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Telehealth Use among Older Adults during COVID-19: Associations with Sociodemographic and Health Characteristics, Technology Device Ownership, and Technology Learning

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Abstract

The COVID-19 pandemic ushered in rapid telehealth/telemedicine adoption. In this study, we (1) examined rates and correlates of telehealth (video call) use among those aged 70+, and (2) tested the significance of access to information and communication technology (ICT) device ownership and knowledge of how to use the internet and devices as telehealth enabling factors. The Behavioral Model of Health Services Use served as the conceptual framework and data came from the COVID-10 supplemental survey of the National Health and Aging Trend Study. Results show that telehealth use increased to 21.1% from 4.6% pre-pandemic. In logistic regression models without technology enabling factors, older age and lower income were negatively associated with telehealth use; however, when technology enabling factors were included, they were significant while age and income were no longer significant. Insuring that older adults have ICT devices and internet access may reduce health disparities and improve telehealth care delivery.

Keywords

COVID-19; telehealth; ICT; technology learning; low-income older adults

Introduction

With the coronavirus disease pandemic (COVID-19), use of telehealth via video calls (also called telehealth or telemedicine) rapidly increased in 2020 in both primary and specialty healthcare (Alexander et al., 2020; Baum et al., 2021; Cantor et al., 2021; Darcourt et al., 2021; Koonin et al., 2020; Whaley et al., 2020; Wosik et al., 2021). U.S. primary care (internal medicine, pediatrics, geriatrics, general practice, and family practice) visit data

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show that telemedicine visits increased from an average of 1.1% of all quarterly visits in 2018-2019 to 4.1% of visits in the first quarter and 35.3% of visits in the second quarter of 2020 (Alexander et al., 2020). However, studies generally showed that telehealth visit rates were lower among older than younger adults, those living in low-income/high poverty and/or non-metropolitan/rural areas, and those with Medicare or Medicaid (Cantor et al., 2021; Darcourt et al., 2021; Ferguson et al., 2021; Gilson et al., 2020; Patel et al., 2021). With respect to racial/ethnic differences, some studies show similar participation rates among Whites and Blacks (Alexander et al., 2020), while others show a lower rate among Blacks or those living in high racial/ethnic minority zip code areas (Gilson et al., 2020; Whaley et al., 2020).

For older adults with underlying health problems, telehealth is a safe and viable option for obtaining care under COVID-19 social/physical distancing guidelines, although it may not be as effective as in-person visits when a physical examination or other in-person contact is required (Gomez et al., 2021). Pre-COVID-19 studies showed that older adults, especially those with mobility disabilities, were highly receptive to and satisfied with telehealth for its in-person-like interactions, convenience (i.e., not having to leave home), and privacy protections in the case of mental health treatment (Choi et al., 2014, 2020). During COVID-19, older adults and their healthcare providers have reported high satisfaction with telehealth as a means of accessing care while staying safe (Iyer et al., 2021). In addition, no show rates were significantly lower for telehealth visits during COVID-19 compared to no show rates for in-office visits pre- and during COVID-19 (Drerup et al., 2021).

Despite the high receptivity to and convenience and necessity of telehealth, especially during the current pandemic, a digital divide persists. This divide, defined in terms of lack of information and communication technology (ICT) device (e.g., cell phones, laptop computers, tablets) ownership, internet access, and ICT know-how, presents barriers to telehealth participation and scalability for low-income older adults (Choi & DiNitto, 2013). Although the digital divide between older and younger or middle-aged adults has narrowed in recent years, in early (January-February) 2021, among the 65+ age group, almost 40% did not own a smart phone and 25% did not use the internet, the highest rates of all age groups (Perrin, 2021). Older adults were also least likely to own other ICT devices, i.e., only 55% and 32%, respectively, owned a laptop/desktop computer and tablet (Perrin, 2021). AARP's Older Adults Technology Services (OATS) found that 42%, or 22 million older adults, did not have in-home broadband access, with annual income below \$25,000 and low educational attainment (less than high school degree) as the two strongest correlates of lack of access, followed by living alone, being Black or Hispanic, disability, fair-to poor health, female gender, and rural location (OATS, 2021).

