



Volume 12 Issue 2



RESEARCH  
ARTICLE



OPEN  
ACCESS



PEER  
REVIEWED

## Online but still falling behind: measuring barriers to internet use 'after access'

**Kevin Hernandez** *University of Sussex*

**Becky Faith** *University of Sussex*

**DOI:** <https://doi.org/10.14763/2023.2.1713>

**Published:** 27 June 2023

**Received:** 22 February 2022 **Accepted:** 23 December 2022

**Funding:** As part of the Digital Futures at Work Research Centre (Digit), this work was supported by the UK Economic and Social Research Council [grant number ES/S012532/1], which is gratefully acknowledged.

**Competing Interests:** The author has declared that no competing interests exist that have influenced the text.

**Licence:** This is an open-access article distributed under the terms of the Creative Commons Attribution 3.0 License (Germany) which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. <https://creativecommons.org/licenses/by/3.0/de/deed.en>  
Copyright remains with the author(s).

**Citation:** Hernandez, K., & Faith, B. (2023). Online but still falling behind: measuring barriers to internet use 'after access'. *Internet Policy Review*, 12(2). <https://doi.org/10.14763/2023.2.1713>

**Keywords:** Digital divide, Digital inequality, Digital inclusion, Internet access, Online surveys

**Abstract:** UK, US, and EU internet access statistics show over 95%, 93% and 90% of individuals online respectively. Yet during the Covid-19 pandemic, many children missed out on essential schooling, and people struggled to access government assistance as services shifted online. At first the co-existence of near universal connectivity and people's inability to access digital services may seem like a paradox. This paper analyses six digital access surveys in the UK, US, and EU to reveal how they are failing to consider ways that users may experience barriers to further use of digital technologies 'after access', making surveys ineffective in capturing and helping respond to their needs.

## 1. Introduction

During the COVID-19 crisis many aspects of daily life moved online, reflecting longer-term trends in which digital technologies are reshaping many areas of life. This has led to bold claims from policymakers in Europe and the United States as to the pandemic's potential 'positive' impact in "*increasing further the number of internet users and their interactions online*" (European Commission, 2020a). Across Western Europe and the United States, datasets consistently show that more than 90% of the population are online. The United Kingdom's Office for National Statistics (2020a) data shows that 95% of adults in the UK were classified as internet users in 2020, including 100% of people aged 16 to 34 and 99% of people aged 35 to 44. Data from the UK's telecommunications regulator, Ofcom, shows that the number of households without internet access dropped from 11% in March 2020 to just 6% in March 2021 and suggests that the pandemic has been a catalyst for increased internet penetration and digital skills (Ofcom, 2021a). In Europe, Eurostat (2021) data suggests that 90% of adults in EU-27 countries were internet users in 2020 (see figure 1 below) with internet penetration. In the US, 93% of adults are classified as 'internet users' (Pew Research Center, 2021). Figures like these suggest that the digital divide has significantly narrowed.

Yet recent work published in this journal and beyond shows the continued risk of digital exclusion amongst certain marginalised communities (Carmi & Yates, 2020; Faure et al., 2020; Watts, 2020). EU data shows that 24% of people with no or low education levels, and 26% of economically inactive people (individuals who are not employed, have not been working in the past four weeks and/or are unable to start working within two weeks) are internet non-users (European Commission, 2020a). Despite apparently high levels of connectivity, digital inequalities were a factor in exposing less connected individuals to greater risk during the pandemic (Robinson et al., 2020), impacting negatively on health outcomes due to a need to get things done in person (Beaunoyer et al., 2020).

The onset of the COVID-19 pandemic in early 2020 and the subsequent implementation of social distancing measures across Europe and the United States meant that being able to work, learn, and access government services remotely became a necessity for most of the population. If we are to take the internet user statistics published by official sources at face value, this would lead to an assumption that most people should not have faced any significant challenges making a transition from in-person to remote work, school, and service delivery. However, reports across the UK, US, and Europe warned of potential exclusion from health and other services for less connected individuals during lockdown and social distancing

mandates as services were either exclusively available online or offline alternatives were less available (Baker et al., 2020; Holpuch, 2020; OECD, 2020). An early systematic review on access to digital health services found that disparities in digital access prior to the pandemic translated into lower rates of telemedicine use by marginalised groups (Litchfield et al., 2021). Black, Latino, women, non-English speakers and poorer patients were shown to be less likely to access telemedicine in the US during the pandemic with elderly patients belonging to those groups being especially less likely to access digital health services (Chunara et al., 2021; Eberly et al., 2020; Litchfield et al., 2021; Weber et al., 2020; Whaley et al., 2020). “Yet many organisations, not least among them governments, still proceed as if access to the internet is already universal” (Watts, 2020).

The co-existence of statistics showing near universal internet usage and people not being able to fully participate in the digital society during the pandemic presents a paradox. How can it be the case that over 90% of people have access to the internet, yet many people had trouble learning, working, applying for jobs, and accessing services remotely during the pandemic? In this paper we aim to understand how these two realities can co-exist. We argue that this paradox could have been better anticipated if official surveys were better informed by and updated based on findings from the digital inequalities literature which increasingly calls for a shift from binary conceptualisations of the digital divide to understanding digital inequality as a multi-dimensional issue that includes but goes beyond access to include other factors such as quality of access (e.g. speed, devices used, etc.) skills, motivational factors, usage patterns, user autonomy, and the right to disengage.

