GOING DIGITAL? HOW BLACK AND HISPANIC SENIORS ADAPTED DURING COVID

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ABSTRACT

The COVID-19 pandemic required isolation for many people at its peak. This isolation was especially prevalent and painful for seniors who became cut-off from friends and family. This study examines access to information and communication technologies by older adults and extends previous research by focusing on outcomes for racial and ethnic minorities within this population. Census data from 2017 and 2021 is used to compare online activities by older adults before and during the COVID-19 pandemic. Our results indicate that Black and Hispanic individuals aged 65 or older were less likely to own a computer or access the Internet than their White peers in both 2017 and 2021, but that the gap between these groups decreased during the pandemic. We also find that older Black Internet users were significantly less likely to engage in most activities online than their White peers. This deficiency, however, closed significantly between 2017 and 2021, especially in relation to social media use where no deficiency was found to exist. Hispanic Internet users who were 65 or older were found to be less likely to participate in half of the studied online activities in both years. Older Hispanic adults still lagged in online shopping and searching for health information online, while this group was equally as likely as their White peers to do activities such as use social media and engage in finances online. Our results indicate real progress for racial and ethnic minorities in the acceptance of information and communication technologies in their daily lives, but we also find that large benefits could still be achieved by targeting policy towards these groups.

INTRODUCTION

The sudden onset of the COVID-19 pandemic resulted in widespread uncertainty and panic as governments scrambled to understand the virus and control its spread. While the virus negatively impacted all demographics, it has been particularly dangerous for the elderly, who suffered significantly higher death rates than the general population. Early in the pandemic Americans over the age of 65 were at a 16- to 52-fold higher risk of dying from COVID-19 than their younger counterparts (Ioannidis et al., 2020). To date there have been over 1.1 million deaths in the U.S. from COVID-19 with adults aged 65 and older accounting for nearly 800,000 of these cases. In the month of September 2022 alone, the elderly represented 88% of COVID related deaths (Freed et al., 2022).

As it became apparent that the elderly were at an elevated risk from COVID-19 they began to self-isolate to avoid contracting the disease. At the same time, family members began to limit physical proximity with this group out of fear of unintentionally spreading the virus to them (Markowitz et al., 2022). This combination resulted in extended periods of isolation and increased loneliness among the elderly (Paulin, 2020). It had already been well documented before the pandemic that older adults who are socially isolated experience adverse health outcomes including higher rates of dementia, obesity, heart diseases, depression, and premature

death (NAS, 2020; Gerst-Emerson et al., 2015; Santini et al., 2020). The extended isolations that resulted from the spread of the COVID-19 virus magnified these effects, especially for those living in assisted care facilities, those who lived alone, and those who had socioeconomic disadvantages (Armitage et al., 2020; Kasara et al., 2021; Santini et al., 2020). One potential way to mitigate the feelings of isolation and loneliness is through the use of information and communication technologies (ICT's), specifically through online connections. Internet use can help, not only with shopping and receiving health related information during the pandemic, but it can also serve as a way to stay connected with friends, family, and society as a whole (Kasara et al., 2021; Berg-Weger et al., 2020).

Given the benefits of having access to technology, particularly during a pandemic, it becomes important to determine whether older adults lag behind the general population in adoption of ICT's. If a gap does exist, it is crucial to determine which groups of seniors are most at risk of lacking access to ICT's so that policies and programs can be better targeted to those groups. This study aims to fill this gap in the current literature by first examining the digital divide between the elderly and the young before and during the pandemic, then determining whether specific racial and ethnic groups among the older generations are at a greater risk of not being connected. We then answer the question of whether, once online, do Black and Hispanic seniors engage in online activities in the same way as their White peers? In the next section, we look at research that describes the digital divide in technology access and Internet use for older adults. Next, we describe the data in this study and outline the model and methodology that are employed to achieve our results. We then present our initial results on computer ownership, Internet access, and online activities. These activities include e-commerce, online banking, social media use, and finding health information online. The subsequent section extends these results by implementing interaction effects between race/ethnicity and age variables. We conclude by discussing the implications of our findings and recommending future research that should be conducted in this area.