Given the digital divide, it is not surprising that older adults lagged behind younger age groups in telehealth participation during the initial stages of the COVID-19 outbreak. Older adults themselves perceive lack of access to necessary technology and confidence in setting up and using it as barriers to telehealth participation (Hawley et al., 2020). However, studies before and during the COVID-19 pandemic show that providing ICT devices, internet access, and instruction on how to access telehealth platforms increased low-income older adults' telehealth participation (Abrashkin et al., 2020; Choi et al., 2020). One study found

that low-income, disabled older adults who had never used a computer/internet quickly learned online navigation when provided a one-on-one lesson (Choi, An, & Garcia, 2014).

In the present study, using a nationally representative sample of older Medicare beneficiaries aged 70+, we examined associations of telehealth participation during the COVID-19 outbreak with sociodemographic and health-related characteristics, ICT device ownership, prior online experience, and technology instruction (specifically for accessing/navigating the internet using an ICT device). Andersen's Behavioral Model of Health Services Use (BHS; Andersen & Newmann, 1973; Andersen, 1995) was the study's conceptual framework. The BHS posits that healthcare service use is determined by individual and contextual predisposing factors (sociodemographic characteristics, health beliefs, norms and political perspectives), enabling factors (ability to pay, access to care), and need factors (perceived and evaluated illness severity). Previous studies of healthcare service use showed need factors to be primary determinants, especially among medically vulnerable population groups (e.g., older adults), but predisposing and enabling factors were also important contributors (Babitsch et al., 2012). In the present study, the COVID-19 outbreak is the contextual predisposing factor for telehealth use, and access to technology (ICT device ownership and knowledge of how to use the internet and devices) is the technology enabling factor. Given previous research, lack of ICT device ownership and knowledge of how to use the internet and devices are likely to be more important barriers to telehealth participation than individual predisposing and non-technology enabling factors (age or income per se).

Study hypotheses were: (H1) Telehealth use will be lower among older individuals and those with low-income but higher among those with greater physical and behavioral health needs (chronic medical conditions, disability, and mental health problems); and (H2) when technology enabling factors (ICT device ownership, prior online experience, and technology learning) are included in the multivariable model, age and income will no longer be significant factors for telehealth use. Even when the pandemic ends, telehealth is likely to remain an important means of delivering healthcare services. Study findings may provide empirical evidence of the importance of providing low-income older adults digital access to facilitate their participation in telehealth as a means of improving their health and quality of life.

Methods

Data and Sample

We used National Health and Aging Trend Study Round 10 (NHATS R10) public use data files including the supplemental mail survey about participants' experiences during the COVID-19 outbreak. NHATS collects data annually from a nationally representative panel of Medicare beneficiaries aged 65+. The initial sample persons (SP) were first interviewed in 2011 and replenishment sample persons were added in 2015 (Kasper & Freedman, 2021). Due to the COVID-19 pandemic, NHATS R10 data were collected by telephone in 2020 with 3,961 SP (3,602 living in the community, 99 in nursing homes, and 269 in other facilities). (NHATS R10 also includes data from relatives or formal caregivers of 325 SP who had died and 139 interviews with facility personnel.) The COVID-19 questionnaires for the 3,961 SP were mailed from the end of June 2020 through the end of October

2020. Collection continued through mid-January 2021, although most questionnaires were completed in July and August 2020. Of the 3,961 eligible SP, 3,257 (2,696 self-respondents, with or without assistance from a proxy, and 561 proxy/unknown respondents) provided complete data, representing 32.7 million Medicare beneficiaries aged 70+. We linked the 2020 COVID-19 SP data file to the NHATS R10 SP data file to obtain sociodemographic data (age, race/ethnicity, gender, marital status), diagnosed chronic medical conditions, and ICT device ownership and online experience, and to the 2019 NHATS R9 SP data file to obtain income data (the 2020 NHATS SP file does not include income). The study was exempt from the authors' institutional review board review.