We analysed six key national-level surveys from government bodies and research institutions which are used to gauge digital exclusion in the UK, the United States, and Europe. Rather than solely analysing the data in the surveys, we also analysed what the surveys questionnaires did and did not capture. This approach allowed us to highlight gaps in the way that digital access is recorded by surveys which may have a knock-on effect on how it gets understood and reported by the media, government, and civil society (including in activism). We argue that digital exclusion remains a persistent problem that is currently hiding in plain sight due to the way individuals are labelled ‘internet users’. National-level digital access statistics tend to ‘count’ people as being online as merely having used the internet once in the last three months, twelve months, ‘at least occasionally’, or over an indefinite amount of time effectively ignoring the many ways in which people might have limited digital access or experience a range of barriers that may limit their ability

to make more use of digital technologies. *After access* barriers faced by people counted as internet users are largely ignored by the national-level digital access surveys we analysed. Surveys continue to emphasise barriers as something experienced mainly by non-users, despite decades of digital divide literature that have highlighted the need to go beyond the online/offline binary (Ragnedda & Ruiu, 2017; Selwyn, 2002). The result is that national-level internet user surveys—and any studies built on their data—provide policymakers with insights regarding who their target populations are, but leave them in the dark about what can be done beyond ‘one size fits all’ solutions. A deeper look at the barriers that limited users face illustrate that further action may be needed.

This paper consists of five main sections. This introduction is followed by a literature review illustrating how the digital inequalities literature has shifted from binary to multi-dimensional conceptualisations of digital connectivity. The third section describes the methodology used to analyse the questionnaires of the six national-level digital inclusion surveys. The fourth section summarises which user barriers found in the questionnaires and which ones were not. The fourth section is divided into eight subsections covering how surveys currently measure and label internet users, frequency of use and activities; intermittent access; devices and autonomy; skills and language barriers; fear of the internet, negative experiences, and internalised norms; user dependency and lack of autonomy; and data disaggregation respectively. The final section concludes the paper and provides recommendations for future digital access surveys.

## 2. Literature review

Contemporary national-level digital access statistics in Europe and the United States give the misleading impression that almost everyone is connected to the internet, and that governments, private companies and civil society can efficiently and effectively reach over 90% of the population using apps, websites, and platforms for health, job seeking, education, and other forms of service delivery. Yet these policies and statistics have not kept pace with digital divide research over the last two decades which has highlighted the many ways in which those officially counted as connected may, in effect, be partially disconnected.

The concept of the ‘digital divide’ has been used to explain the relationship between social inequality and access to digital tools and connections for over 25 years (Robinson et al., 2020). Against the backdrop of rapid digitalisation over the last three decades there has been a growing recognition that binary conceptualisations of divides between ‘haves and have not’ are insufficient. Thus, literature on

the digital divide has progressively shifted from first, to second and third level digital divides in skills and benefits derived from the use of digital tools (van Deursen & Helsper, 2015). From these early conceptualisations of a binary digital divide between technology ‘have and have nots’ (Warschauer, 2003) studies have highlighted the many different barriers that users may encounter after getting online, including a lack of digital skills, the type of device used to go online, the cost of maintaining connectivity, autonomy of use, and motivational and attitude factors. As well as a large body of work across disciplines showing how digital access is not binary (Roberts & Hernandez, 2019; Selwyn, 2002; van Dijk, 2006) studies have highlighted ‘classes of connectivity’ (Qiu, 2009) including some users who are intermittent’ (Gonzales, 2016) or ‘limited users’ (Yates et al., 2020) of the internet resulting in what a commentary in this journal (Mathers, 2020) describes as an increasingly complicated “picture of online behaviour and benefit”. The rest of this section will provide a glimpse at the literature regarding some of the *after access* barriers users may encounter including digital skills, motivations and attitudes, intermittent access and data, internet speeds, types and quality of devices, autonomy, and the ability to disengage.

Given the potential economic significance of a lack of digital skills, this issue is often a policy priority. Yet, like digital access more generally, digital skills are not binary. Instead they range from basic usage skills that enable individuals to take part in the digital society and consume digital goods and services to advanced skills that empower the workforce to develop new digital goods and services (UNESCO et al., 2018). The European Commission’s Digital Economy and Society Index (European Commission, 2020b) shows that only 58% of the EU population possesses at least basic digital skills and suggests that lack of relevant skills remains by far the most important factor deterring European households from having internet access at home. Moreover, users who are unable to understand information, content, or questions on online forms due to a lack of literacy in country specific official languages can find themselves disconnected from digital services and up to date information even when they have sufficient internet access, a high level of digital skills, and the latest digital devices (Abujarour et al., 2021). Language is especially an access barrier for refugee, low-income and undocumented migrant communities. Governments sometimes make efforts to make content, information and forms available beyond the official/dominant language. However, it is often not possible to translate all material to all languages spoken by migrants leaving those who speak unrepresented languages at a disadvantage.

Gaining internet access is also not always a linear process. In her work on the digi-

tal exclusions experienced by low-income internet users in the United States, Gonzales describes how they “often experience frequent, short-term disconnection, or periods of dependable instability. Yet, frequent disconnection, and more importantly, the implications of disconnection is rarely studied” (2016, p. 235). Gonzales emphasises that periods of instability tend to be cyclical and reoccurring rather than one-off events. Moreover, intermittent access is not only experienced over extended periods of time. It can also occur in short bursts (e.g., hours or days) as is often the case for rural residents (Mason et al., 2022). Slow internet speeds and a lack of sufficient data is another mechanism by which users can experience disadvantages by making some activities too time-consuming, unavailable, or requiring users to make trade-offs or to ration data when considering the use of data-intensive applications (Lai & Widmar, 2020). This data rationing might also relate to issues around digital poverty (Faith & Hernandez, 2022), whereby people are limiting their access to the internet owing to a lack of money for data, an issue that is becoming evermore important amidst a cost-of-living crisis.