LITERATURE

It was discovered early in the computer revolution that older adults are consistently slower to adopt computers and connect to the Internet. It follows, therefore, that the pandemic did not cause a shortage of computers for the elderly or limit their access to the Internet; instead it highlighted a problem that already existed. Studies by Lenhart et al. (2003), Goolsbee (2001), and Scanlan (2007) all noted that a person's age was inversely related to the likelihood that they would own a computer or connect to the Internet. Morris and Brading (2007) referred to this gap as the "Grey Divide". Anderson and Perrin (2017) find that Internet use among people 65 or older increased by 55% between 2000 and 2016, to a 67% overall usage rate. Even with this progress, they find older adults still significantly lag behind younger Americans who achieved a 90% usage rate. Therefore, while we observe the adoption rate of technology among older adults is increasing, it still falls short of the general population, even after controlling for income and educational differences using multivariant regression analysis (Friemel, 2016; Scanlan, 2022; Song et al., 2021).

As Internet usage among older adults has expanded, so has the literature on how this group consumes online content. One such area, eHealth, relates to searching for, receiving, and understanding health information found online (Hong et al., 2017). Opportunities for eHealth have broadened over time due to expansions in telehealth services, access to medicines online,

health intervention services, and health information being shared on social media. Taking advantage of these resources has been shown to bring about a variety of health benefits such as improved access to doctors and medicine, participation in support groups, and improved diets (McCully et al., 2013; Chou et al., 2011). In one such example, Muellmann et al. (2018) and Van Dyck et al. (2016) find that intentional web-based health interventions lead to improved physical activity among older adults. Given these quality-of-life benefits, eHealth literacy becomes acutely beneficial to older adults as they begin to face the health challenges that arise with age. However, even after controlling for access to computers and the Internet, older adults are still found to have low eHealth literacy and are less likely to use the Internet to search for health-related information online (Levy et al., 2015). Furthermore, older adults that are in good health are found to be more likely to use computers than those who were unhealthy, while Black and Hispanic seniors were less likely to use ICTs for health-related activities (Heart et al., 2013; Mitchell et al., 2019; Yoon et al., 2020; Walker et al., 2020). Our results confirm that older Black and Hispanic Internet users were less likely to engage in eHealth before the pandemic, we then extend this research by showing that this did not improve significantly after the pandemic began.

Beyond the health-related benefits of social media discussed above, the use of social networks during the pandemic became a way for friends and families to stay connected when direct contact became difficult. Historically older adults have been slow to adopt social media usage due to security and privacy concerns, uncertainty regarding social norms online, and an initial feeling that it lacked personal relevance for them (Leist, 2013). Yu et al. (2016a) find that older adults become less likely to use social media as they age but find older Black and Hispanic users are not significantly less likely to use social media than their White peers. Once older adults do become active on social media, they often fully incorporate it into their daily lives and view it as an effective resource in maintaining contact with friends and family (Quan-Haase et al., 2017; Yu et al., 2016b).

A final area of related literature for this study deals with the move by consumers towards shopping and banking online since the start of the pandemic. Anxiety over being exposed to COVID-19 while in public places convinced many consumers to move a large portion of their banking and consumer purchases online. According to the U.S. Census Bureau, e-commerce in the U.S. increased by 43% in 2020 alone, rising from $571.2 billion to $815.4 billion (Brewster, 2022). Truong and Truong (2022) explain that age was positively related to online shopping during the pandemic, indicating older adults were spending more than younger adults on e-commerce. They also find racial and ethnic minority shoppers were less likely to shop online than White consumers. Shaw et al. (2022) find that while older adults still lag in e-commerce, all age groups are expected to shop online significantly more in the coming years, relative to before the pandemic, due to the increased convenience.

STUDY OUTLINE AND FINDINGS

Our study builds from the broad concept in Friemel (2016) and Kampfen and Maurer (2018) who find that it is inappropriate to group all older adults into a single category when exploring technology use. Specifically, they find that activities such as having used a computer before retirement and exhibiting technical interest significantly increases the likelihood of technology use among older adults. They also find that key socio-economic variables such as income and years of schooling have significant effects on computer and Internet use among older adults. Related studies have focused on traits such as the difference between male versus female

Internet use among older adults. Van Deurson et al. (2015) find that Internet use is a male dominated activity among seniors with female seniors showing a greater propensity to avoid using the available Internet access at home. Hargittai, Piper, and Morris (2018) however, find that this difference disappears completely when they controlled for income, education, and level of autonomy.