Measures

Contact/communication modalities: Respondents (SP or proxies) were first asked how often, "in a typical week," SP had in-person visits, phone calls, emails/texts or social media messages, and video calls (including Zoom, FaceTime, and other online videoconferencing) with family and friends not living with the SP before and during the COVID-19 outbreak. We report whether or not older adults used these means of communication with family/friends (at least daily, a few times a week, about once a week, or less than once a week=1, never=0) to compare them to means of healthcare communication.

Respondents were then asked how SP communicated with their usual healthcare providers before and during the COVID-19 "outbreak." Response categories were in-person visits, phone calls, emails/texts or portal messages, and "video calls (also called telehealth)" (yes=1, no=0 for each). Frequency of communication/contacts was not collected. "During the COVID-19 outbreak" was defined as from March 2020 until the data collection time or an earlier date, and 98% responded that the outbreak was ongoing at the time of their survey.

Predisposing factors (sociodemographic characteristics) were age group (70-74, 75-79, 80-84, or 85+ years); gender; race/ethnicity (non-Hispanic White, non-Hispanic Black, Hispanic, or Other); and residence (in the community vs. residential care facility [but not a nursing home] or nursing home).

Nontechnology enabling factors were proxy response status (responded without a proxy or together with a proxy, proxy response, or missing), marital status (married/partnered, divorced/separated, widowed, never married), living arrangement change during the COVID-19 outbreak (moved in with family or friends "even for a short time" or the latter moved in with the SP vs. no change); and income in 2019 (up to \$29,999, \$30,000-\$42,999, \$43,000-\$65,999, \$66,000-\$99,999, or \$100,000+). We included proxy status, marital status, and living arrangement change as enabling factors given that a proxy, spouse/partner, or other people in the household may function as technology helpers and/or conduits to telehealth arrangements.

Technology enabling factors were: (1) ICT device (working cell phone, computer, tablet) ownership at "home/apartment/room/unit/suite/other" (yes=1, no/missing=0 for each device); (2) online use experience (for shopping, bill payment/banking, prescription ordering or refilling, social network sites, contacting healthcare provider [making or changing medical appointments, getting test results, requesting referrals or prescriptions,

or getting advice], help with insurance, and health condition information look-up; yes=1, no/missing=0); and (3) whether or not the SP learned to use a new technology or program (“smartphone, computer or iPad or a program like Zoom or FaceTime”) to go online during the COVID-19 outbreak (yes=1, no=0). Those who responded affirmatively were asked, “Has anyone helped you with that or did you learn that on your own?” (received help=1, did not receive help=0).

Health-related need characteristics: We included the following SP’s health characteristics in this study: (1) dementia diagnosis; (2) number of diagnosed chronic medical conditions (heart attack or heart disease, hypertension, stroke, arthritis, osteoporosis, diabetes, lung disease, cancer); (3) numbers of activities of daily living (ADL, 0-6) and instrumental activities of daily living (IADL, 0-6) for which the sample person received help due to health or functioning problems during the COVID-19 outbreak; and (4) mental health problems (level of worry/anxiety and/or sad/depressed feelings during a typical week during the COVID-19 outbreak; not at all, mild [on some days], moderate [some of the time on more than half days], or severe [nearly every day, during the day and at night] for each). In addition, we included whether or not the SP, a household member, or any facility resident or staff had symptoms, positive test results, and/or a healthcare professional’s diagnosis of COVID-19. To describe the sample, we also reported whether or not the SP received help with visiting or communicating with healthcare providers or delayed needed healthcare during the COVID-19 outbreak.