The types of devices people have access to may also contribute to digital exclusion. Although smartphones are now more powerful than the PCs of ten years ago, their small screen size and keyboards make them an inferior alternative to Laptops and PCs to perform remote office work, do research, fill out forms or study. In other words, their affordances, or action possibilities (Faith, 2018) limit the activities that people can perform on them comfortably. Studies of mobile only internet users (de Lanerolle et al., 2017; Napoli & Obar, 2014; Tsetsi & Rains, 2017) show these limitations. Faith (2018) showed that the condition of a user’s device (e.g., whether it is broken, slow, or out of date) influences whether they can use it for productive activities. Smartphones do provide some advantages over laptops in some areas including portability, use on the go, and quick access. Access to both personal computers and smartphones allows users to take advantage of all the action possibilities and benefits that each type of device offers (Grošelj, 2021).

The literature has also highlighted a range of factors related to users autonomy when using devices; autonomous internet use refers to the ability to get online and perform and access digital activities, transactions, or services without having to rely on others for connectivity, devices, or skills to carry out digital activities (Schradié, 2011). Research suggests that users who borrow devices may not benefit from internet use as much as users owning a device (Girl Effect & Vodafone Foundation, 2018; Schradié, 2011). Borrowers are unable to access the internet at any time of the day, for any purpose they wish to use it for and may have to ask for permission from gatekeepers who may determine what the device can be used for

and for how long. Such restrictions impose limitations on what users may have the capacity to do or feel comfortable doing during their limited time online. As a result, borrowers are most likely to use the internet only for the most necessary/immediate of tasks while not really using it for more productive or long-term projects (Robinson, 2009). This is also the case for users who rely on public libraries, computer labs, internet cafes, public Wi-Fi, or use equipment belonging to friends and family. Device autonomy manifested itself as a significant barrier during COVID-19 when lockdown and social distancing rules prohibited the use of or limited the amount of people who could use libraries and computer labs (Turner Lee, 2020). Moreover, people who only use the internet at work are dependent on their employers for internet access which often affects what they can do online. Access at home is important since research shows that uninterrupted access at home affords users more autonomy than usage at work or on public computers which may be monitored, have certain apps and websites blocked, and may only be available for limited time slots (Schradié, 2011). Similarly, Proxy users who require assistance from others to either get online or to carry out specific online activities (e.g., applying for government benefits or signing up for an email account) that they may have trouble carrying out on their own (Reisdorf et al., 2020) experience less autonomy. Users can also be dependent on others when they mainly access the internet through devices or broadband that is not theirs.

Some non-users and users may choose to self-exclude from using the internet altogether or from specific uses (e.g., e-government or social media). Others may choose to never go online, disconnect from the internet or to use it less due to fear of what they may find online or due to negative experiences that occurred after having gone online (e.g. harassment, scams, surveillance, etc.) (Jane, 2017), or when they internalise norms about what a person from their background should or should not be doing online. A study of technophobia in older adults found “significant associations between technophobia and internet use patterns, including type and complexity of use” and highlighted that the literature on technophobia and older people tends to focus on non-users while ignoring the experiences of older people who are internet users (Nimrod, 2018, p. 148). Other forms of disengagement might relate to people who simply prefer analogue forms of service delivery, such as a study of library users revealing their preference for the ‘physicality’ of books and library spaces (Ruthven et al., 2022). Yet there are blind spots in the issue of disengagement in digital inclusion surveys which reflect a broader political reality in the removal of the choice to access services in person or via analogue means - described in recent critiques as ‘digital enforcement’ (Díaz Andrade & Techatassanasoontorn, 2020) or the shrinking space for ‘digital disengagement’

(Kuntsman & Miyake, 2022).

Where there is a focus on 'limited users' (see London Office of Technology and Innovation, 2021) this has been in regard to quantifying how many people use the internet below certain thresholds (e.g. a few times a week), for a limited amount of online activities (e.g., social media, search engines, etc.) or predicting connectivity in an area based on the prevalence of demographic groups less likely to be online. This can help identify how many users make limited use of the internet and who they might be, but quantifying limited users in this way provides little insight into the barriers that result in limited usage. In other words, surveys are currently not capturing the 'how' of limited use - from slow devices, through to dependence on proxy users for access - despite the rich empirical data and analysis in the studies covered in this section. Surveys continue to emphasise barriers as something experienced mainly by non-users, despite decades of digital divide literature that have highlighted the need to go beyond the online/offline binary (Ragnedda & Ruiu, 2017; Selwyn, 2002).

### 3. Methodology

In order to deepen our understanding of contemporary digital divides, we drew on over twenty years of literature to expand our understanding of the barriers faced by people who are described as 'limited' users of the internet (Yates et al., 2020). As the literature review showed, these barriers include a lack of digital skills, motivational factors, the limitations of the type of devices used to get online and frequency of use, etc. To do this we analysed six national-level surveys from government bodies and research institutions which provide digital access metrics in the UK, the United States, and Europe. Each survey's questionnaire was analysed against a checklist of *after access* barriers users may encounter based on findings from the literature review. The list of barriers analysed in this paper are illustrative but not exhaustive. Further qualitative research and a systematic review of current digital inequalities research may uncover further barriers. This paper mainly analyses well-known national-level surveys from the US and UK whose findings are widely cited by advocacy groups and the media. Eurostat data was used to make generalisations across the EU since it collates data from government and official sources across the continent. It was beyond the scope of this paper to analyse national surveys from all of Europe due to time and language constraints. Future studies should analyse the extent to which the trends uncovered in this paper hold true across national level surveys in the EU and elsewhere and could also apply a similar analysis to sub-national surveys including individual US states.

