



How the pandemic has stress-tested the crowded digital home

Deloitte's Connectivity & Mobile Trends 2021 survey reveals the ways that the pandemic is leading us to new innovations

About the Deloitte Center for Technology, Media & Telecommunications

Deloitte's Center for Technology, Media & Telecommunications (TMT) conducts research and develops insights to help business leaders see their options more clearly. Beneath the surface of new technologies and trends, the center's research will help executives simplify complex business issues and frame smart questions that can help companies compete—and win—both today and in the near future. The center can serve as a trusted adviser to help executives better discern risk and reward, capture opportunities, and solve tough challenges amid the rapidly evolving TMT landscape.

Connect

To learn more about the Deloitte Center for Technology, Media & Telecommunications and to stay up to date on our latest research and insights, please visit www.deloitte.com/us/tmtcenter.

Subscribe

To receive TMT email communications, please subscribe at <https://my.deloitte.com/subscriptions.html> and select your areas of interest.

Engage

Follow us on Twitter at: [@DeloitteTMT](https://twitter.com/DeloitteTMT).

Contents

Introduction: The COVID-19 beta test	2
Work, school, and wellness at home: New behaviors, new requirements	4
How has connectivity held up?	12
What's next?	15
Endnotes	17

Introduction

The COVID-19 beta test

IN MARCH 2020, households became the center of daily American life—and connectivity took on new importance. As lockdowns shook fundamental pillars of the economy and challenged the inescapable requirements of living, the COVID-19 pandemic accelerated ongoing trends in connectivity and technology, further blurring the lines between our physical lives and the digital world. With work, school, medical visits, fitness, and retail shopping all crowding into the home, rapidly shifting needs drove sudden demand for an evolving suite of connected devices and digital services.

Telecoms, digital service providers, device makers, and institutions quickly rallied to keep the nation connected and productive. Overall, it has been a remarkable beta test of how existing technology could support and even accelerate use cases that were emerging before the pandemic made them critical. But with more needs crowding into the home came challenges as households began to

push the limits of the new connected cocoon. More upgraded their home broadband, reinforced Wi-Fi, and expanded their mobile data plans. Households found themselves tasked with managing a wide range of devices, services, and communications suddenly necessary for life at home. For many, the biggest challenges were human factors: more work, more distractions, fewer human connections, and vanishing boundaries between work and leisure.¹

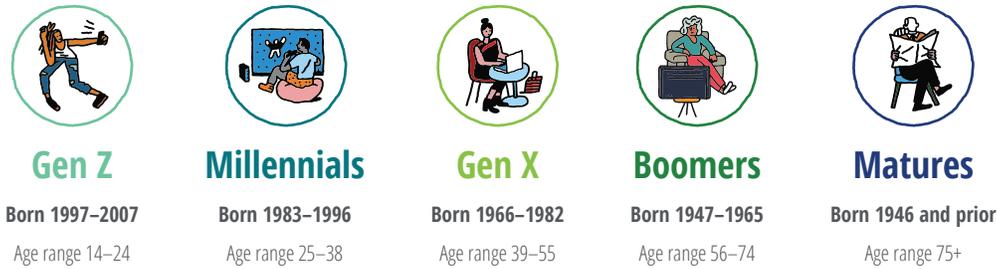
With vaccines being distributed, people are beginning to leave their cocoons and return to workplaces, schools, and public life, but to what degree and in which forms remains to be seen. The pandemic beta test has shown what's possible and what needs improvement while establishing the frontlines of innovation toward the next normal. This year's Connectivity and Mobile Trends survey of US households explores the extent to which our lives have changed—and how tech firms have moved to meet those changes.

ABOUT THE SURVEY

This second edition of the Connectivity and Mobile Trends Survey, conducted by Deloitte's Center for Technology, Media & Telecommunications, was fielded by an independent research firm in March 2021. It employed an online methodology among 2,009 US consumers. All data is weighted back to the most recent US Census to arrive at a representative view of US consumers' opinions and actions. We define the five generations the survey represents as shown in figure 1.

FIGURE 1

Five generations



Source: Connectivity and mobile trends survey, 2nd edition.

A crowded house: A snapshot of the connected home

A year into the pandemic, the typical American home is far more reliant on its devices and their connectivity to remote services. Kids are learning online and messaging and playing video games with remote friends, while adults are working from home, juggling video calls, managing finances, and shopping digitally until they can shift off work and into home entertainment and streaming services. Older adults are browsing on tablets and attending doctor's appointments without leaving the home, while many across all generations are using devices, apps, and services to manage more of their health, wellness, and fitness in lieu of gyms, sports, and outdoor adventures.

This increasingly digital texture of home life has demanded more tech: Thirty-eight percent of survey respondents report more connected household devices—and more *types* of devices—than at the start of the pandemic. The average US household now has a total of 25 connected devices. These include laptops, tablets, and smartphones, video

streaming devices and smart TVs, wireless headphones and earbuds, gaming consoles and smart home devices, fitness trackers and connected exercise machines, and others.²

People are also adding capabilities to their devices with online services. For instance, 87% have at least one kind of software or service for their connected devices, such as cloud storage and antivirus software. Among owners of smartwatches and fitness trackers, for example, 26% subscribe to a service that adds personalized health and fitness reports. Some are making connectivity upgrades to support it all: Of the two-thirds of households with smart home devices, 39% paid for increased home internet speed.

Perhaps unsurprisingly, getting expanding suites of devices and services to work in concert is straining patience as well as bandwidth, leading to signs of tech fatigue. One-third of survey respondents admit to feeling overwhelmed by the number of devices and subscriptions they need to manage. The sudden shift of work, schooling, and health care into the home has likely amplified these sentiments.