Analysis

All analyses were conducted with Stata/MP 17’s *svy* function (College Station, TX) to account for NHATS’s stratified, multistage sampling design (DeMatteis et al., 2021). All estimates presented in this study are weighted except sample sizes. First, we tabulated the rates (and 95% confidence intervals [CI]) of in-person visits, telephone calls, email/texting/social media/portal message, and video calls with family/friends and usual healthcare providers before and during the COVID-19 outbreak. We evaluated the significance of changes in these contact modalities before and during the outbreak using an approximation of McNemar’s test for survey data implemented with Stata’s *lincom* command for comparing linear combination of model estimates (<https://www.stata.com/statalist/archive/2014-01/msg00101.html>). Second, focusing on telehealth use (i.e., video calls with usual healthcare providers), we used Pearson’s χ^2 and *t* tests to compare telehealth users to nonusers on sociodemographic and health characteristics, ICT device ownership, and technology learning (i.e., predisposing, enabling, and need factors). Third, we fit two multivariable logistic regression models to test the study hypotheses (telehealth’s associations with predisposing, enabling, and need factors). In Model 1, we entered the predisposing, non-technology enabling factors and health-related need factors, and in Model 2, we added the technology enabling factors. As a sensitivity analysis, we fit the same logistic regression models for only those who did not use telehealth before the COVID-19 outbreak; however, the results did not deviate from those of our main analyses. Logistic regression results are presented as adjusted odds ratios (AOR) with 95% CI. Variance inflation factor (VIF) diagnostics, using a cut-off of 2.50 (Allison, 2012), indicated that multicollinearity among covariates was not a concern. Significance was set at $p < .05$.

Results

Methods of Communication with Family/Friends and Healthcare Providers Before and During COVID-19 Outbreak

Table 1 shows that as expected, before the COVID-19 outbreak, the most common method of communicating with family and friends was telephone calls, followed by in-person visits. A little more than 70% also used emails, texting, and/or social media, and 41.2% used video calls with family/friends. During the COVID-19 outbreak, in-person visits decreased by almost 14 percentage points. Telephone calls and email/texting/social media contacts also decreased, while video calls increased to 43.7% ($t=2.73$, $p=.008$).

Table 1 also shows that before COVID-19, the most common methods of communicating with usual healthcare providers were in-person (most likely office-based) visits, followed by telephone calls. Only a fifth used email or portal messages, and 4.6% used telehealth. During the COVID-19 outbreak, in-person visits decreased by 31 percentage points (to 56.6% from 87.6% before the outbreak), while telephone calls increased by 13 percentage points and email/portal messaging increased by nearly 4 percentage points. Telehealth use during the outbreak increased to 21.1%.

Sociodemographic and Health Characteristics of Telehealth Users versus Nonusers

Table 2 shows that compared to nonusers, telehealth users were younger, included a higher proportion of those who were married/partnered, and had higher incomes. Higher proportions of users than nonusers either moved in with someone or someone moved in with them during the outbreak. Users also had more chronic medical conditions and IADLs for which they received help. A higher proportion of users had moderate or severe mental health symptoms. A higher proportion of users also reported that they received help with visiting/communicating with healthcare providers and had to delay needed healthcare (mostly due to provider closing or cancelation). Users and nonusers did not differ on gender, race/ethnicity, residence, proxy status, dementia diagnosis, self or others' COVID-19 clinical status, and ADL impairments. Additional analyses of all respondents showed that Hispanics were significantly younger and had lower incomes than the other racial/ethnic groups. Compared to 34.2% of non-Hispanic Whites, 33.6% of Blacks, and 35.9% of Others, 49.2% of Hispanics were aged 70-74 years. Compared to 23.5% of non-Hispanic Whites, 59.0% of Blacks, and 45.1% of Others, 71.6% of Hispanics had income $< \$30,000$.

ICT Device Ownership, Online Experience, and Technology Learning

Table 3 shows that compared to nonusers, a higher proportion of telehealth users reported owning a working cell phone, computer, and a tablet. Higher proportions of telehealth users than nonusers also reported that they used the internet (went online) (78.2% vs. 59.9%) and that they learned a new technology or program to use online during the COVID-19 outbreak (39.9% vs. 21.3%). Among those who learned a new technology or program, telehealth users and nonusers did not differ on receiving help with technology learning. Among residents of residential care communities, a higher proportion of telehealth users than nonusers reported that the facility helped them keep in touch with family/friends online.

