobile device access) and sociodemographic attributes. The age and race/ethnicity restrictions of the data account for the largest reductions in the sample size (roughly 42 percent). Although people over the age of 60 are more likely to face chronic diseases than the age group in our study, we assert that our study has the potential to help policy makers get ahead of ways to increase utilization as people age. Given that the study focused on multiple outcomes, the sample size varied slightly based on the outcome of interest. A total of 1,036 respondents provided valid data on all measures of interest.

Measures

Dependent Variables. The primary dependent variables were ascertained from a series of questions concerning attitudes and behaviors toward the sources of health information. Trust in sources of health information was ascertained from the following question: "In general, how much would you trust information about health or medical topics from [source]?" Twelve sources of health information were evaluated: (1) Doctor; (2) Family or friends; (3) Online newspapers; (4) Print newspapers; (5) Special health or medical magazines or newsletters; (6) Radio; (7) Internet; (8) Local TV; (9) National or cable TV news programs; (10) Government health agencies; (11) Charitable organizations; and (12) Religious organizations and leaders. The four response options included: Not at all; A little; Somewhat; Very. The values were recoded so that higher values indicated distrust in the source of health information.

Among people who reported having "ever looked for information about health or medical topics from any source," recent source of health information was ascertained from the following question: "The most recent time you looked for information about health or medical topics, where did you go first?" The response options were: (1) Doctor or health care provider; (2) Internet; (3) Other (Books; brochures, pamphlets, etc.; Cancer organization; Family; Friend/Co-worker; Library; Magazines; Newspapers; Telephone information number; Complementary, alternative, or unconventional practitioner; Other). A fourth response option was allowed for people

who had not recently sought health information. A four-category outcome was created, as follows: (1) Doctor or health care provider; (2) Internet; (3) Other (list); (4) Did not seek health information recently.

Go-to source of health information was ascertained from the following question: “Imagine that you had a strong need to get information about health or medical topics. Where would you go first?” The response options were: (1) Doctor or health care provider; (2) Internet; (3) Other (Books; brochures, pamphlets, etc.; Cancer organization; Family; Friend/Co-worker; Library; Magazines; Newspapers; Telephone information number; Complementary, alternative, or unconventional practitioner; Other). A binary indicator of reliance on the Internet was also created by coding Internet as 1 and all other non-missing responses as 0.

Table 1 provides a description of the variables used in the primary analysis based on the sample of individuals with non-missing data on all outcomes and covariates of interest. For convenience sake, trusting attitudes were dichotomized such that 1 = very trusting; 0 = not at all, a little, or somewhat trusting. All other measures are reported in accordance with how they are used in the analysis.

Independent Variables. The analysis focused on explaining variation in the outcomes of interest due to three factors: (1) mobile device access; (2) insurance type; and (3) racial group membership. For mobile devices, we created a three-category ordinal measure to proxy mobile device access, where: (1) I do not have any of the above (“No mobile device”); (2) tablet computer only, smartphone only, or cell phone only (“1 mobile device”); and (3) Multiple devices selected (“2+ mobile devices”). Mobile devices exclude desktop computers and laptops, but do include: tablets like an iPad, Samsung Galaxy, Motorola Xoom, or Kindle Fire; smartphones such as an iPhone, Android, Blackberry, or Windows Phone; and cell phones. This measure captured the relative extent to which a respondent was connected to the Internet via mobile devices. Higher values indicate more ways in which an individual can access the Internet.

For insurance type, we created a three-category nominal variable, where (1) no health care insurance; (2) Medicare or government-assistance; or (3) Employer-provided or insurance purchased directly from an insurance company. All other responses were coded to missing. Of those that were missing, forty-nine respondents did not provide data on health care coverage, and seventy-six respondents reported some other form of health care insurance coverage than ascertained in this study (e.g., VA). Racial group membership was a self-reported measure and includes those who identify

Table 1 Weighted Means of Outcomes of Interest, Independent Variables, and Sociodemographic Attributes, Ages 18–59, HINTS 4 – Cycle 3, *N*=1,036