This study extends the previous research by examining computer ownership, Internet access, and the online habits of Black and Hispanic seniors relative to their White counterparts both before and after the COVID-19 outbreak. We are the first to use a large, well respected, data set to study a wide range of connectivity issues and online activities for minority seniors over this timeframe. We are able to make unique observations regarding how habits may have changed for these older adults since the pandemic began by using data from both 2017 and 2021. Our research questions include whether Black and Hispanic seniors lagged behind their White peers in 2017 with respect to computer ownership, Internet access, social media use, eHealth activity, e-commerce, and online finances. We then address whether the incentives to increase Internet access created by the pandemic significantly changed the connectivity and online habits of this group of older adults. Our results indicate that Black and Hispanic seniors were less likely, in 2017, to own a computer and access the Internet than White seniors. Further, we find that the digital divide between minority and White users expands significantly in most areas for those over the age of 65, hitting Black seniors especially hard. Finally, we find that while there has been significant progress in closing the digital divide since 2017 large gaps still persist for Black and Hispanic seniors relative to their White peers.

DATA

The data for this study comes from the 2017 and the 2021 Current Population Surveys (CPS) conducted jointly by the U.S. Census Bureau and the Bureau of Labor Statistics. We take advantage of the Computer and Internet Use Supplement survey that was included in the November 2017 and 2021 surveys (NTIA). This supplement asks detailed questions about computer ownership, Internet access, and online activities for over 52,000 households and receives responses from over 123,000 individuals within those households. The breadth of questions asked in this survey allows us to address a wide variety of research questions, while the large sample size helps in the identification issues within the regression analysis. By using these data sets we can analyze how the spread of COVID-19 impacted online behavior among older adults.

The dependent variables of interest are only asked during the Computer and Internet Use Supplement survey and are described in the Table 1.

Table 1	
Dependent Variable	**Description**
Computer Ownership	Does anyone in the household own a desktop, laptop, or tablet?
Internet Access	Does anyone in the household use the Internet from home?
Shop Online	In the past 6 months have you used the Internet for online shopping, travel reservations, or other consumer services on the Internet?
Finance Online	Do you use the Internet for financial services such as banking, investing, or paying bills online?
Social Media	Do you use social networks such as Facebook, Twitter, or Instagram?
Health Search Online	Did you use the Internet to communicate with a doctor or health professional, access health records or health insurance records, or research health information online, such as with WebMD?

The explanatory variables of interest are presented in Table 2 and are separated into three categories. The first is the entire sample, the second compares computer owners to those that do not own computers, and the third compares Internet users with non-users. The household income and education questions ask the respondent to select a range in which their household income or education falls. These variables are therefore set up as categorical variables that correspond to the midpoints of each given range. The table shows that computer owners compared to those that do not own a computer are younger, have higher income and education levels, are married, and are more likely to live in a metropolitan area. It also indicates that Black, Hispanic and people with disabilities are less likely to own a computer. The same pattern for each of these variables holds true when comparing those who connect to the Internet from home to those who do not.

Table 2 Summary Statistics 2021					
Variable	Entire Sample	Computer		Internet	
		Owners	Non Owners	Users	Non-Users
N	84,206	63,620	20,586	65,648	18,558
Age	48.55	47.144	52.889	47.263	53.096
	(19.61)	(19.138)	(20.831)	(19.02)	(20.923)
White	0.804	0.814	0.773	0.812	0.773
	(0.397)	(0.389)	(0.419)	(0.39)	(0.419)
Black	0.103	0.09	0.145	0.096	0.131
	(0.304)	(0.286)	(0.352)	(0.294)	(0.337)
Hispanic	0.136	0.125	0.17	0.128	0.165
	(0.343)	(0.33)	(0.376)	(0.334)	(0.371)
Native Am.	0.012	0.01	0.019	0.011	0.018
	(0.087)	(0.101)	(0.136)	(0.103)	(0.134)
Asian	0.058	0.064	0.041	0.059	0.057
	(0.235)	(0.245)	(0.199)	(0.235)	(0.231)
# People in HH	2.883	3.00	2.56	2.909	2.791