Associations of Telehealth Use with Predisposing, Enabling, and Need Factors

Model 1 in Table 4 shows that of the predisposing factors, those aged 80+ had lower odds of telehealth use than those aged 70-74 (AOR=0.62, 95% CI=0.43-0.89 for 80-84 year-olds and AOR=0.58, 95% CI=0.42-0.80 for those aged 85+). Those who moved in with someone or had others move in with them had higher odds. Of the non-technology enabling factors, compared to those with income up to \$29,999, those with incomes of \$43,000 or higher had higher odds of telehealth use. Of the health-related need factors, more chronic health conditions and IADL impairments and a moderate level of mental health problems were associated with higher odds of telehealth use.

In Model 2 where the technology enabling factors were added, moved in with someone or had others move in with them (AOR=1.36, 95% CI=1.04-1.76) and numbers of medical conditions (AOR=1.17, 95% CI=1.08-1.26) and IADL impairments (AOR=1.25, 95% CI=1.13-1.38) remained significant; however, age and income were no longer significant, while being Hispanic and residing in a residential care facility became significant. Having a working computer (AOR=1.58, 95% CI=1.11-2.25) or tablet (AOR=1.50, 95% CI=1.09-2.06), online experience (AOR=1.89, 95% CI=1.35-2.64), and new technology learning (AOR=1.73, 95% CI=1.32-2.28) during the COVID-19 outbreak were associated with higher odds of telehealth use.

Discussion

We examined the rate of and factors associated with telehealth use among older Medicare beneficiaries during the COVID-19 outbreak. The 21.1% rate of telehealth use among these older adults is lower than the 35.1% rate found among all outpatients during the second quarter of 2020 (Alexander et al., 2020), roughly the same observational time frame as our study. Given the lower rates of ICT device ownership and internet use compared to younger age groups, the lower telehealth use rate among older adults was expected. However, the 21.1% rate was nearly five times higher than the 4.6% telehealth use rate before the COVID-19 outbreak.

Multivariable findings show that in addition to health-related need factors, age and income were significant correlates of telehealth use, with older age and lower income as barriers to engaging in telehealth; however, when ICT device ownership, online experience, and technology learning were entered in the multivariable analysis, the effects of age and income disappeared. Thus, age and income effects are likely proxies for ICT device ownership (with online access) and opportunities to learn technology. These findings support the study hypotheses and are consistent with previous study findings that when low-income older adults have ICT devices, internet access, and technology learning opportunities, they were highly likely to use telehealth (Choi et al., 2014, 2020). Although Hispanic older adults had the lowest income of all four racial/ethnic groups, they had higher odds of telehealth use than non-Hispanic White older adults when the technology enabling factors were included in the model. This further shows that ICT devices, internet access, and technology learning opportunities, rather than income per se, are important factors for telehealth use. The higher odds of telehealth use among facility residents are likely due to their having

received technology help from facility staff, as these older adults were often not allowed any in-person contact, even with family, during the COVID-19 outbreak.

Of those who reported learning a new technology or program, about 60% received help with learning, suggesting that helpers are instrumental in closing the digital access gap among older adults. The higher odds of telehealth use among older adults who moved in with someone or had someone move in with them suggests that they may have received help with new technology learning and/or telehealth use. A recent study found that following in-home Ipad lessons by volunteers, socially isolated older adults reported increased confidence in technology use and higher perceived connectedness to the world (Fields et al., 2021). Another study also found that tablet training for older adults helped increase the frequency of tablet use and improved attitudes toward technology use (Neil-Sztramko et al., 2020). Of ICT devices, cell phone ownership was not significantly associated with higher odds of telehealth participation, likely because cell phones tend to be more widely used than computers and tablets. Cell phones also have smaller screens than computers and tablets, making them less convenient for older adults with vision or dexterity problems to use for telehealth purposes. As expected, prior experience with internet use for any purpose increased the odds of telehealth use during the COVID-19 outbreak.