	Black	Latino	White
<i>Outcomes of Interest</i>			
Sources Trusted for Health Information			
Doctor	0.71	0.70	0.70
Family	0.10	0.03	0.06
Online news sources	0.02 ^b	0.09 ^a	0.03
Print news sources	0.01	0.06 ^a	0.02
Health news sources	0.28	0.27	0.23
Radio	0.02 ^a	0.04 ^a	0.01
Internet	0.15	0.12	0.11
Local TV	0.05	0.08 ^a	0.02
National TV	0.05	0.10 ^a	0.04
Government	0.35	0.32	0.28
Charities	0.12	0.12 ^a	0.05
Religious organization	0.06 ^a	0.08 ^a	0.03
Sought Health Information Recently from . . .			
The Internet	0.49 ^a	0.50 ^a	0.67
Doctor or health care provider	0.13	0.06	0.07
Other sources	0.11	0.14 ^a	0.08
Not sought information recently	0.26	0.31	0.18
In Need of Health Information, Would Go To . . .			
The Internet	0.37 ^a	0.45	0.52
Doctor or health care provider	0.56 ^a	0.49	0.41
Other source	0.07	0.06	0.07
<i>Independent Variables</i>			
Mobile Device Access			
No mobile Devices	0.07	0.13 ^a	0.03
One Mobile device	0.47	0.33	0.43
2+ mobile devices	0.46	0.54	0.54
Insurance Type			
Federally insured	0.23 ^a	0.14	0.10
Only privately insured	0.54 ^a	0.50 ^a	0.72
Uninsured	0.23	0.36 ^a	0.19
<i>Sociodemographic Controls</i>			
Male (0=Female)	0.44	0.55	0.49
Age	39.14	37.55	39.45
Geographical Region			
Midwest	0.23	0.06 ^a	0.25
South	0.53 ^a	0.40	0.33
West	0.06 ^{a,b}	0.32	0.25
Northeast (ref.)	0.18	0.21	0.17

Table 1 (continued)

	Black	Latino	White
Marital Status			
Divorced/widowed/separated	0.13	0.08	0.12
Single	0.43 ^{a,b}	0.23	0.26
Married/cohabitating (ref.)	0.44 ^{a,b}	0.69	0.62
Total household size	3.21 ^b	3.67 ^a	3.09
Household Income	70208	73647	78592
Highest Education Level			
Less than high school (ref.)	0.11 ^a	0.17 ^a	0.02
High school diploma	0.27	0.25	0.22
Some college	0.18 ^a	0.21 ^a	0.47
College degree	0.22	0.25	0.19
Graduate school	0.23 ^a	0.13	0.10
Occupational Status			
Employed (ref.)	0.72	0.66 ^a	0.78
Unemployed	0.15 ^a	0.12 ^a	0.04
Not in labor market or retired	0.12	0.23	0.18
Felt Sad . . .			
All of the time	0.01	0.00	0.01
Most of the time	0.02	0.04	0.04
Some of the time	0.30	0.24	0.21
A Little of the time	0.42 ^a	0.47	0.53
None of the time	0.25	0.25	0.21
Ever Diagnosed with Cancer	0.04	0.03	0.04
Self-Rated Health			
Poor	0.03 ^a	0.02	0.01
Fair	0.21 ^a	0.15	0.08
Good	0.28	0.40	0.34
Very good	0.37	0.29 ^a	0.45
Excellent	0.12	0.14	0.12
<i>N</i>	172	201	663

^a*p* < .05, statistically different from whites (two-tailed test).

^b*p* < .05, statistically different from Latinos (two-tailed test).

as either white, black or African American, or Hispanic/Latino. Due to small sample sizes for other groups, they were excluded from the analysis.

Control Variables. Control variables included sociodemographic attributes and health. Sociodemographic attributes included gender, age, marital status, household size, household income (mid-repoint recode of nine-category ordinal variable with the following categories: \$0 to \$9,999;

\$10,000 to \$14,999; \$15,000 to \$19,999; \$20,000 to \$34,999; \$35,000 to \$49,999; \$50,000 to \$74,999; \$75,000 to \$99,999; \$100,000 to \$199,999; \$200,000 or more), highest educational level in household, and occupational status. Health indicators included a five-category ordinal measure of feeling sad in the most recent month, lifetime cancer diagnosis, and self-rated health.

Analytic Strategy

We noted missing data for both the dependent and independent variables for the 18–59 population. Percentages with missing data for the dependent variables were low, ranging from 0.7 percent (trust in doctors) to 7.4 percent (recent source of health information). Percentages of respondents having missing data on independent variables ranged from 0.0 percent (geographical region, marital status) to 3.5 percent (occupational status). We assumed the data were missing at random, and deleted all cases from the list with missing data on independent variables allowing for variation in sample sizes based on the dependent variable of choice.

All analyses were adjusted for the complex survey design of HINTS. Survey estimation (`svy:`) commands in Stata 14 were used to include probability weights (`person_finwt0`), clustering by Designated Market Areas (`dmaid`), and three different sampling strata (`stratum`). Trust in sources of health information outcomes were measured using ordered logistic regression with an allowance for five response categories. For behaviors and attitudes toward the Internet as a source of health information, multinomial logistic regression was used with health care providers as the reference category. Proportions tests were conducted to determine if there were differences in behaviors and attitudes toward sources of health information among the different types. These tests suggested that the Internet response option could not be combined with other nonmedical response options or with the Never category (for recent source of health information). The tests also revealed that health care providers could be combined. So, we analyzed three categories: Internet, health care providers, and other nonmedical sources.