	(1.600)	(1.542)	(1.569)	(1.532)	(1.652)
HH Income	86,234	94,841	59,635	90,840	69,940
	(56,077)	(54,999)	(50,779)	(55,589)	(54,750)
Own Business	0.130	0.144	0.085	0.137	0.105
	(0.336)	(0.352)	(0.279)	(0.344)	(0.306)
Married	0.500	0.533	0.394	0.516	0.44
	(0.500)	(0.500)	(0.489)	(0.500)	(0.496)
Education	13.579	13.906	12.566	13.83	12.691
	(2.689)	(2.595)	(2.722)	(2.575)	(2.900)
Female	0.520	0.518	0.521	0.521	0.511
	(0.500)	(0.500)	(0.500)	(0.500)	(0.500)
Metro Area	0.812	0.826	0.768	0.819	0.785
	(0.391)	(0.379)	(0.422)	(0.385)	(0.411)
Disability	0.131	0.107	0.207	0.112	0.200
	(0.338)	(0.309)	(0.405)	(0.315)	(0.400)

METHODOLOGY

Each dependent variable of interest in this study, described in Table 1, is presented in the survey as a "Yes" or "No" question resulting in discrete dependent variables in each specification. To account for this restriction, we employ probit regression analyses and present the marginal effects in our findings. The explanatory variables will include age and race along with a variety of demographic and socioeconomic variables, as described in Table 2. Dummy variables for region are also included in each specification. The model will be defined as follows:

$$Y_i^* = X_i\beta + u_i \tag{1}$$

where X_i is a vector of explanatory variables, β is their corresponding coefficient estimates, and u_i is the error term. The observable outcome is defined as:

$$Y_i = \begin{cases} 1 \text{ if } X_i\beta + u_i > 0 \\ 0 \text{ if } X_i\beta + u_i \leq 0 \end{cases}$$

Questions on the survey relating to online activities are only asked to respondents who indicated they have access to the Internet. This allows for a better comparison of online activities based on race and ethnicity among those who are already online. This restriction on the data however can introduce selection bias into the results. To account for this structure of survey questions an inverse mills ratio is implemented in the regression analysis to avoid any bias in the results (Heckman 1979).

RESULTS ON COMPUTER OWNERSHIP AND INTERNET ACCESS

In this section we investigate whether older adults are still less likely than younger generations to own a computer or access the Internet in both 2017 and 2021. The independent variables of interest include age, race, and ethnicity variables. Other independent variables that are included in the probit regression, but not shown, are disability status, sex, marital status, the number of people living in the household, living in a metro area, whether they own their own business, household income (logged), highest education level, and regional dummies. The results of the multivariate regression analysis are included in Table 3 where columns (1) and (2) represent data from 2017 and columns (3) and (4) represent data from 2021.

Columns (1) and (3) of Table 3 relate to computer ownership based on age, race, and ethnicity for the entire sample in 2017 and 2021 respectively. We find that, similar to past studies, coefficients on age, Black, and Hispanic are all negative and highly significant for both years of study. This confirms the continued existence of digital divides in computer ownership based on age, race, and ethnicity, though it appears the divide has modestly shrunk between 2017 and 2021 for both Black and Hispanic individuals. Columns (2) and (4) of Table 3 examine the computer ownership of individuals who are 65 years of age or older in 2017 and 2021 respectively. Again, we find highly significant negative coefficients on both the Black and Hispanic variables. Like before we do find that the coefficients are less negative in 2021 suggesting the divide is shrinking.