A study of older Medicare beneficiaries found that while ICT device ownership rates slowly increased over time (2011-2017) for those without serious illness, rates did not increase for those with serious illness, who tend to be low-income and homebound (Frydman et al., 2021). During the COVID-19 pandemic, digital access gaps among the latter group of older adults may have grown given economic hardship and social isolation (Frydman et al., 2021). Attention to these gaps is needed since telehealth will continue to be a necessity during any future pandemic. It can also make healthcare use more convenient for many individuals, and some healthcare professionals are expected to continue to use telehealth post-COVID-19 (Zhu et al., 2021). For those with behavioral healthcare needs, telehealth is not only acceptable but a preferred service delivery mode because of its convenience (Tse et al., 2021). Our findings indicate that solutions for closing the digital divide and increasing telehealth use among older adults are readily achievable with access to ICT devices and the internet and lessons on how to use technology, especially for low-income older adults. Older adults who have access to low-cost, subsidized broadband services may need assistance to take advantage of this technology, and those without such access should be provided low-cost and/or publicly funded or subsidized digital access programs (OATS, 2021; Weil et al., 2021). Improved digital infrastructure can help older adults access ICT devices and the internet and obtain technology lessons that can increase access to needed healthcare and quality of life.

The study has some limitations. First, self-reported telehealth use, not confirmed by health records, may have been subjected to recall bias. Second, mental health problems were measured with two single-item questions (one for anxiety and one for depressive symptoms) and may have been under-reported by some older adults due to stigma and social desirability bias. Third, most data collection occurred between June and August 2020 (i.e., the first three to six months of the ongoing COVID-19 pandemic) when many primary care offices closed temporarily or permanently (Corlette et al., 2021), limiting access to both in-person

and telehealth care. Moreover, the telehealth use rate during this period may have been lower than it was in later months as the pandemic dragged on and individuals were no longer willing or able to delay care.” Fourth, the data set did not allow us to factor in the potential impacts of pandemic-related Medicare telehealth policy changes (e.g., coverage expansion that allowed healthcare professionals greater flexibility in providing telehealth services [Koma et al., 2021]) and that may have influenced older adults’ uptake of telehealth services. Fifth, although over 96% of U.S. older adults have Medicare coverage, those not covered by Medicare are least likely to have digital access and are not represented in the study sample.

Despite these limitations, we found that a fifth of older Medicare beneficiaries used telehealth services during the most serious global pandemic in a century in which social distancing was one of the most important safety measures. Prompted by health problems as need factors, digital access and technology know-how were significant enabling factors for telehealth use rather than age and income. All older adults should have access to ICT devices, internet, and technology learning for equitable healthcare delivery and access.

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Table 1.

Methods of contact/communication with family/friends and usual healthcare provider before and during the COVID-19 pandemic, % (95% confidence interval)

	In-person visit	Telephone calls	Email/texting/social media/ portal message	Video calls/telehealth
Family/friends ^a				
Before	85.15 (83.27-86.85)	94.98 (93.63-96.06)	70.18 (68.02-72.26)	41.21 (38.75-43.72)
During	71.36 (68.97-73.64)	92.94 (91.82-93.92)	67.59 (65.40-69.70)	43.65 (40.99-46.35)
Changes between before and during ^c	t=-15.31, p<.001	t=-2.96, p=.004	t=-4.46, p<.001	t=-2.73, p=.008
Usual healthcare provider ^b				
Before	87.57 (86.16-88.85)	49.01 (46.58-51.45)	19.68 (16.93-22.76)	4.59 (3.67-5.72)
During	56.64 (53.98-59.26)	61.97 (59.75-64.14)	23.55 (21.11-26.18)	21.14 (19.10-23.33)
Changes between before and during ^c	t=-26.02, p<.001	t=12.29, p<.001	t=6.70, p<.001	t=18.37, p<.001
N=3,257				

^a Any contact (including less than once a week) vs. no contact at all in a typical week

^b Any contact before or during the COVID-19 outbreak (without specific time frame)

^c Evaluation of changes in proportions of users before and during the pandemic was performed using an approximation of McNemar's test for survey data (<https://www.stata.com/statalist/archive/2014-01/msg00101.html>).