In the analysis that follows, we provide four types of estimates. First, we include estimates of racial disparities in trusting twelve different sources of health information, holding constant sociodemographic attributes and health-related indicators. Second, we provide estimates of racial disparities in behaviors and attitudes toward the specified sources of health

information, holding constant sociodemographic attributes and health-related indicators. Third, we provide estimates of racial disparities in attitudes toward the Internet as a go-to source of health information, while adjusting for the main and moderating effect of insurance type and for the main and moderating effect of mobile device access. Fourth, we provide estimates of racial disparities in attitudes toward the Internet as a go-to source of health information, while adjusting for the ways that insurance type moderates the main effect of mobile device access. For each type of evaluation with second-order interactions, we produced adjusted models that control for sociodemographic attributes, health-related indicators, and trust in the Internet as a source of health information (see figs. 1, 2, and 3).

Limitations

The data in our study obviously have limitations that impact our analysis. First, the survey had a low response rate. Though this response rate is similar to—and, in some regards, better than—other studies that sample using traditional phone methods, we do not have information for the potential respondents who opted out of the study either due to non-response or refusal. Therefore, there may be response bias present in the sample, though research is mixed on whether non-respondents differ from respondents in nationally representative and/or random samples (Abraham, Helms, and Presser 2009; Tourangeau, Groves, and Redline 2010). Second, we were unable to ascertain the specific types of websites and news sources that respondents obtained from the Internet. Third, it is possible that people who use their mobile devices to do Internet searches for health information may have unmeasured characteristics that also are associated with getting mobile devices in the first place, leading to endogeneity issues (e.g., doing Internet searches may make them care more about accessing health information than people who do not do those things). Fourth, although we purport that accessing health information online may translate to telehealth opportunities, assessing this potential payoff is beyond the scope of this study. We also do not want to imply that telehealth can be used as a substitute for direct interaction with health care providers. Rather, we view telehealth as another tool for health care providers to use, and the potential payoff from these opportunities may benefit individuals living in impoverished communities. Future research should aim to explore these possibilities given policy changes that aim to enhance wireless capabilities.

Table 2 Ordinal Logistic Regression for Trusting Sources of Health Information on Racial Group Membership, HINTS 4 – Cycle 3 (Whites Reference Group)

	Black	Latino	<i>N</i>
Doctor	1.09 (0.26)	0.96 (-0.15)	1,194
Family	0.89 (-0.38)	0.49*** (-3.43)	1,192
Online news	1.61* (2.36)	1.66* (2.15)	1,189
Print news	1.44+ (1.76)	1.06 (0.30)	1,181
Health news	1.35 (1.06)	1.08 (0.30)	1,194
Radio	1.67* (2.14)	1.30 (1.16)	1,192
Internet	1.22 (0.66)	1.12 (0.50)	1,198
Local TV	1.87** (2.69)	2.34*** (3.53)	1,185
National TV	1.99*** (3.38)	2.21** (3.31)	1,191
Government	1.48+ (1.67)	1.54* (2.05)	1,186
Charities	1.69+ (1.96)	1.48 (1.44)	1,187
Religious organizations	2.81*** (4.73)	1.34 (1.30)	1,190

Note: Exponentiated betas shown. Z-statistic in parentheses (two-tailed test). Models include controls for sociodemographic attributes, including male gender, age, geographical region, marital status, household size, household income, household education, occupational status, sadness in past month, cancer diagnosis, and self-rated health.

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (two-tailed test)

Results

Racial Disparities in Trusting Sources of Health Information

Table 2 shows racial disparities in trusting twelve different sources of health information. The estimates adjust for racial differences in socio-demographic attributes that may also be correlates of trust. The analysis reveals heterogeneity in the nature and degree of black-white and Latino-white disparities in trust in sources of health information.

Blacks are more likely to trust online news sources, radio, local TV, national TV, and religious organizations than whites, while Latinos are more likely to trust online news, local TV, national TV, and the government than whites. Latinos are less likely than whites to trust family members; yet, no black-white differences exist in trusting this source of health information. In addition to there being no racial differences in trusting doctors for health information, there are also no racial differences in trusting print news, health news, the Internet, and charities. There are also no statistically significant black-white differences in trusting government, and no Latino-white differences in trusting religious organizations.

Racial Disparities in Use of and Reliance on the Internet for Health Information

Table 3 shows variation in recent use of the Internet and reliance on the Internet in times of strong need by racial group membership, insurance type, and mobile device access status—the key covariates of interest in this study. The results reveal that distrust in the Internet is associated with lack of use and reliance on the Internet as a source of health information. The estimates indicate that people who think the Internet is not a trustworthy source of health information are less likely to actually have used the Internet in the most recent search for health information compared to using a doctor. They are also less likely to use the Internet as a go-to source for health information in times of strong need for information about health.

Holding as constant distrust in the Internet, while there are no racial differences in recent use of the Internet, blacks are less likely than their white counterparts to rely on the Internet and other nonmedical sources. That is, blacks are more likely to report preferring to go to a doctor or health care provider during times of strong need. There are no Latino-white differences in either use of or reliance on the Internet.