Work, school, and wellness at home

New behaviors, new requirements

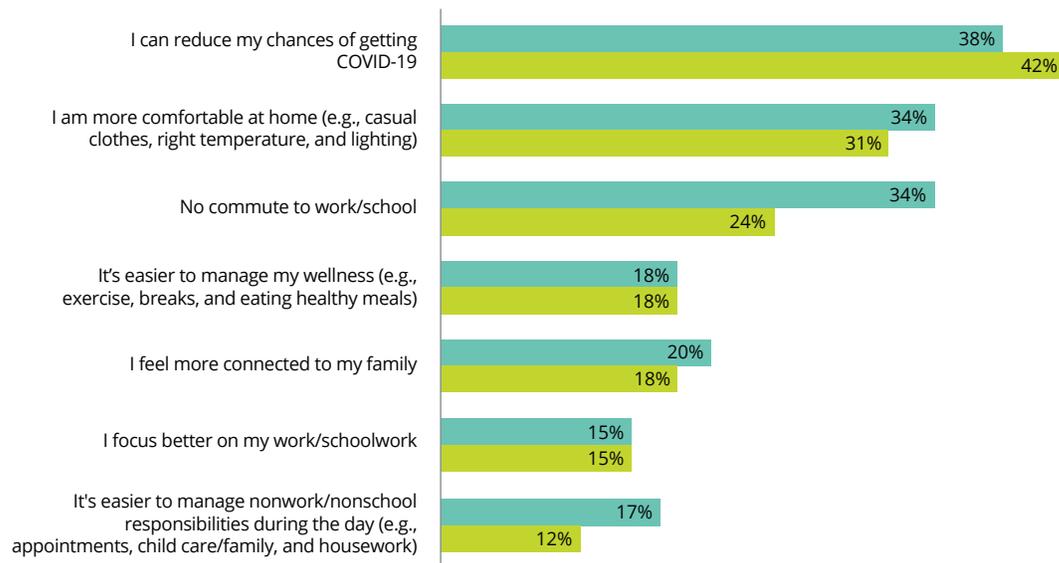
UNDER THE EARLY lockdowns and threats of the COVID-19 pandemic, three integral and interdependent components of the global economy were forced to shift radically. Work, education, and health care—all traditionally in-person activities—had to deliver services remotely and virtually. And remarkably, networks, services, devices, and institutions rallied to effectively support this shift.

At the start of 2021, 55% of US households included someone working from home; 43% had someone schooling from home. Both groups agreed that the top benefit was the ability to reduce the chances of getting COVID-19, closely followed by having no commute and being more comfortable. Both felt more connected to family and better able to manage wellness (figure 2).

FIGURE 2

Safety, comfort, and no commutes top the list of benefits to remote work and education

What do you like best about: ● Working from home ● Attending school from home



Notes: N = Working from home: have been working from home; respondents could select up to two. N = Attending school from home: have been attending virtual school from home or their child(ren) have been attending virtual school from home; respondents could select up to two.

Source: Connectivity and mobile trends survey, 2nd edition.

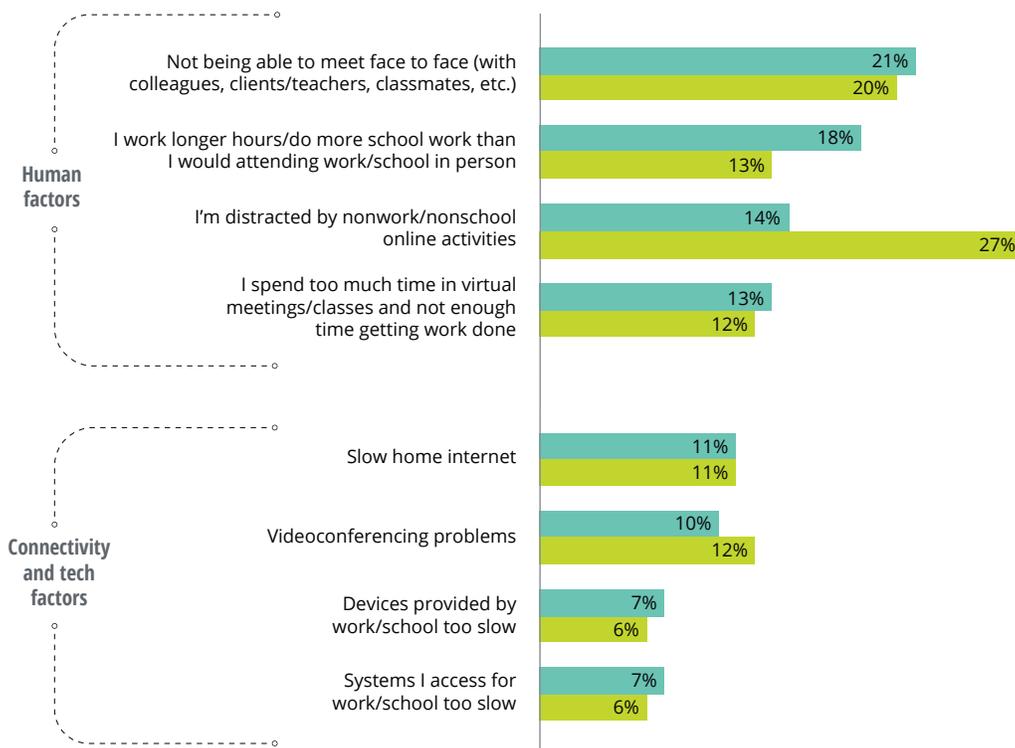
Shifting productivity into the home has exposed some of the limits of current technology and connectivity solutions, with home workers and home schoolers noting videoconferencing problems, slow or unstable home internet service, and balky systems accessed for work or school. Another notable challenge of this shift: Twenty-eight percent of home workers and 32% of home schoolers struggled to connect to the internet from certain locations in the home, leading many to purchase in-home Wi-Fi extenders, as we'll see. Still, it's impressive how well networks and supporting infrastructure held up to the unprecedented demand.

Networks, devices, and services have certainly been stressed, but those working and schooling from home cite human factors as being the most difficult. Overall, workers at home cited the inability to meet face to face with colleagues or clients as the most difficult challenge, followed by working longer hours than they would in person and being distracted by nonwork activities. For home schoolers, nonschool online distractions were first, then the inability to meet face to face with teachers and classmates, followed by doing more schoolwork than if in person (figure 3).