Comparing column (1) to column (2) shows that in 2017 the negative coefficients on both the Black and Hispanic variables increased substantially (were more negative) for older adults relative to the entire sample. This indicates the racial divide in ICT's was larger for seniors than

	(1)	(2)	(3)	(4)
Table 3 — Probit Regressions for Computer Ownership in 2017 and 2021				
	2017		2021	
	Own a Computer	Own a Computer Age 65+	Own a Computer	Own a Computer Age 65+
Age	-0.004***	-0.011***	-0.004***	-0.009***
	(0.001)	(0.001)	(0.0001)	(0.001)
Black	-0.092***	-0.153***	-0.078***	-0.115***
	(0.006)	(0.013)	(0.006)	(0.014)
Hispanic	-0.117***	-0.159***	-0.093***	-0.138***
	(0.005)	(0.016)	(0.006)	(0.017)
N	105,596	22,189	83,051	20,479
LR chi(2)	19,431.29	5,121.39	12,449.59	3,809.24
Standard errors are in parentheses. * indicates significance at the 10% level, ** at the 5% level, and *** at the 1% level or smaller.				

for the general population in that year. A similar analysis can be done for 2021 by comparing columns (3) and (4). The results show that the coefficients on the Black and Hispanic

variables are again more negative for older adults than for the general population. There were some positive changes over this period, however, as older Black individuals closed the gap on their White peers between 2017 and 2021. In 2017 Black individuals overall were 9.2% less likely to own a computer than their White counterparts, while those aged 65 or older were 15.3% less likely to own a computer than their White peers. This translates to a 6.1% additional lag faced by older Black adults in 2017. This gap shrank in 3.7% in 2021 signifying progress in bridging this aspect of the Grey Divide, as older Black adults began catching up with their White peers more quickly than Black individuals in general. The gap for Hispanic individuals over this period actually increased slightly, changing from 4.2% in 2017 to 4.5% in 2021.

Table 4 presents results from the probit regressions on whether the respondent had Internet access at home in 2017 and 2021. We again verify previous research by finding that

Table 4 Probit Regressions for Internet Access in 2017 and 2021				
	(1)	(2)	(3)	(4)
	2017		2021	
	Internet Access	Internet Access Age 65+	Internet Access	Internet Access Age 65+
Age	-0.005***	-0.013***	-0.003***	-0.010***
	(0.0001)	(0.001)	(0.0001)	(0.0001)
Black	-0.067***	-0.153***	-0.039***	-0.081***
	(0.005)	(0.013)	(0.005)	(0.013)
Hispanic	-0.046***	-0.098***	-0.035***	-0.073***
	(0.005)	(0.016)	(0.005)	(0.015)
N	105,596	22189	83,051	20,479
LR chi(2)	14,328.67	4,854.61	5,452.46	2,757.17
Standard errors are in parentheses. * indicates significance at the 10% level, ** at the 5% level, and *** at the 1% level or smaller.				

Black, Hispanic, and older individuals have lower Internet penetration rates than younger White individuals in both 2017 and 2021. Columns (2) and (4) extends this result by again focusing solely on computer owners who are aged 65 or older. Our results reiterate that the racial digital divide is magnified for those who are 65 or older in all instances. Interestingly, there are positive signs in the results for older adults as the gap between young and old Black users decreased from 8.6% down to 4.2%. Older Hispanic users also saw progress in this area as their gap shrank from 5.2% to 3.8%.

ONLINE HABITS

This section explores the online habits of Black and Hispanic seniors in areas related to social media use, online searches for health information, online shopping, and online finances. Since the CPS survey only asks about online activities for those who have access to the Internet, the results will directly measure the online habits of each group instead of capturing the underlying differences in access to technology. As before, independent variables that are included but not shown in each of the tables in this section are disability status, sex, marital status, the number of people living in the household, whether they live in a metro area, whether

they own their own business, household income (logged), highest education level, and regional dummies. Additionally, the Mills Ratio (Lambda) is included to account for selection bias, as discussed in the section on methodology.

Table 5 Probit Regressions for Social Media Use in 2017 and 2021				
	(1)	(2)	(3)	(4)
	2017		2021	
	Social Media	Social Media Age 65+	Social Media	Social Media Age 65+
Age	-0.010***	-0.012***	-0.008***	-0.004
	(0.0004)	(0.002)	(0.001)	(0.002)
Black	-0.086***	-0.138***	-0.022*	-0.037
	(0.01)	(0.031)	(0.011)	(0.026)
Hispanic	-0.057***	-0.05	-0.009	-0.012
	(0.009)	(0.032)	(0.010)	(0.031)
N	43,902	8,989	36,097	9,563
LR chi(2)	5,271.06	273.86	4,004.79	371.24
Standard errors are in parentheses. * indicates significance at the 10% level, ** at the 5% level, and *** at the 1% level or smaller.				