There are, however, gaps in Internet use and reliance based on insurance type. Individuals who are insured by Medicare or Medicaid (i.e., federally insured) are less likely than the uninsured to use the Internet when looking for health information recently. In fact, insured persons (both federally and privately insured) are less likely than the uninsured to indicate the Internet as a go-to source of health information in times of strong need. There are no main effects of mobile device status, holding constant these key covariates of attitudes toward the Internet.

Table 3 Multinomial Logistic Regressions for Use of and Reliance on Internet for Health Information on Racial Group Membership, HINTS 4 – Cycle 3

	The Most Recent Time You Looked for Health Information, Where Did You Go First? (Reference: Provider)			Imagine You Had a Strong Need to Get Health Information, Where Would You Go First? (Reference: Provider)	
	Internet	Other	Never	Internet	Other
Black	0.37+ (-1.83)	0.88 (-0.21)	0.76 (-0.53)	0.43** (-2.82)	0.32* (-2.12)
Latino	1.11 (0.20)	3.30+ (1.92)	1.69 (0.90)	0.70 (-1.24)	0.45+ (-1.71)
Any federal	0.08* (-2.31)	0.26 (-1.25)	0.14+ (-1.82)	0.26*** (-3.41)	0.84 (-0.33)
Private only	0.19 (-1.62)	0.40 (-0.85)	0.18 (-1.62)	0.27*** (-3.92)	0.60 (-1.03)
1 device	5.95+ (1.92)	1.61 (0.55)	1.24 (0.26)	2.17 (1.29)	0.90 (-0.21)
2+ devices	4.66+ (1.67)	0.44 (-0.85)	0.65 (-0.53)	2.63 (1.61)	0.72 (-0.55)
Distrust in Internet	0.24*** (-6.41)	0.61+ (-1.77)	0.70 (-1.38)	0.32*** (-6.80)	0.60* (-2.00)
<i>N</i>		1,086			1,198

Note: Exponentiated betas shown. Z-statistic in parentheses (two-tailed test). Models include controls for sociodemographic attributes not shown, including male gender, age, geographical region, marital status, household size, household income, household education, occupational status, sadness in past month, cancer diagnosis, and self-rated health.

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (two-tailed test)

Differential Reliance on the Internet by Insurance Type across Racial Groups

Uninsured individuals of all races are more likely to rely on the Internet as their go-to source for health information. However, the gap between the uninsured and the privately insured is smaller for blacks and Latinos than among whites. Compared to whites, the Uninsured/Private Insured gap is 5.92 times smaller among blacks ($z = 2.74$) and 3.65 times smaller among Latinos ($z = 2.54$) (table 4, column 1). These race differentials in the relative association of insurance type with reliance on the Internet hold when adjusting for sociodemographic attributes (fig. 1; table 4, column 2).

Table 4 Logistic Regression for Reliance on Internet on Racial Group Membership, Insurance Type, and Mobile Device Access, HINTS 4 – Cycle 3

	Racial Group Membership		Racial Group Membership		Insurance Type	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
Black	0.16** (-3.11)	0.18* (-2.59)	0.02** (-3.03)	0.02*** (-3.65)	0.63+ (-1.76)	0.53* (-2.26)
Latino	0.34* (-2.30)	0.40+ (-1.92)	0.26 (-1.22)	0.12+ (-1.90)	0.84 (-0.73)	0.82 (-0.72)
Any federal	0.33* (-2.25)	0.26** (-2.78)		0.24*** (-3.57)	8.19+ (1.80)	10.88* (2.09)
Private only	0.40** (-3.00)	0.20*** (-4.37)		0.28*** (-4.18)	0.79 (-0.21)	0.60 (-0.48)
1 Device		2.03 (1.30)	2.26 (1.22)	1.01 (0.02)	10.66** (2.69)	9.13* (2.39)
2+ Devices		2.46+ (1.65)	3.11+ (1.68)	1.31 (0.39)	24.82*** (3.59)	10.60* (2.49)
Black X any federal	2.65 (1.20)	1.97 (0.79)				
Latino X any federal	0.78 (-0.31)	0.59 (-0.60)				
Black X private only	5.92** (2.74)	4.15* (2.08)				
Latino X private only	3.65* (2.54)	3.10* (1.99)				

(continued)

Table 4 Logistic Regression for Reliance on Internet on Racial Group Membership, Insurance Type, and Mobile Device Access, HINTS 4 – Cycle 3 (*continued*)

	Racial Group Membership X Insurance Type		Racial Group Membership X Mobile Device Access		Insurance Type X Mobile Device Access	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
Black X 1 device			17.01* (2.19)	17.77* (2.58)		
Latino X 1 device			4.06 (1.23)	11.32* (1.99)		
Black X 2+ devices			36.60** (2.70)	39.45** (3.29)		
Latino X 2+ devices			3.14 (1.05)	4.97 (1.46)		
Any federal X 1 device					0.04** (-2.64)	0.01*** (-3.40)
Private only X 1 device					0.79 (-0.21)	0.47 (-0.67)
Any federal X 2+ devices					0.03** (-2.86)	0.02** (-2.99)
Private only X 2+ devices					0.48 (-0.66)	0.49 (-0.66)
<i>N</i>	1,198	1,198	1,198	1,198	1,198	1,198