FIGURE 3

For many, human factors are the top challenges when working and schooling from home

Challenges that have made it most difficult to: ● Work from home ● Attend school from home



Notes: N=Work from home: Experienced at least 2 challenges while working from home; respondents could select up to two. N=Attend school from home: Experienced at least 2 challenges while attending school from home; respondents could select up to two.

Source: Connectivity and mobile trends survey, 2nd edition.

Existing technologies—and some quick fixes and upgrades—proved good enough to bridge the gap in this historic moment. But in the blended world of physical and digital that the pandemic greatly accelerated, those technologies highlighted their own limitations to support greater collaboration, productivity, and education.

Virtualized care: Toward an ecosystem of health

Blurring the lines between work and play, juggling too many responsibilities, and maintaining high performance in the face of economic and physical uncertainty all beg for consistent health care and wellness support. Some households under lockdowns also needed medical support for patients with acute and chronic conditions. On the heels of recent growth in inexpensive and easy videoconferencing, medical organizations were able to overcome distance to deliver virtual house calls—indeed, the pandemic’s urgency suspended some of the regulatory barriers that made it difficult for health care providers to connect virtually with patients.³

The shift was dramatic: During the pandemic, more than half of US consumers attended virtual doctor visits, and 29% of adults assisted someone else in their household with a virtual visit. These services barely existed before COVID-19, and health care providers scrambled to quickly deliver and scale programs. Notwithstanding some inevitable hiccups with this first generation of virtual doctor’s visits, 82% of those using them claimed to be satisfied with the experience.

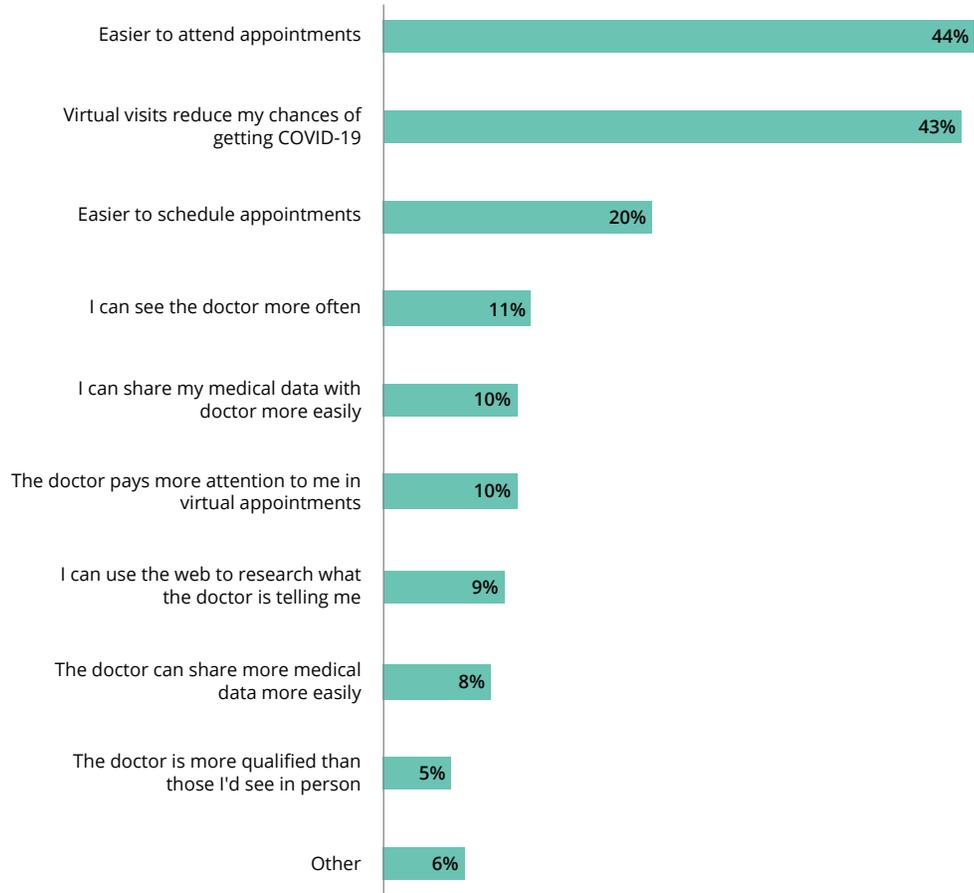
Not only have virtual visits enabled people to continue their care during the pandemic—they could improve public health by making it easier to access health care while minimizing exposure to other patients. Among those who attended virtual medical visits, 44% cited ease in attending appointments, 43% said it reduced their chances of getting COVID-19, 20% said it was easier to schedule appointments, and 10% cited ease in sharing medical data with doctors (figure 4). In short, removing the friction in health care may make it easier to be healthy, and people appear to recognize the value: Sixty-two percent say they are likely to schedule future virtual appointments after the pandemic ends.



FIGURE 4

The upside of onscreen medical care

What do you like best about attending virtual medical appointments? Select up to two



Note: N = Attended at least one virtual medical appointment.
 Source: Connectivity and mobile trends survey, 2nd edition.