Table 5 focuses on social media activity for the general population and those 65 and older in 2017 and 2021. The negative coefficients on the Black and Hispanic variables in Column (1) indicate that minorities overall were less likely to use social media than White users in 2017. Column (2) shows that Black Internet users who are 65 or older were significantly less likely than their White peers to use social media in that year. Contrary to this, in Column (2) we see that Hispanic Internet users who are 65 or older are just as likely to use social media as their White counterparts in 2017. Columns (3) and (4) of Table 5 show that during the pandemic the divide in social media use across race and ethnicity almost completely disappeared. Only Black Internet users overall were found to still lag behind White Internet users, but only by 2.2% and with only a 10% significance level.

Table 6 shifts the focus to whether individuals utilize the Internet to find health information of any type online. Column (1) of Table 6 shows Black and Hispanic Internet users were far less likely than White users to lookup up health information online in 2017. Column (2)

Table 6 Probit Regressions for Online Health Searches in 2017 and 2021				
	(1)	(2)	(3)	(4)
	2017		**2021**	
	Health Search Online	Health Search Age 65+	Health Search Online	Health Search Age 65+
Age	-0.002***	-0.010***	-0.003***	-0.013***
	(0.0005)	(0.002)	(0.001)	(0.002)
Black	-0.126***	-0.202***	-0.138***	-0.202***
	(0.011)	(0.032)	(0.012)	(0.027)
Hispanic	-0.163***	-0.218***	-0.168***	-0.197***
	(0.009)	(0.031)	(0.012)	(0.032)
N	43,902	8,989	36,097	9,563
LR chi(2)	5,508.06	955.57	4,671.04	1,114.19
Standard errors are in parentheses. * indicates significance at the 10% level, ** at the 5% level, and *** at the 1% level or smaller.				

indicates that for seniors this gap not only persists, it expands, with each minority group lagging even further behind their White peers in that year. Unlike social media use, we find, in Columns (3) and (4), that Black and Hispanic users made very little progress bridging the gap in online health searches between 2017 and 2021. In fact, the results for the coefficients in 2021 are very similar to those in 2017. In both 2017 and 2021 Black Internet users who were age 65 or older were 20.2% less likely than their White counterparts to search for health information online. For Hispanic Internet users this changed from 21.8% in 2017 to 19.7% in 2021, showing a modest improvement over this period relative to White users.

Results from probit regressions related to the online shopping habits of the general population and seniors are presented in Table 7. Column (1) of the table provides evidence that Black and Hispanic Internet users were less likely to shop online than White users overall in both 2017 and 2021. These marginal effects are relatively large and highly significant. Given the mobility concerns and transportation limitations faced by many seniors, actively participating in

Table 7 Probit Regressions for Shopping Online in 2017 and 2021				
	(1)	(2)	(3)	(4)
	2017		**2021**	
	Shop Online	Shop Online Age 65+	Shop Online	Shop Online Age 65+
Age	-0.006***	-0.014***	-0.005***	-0.010***
	(0.0005)	(0.002)	(0.001)	(0.002)
Black	-0.125***	-0.193***	-0.082***	-0.106***
	(0.011)	(0.034)	(0.011)	(0.027)
Hispanic	-0.109***	-0.121***	-0.102***	-0.114***
	(0.01)	(0.033)	(0.011)	(0.032)
N	43,902	8,989	36,097	9,563
LR chi(2)	7,602.94	1,038.46	5,376.03	1,111.37
Standard errors are in parentheses. * indicates significance at the 10% level, ** at the 5% level, and *** at the 1% level or smaller.				

online shopping could be very beneficial for their overall well-being. These potential benefits were magnified during the pandemic since e-commerce allowed people to avoid close contact in a public setting with people who may have been exposed to COVID-19. However, Column (2) of Table 7 shows that in 2017 Black and Hispanic Internet users that were aged 65 or older were 19.3% and 12.1% less likely to engage in e-commerce than their White peers respectively. Column (4) shows that while there was measurable progress in 2021, especially by older Black Internet users, there still existed a large and significant divide. In 2021 Black and Hispanic seniors were 10.6% and 11.4% less likely to shop online than their White peers.