The surveys analysed are listed below:

### United Kingdom

- the Office of National Statistics' (ONS): internet access - households and individuals survey (Office for National Statistics, 2020b)<sup>1</sup>
- Ofcom: Media use and attitudes questionnaire (Ofcom, 2020)
- Oxford Internet Institute: Oxford Internet Survey (Blank, 2019)

### United States

- Pew Research Institute: Core Trends: Mobile Technology and Home Broadband Survey (Pew Research Center & Abt Associates, 2019)
- US Census Bureau: American Community Survey (United States Census Bureau, 2021)

### European Union

- Eurostat: 'ICT usage in households and by individuals (isoc\_i)' database (Eurostat, 2021a)

The following section summarises the findings of the review.

## 4. Measuring digital exclusion – what's in national surveys and what's not

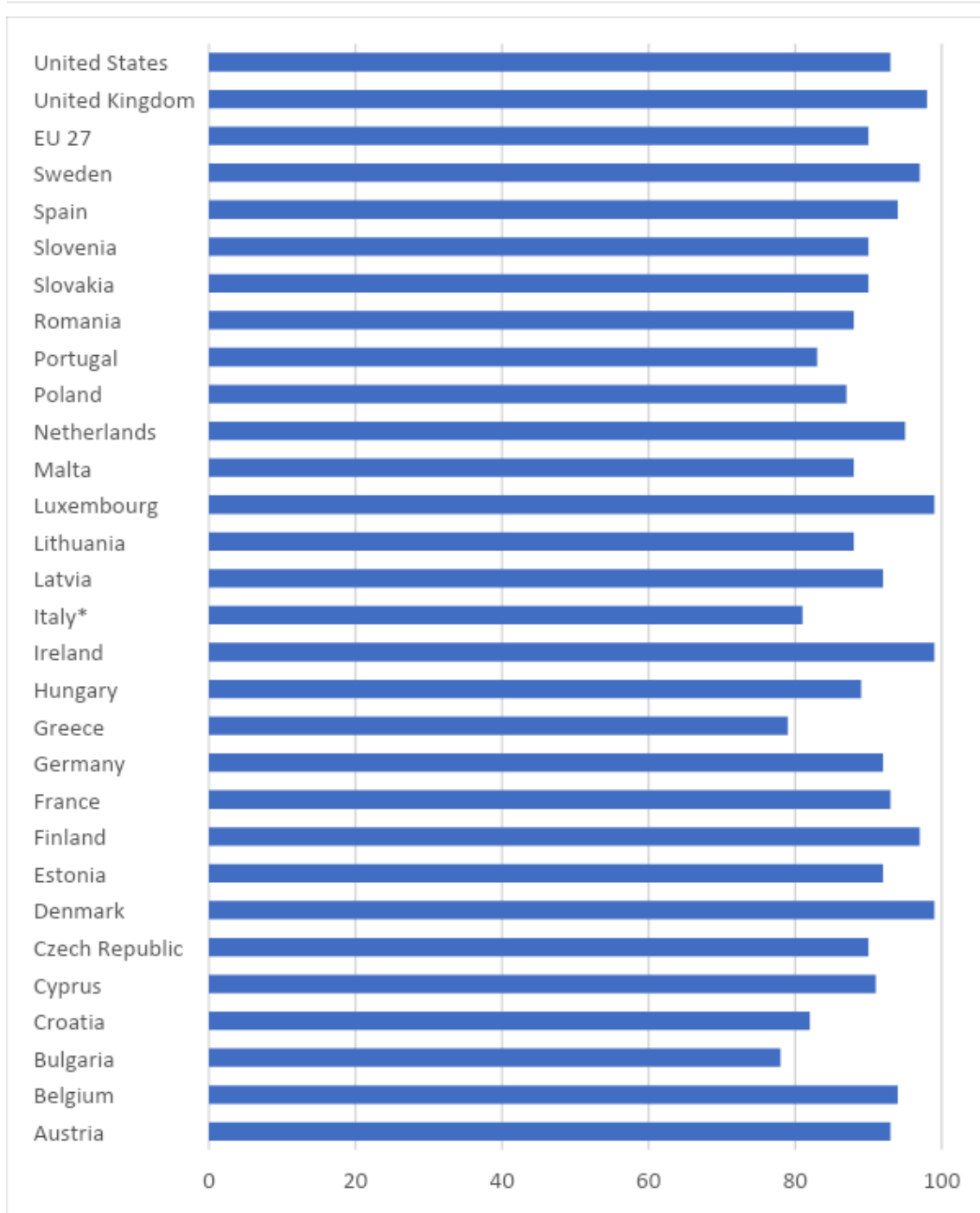
Although most major digital access surveys in the UK, US, and EU collect data on digital barriers, these surveys tend to be concerned with barriers to using the internet at all; barriers hindering non-users from using the internet at least once in a predetermined extended period of time. Surveys do not tend to collect data on barriers that internet users may encounter once online, barriers which may hinder them from being continuously and autonomously connected. This section summarises which *after access* barriers are included in national level surveys and which ones are left out.