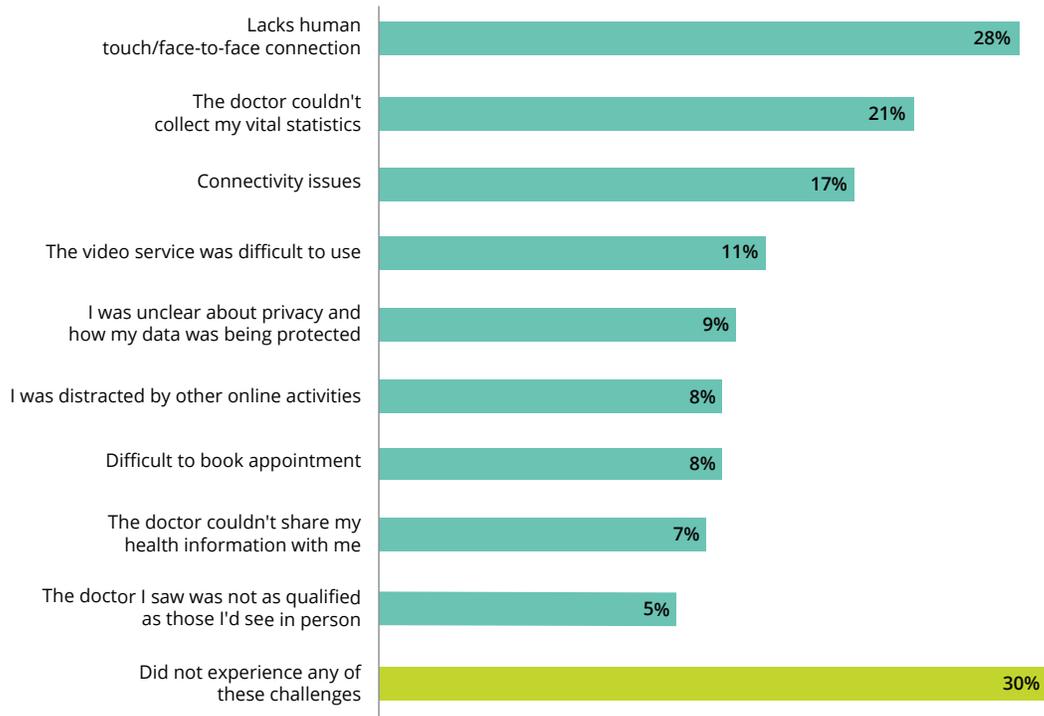
That said, onscreen consultations can't entirely replace in-person visits. Patients miss the human touch and face-to-face interactions (28%) and lament medical staff's inability to directly measure vital statistics (21%, but higher among older patients); people also cite connectivity issues (17%)

and video services being difficult to use (11%). Despite potential glitches and distractions, 30% of patients who attended a virtual medical appointment said they didn't experience any challenges (figure 5).

FIGURE 5

Some patients miss the human touch and ease of sharing information directly with doctors

Which of the following were most challenging when attending virtual medical appointments? Select up to two.



Note: N = Attended at least one virtual medical appointment.
Source: Connectivity and mobile trends survey, 2nd edition.

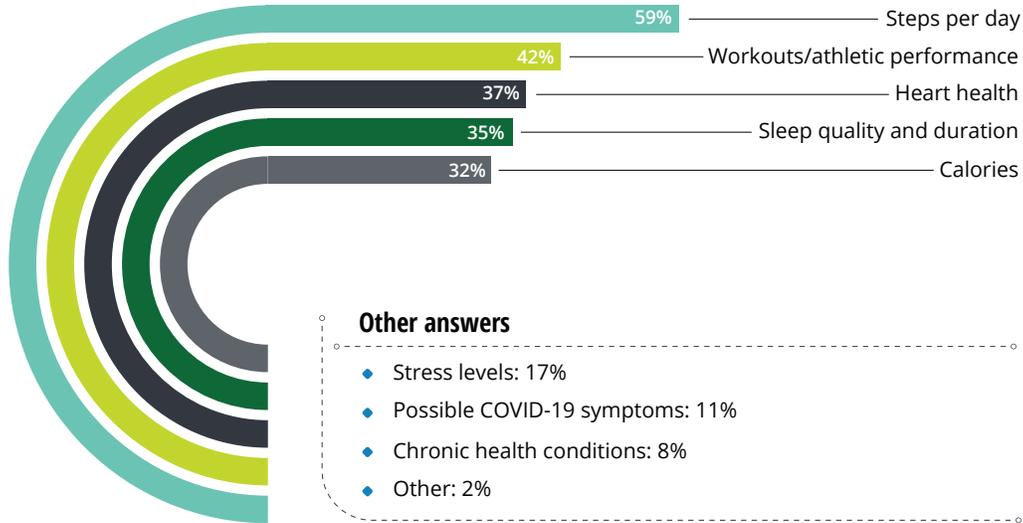
Health care providers were already working to improve the patient experience, but virtual visits add new dimensions—and open competitive fronts for disrupters.⁴ The early challenges with virtual doctor visits will likely drive innovation. For instance, health care providers and medical device manufacturers are creating more devices for remote measurement⁵ and boosting support for personal wearables, such as smartwatches and

fitness trackers. Overall, 58% of households have a smartwatch or fitness tracker, and 39% of consumers own one personally. Among device owners, 14% bought their smartwatch or fitness tracker since the start of the pandemic. Device owners use them to count steps (59%), measure athletic performance, track heart health, and monitor sleep and calories (figure 6).

FIGURE 6

Using health and fitness trackers to count steps, calories, and more

Which of the following do you use your smartwatch/health and fitness tracker to measure?
Select all that apply.



Note: N = Personally own either health and fitness tracker or smartwatch or both and use these devices.
Source: Connectivity and mobile trends survey, 2nd edition.

Although adoption was healthy, use of wearables was mixed during the pandemic: Some people worked out less frequently during the pandemic and had fewer steps and workouts to track, while others exercised more often.⁶ Among those with a smartwatch or fitness tracker, 18% used them more often during the pandemic, 21% used them less often (31% for Generation Z), and 46% used them about the same amount.