Note: Exponentiated betas shown. Z-statistic in parentheses (two-tailed test). Adjusted models include controls for mobile device access, trust in the Internet, and sociodemographic attributes, including male gender, age, geographical region, marital status, household size, household income, household education, occupational status, sadness in past month, cancer diagnosis, and self-rated health.
[†]*p* < 0.10, **p* < 0.05, ***p* < 0.01, ****p* < 0.001 (two-tailed test)

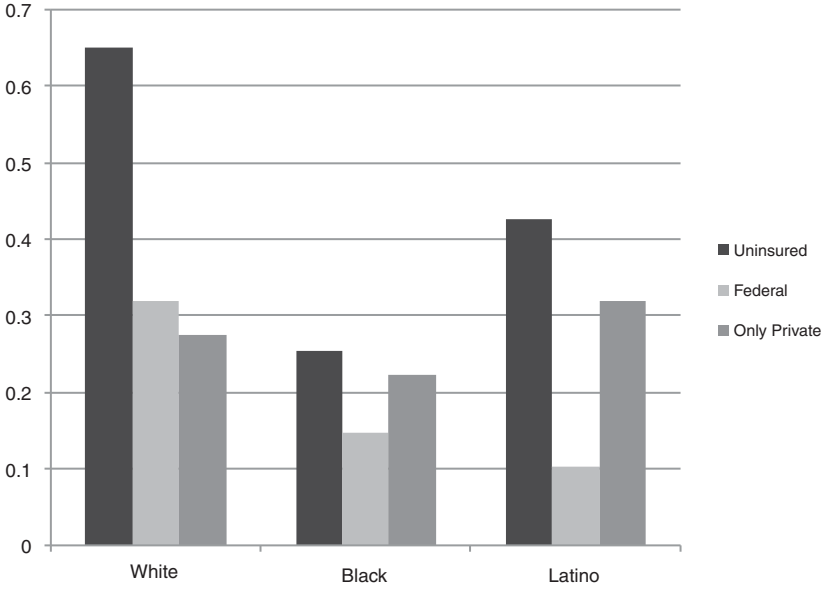


Figure 1 Predicted Likelihood of Internet as Go-To Source of Health Information When in Need by Race and Insurance Type, Adjusted Model

Differential Reliance on the Internet by Mobile Device Access across Racial Groups

Having a mobile device is associated with reliance on the Internet as a go-to source of health information for all racial groups. However, the relative extent to which the mobile device divide matters for Internet health information reliance varies by racial group. For instance, there is a smaller gap between people who have two or more mobile devices and people who have no mobile device among whites than among either blacks or Latinos (table 4, column 3). Blacks who do not have a mobile device face a serious dearth of reliance on the Internet. Virtually no blacks in these data who did not have a mobile device reported that they would turn to the Internet for health information in a time of need (fig. 2; table 4, column 4). The probability of Internet reliance of Latinos who are not connected is only slightly higher than the probability for blacks. Even though connected blacks are less likely to rely on the Internet than connected whites, the large magnitude of the mobile device divide between blacks with no devices, compared to one or two devices, indicates that being connected

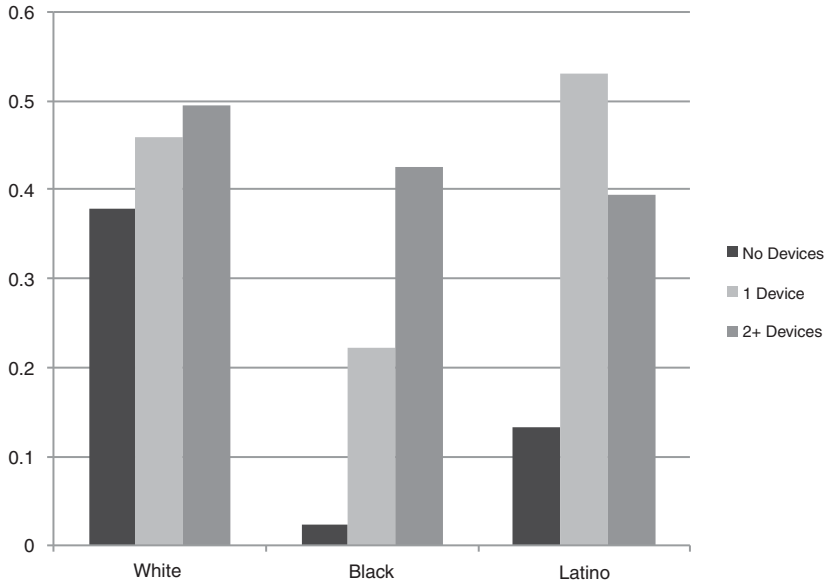


Figure 2 Predicted Likelihood of Internet as Go-To Source of Health Information by Race and Mobile Device Access, Adjusted Model

provides blacks with a vastly different orientation toward the Internet and its relationship with health information than is the case among whites.