### How surveys currently measure and label 'internet users'

National level surveys currently label individuals as internet users if they report having used the internet at least once over an extended period of time (e.g., once in the last month, once in the last three months, once in the last year, at least occasionally, or ever) or if they use any device to go online. It is important to note

1. We were able to access a copy of the ONS questionnaire by requesting access via email.

that although surveys label individuals as internet users using long time-frames, this is not always the most granular data collected about internet use frequency. Figure 1 below shows ‘internet user’ figures in the US, UK and 27 EU countries in 2021 using these metrics.



**FIGURE 1:** Percentage of individuals reporting using the internet in the last 12 months in US, UK, and EU 27 countries in 2021 (Eurostat, 2021a; Pew Research Center, 2021).

\* Latest available figures from Italy were from 2020.

All but one survey analysed (US Census) collected additional data regarding granularity of use. This subsection explores how each survey determines whether an individual is an internet user and looks at the data which surveys collect about use frequency.

In the UK, the Office of National Statistics' (ONS) 'internet access - households and individuals survey' (2020a) labels individuals as internet users if they report having used the internet in the last three months. The most granular level of usage data the ONS publishes is whether users go online almost every day. Once the almost daily indicator is considered, the number of daily internet users in the UK falls to 89% (Office for National Statistics, 2020a). The ONS questionnaire also includes response options for using the internet everyday and usage of the internet throughout the day (Office for National Statistics, 2020b), but the ONS does not publish these figures. It is not possible to decipher how many individuals use the internet everyday or throughout the day since ONS only publishes tables and does not publish correspondent level data. However, we can infer that these figures are both likely to be below 89%.

Rather than tying internet use to a specific time, Ofcom's adult media use and attitudes survey measures internet usage by asking people which devices they use to go online (Ofcom, 2020). Respondents who report going online on any device (smartphone, laptop, PC, tablet, smart TV, gaming console, etc.) are considered internet users. Using this metric, Ofcom counts 90% of adults in the UK as internet users in 2021 (Ofcom, 2021b). Ofcom also collects more granular data regarding the amount of time users spend online per week. The 90% figure becomes questionable once hours spent online per week figures are considered. 12% of respondents reported not using the internet at least once a week and 3% reported only using it for 2 hours or less per week. Only 73% of respondents reported using the internet at least 6 hours a week (Ofcom, 2021b).

The Oxford Internet Survey carried out by the Oxford Internet Institute (OII) simply asks UK adults 'Do you personally go online?' (Blank, 2019). The survey also collects more granular questions about internet use frequency. Users are asked how much time they spend online. Available answers include almost constantly, many times a day, about once a day, several times a week, and less often. However, the OII survey has its flaws regarding regularity and data access. The collection of the data seems to be sporadic; whilst the survey was conducted every two years between 2009 and 2013, there was a gap between 2013 and 2019. Unfortunately, OII data is not open access nor are any data tables made available. Moreover, their 2019 survey report did not include any text regarding percentage of overall users,

nor did it break down users by frequency of use, nor does it include any data tables (Blank et al., 2019).

Eurostat is the statistical office of the European Union. Through the European Statistical System (ESS), harmonised statistics are produced and published by Eurostat in partnership with EU member state National Statistics enabling the provision of comparable statistics across the EU. Eurostat's 'ICT usage in households and by individuals (isoc\_i)' database has been published annually since 2002 and includes digital access data for EU 27 countries and the UK. Its main internet user metric is individuals having used the internet in the last 12 months (Eurostat, 2021b). However, Eurostat also collates more granular EU-wide data on internet users including individuals having used the internet less than every month, at least once a month, at least every week, and daily. When the daily internet user metric is considered, the number of connected individuals drops from 89% (those using the internet in the last 12 months) to 80% of adults across EU 27 countries (Eurostat, 2021a).

The Pew Research Institute is a non-partisan fact tank in the United States. Their 'Core Trends: Mobile Technology and Home Broadband' survey's internet penetration figures are derived at by asking interviewees if they use the internet or email at least occasionally (Pew Research Center & Abt Associates, 2019). The survey also asks more specific and granular questions about internet usage including asking users whether they use the internet almost constantly, several times a day, about once a day, several times a week, or less often. In 2019 the percentage of the US population accessing the internet at least occasionally was 90% whereas the number of people using the internet almost constantly (31%) and several times a day (49%) were significantly lower.

The US Census Bureau (2021) carries out the American Community Survey which includes a question about whether the interviewee or any member of their household have access to the internet at home. Thus, the survey mainly focuses on the household level rather than on individuals. Moreover, there are no questions about internet use frequency in the survey. Recently the US Census Bureau published a report suggesting that 85% of the US population had access to a broadband subscription in 2018 based on this data (Martin, 2021).

## **Frequency of use and activities**

As mentioned, surveys are capturing data on how frequently 'internet users' go online. However, the level of granularity varies greatly between surveys. One survey (the US Census) does not make a distinction regarding frequency of use. Other sur-

veys collect more granular data. Five surveys (ONS, Ofcom, OII, Eurostat, Pew) asked whether users access the internet at least once a week. Four surveys asked users whether they access the internet throughout the day and everyday (ONS, OII, Eurostat, Pew). Two surveys (Ofcom and OII) included questions about when the user first accessed the internet.

Most surveys (five, all except US Census) are now also capturing data regarding activities users carry out online. The granularity of detail in this area varies from asking users whether they ever carried out online activities to asking users how frequently they carry them out. Some surveys are also asking whether individuals have used the internet to further work opportunities and prospects. Three surveys (Ofcom, OII, Eurostat) included questions about use of the internet to search for or apply for work and three surveys (ONS, OII, and Eurostat) included questions about participating in online training or learning programmes. Surveys in the UK and EU are also generally (Ofcom, ONS, OII, Eurostat) asking whether people have used the internet to access government information and services.