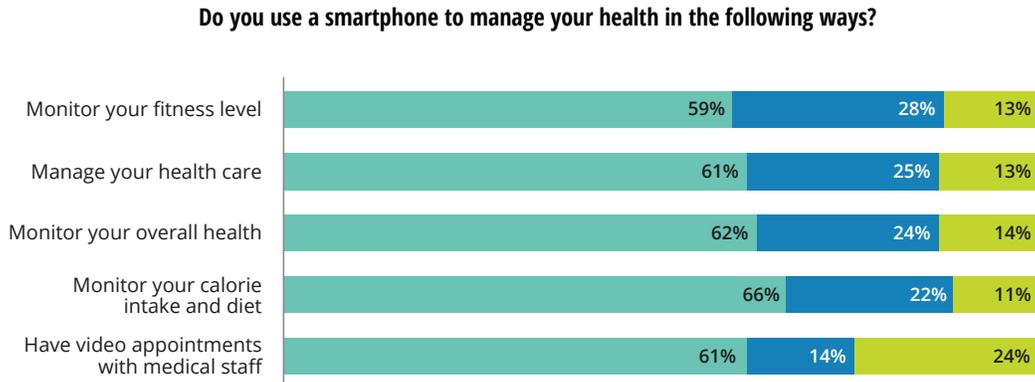
For households without any wearables, interest in them grew slightly, but cost remains the key limiting factor. Among those interested in them, 39% listed cost as the primary reason they haven't bought one—considerably larger than other factors. Yet more

seem to see value in wearables, especially for health and fitness: Twenty-seven percent of respondents are interested in buying a smartwatch or fitness tracker, up from 24% before COVID-19. More smartwatches and fitness bands are enabling people to monitor their health and wellness at a deeper level. They can detect potential signs of COVID-19 by measuring blood oxygen levels and respiratory rate;⁷ they can help people get enough sleep and maintain proper glucose levels.⁸ It's these emerging capabilities that could help people not only maintain their health but keep their doctors better informed, in real time. These advanced features may help better differentiate smartwatches and fitness trackers from smartphones.

FIGURE 7

Use of smartphones for health and fitness grew around 50% during the pandemic

● No ● Did this before pandemic began ● Started doing this since the pandemic began



Will you continue to use your smartphone in the following ways once the COVID-19 pandemic is over?



Notes: N = Own smartphone/have in household. N=Started doing respective activities since the pandemic began.
 Source: Connectivity and mobile trends survey, 2nd edition.

Before COVID-19, around a quarter of respondents used their device to monitor fitness levels, health care, overall health, and calorie intake. During the pandemic, these smartphone uses grew around 50% on average, and two-thirds of those new users say they will continue to do so after the pandemic (figure 7).

As wearables advance to record more discrete health, fitness, and wellness data, their ability to support health care providers will likely grow, along with many users’ desire to share more of this data with their doctors. Though health care stakeholders should continue to keep privacy and security at the

forefront, 60% of users claim to not be particularly concerned about the privacy of their wearable-generated data. Services supporting virtual doctor visits will likely look for ways to ease data-sharing, though integrating personal data with health systems has been challenged more by regulatory barriers and the siloed and fragmented traditional health care system than by technical barriers. Given the unsustainable costs and the push for more value in health care, a successful ecosystem of health that brings together patients, their devices, their data, and health care providers and medical systems will likely need to keep the smartphone at the center.

Emerging smartphone behaviors: Removing friction, distance, and exposure

Both in and out of the home, smartphones helped people get on with their lives while mitigating pandemic risks. Users adopted a range of new digital behaviors, including online mobile payment services, contactless payments at stores, and shopping and buying online from local providers for home delivery or curbside pickup. These solutions reduce friction for common activities, remove distance by virtualizing transactions, and minimize physical interactions with high-traffic touchpoints.

Using a mobile app or website to order food from a local provider grew from 36% to 56% during COVID-19, while using a mobile app or website to order a product and then pick it up at a local store grew from 31% to 51%. Contactless payments

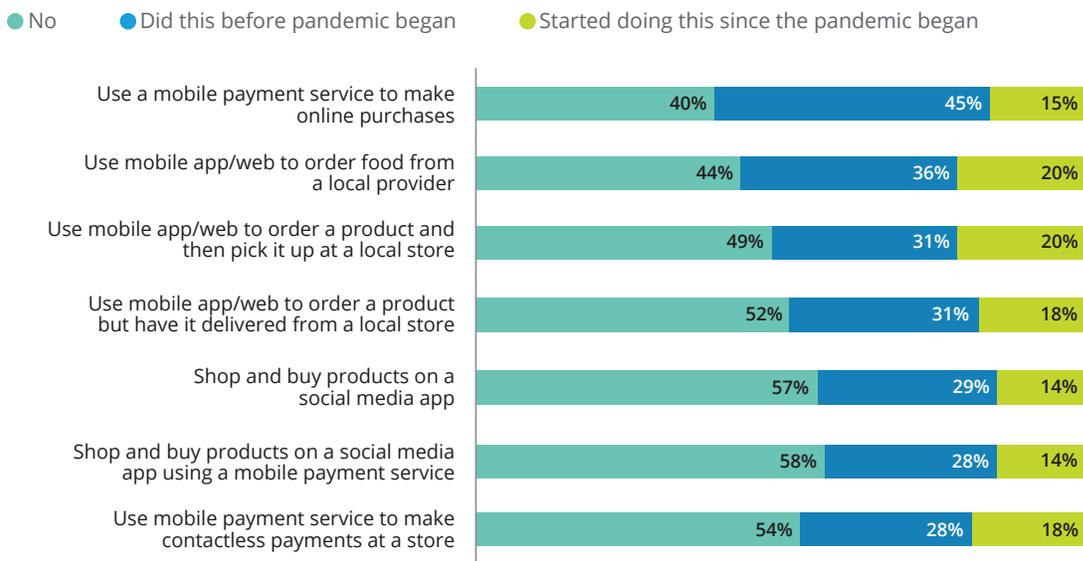
jumped from 28% to 46% during the pandemic; using mobile payments to shop on social media grew from 28% to 42%. These capabilities not only supported households but proved essential to keeping the economy running, especially for businesses that could no longer take in-person customers (figure 8).

These mobile solutions were available prior to COVID-19, but the pandemic highlighted their value. It also reinforced adoption and “stickiness” for retailers who could do business only with customers who were ordering and arranging pickup through mobile apps. Those customers will likely continue to use them: Among those who began smartphone-based retail behaviors during the pandemic, around 70% intend to continue those behaviors after. This shift in usage may drive the next generation of smartphone services, along with a new wave of digitization for retail.