The final area of online activity that we investigate relates to financial activities done over the Internet, such as online banking, investing, and bill payment. Similar to the benefits described for online shopping, completing financial services online helps seniors circumvent any transportation difficulties they may face and lets them avoid unneeded exposure during a pandemic. The results in Columns (1) and (3) of Table 8 show that in both 2017 and 2021 Black and Hispanic Internet users in general lagged behind White Internet users in online finance activities. In 2017 Black users in general were 13.7% less likely to engage in online finance while Black users who were 65 or older were 17% less likely. Older Black users showed incredible progress between 2017 and 2021 ending up only 10.7% less likely to participate in online finance than their White peers. This is important progress, but the gap is still large and significant. Older Hispanic Internet users fared much better in this online activity. In 2017 the coefficient for Hispanic Internet users who were 65 or older was almost identical to that for the Hispanic population in general, and only showed significance at the 10% level. By 2021, Column (4) of Table 8 indicates that older Hispanic users were just as likely to use online finances as their White peers.

	Table 8 Probit Regressions for Finances Online in 2017 and 2021			
	(1)	(2)	(3)	(4)
	2017		2021	
	Finance Online	Finance Online Age 65+	Finance Online	Finance Online Age 65+
Age	-0.009***	-0.017***	-0.008***	-0.012***
	(0.0005)	(0.002)	(0.001)	(0.002)
Black	-0.137***	-0.170***	-0.093***	-0.107***
	(0.011)	(0.032)	(0.012)	(0.027)
Hispanic	-0.086***	-0.083*	-0.084***	-0.050
	(0.01)	(0.032)	(0.011)	(0.031)
N	43,902	8,989	36,097	9,563
LR chi(2)	6,817.94	727.12	4,961.55	902.43
Standard errors are in parentheses. * indicates significance at the 10% level, ** at the 5% level, and *** at the 1% level or smaller.				

INTERACTION EFFECTS

To determine whether there is a persistent relationship between age and minority status across ICT usage we add interaction effects to each general specification. Table 9 presents the results from including an interaction effect between the age and Black variables. Columns (1) and (2) show that the racial divide relating to computer ownership and online access are persistent across age ranges. Columns (3) through (6) show that this connection disappears when focusing on online habits with the divide created by older individuals being offset by other age groups. Table 10 illustrates the results from including an interaction effect between the variables age and Hispanic. Again, there is a significant negative coefficient for computer ownership but no significant impact in relation to Internet access. Columns (3), (4) and (5) show positive and significant interaction effects for online shopping, online finances, and social media use. These results are driven heavily by younger users, but may be an indication of future progress in this area.

Table 9 Probit Regressions with Black and Age Interaction Term Included						
	(1)	(2)	(3)	(4)	(5)	(6)
	Computer Ownership	Internet Access	Shop Online	Finances Online	Social Media	Health Online
Age	-0.004***	-0.005***	-0.006***	-0.009***	-0.01***	-0.002***
	(0.001)	(0.0001)	(0.0005)	(0.0005)	(0.0004)	(0.0005)
Black	-0.035***	0.007	-0.119***	-0.164***	-0.047*	-0.088***
	(0.013)	(0.011)	(0.023)	(0.024)	(0.023)	(0.023)
Black*Age	-0.001***	-0.002***	-0.0001	0.0005	-0.001	-0.001
	(0.0003)	(0.0002)	(0.0004)	(0.0004)	(0.0004)	(0.001)
Standard errors are in parentheses. * indicates significance at the 10% level, ** at the 5% level, and *** at the 1% level or smaller.						