Table 1: Frequency of use and digital activities

	ONS	OFCOM	OII	EUROSTAT	US CENSUS	PEW	TOTAL
USE INTERNET ONCE A WEEK	Yes	Yes	Yes	Yes	No	Yes	5
USE INTERNET ALMOST EVERYDAY	Yes	No	Yes	Yes	No	Yes	4
USE INTERNET EVERYDAY	Yes	No	Yes	Yes	No	Yes	4
USE INTERNET THROUGHOUT THE DAY	Yes	No	Yes	Yes	No	Yes	4
WHEN USER FIRST USED INTERNET	No	Yes	Yes	No	No	No	2
DIFFERENT ACTIVITIES PERFORMED ONLINE	Yes	Yes	Yes	Yes	No	Yes	5
JOB SEARCH	No	Yes	Yes	Yes	No	No	3
ONLINE TRAINING OR LEARNING PROGRAMMES	Yes	No	Yes	Yes	No	No	3
ACCESS GOVERNMENT SERVICES ONLINE	Yes	Yes	Yes	Yes	No	No	4
TOTAL	7	5	9	8	0	5	

Inclusion of questions regarding online activity is a welcome sign, however data based on these answers do not give much indication to why some users perform certain activities while others do not. Collecting data on barriers for non-users could help shed light on how to improve uptake of specific applications or information provided online. Subsections 3.3 to 3.7 provide insights regarding the lack of questions—and thus data—regarding barriers limited users face to make more use of the internet and for a greater breadth of activities. It should also be noted that these surveys reflect a notion of compulsory digitality—whereby ‘digital dis-

engagement’—or choosing to be offline (Kuntsman & Miyake, 2022) is not considered a serious option.

## Intermittent access

All surveys reviewed show an increase in the number of internet users in each subsequent survey period. Moreover, surveys tend to present the data in a way that suggests that internet uptake is a unidirectional phenomenon where users begin to use the internet, continue using it, and are joined by new users in the next survey period. However, the meta-trend of growing internet users over time may obscure the experiences of individuals who may fluctuate between usage and non-usage. Of all the surveys reviewed, only two (Pew and OII) included any questions regarding intermittent access. However, the questions mainly concerned non-users who previously had access and did not account for individuals counted as users who may routinely fluctuate between being users and non-users.

None of the surveys reviewed currently include questions about whether users routinely face internet service disruptions throughout the day or week, let alone the reasons for disruptions. Another way that users may experience intermittent access is through insufficient data or having to scale down internet usage when reaching data usage limits. None of the surveys included questions about the sufficiency of user data plans. Not all surveys take speed into account. Four surveys (Eurostat, OII, Pew, US Census) included questions about internet speed.

Table 2: Barriers related to intermittent access

	ONS	OFCOM	OII	EUROSTAT	US CENSUS	PEW	TOTAL
NON-USERS WHO WERE PREVIOUS USERS	No	No	Yes	No	No	Yes	2
USERS WHO WERE PREVIOUSLY NON-USERS	No	No	No	No	No	No	0
EXPERIENCES OF SIGNIFICANT ACCESS DISRUPTIONS (E.G. 1 DAY, WEEK, MONTH, MORE)	No	No	No	No	No	No	0
ROUTINE DISRUPTION TO ACCESS THROUGHOUT THE DAY	No	No	No	No	No	No	0
DATA SUFFICIENCY	No	No	No	No	No	No	0
INTERNET SPEED	No	No	Yes	Yes	Yes	Yes	4
TOTAL	0	0	2	1	1	2	

## Devices

Some of the surveys reviewed did consider users who are ‘smartphone only’ users. For example the Ofcom survey (2021a) found that 10% of internet users in the UK

only access the internet using their mobile phones. Five surveys (Eurostat, Ofcom, OII, Pew, US Census) had questions about access to a laptop/PC. All surveys included questions about mobile phone access, but the Eurostat model questionnaire does not include a question which asks users to clarify whether their mobile phone is a smartphone.

Although it is common for internet access surveys to take device type into account, none of the surveys included any questions regarding the current state of devices including whether the device is broken, very old and run down, slow, constantly freezing, running on an old operating system that is no longer supported by some apps, has limited functionality, or is prone to security vulnerabilities. None of the surveys included a question about whether users mainly have access to devices through borrowing and only the OII survey included a question asking whether users are reliant on public libraries or computer labs for access.

Table 3: Barriers related to devices

	ONS	OFCOM	OII	EUROSTAT	US CENSUS	PEW	TOTAL
ACCESS TO LAPTOP/PC	No	Yes	Yes	Yes	Yes	Yes	5
ACCESS TO MOBILE PHONE	Yes	Yes	Yes	Yes	Yes	Yes	6
ACCESS TO SMARTPHONE	Yes	Yes	Yes	No	Yes	Yes	5
USERS WHO MAINLY ACCESS THROUGH BORROWING	No	No	No	No	No	No	0
RELIANCE ON PUBLIC COMPUTERS OR WIFI	No	No	Yes	No	No	No	1
BROKEN DEVICES	No	No	No	No	No	No	0
SLOW DEVICES	No	No	No	No	No	No	0
OLD DEVICE AND/OR OPERATING	No	No	No	No	No	No	0
TOTAL	2	3	4	2	3	3	

## Skills and language barriers

Digital skills are one area where most surveys are capturing some data on barriers for individuals counted as ‘internet users’. Four surveys (Eurostat, Ofcom, OII, and ONS) captured data on digital skills. The extent and depth to which these were measured varied with some surveys capturing digital skills data that does not reflect the wide range of skills needed in the 21st century, particularly in relation to employment. It was beyond the scope of this paper to cover all digital skills, especially ones related to specific apps (e.g. email, text messaging) and tasks (e.g. downloading an app, uploading a document, etc.). Future analyses of surveys could be more inclusive of these skills and also consider approaches to digital skills be-

yond a purely commercial lens, to consider digital capabilities as a form of social and democratic participation (Eynon, 2021)

Only the Oxford Internet Institute survey included a question regarding work-related digital skills. Four surveys (Eurostat, Ofcom, OII, ONS) included questions about user ability to protect privacy online. Three surveys (Eurostat, Ofcom, and OII) included questions about information literacy (e.g. the ability to spot fake news) and three surveys (Eurostat, Ofcom, OII) included questions regarding user ability to protect themselves from digital harms.