Differential Reliance on the Internet by Mobile Device across Insurance Types

Having a mobile device is associated with reliance on the Internet as a go-to source of health information for all insurance types. However, the relative extent to which the mobile device divide matters for Internet health information reliance varies by insurance type. For instance, there is a larger gap between people who have two or more devices and people who have no mobile devices among the uninsured and the privately insured than among the federally insured (table 4, column 5). Holding constant socio-demographic attributes, federally insured persons who do not have a mobile device are more likely to rely on the Internet as a go-to source for health information than uninsured and privately insured persons who have one mobile device (fig. 3; table 4, column 6). These findings indicate that

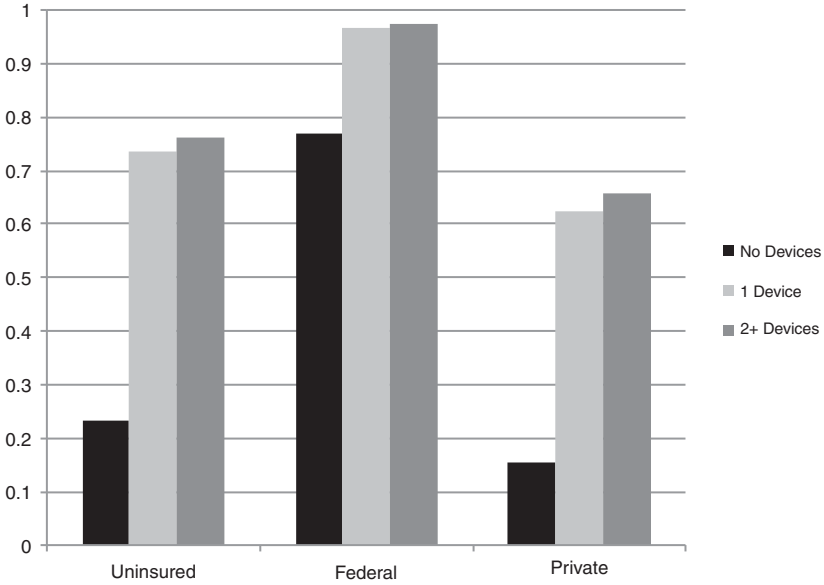


Figure 3 Predicted Likelihood of Internet as Go-To Source of Health Information by Insurance Type and Mobile Device Access, Adjusted Model

the mobile device divide is nearly nonexistent among federally insured persons, but is prominent among people who lack insurance and people who have private insurance. Mobile devices may serve similar functions for the uninsured and the privately insured.⁷

Health Policy Implications

Establishing health equity for all Americans regardless of race/ethnicity or social class background is not solely about economic resources. Rather, health equity is also about social resources and providing individuals with the ability to exert agency to maintain and improve their health outcomes. Providing access to health information allows people to obtain knowledge important to their well-being more expeditiously. Health information dissemination improves health literacy and may enhance compliance and

7. Supplemental analysis (available upon request) examined the probability of a three-way interaction between racial group membership, mobile device access, and insurance type; however, sample sizes for minorities were too small to conduct a reliable test of third-order interactions.

behavioral change. It also allows people to become more prepared for interactions with health care providers and feel greater autonomy over their lives. For people with chronic health conditions such as diabetes, heart failure, and kidney failure, mobile and wireless technologies allow them to maintain care in outpatient settings rather than in hospital settings. This change in setting helps to reduce health care costs for insurance companies and government-sponsored insurance programs.

Despite these benefits, poor and minority community members are less likely to have access to mobile and wireless technology, yet more likely to have chronic health conditions. Providing wireless infrastructures to improve telehealth capabilities in poor and minority communities could help to overcome the lack of health care providers and inadequate resources in such neighborhoods. With these infrastructures, mobile technologies may be used to document how travel patterns and neighborhood locations are associated with health-risk behaviors across the life course of youth and aging adults. Nonetheless, providing access to mobile and wireless technologies is not a substitute for dealing with the real challenges of building an infrastructure of health that provides equitable opportunities for health care. Moreover, access to health information via mobile technology is simply a complement to primary care services for the underserved. Strategies that provide ways to enhance patient agency, while also aiming to overhaul an inequitable health care system, should be pursued simultaneously.

One health policy program, in particular, may lend itself to leveraging mobile technology for poor Americans. The Obama Phone Program allows residents who meet a certain financial threshold to obtain a mobile phone to communicate with employers, job prospects, and family members and friends. These phones, however, only give a person the ability to call and text. What is needed is the ability to gain access to the Internet. As we show here, blacks and Latinos will definitely heed these opportunities to access the Internet in order to obtain vital health information. Incentives and subsidies can be offered to corporations that provide wireless infrastructure in poor neighborhoods. This is in line with Healthy People 2010 objectives that aimed to increase the number of people with home-based Internet.