Table 2.

Sociodemographic and health characteristics of the study population by telehealth (video call) use status during the COVID-19 pandemic

	All	Telehealth nonusers	Telehealth users	P
	N (%)	3,257 (100%)	2,653 (78.86%)	604 (21.14%)
Age group (%)				.004
70-74	38.57	33.94	40.83	
75-79	38.55	27.79	31.40	
80-84	18.37	19.53	14.02	
85+	17.68	18.74	13.75	
Female (%)	55.86	55.84	55.94	.974
Race/ethnicity (%)				.477
Non-Hispanic White	78.62	79.13	76.71	
Non-Hispanic Black	7.77	7.93	7.16	
Hispanic	7.43	7.14	8.51	
Other	6.19	5.81	7.63	
Residence (%)				.662
In community	93.60	93.71	93.18	
In residential care facility	6.40	6.29	6.82	
Marital status (%)				.005
Married/partnered	54.22	52.11	62.11	
Divorced/separated	13.85	14.19	12.61	
Widowed	28.76	30.48	22.35	
Never married	3.16	3.23	2.93	
Proxy response status (%)				.111
No proxy or both self and proxy	85.93	85.69	86.84	
Proxy	10.15	9.90	11.08	
Missing	3.92	4.42	2.08	
Moved in with family/friend or someone moved in (%)	8.48	7.46	12.26	<.001
Moved in with family or friend	2.54	2.30	3.47	<.001
Someone moved in with	6.32	5.58	9.07	.009
Income (%)				<.001
Up to \$29,999	31.16	33.13	23.80	
\$30,000-\$42,999	16.25	16.71	14.52	
\$43,000-\$65,999	18.15	18.09	18.39	
\$66,000-\$99,999	15.33	14.77	17.45	
\$100,000+	19.10	17.30	25.84	
Diagnosis of dementia (%)	6.23	6.25	6.15	.935
No. of chronic medical conditions, M (SE)	2.64 (0.03)	2.58 (0.03)	2.83 (0.06)	<.001
No. of ADLs ^a received help, M (SE)	0.39 (0.02)	0.36 (0.03)	0.51 (0.07)	.058
No. of IADLs ^b received help, M (SE)	0.65(0.04)	0.59 (0.03)	0.89 (0.11)	.002

	All	Telehealth nonusers	Telehealth users	P	
	N (%)	3,257 (100%)	2,653 (78.86%)	604 (21.14%)	
Received help visiting or communicating with healthcare provider (%)	20.37	19.23	24.64	.032	
Delayed healthcare despite need during COVID-19 pandemic (%)	38.04	36.85	42.47	.023	
Mental health problems ^c (%)				.009	
No/minimal	64.99	66.70	58.60		
Moderate	26.63	24.87	33.21		
Severe	6.18	5.99	6.89		
Not ascertained	2.20	2.44	1.30		
Self, household member, facility resident/staff had COVID-19 (%)	8.30	7.61	10.90	.060	

^aEating, showering/bathing, dressing, toileting, getting out of bed, and help inside the home

^bLaundry, meals, going outside, shopping, medication, and bill payment

^cLevel of self- or proxy-reported worry/anxiety/depressive symptoms

Table 3.

Telehealth devices and online experience before pandemic and new technology learning to go online during pandemic

	All	Telehealth nonusers	Telehealth users	P
N (%)	3,257 (100%)	2,653 (78.86%)	604 (21.14%)	
Telehealth device at home				
Cell phone	89.01	88.25	91.84	.077
Computer	73.33	70.48	84.00	<.001
Tablet	51.47	47.74	65.35	<.001
Online experience	63.77	59.89	78.24	<.001
Learned a new technology or program to go online during COVID-19	25.21	21.26	39.94	<.001
Someone helped with learning (n=748)	60.41	61.16	58.92	.645
Facility helped residents keep in touch with family/friends online (n=250)	54.53	49.65	71.28	.030

Table 4.