Digital access surveys seem to operate on the assumption that everyone has enough written and reading literacy to be able to make use of the internet. Only the Ofcom and US Census surveys included any questions regarding general literacy levels. Although Ofcom and the US Census took English literacy into account, none of the surveys reviewed took availability of official content in other languages into account. This means that national-level data is unavailable on whether individuals can engage with and find relevant information, content, and applications in a language they are comfortable with. The lack of questions on language barriers is likely to disproportionately hide barriers experienced by migrants and ethnic and linguistic minorities. Given that migrants and linguistic minorities are a subset of the general population, a separate representative survey that focuses on these groups might be necessary to better gauge the extent to which language barriers affect these groups.

Table 4: Barriers related to digital skills and language

	ONS	OFCOM	OII	EUROSTAT	US CENSUS	PEW	TOTAL
ANY DIGITAL SKILLS	Yes	Yes	Yes	Yes	No	No	4
WORK-RELATED DIGITAL SKILLS	No	No	Yes	No	No	No	1
ABILITY TO PROTECT PRIVACY ONLINE	Yes	Yes	Yes	Yes	No	No	4
INFORMATION LITERACY	No	Yes	Yes	Yes	No	No	3
ABILITY TO PROTECT FROM POTENTIAL ONLINE HARMS	No	Yes	Yes	Yes	No	No	3
LITERACY IN COUNTRY'S DOMINANT LANGUAGE	No	Yes	No	No	Yes	No	2
CONTENT AVAILABLE IN LANGUAGE USER IS FLUENT IN	No	No	No	No	No	No	0
TOTAL	2	5	5	4	1	0	

## Fear of the internet, negative experiences and internalised norms

Capturing data on negative experiences, fear, and internalised norms can help government pinpoint potential awareness-raising campaigns and highlight the need for digital literacy programs in new areas (e.g. how to deal with online harassment and how to avoid scams). Only two surveys (Ofcom and OII) included questions about fear, negative experiences and confidence levels for current users. However, none of the surveys included questions about internalised norms.

Table 5: Internalised barriers

	ONS	OFCOM	OII	EUROSTAT	US CENSUS	PEW	TOTAL
FEAR	No	Yes	Yes	No	No	No	2
NEGATIVE EXPERIENCES	No	Yes	Yes	No	No	No	2
CONFIDENCE	No	Yes	Yes	No	No	No	2
TOTAL	0	3	3	0	0	0	

## User dependency and lack of autonomy

Some of the surveys did include questions about proxy use, but only for non-users. Only the OII and ONS survey captures data about the use of proxies by current users. However, whereas the OII survey captures data on proxy use across a range of activities, the ONS only captures proxy use data regarding filling out government forms. The latter is a major shortcoming since limited users may need help for a greater range of activities than filling out forms. Moreover, despite the OII capturing proxy use data, the data is not published in the public domain, nor have we come across the data in any publications.

Surprisingly, place of access was not always considered in surveys. Five surveys (Eurostat, OII, ONSUS Census, and Pew) included questions about internet access at home. Just two surveys (ONS and OII) included questions about use of the internet at work while only the ONS survey distinguished users who are dependent on access at work. Only the OII survey included a question about dependency on public wifi and whether users are dependent on public libraries or computer labs to go online.

Table 6: Barriers related to user dependency and lack of autonomy

	ONS	OFCOM	OII	EUROSTAT	US CENSUS	PEW	TOTAL
NEED HELP CARRYING OUT SOME ONLINE ACTIVITIES	No <sup>2</sup>	No	Yes	No	No	No	1

	ONS	OFCOM	OII	EUROSTAT	US CENSUS	PEW	TOTAL
ACCESS AT HOME	Yes	No	Yes	Yes	Yes	Yes	5
ACCESS AT WORK	Yes	No	Yes	No	No	No	2
DEPENDENT ON WORK ACCESS	Yes	No	No	No	No	No	1
DEPENDENT ON PUBLIC WIFI	No	No	Yes	No	No	No	1
DEPENDENT ON PUBLIC LIBRARIES OR COMPUTER LABS	No	No	Yes	No	No	No	1
TOTAL	3	0	5	1	1	1	

## Disengagement

Digital usage surveys are not currently considering disengagement as an option that non-users or users may prefer. Only the OII and Pew surveys asked non-users any questions regarding why they chose not to use digital technologies. Only OII asked questions for non-engagement that included aspects beyond access, skills, and motivational barriers. None of the surveys asked users whether they would like to use the internet less, would prefer to do things offline if given the choice or captured practices of partial and periodic disengagement.