Altogether, mobile technologies are vital for health care as we progress into the twenty-first century. Finding ways to enhance existing programs in order to provide access to mobile technologies will correspondingly improve health literacy and outcomes. Mobile technologies may also

contribute to reducing racial health disparities among whites, Latinos, and blacks, as well as those individuals on Medicare and Medicaid.

Conclusion

This article examined racial differences in the propensity to access health information online. Blacks and Latinos, compared to whites, were more likely to trust online newspapers to get health information. Blacks also were more likely than whites to use the Internet to access health information when in the midst of a strong need event. However, minorities who are privately insured were more likely than their uninsured counterparts to rely on the Internet. These findings are important considering that federally insured persons who are connected to mobile devices had the highest probability of reliance on the Internet as a go-to source of health information. In sum, these findings lend credence that mobile technologies are important for achieving greater racial equity in health behavior and health outcomes.

■ ■ ■

Rashawn Ray is associate professor of sociology and the Edward McK. Johnson Jr. endowed faculty fellow at the University of Maryland (UMD), College Park. Formerly, Ray was a Robert Wood Johnson Foundation Health Policy Research Scholar at the University of California, Berkeley/UCSF. Ray's research addresses the mechanisms that manufacture and maintain racial and social inequality. His work also speaks to ways that inequality may be attenuated through racial uplift activism and social policy. Selected as a member of "40 under 40 Prince George's County" (Maryland), Ray has published over forty books, articles, book chapters, and op-eds, and was awarded the 2016 UMD Research Communicator Award.
rjray@umd.edu

Abigail A. Sewell is assistant professor of sociology at Emory University. Her research focuses on the political economy of racial health disparities; the inter-relatedness of the economy, public policy, and racial domination; and quantitative methods in studies of race and supra-individual racism. Her work has received support from the National Institutes of Health, the Ford Foundation, the National Science Foundation, and the Society for the Study of Social Problems. Her work has been published in *Social Science Medicine*, *Social Science Research*, and *Journal of Urban Health*. She teaches courses in race, racism, and quantitative approaches in studies of ethnoraciality.

Keon L. Gilbert is an associate professor at the Saint Louis University College for Public Health and Social Justice, Department of Behavioral Sciences and Health Education. His primary research interests are inspired by a quest to reduce health disparities through chronic disease prevention and promoting healthy behaviors by applying mixed methods in areas such as social capital, community capacity, organizational readiness, and community-based participatory research with populations such as African American males. His research is centered on the intersection of racial and gender identity, racial and gender socialization, and structural racism as important, yet unexplored, determinants of African American males' health across the life course.

Jennifer D. Roberts is assistant professor of kinesiology at the University of Maryland, College Park, School of Public Health, and is the director of the Public Health Outcomes and Effects of the Built Environment (PHOEBE) Laboratory. Her research focuses on the relationship between the built environment and physical activity in addition to its impact on obesity and other public health outcomes. More specifically, much of her research has explored the dynamic relationship between environmental, social, and cultural determinants of physical activity, using empirical evidence of this relationship to infer complex health outcome patterns among adults and children.

Acknowledgments

The authors acknowledge the JHPPL special issue editors and reviewers as well as participants of the 2016 Robert Wood Johnson Foundation Investigator Awards conference for helpful comments on this manuscript.

References

- Abraham, Katherine G., Sara Helms, and Stanley Presser. 2009. "How Social Processes Distort Measurement: The Impact of Survey Nonresponse on Estimates of Volunteer Work in the United States." *American Journal of Sociology* 114: 1129–65.
- Barnes, Sandra L. 2003. "Determinants of Individual Neighborhood Ties and Social Resources in Poor Urban Neighborhoods." *Sociological Spectrum* 23, no. 4: 463–97.
- Barnes, Sandra L. 2004. "Too Poor to Get Sick? The Implications of Place, Race, and Costs on the Healthcare Experiences of Residents in Poor Urban Neighborhoods." *Chronic Care, Healthcare Systems and Services Integration: Research in the Sociology of Healthcare* 22: 47–64.
- Blumberg, Stephen J., and Julian V. Luke. 2014. "Wireless Substitution: Early Release of Estimates from the National Health Interview Survey, January–June 2014."