FIGURE 8

Smartphones helped people shop, pay, and eat safely

Do you use a smartphone to shop or pay in the following ways?



Note: N = Own smartphone/have in household.
 Source: Connectivity and mobile trends survey, 2nd edition.

How has connectivity held up?

PREPANDEMIC INFRASTRUCTURE HAS held up remarkably well to the demands of unexpectedly crowded homes. By some estimates, broadband usage in 2020 rose by 50% from 2019.⁹ But as usage and congestion grew, many households reached the limits of their broadband, wireless, and Wi-Fi networks.

Since the pandemic began, 19% of home internet subscribers have upgraded to higher-speed service; 8% switched providers. Those who switched most often cited cost, followed closely by reliability issues, inadequate coverage throughout the home, and slow connectivity. Although around 70% say their home Wi-Fi met their needs for range and speed, many have tried to fix dropouts and dead spots by extending their home networks: Thirty-five percent of home internet users have Wi-Fi extenders, 35% have mobile hotspots, and 25% have mesh Wi-Fi networks. Up to a third purchased them since the pandemic began.¹⁰ However, only 19% of those who purchased extenders claim to have seen significant improvement, while 43% saw some. A full 38% saw no improvement at all (figure 9).

Many households, even after a year of managing home connectivity, may not truly understand what their internet provider delivers and how that might differ from their in-home Wi-Fi. Bridging the gap between the two is an area ripe for improvement, particularly as Wi-Fi 6 routers become more common.¹¹ Carriers and ISPs have an opportunity to ensure better connectivity inside the home.

For most, mobile connectivity appears to have delivered enough speed and reliability, though around 40% of those with mobile data plans have made some change to their mobile data plan since

COVID-19. Upgrading to a new phone was the most common change, followed by switching to an unlimited data plan and adding 5G; those who switched providers most often cited price and value. With reduced movement outside the home during the pandemic, we may not yet have a clear sense of how well existing smartphones and mobile connectivity will serve our postpandemic behaviors. Notably, Gen Z consumers were less likely to be completely satisfied with their mobile service's performance, possibly because, as Deloitte's Digital Media Trends survey for 2021 suggests, Gen Z is far more engaged with social and interactive media than others.¹² Consumption of new media and entertainment is another driver of demand for greater connectivity.

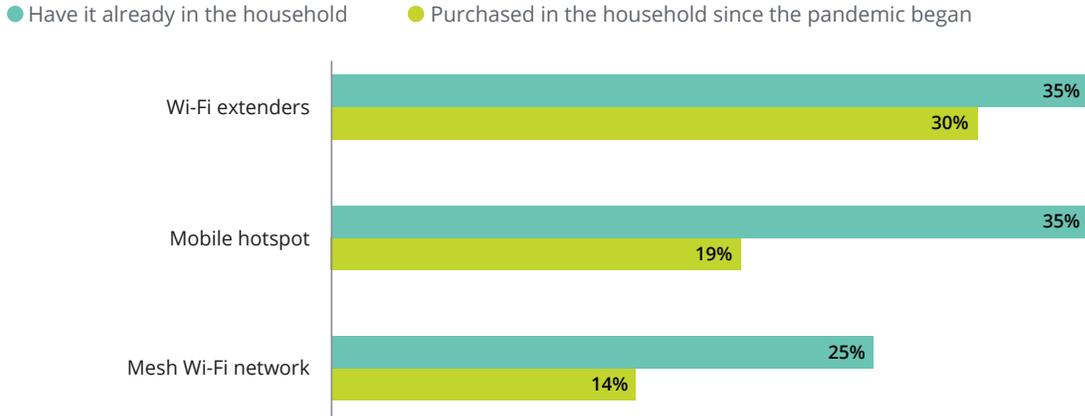
The 5G solution

The COVID-19 pandemic has served as a massive experiment with next-generation solutions that further blend our physical and digital lives—and the urgency of the crisis removed many of the historic barriers to such change. The technologies, services, and connectivity already in place offered a functional sandbox for this grand experiment, with the sandbox's limitations showing us where we need improvements: in our devices and the services with which they integrate; in connectivity across multiple networks, use cases, and bandwidth needs; and with the ways that human factors are challenged by the very nature of remote collaboration. Addressing and updating each of these fundamental requirements of modern life offers a path forward for innovation, born out of the crucible of the pandemic. The next generation of connectivity—5G—is a key enabler of this unfolding future.

FIGURE 9

Since the start of the pandemic, half of households bought devices to improve home Wi-Fi—with mixed results

Ownership and purchase of devices meant to enhance performance of home internet



How much have these devices improved the performance of your home wireless network since the COVID-19 pandemic began?

● Significant improvement ● Some improvement ● No noticeable improvement



Notes: Have it already: N = Household has home internet. Purchased since the pandemic began: N = Household has devices to improve performance of home internet.

Source: Connectivity and mobile trends survey, 2nd edition.

As of early 2021, 5G mobile connectivity was mostly attracting early adopters or those who purchased new smartphones with 5G capabilities. Use cases that demand 5G are not yet available, but overall, 5G is expected to expand significantly over the next few years, for both mobile wireless and fixed home internet: The GSMA forecasts that half of North American mobile connections will be 5G by 2025.¹³

Favorable consumer sentiment toward 5G seems to be growing. Among survey respondents planning to switch mobile providers in the next year, the largest reason is to access 5G service, followed closely by getting better value for the price. Among those who do not yet have 5G mobile coverage, 54% say that when 5G becomes available, they intend to eventually buy a 5G-compatible smartphone, and 52% will sign up for a 5G mobile data plan with their carrier. Providers are also starting to offer fixed 5G internet to the home, though people may not yet see the clear value: Forty-seven percent of all respondents say that they won't get 5G home internet if it costs more than their current service. Bundling 5G mobile and home internet may help.