Table 10 Probit Regressions with Hispanic and Age Interaction Term Included						
	(1)	(2)	(3)	(4)	(5)	(6)
	Computer Ownership	Internet Access	Shop Online	Finances Online	Social Media	Health Online
Age	-0.004***	-0.01***	-0.01***	-0.009***	-0.010***	-0.002***
	(0.001)	(0.0001)	(0.0005)	(0.0005)	(0.0004)	(0.0005)
Hispanic	-0.055***	-0.031**	-0.18***	-0.219***	-0.113***	-0.191***
	(0.012)	(0.011)	(0.022)	(0.022)	(0.023)	(0.022)
Hispanic*Age	-0.001***	-0.0003	0.001***	0.003***	0.001**	0.001
	(0.0003)	(0.0002)	(0.0004)	(0.0005)	(0.0004)	(0.001)
Standard errors are in parentheses. * indicates significance at the 10% level, ** at the 5% level, and *** at the 1% level or smaller.						

DISCUSSION

In this study we find that older adults, along with those identifying as Black and Hispanic, still lag behind the general population in computer ownership, Internet access, and participation in many online activities. Our results go beyond updating the existence of the racial and Grey Divides by explicitly focusing on how age and race interact in these areas. By using Census data from before and during the pandemic, we investigate whether older adults were motivated to transition online as a way to maintain social distancing during the spread of COVID-19. We find that the racial divide does not only persist for those who are 65 or older relative to the general population, it is magnified in most cases. On a positive note, we do find the gap in technology use between Black and Hispanic older adults and the rest of the population shrank significantly in most areas between 2017 and 2021.

Older Black adults, in 2017, were 15.3% less likely to own a computer than their White peers, but this outcome decreased to 11.5% in 2021. This 3.8% improvement in computer ownership shows a step in the right direction, but also that deficiencies still exist. Positive changes in other activities experienced by Black seniors include a 7.2% improvement in Internet access, an 8.7% improvement in online shopping, and a 6.3% improvement in online finances. There were two surprising results for older Black Internet users. The first was a complete lack of improvement in searching for health care information online between 2017 and 2021. The second was the improvement in social media usage for this group who went from being 13.8% behind their White peers in 2017 to showing no statistical difference in this activity from their White peers in 2021.

Older Hispanic adults only made limited progress in computer ownership and Internet access, but were moderately more successful at bridging the divide in online activities with their White peers than were older Black adults. Between 2017 and 2021 Hispanic seniors experienced little change in their rates of online shopping and researching health information online. This group however was just as likely as their White peers to use social media and to engage in financial activities online in 2021. Surprisingly, we also found that in 2017 Hispanic Internet users in general were 5.7% less likely to use social media than their White counterparts, while in the same year Hispanic Internet users over the age of 65 were equally likely as their White peers to connect to social networks.

Results presented here are meaningful since they provide evidence that gaps still exist across race and ethnicity even after controlling for differences in income, education, and connectiveness to the Internet. These concepts have always been important to study but have taken on grave importance, especially for seniors, after experiencing a worldwide pandemic. The COVID-19 pandemic highlighted how isolated seniors can become during times of national or international emergencies. Without modern information and communication technologies in place, many older citizens can become effectively cut off from their friends, family, and society. Providing adequate access to computers and the Internet is crucial but is lacking for some groups. Racial and ethnic minorities still face a substantial digital divide. For minorities over the age of 65, this divide can seem more like a chasm that cannot be easily traversed. Effective policy moving forward must include increased access along with training aimed at this underrepresented group. This will ensure fewer people become isolated in the face of future pandemics or national emergencies.

Future research in this field needs to address two key issues: whether the positive trends in access and online activity continue after the pandemic has subsided, and what technology interventions are most meaningful for underrepresented seniors. This paper uses data from 2021 which is in the heart of the pandemic, and as of writing this study the country is still dealing with the very contagious Omicron variant of COVID-19. Once the pandemic has eased more substantially it will be important to determine if Black and Hispanic seniors persisted in their use of technology, or if the large divides re-emerged. One method of keeping technology use relevant for seniors is to provide targeted training in technical skills that promote safe and meaningful online engagement. Experimental research on different intervention techniques will provide invaluable insights on the most effective ways to get older adults comfortable with online activities. Documenting what types of trainings are successful for Black and Hispanic seniors in particular can help guide policy and resources to appropriate areas.

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