- US Department of Health and Human Services. Centers for Disease Control and Prevention. National Center for Health Statistics. 1–14.
- Boardman, Jason D., Jarron M. Saint Onge, Richard G. Rogers, and Justin T. Denney. 2005. “Race Differentials in Obesity: The Impact of Place.” *Journal of Health and Social Behavior* 46: 229–43.
- Cavallo, David N., Deborah F. Tate, Amy V. Ries, Jane D. Brown, Robert F. Devellis, and Alice S. Ammerman. 2012. “A Social Media-Based Physical Activity Intervention: A Randomized Controlled Trial.” *American Journal of Preventive Medicine* 43, no 5: 527–32.
- Charles, Camille Z. 2003. “The Dynamics of Racial Residential Segregation.” *Annual Review of Sociology* 29: 167–207.
- Diez-Roux, A. V. 2001. “Investigating Neighborhood and Area Effects on Health.” *American Journal of Public Health* 91: 1783–89.
- Diez-Roux, Ana V. 2011. “Complex Systems Thinking and Current Impasses in Health Disparities Research.” *American Journal of Public Health* 101: 1627–34.
- Gilbert, Keon L., Rashawn Ray, and Marvin Langston. 2014. “Social Dis(ease) of African American Males and Health.” In *Urban Ills: Twenty-First-Century Complexities of Urban Living in Global Contexts*, vol. 2., edited by Carol Camp Yeakey, Vetta Sanders Thompson, and Anjanette Wells, 23–36. Lanham, MD: Lexington Books.
- Gilbert, Keon, Rashawn Ray, Arjumand Siddiqi, Derek Griffith, Elizabeth Baker, Shivan Shetty, and Keith Elder. 2016. “Visible and Invisible Trends in African American Men’s Health: Pitfalls and Promises.” *Annual Review of Public Health* 37: 295–311.
- Go, Alan S., Elaine M. Hylek, Kathleen A. Phillips, YuChiao Chang, Lori E. Henault, Joe V. Selby, and Daniel E. Singer. 2001. “Prevalence of Diagnosed Atrial Fibrillation in Adults—National Implications for Rhythm Management and Stroke Prevention: The AnTicoagulation and Risk Factors in Atrial Fibrillation (ATRIA) Study.” *Journal of the American Medical Association* 285, no. 18: 2370–75.
- Hajat, A., J. S. Kaufman, K. M. Rose, A. Siddiqi, and J. C. Thomas. 2010. “Do the Wealthy Have a Health Advantage? Cardiovascular Disease Risk Factors and Wealth.” *Social Science and Medicine* 71: 1935–42.
- Kawachi, Ichiro, and Lisa F. Berkman. 2003. *Neighborhoods and Health*. New York: Oxford University Press.
- Keller, Brett, Alain Labrique, Kriti M. Jain, Andrew Pekosz, and Orin Levine. 2014. “Mind the Gap: Social Media Engagement by Public Health Researchers.” *Journal of Medical Internet Research* 16, no. 1: e8.
- Kwate, Naa Oyo A., Chun-Yip Yau, Ji-Mengh Loh, and Donya Williams. 2009. “Inequality in Obesigenic Environments: Fast Food Density in New York City.” *Health and Place* 15: 364–73.
- Massey, Douglas S., and Nancy Denton. 1993. *American Apartheid: Segregation and the Making of the Underclass*. Cambridge, MA: Harvard University Press.
- Ray, Rashawn, Keon L. Gilbert, and Abigail A. Sewell. 2016. “Mobile Technology as a Conduit for Reducing Obesity-Related Health Disparities.” *Issues in Race and Society* 4, no. 1: 98–119.

- Sewell, Abigail A. 2010. "A Different Menu: Racial Residential Segregation and the Persistence of Racial Inequality." In *Race and Ethnic Relations in the 21st Century: History, Theory, Institutions, and Policy*, edited by Rashawn Ray, 279–90. San Diego: Cognella Publishing.
- Stainback, Kevin, and Donald Tomaskovic-Devey. 2012. *Documenting Desegregation: Racial and Gender Segregation in Private-Sector Employment Since the Civil Rights Act*. New York: Russell Sage Foundation.
- Szreter, Simon, and Michael Woolcock. 2004. "Health by Association? Social Capital, Social Theory, and the Political Economy of Public Health." *International Journal of Epidemiology* 33, no. 4: 650–67.
- Tate, Deborah F., Elizabeth H. Jackvony, and Rena R. Wing. 2004. "Effects of Internet Behavioral Counseling on Weight Loss in Adults at Risk for Type 2 Diabetes: A Randomized Trial." In *Year Book of Psychiatry and Applied Mental Health*, 96–97.
- Tate, Deborah F., Elizabeth H. Jackvony, and Rena R. Wing. 2003. "Effects of Internet Behavioral Counseling on Weight Loss in Adults at Risk for Type 2 Diabetes." *Journal of the American Medical Association* 289, no. 14: 1833–36.
- Tourangeau, Roger, Robert M. Groves, and Cleo D. Redline. 2010. "Sensitive Topics and Reluctant Respondents: Demonstrating a Link between Nonresponse Bias and Measurement Error." *Public Opinion Quarterly* 74: 413–32.
- Wiehe, Sarah E., Shawn C. Hoch, Gilbert C. Liu, Aaron E. Carroll, Jefery S. Wilson, and J. Dennis Fortenberry. 2008. "Adolescent Travel Patterns: Pilot Data Indicating Distance from Home Varies by Time of Day and Day of Week." *Journal of Adolescent Health* 42: 418–20.
- Williams, David R., and Chiquita Collins. 1995. "U.S. Socioeconomic and Racial Differences in Health." *Annual Review of Sociology* 21: 349–86.