US households are showing greater interest in home 5G, but some consumers don't yet see how it would improve their existing services. More homes are hitting the limits of their broadband and Wi-Fi, but smartphones and data plans appear robust. Adoption of 5G will likely depend on two engines of the upgrade cycle. First, more will upgrade their devices to handsets that include 5G, but 5G may not be the primary reason to upgrade. Among our respondents, 62% of smartphone users have had their current handset for at least a year, while 31% plan on upgrading within a year. New smartphones will increasingly include 5G. Second, adoption may be slow until there are new applications, services, and experiences that demand next-generation connectivity, whether in the home or on-the-go. As we've shown, the pandemic has offered clear innovation pathways toward the next generation of productivity, collaboration, education, and wellness, as well as their hunger for bandwidth. When 4G-LTE networks were deployed at scale, it took years for "killer apps" such as ridesharing and mobile video streaming to reach mass adoption.¹⁴ What killer apps will 5G enable, and when will they arrive? The synergy between nationwide 5G networks, millions of 5G smartphones, and the need for new—and better—virtual experiences could prove a catalyst for innovation.

What's next?

THE BIG QUESTION: How much of the pandemic response, in and out of the home, will persist? Sectors will move forward in different ways.

Employers may allow many of the workers who were able to go fully remote during the crisis to shift to a hybrid model, mixing workdays at home and in the office. For these workers, existing videoconferencing solutions have opportunities to better address the human factors that have challenged many users. For education, there is an opportunity to deliver better solutions that blend physical and digital presence, leverage artificial intelligence to support personalized learning, and provide more regular learning experiences when students are not in school. Virtual doctor visits could flourish, enabling greater health and productivity—if the regulatory landscape can evolve effectively, and if health care providers can better leverage the health and fitness behaviors that more people are adopting with the use of wearables and connected exercise equipment. In every area, smartphones' role will likely only expand, as the devices continue to absorb more capabilities supporting our daily lives, make it easier to acquire goods and services, and offer protection from exposure to contagion. Indeed, new retail behaviors mediated by smartphones have shown strong consumer satisfaction and will likely persist after COVID-19 vaccinations are ubiquitous.

People, institutions, and technologies continue to adapt and evolve. The pandemic has been a crucible of this evolution, demanding change in order to adapt to change, breaking down old structures to build new ones. And indeed, the ways in which we work, play, learn, stay healthy, manage our finances, and buy our essentials have changed rapidly. The urgency of these shifts may soon fade, but they have removed friction, broken down distance, and unlocked new forms of value—three key elements of how innovation has long reshaped the world.

The next “normal” will likely be a hybrid between prepandemic life and the newfound capabilities, priorities, and opportunities unlocked by our passage through a historical moment that—with the invaluable aid of technology and connectivity—reprioritized the home as the center of our lives. The pandemic showed that people can and will embrace change, and they can do it quickly when innovation improves their condition. Looking ahead, this evident willingness to adopt innovation and adapt may put more pressure on technology companies to innovate even faster. The next normal will likely invite greater innovation and opportunity around the essential elements of daily life, underscoring the simple fact that technology and innovation, ideally, are in the service of people. Amid cyclones of whirling change, we remain at the center.

Questions to consider

The breadth of our survey, and the pandemic-led changes it represents, point to implications for a wide range of industries and leaders. Telecoms, device makers, health care, human resources and talent, education, and service providers of many stripes can all pause to consider the implications. While many of the trends we have highlighted were underway before the pandemic, others are much less mature.

Looking forward, consider the following questions:

- Will households continue to demand more connected devices, experiences, and solutions? What new behaviors or industries might be working their way into the home?
- For emerging behaviors in remote productivity such as working and schooling from home, how much will they continue after the pandemic is over? Which roles and industries are likely to assume a hybrid model, and which may return to full-time colocation?
- How can connectivity providers, device makers, and service providers work together to deliver the next generation of productivity solutions? How can they deliver better presence and collaboration across distributed locations, overcoming the human challenges bedeviling remote workers?
- Has the pandemic unlocked digital transformation for historically resistant industries such as health care and education? Could technological innovation deliver more of these services, at better cost and performance, for underserved communities? How can technology and service providers incentivize their transformation?
- Is there a growing economic imperative to expand high-speed connectivity to rural communities? How can the US overcome challenges to availability and affordability so the underserved can recognize the economic benefits of digital?

Endnotes

1. Erica Volini, Steve Hatfield, and Nicole Scoble-Williams, *From survive to thrive: The future of work in a post-pandemic world*, Deloitte, 2021.
2. The average US home now includes 14 different kinds of connected devices, up from 11 when we measured it in our last Connectivity and Mobile Trends survey in 2019. Types include a connected technology device, such as laptops and smartphones; a digital entertainment device, such as a video streaming device for a TV, a smart TV, wireless headphones or earbuds, or a gaming console; and smart home devices, such as a smart door lock, home security system, and connected cameras, as well as fitness trackers and connected exercise machines. Many households have more than one device in a category—for example, they might have three smartphones, two laptops, and two smart TVs. So, when we count them up, the average household now has a total of 25 connected devices across 14 categories.
3. Nicole Turner Lee, Jack Karsten, and Jordan Roberts, "Removing regulatory barriers to telehealth before and after COVID-19," Brookings, May 6, 2020.
4. David Betts, Leslie Korenda, and Shane Giuliani, *Are consumers already living the future of health? Key trends in agency, virtual health, remote monitoring, and data-sharing*, Deloitte Insights, August 13, 2020.
5. Tracxn, "Top wearables for remote patient monitoring startups," April 17, 2021.
6. Gretchen Reynolds, "How the pandemic is changing our exercise habits," *New York Times*, October 7, 2020.
7. Tejaswini Mishra et al., "Pre-symptomatic detection of COVID-19 from smartwatch data," *Nature* 4 (2020): pp. 1208–20.
8. Betsy Morris, "How Fitbit, Whoop and other gadgets are measuring brain activity, glucose, and sleep," *Wall Street Journal*, April 12, 2021.
9. Mike Robuck, "OpenVault: Covid-19 pandemic drives 51% spike in broadband traffic in 2020," Fierce Telecom, February 10, 2021.
10. Among those owning devices aimed at enhancing the performance of home internet, 30% purchased Wi-Fi extenders, 19% purchased mobile hotspots, and 14% purchased mesh Wi-Fi network since the pandemic began.
11. Brian X. Chen, "A new generation of Wi-Fi to improve your home network," *New York Times*, February 24, 2021.
12. David Jarvis et al., *Digital media trends, 15th edition: Courting the consumer in a world of choice*, Deloitte Insights, April 16, 2021.
13. GSMA Intelligence, "5G to account for half of North America's mobile connections by 2025," October 27, 2020.
14. Jack Fritz et al., *5G in 2020: Plotting a course from invention to innovation*, Deloitte, 2020.