Association of telehealth use during COVID-19 with predisposing, nontechnology and technology enabling factors, and need factors: Logistic regression results

	Telehealth use vs. nonuse	
	Model 1 AOR (95% CI)	Model 2 AOR (95% CI)
Age group: vs. 70-74 years		
75-79	0.94 (0.68-1.35)	1.02 (0.73-1.44)
80-84	0.62 (0.43-0.89)*	0.70 (0.49-1.01)
85+	0.58 (0.42-0.80)**	0.75 (0.54-1.03)
Male vs. female	1.05 (0.80-1.38)	0.97 (0.72-1.29)
Race: vs. non-Hispanic White		
Non-Hispanic Black	1.12 (0.79-1.58)	1.28 (0.92-1.80)
Hispanic	1.44 (0.77-2.70)	1.99 (1.08-3.65)*
Other	1.49 (0.86-2.55)	1.59 (0.89-2.82)
Residence in residential care facility vs. in community	1.30 (0.83-2.03)	1.66 (1.02-2.69)*
Marital status: vs. married/partnered		
Divorced/separated	0.90 (0.60-1.36)	0.97 (0.66-1.42)
Widowed	0.79 (0.55-1.12)	0.81 (0.57-1.15)
Never married	1.00 (0.49-2.02)	1.04 (0.50-2.18)
Proxy response status: vs. no proxy/self and proxy		
Proxy	0.96 (0.63-1.47)	1.41 (0.85-2.32)
Missing	0.50 (0.20-1.26)	0.56 (0.22-1.44)
Moved in with someone or someone moved in vs. no moving	1.53 (1.17-2.00)**	1.36 (1.04-1.76)*
Income: vs. up to \$29,999		
\$30,000-\$42,999	1.39 (0.93-2.08)	1.12 (0.73-1.71)
\$43,000-\$65,999	1.69 (1.13-2.53)*	1.17 (0.80-1.73)
\$66,000-\$99,999	2.01 (1.36-2.97)**	1.28 (0.86-1.91)
\$100,000+	2.47 (1.68-3.63)***	1.41 (0.95-2.10)
Diagnosis of dementia vs. no diagnosis	0.71 (0.45-1.11)	0.81 (0.48-1.39)
No. of chronic medical conditions	1.16 (1.08-1.25)**	1.17 (1.08-1.26)***
No. of ADLs received help	1.00 (0.88-1.13)	1.02 (0.91-1.14)
No. of IADLs received help	1.21 (1.10-1.34)***	1.25 (1.13-1.38)***
Anxiety and/or depressive symptoms: vs. non/minimal		
Moderate	1.39 (1.07-1.82)*	1.33 (1.02-1.74)*
Severe	1.15 (0.63-2.10)	1.08 (0.61-1.91)
Not ascertained		
Self, household member, facility resident/staff had COVID-19 vs. no COVID-19	1.24 (0.79-1.94)	1.19 (0.73-1.94)
Had cell phone vs. no cell phone		1.15 (0.62-2.14)
Had computer vs. no computer		1.58 (1.11-2.25)*

	Telehealth use vs. nonuse	
	Model 1	Model 2
	AOR (95% CI)	AOR (95% CI)
Had tablet vs. no tablet		1.50 (1.09-2.06) [*]
Online use vs. no use		1.89 (1.35-2.64) ^{***}
Learned new technology/program to go online during COVID-19		1.73 (1.32-2.28) ^{***}
Model statistics	N=3,257; design df=56; F (26, 31)=5.89; p<.001	N=3,257; design df=56; F (31,26)=10.37; p<.001

^{*}
p<.05;

^{**}
p<.01;

^{***}
p<.001

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