Acknowledgments

The authors would like to thank **Kevin Westcott, Dan Littmann, Jack Fritz, Naima Essing, and Ankit Dhameja** for their help crafting this research, as well as **Jeanette Watson** and **Kevin Downs** for their industry expertise and help developing the survey.

We would also like to thank **Sayantani Mazumder** and **Shreyas Waikar** for their work on survey data analysis, **Eitan Nir** and **Shannon Rothacher** for their marketing and communications leadership, and **Anisha Sharma** for her continued support with PR.

About the authors

Chris Arkenberg | carkenberg@deloitte.com

Chris Arkenberg is a research manager with Deloitte's Center for Technology, Media & Telecommunications. He has 20 years of experience exploring how people and organizations interact with transformational technologies. Arkenberg's current focus is on the intersection of technology infrastructure and media and entertainment behaviors.

Jeff Loucks | jloucks@deloitte.com

Jeff Loucks is executive director of Deloitte's Center for Technology, Media & Telecommunications, Deloitte Services LP. In his role, he conducts research and writes on topics that help companies capitalize on technological change. An award-winning thought leader in digital business model transformation, Loucks is especially interested in the strategies that organizations use to adapt to accelerating change.

Paul Silverglate | psilverglate@deloitte.com

Paul Silverglate is vice chairman and US Technology sector leader at Deloitte LLP. He also leads the Risk and Financial Advisory practice for Technology, Media & Telecommunications. With more than three decades of professional services experience, Silverglate serves as a lead client service partner for a select number of our most strategic global technology clients. He specializes in leadership development, crisis management, digital enterprise transformation, business continuity, change management, and identifying the best resources within Deloitte's global organization to address clients' most complex issues and professional services needs.

Jana Arbanas | jarbanas@deloitte.com

Jana Arbanas is vice chairman and US Telecom, Media & Entertainment sector leader at Deloitte & Touche LLP. She is also a principal in Deloitte & Touche's Risk and Financial Advisory practice. Arbanas has more than 20 years of experience in serving large, multinational technology companies to help them address enterprise risk. She has leveraged her risk advisory capabilities to lead engagements for digital platform companies, helping them navigate evolving regulatory requirements and business transformation.

Contact us

Our insights can help you take advantage of change. If you're looking for fresh ideas to address your challenges, we should talk.

Practice leadership

Jana Arbanas

US Telecommunications, Media & Entertainment sector leader | Deloitte & Touche LLP
+1 415 987 0436 | jarbanas@deloitte.com

Jana Arbanas is vice chairman and US Telecom, Media & Entertainment sector leader at Deloitte & Touche LLP.

Paul Silverglate

Vice chairman and US Technology sector leader | Deloitte LLP
+1 408 704 2475 | psilverglate@deloitte.com

Paul Silverglate is vice chairman and US Technology sector leader at Deloitte LLP. He also leads the Risk and Financial Advisory practice for Technology, Media & Telecommunications.

The Deloitte Center for Technology, Media & Telecommunications

Jeff Loucks

Executive director | Deloitte Center for Technology, Media & Telecommunications | Deloitte Services LP
+1 614 477 0407 | jloucks@deloitte.com

Jeff Loucks is the executive director of Deloitte's Technology, Media & Telecommunications (TMT) center. In his role, he conducts research and writes on topics that help companies capitalize on technological change.

Deloitte.

Insights

Sign up for Deloitte Insights updates at www.deloitte.com/insights.



Follow @DeloitteInsight

Deloitte Insights contributors

Editorial: Matthew Budman, Sayanika Bordoloi, Dilip Poddar, and Rupesh Bhat

Creative: Sonya Vasilieff, Molly Woodworth, and Anoushriya S Rao

Promotion: Hannah Rapp

Cover artwork: Josh Cochran

About Deloitte Insights

Deloitte Insights publishes original articles, reports and periodicals that provide insights for businesses, the public sector and NGOs. Our goal is to draw upon research and experience from throughout our professional services organization, and that of coauthors in academia and business, to advance the conversation on a broad spectrum of topics of interest to executives and government leaders.

Deloitte Insights is an imprint of Deloitte Development LLC.

About this publication

This publication contains general information only, and none of Deloitte Touche Tohmatsu Limited, its member firms, or its and their affiliates are, by means of this publication, rendering accounting, business, financial, investment, legal, tax, or other professional advice or services. This publication is not a substitute for such professional advice or services, nor should it be used as a basis for any decision or action that may affect your finances or your business. Before making any decision or taking any action that may affect your finances or your business, you should consult a qualified professional adviser.

None of Deloitte Touche Tohmatsu Limited, its member firms, or its and their respective affiliates shall be responsible for any loss whatsoever sustained by any person who relies on this publication.

About Deloitte

Deloitte refers to one or more of Deloitte Touche Tohmatsu Limited, a UK private company limited by guarantee ("DTTL"), its network of member firms, and their related entities. DTTL and each of its member firms are legally separate and independent entities. DTTL (also referred to as "Deloitte Global") does not provide services to clients. In the United States, Deloitte refers to one or more of the US member firms of DTTL, their related entities that operate using the "Deloitte" name in the United States and their respective affiliates. Certain services may not be available to attest clients under the rules and regulations of public accounting. Please see www.deloitte.com/about to learn more about our global network of member firms.