Table 7: Disengagement

	ONS	OFCOM	OII	EUROSTAT	US CENSUS	PEW	TOTAL
REASONS FOR FULL DISENGAGEMENT (NON USERS)	No	No	Yes	No	No	Yes	2
REASONS FOR FULL DISENGAGEMENT BEYOND ACCESS, SKILL, AND MOTIVATIONAL BARRIERS	No	No	Yes	No	No	No	1
WISHING TO USE THE INTERNET LESS	No	No	Yes	No	No	No	1
CHOOSE TO PARTIALLY DISENGAGE OR DISENGAGE PERIODICALLY	No	No	No	No	No	No	0
PREFER TO DISENGAGE IF GIVEN THE CHOICE	No	No	No	No	No	No	0
TOTAL	0	0	3	0	0	1	

## Data disaggregation

Disaggregated data can help pinpoint specific groups that may be more likely to be offline or experience barriers after being online but this data alone cannot provide a picture of how groups experience disconnection or limited connection. The

- The ONS questionnaire does include one question about needing help filling out government forms but doesn't ask users whether they need help completing any other activity. It is possible that a user is able to fill out a form but not be able to do other complex digital tasks and activities

inclusion of a wide range of indicators related to barriers experienced by users—like the ones covered earlier in this paper—could help better illustrate the challenges specific groups may experience and thus help policymakers better tailor digital access programmes to communities based on their specific needs.

Surveys are doing a decent job of disaggregating, but some improvements can be made. All six surveys disaggregated for gender, age, employment status and education level. Five surveys (all except ONS) disaggregated for income. Four surveys disaggregated for race and ethnicity (Ofcom, OII, Pew, and US Census). Four surveys disaggregated for migration (Eurostat, ONS, Pew, US Census Survey). Three surveys disaggregated for disability (Ofcom, OII, US Census) and for urban and rural divides (Eurostat, Ofcom, OII). None of the surveys disaggregated at a state, city, or municipal level, although this is difficult to accomplish given small sample sizes.

Table 8: Data disaggregation across surveys

	ONS	OFCOM	OII	EUROSTAT	US CENSUS	PEW	TOTAL
GENDER	Yes	Yes	Yes	Yes	Yes	Yes	6
AGE	Yes	Yes	Yes	Yes	Yes	Yes	6
EMPLOYMENT STATUS	Yes	Yes	Yes	Yes	Yes	Yes	6
EDUCATION LEVEL	Yes	Yes	Yes	Yes	Yes	Yes	6
INCOME	No	Yes	Yes	Yes	Yes	Yes	5
RACE	No	Yes	Yes	No	Yes	Yes	4
DISABILITY	No	Yes	Yes	No	Yes	No	3
URBAN AND RURAL	No	Yes	Yes	Yes	No	No	3
TOTAL	4	8	8	6	7	6	

## 5. Conclusion

In conclusion, this study analysed six national level digital access survey questionnaires across the UK, the US, and Europe to assess how well they capture the experiences of users *after access* and the barriers that hinder them from making more use of the internet. Given the acceleration of already rapid digitisation during the COVID-19 pandemic where public, private, and civic organisations have turned to digital technologies to limit human contact as much as possible, it is vitally important to have accurate data on how many people are unable to participate in society as effectively or on equal terms with better connected individuals. The ability to continuously and autonomously make use of all digital technology became more important than ever; those who are not as connected are at risk of falling be-

hind (Hernandez & Roberts, 2018). This study highlighted that the lack of questions in official surveys—and thus data—on barriers experienced by limited users makes it difficult to discern how many people are at risk of falling behind and how their limited use manifests itself.

The result is that national-level internet user surveys—and any studies built on their data—provide policymakers with limited insights regarding who their target populations are and leave them in the dark about what can be done beyond ‘one size fits all’ solutions. A deeper look at the barriers that limited users face illustrate that further action may be needed.

Surveys currently label individuals as ‘internet users’ in a way that implies that the digital divide is binary. Surveys should present digital inclusion data in a way that highlights the experiences of people who continue to face barriers after being online. Although some surveys do collect some data that goes beyond the binary, this paper has shown that the data collected does not fully capture digital inequalities, especially barriers related to access to subpar devices or internet connections, digital skills, motivations and attitudes, and user autonomy which may occur *after access*. Instead, barriers are mainly treated as factors that mainly affect offline populations. Moreover, the promotion of headline ‘internet user’ figures further obfuscate the risk of digital exclusion for users who continue to experience barriers *after access*.

Based on our empirical findings, we propose surveys incorporate a further sub-classification within the term ‘internet user’ including the terms like ‘Fully connected internet users’ and ‘Disadvantaged users’. A ‘Fully connected internet user’ would refer to users who do not face any additional barriers after going online (e.g., digital skills, subpar devices, motivations and attitudes, dependency on others, etc.) *AND* are able to use the internet throughout the day without significant disruption outside of working or school hours. ‘Disadvantaged users’ would include all users that continue to face one or more barriers after being online or are unable to use the internet throughout the day without significant disruption. Introducing these internet user sub-classifications, and data on the barriers disadvantaged users face can help policymakers identify more targeted interventions that may improve outcomes for disadvantaged users at risk of falling behind. This study showed that surveys are currently not asking enough questions—if at all—about barriers that hinder limited users from using the internet more or for a greater range of activities. The user barriers identified and written about in this paper are illustrative but not exhaustive. Further qualitative research is needed that may identify barriers faced by disadvantaged users to better inform quantitative sur-

veys.

Several studies have taken an alternative approach of using demographic data to predict which users may not be online or may use the internet less (London Office of Technology and Innovation, 2021; Yates et al., 2020). Although these efforts help give us a better understanding of *who* might be disconnected or facing barriers once they are online, they are unable to tell us *how* limited users are less connected (the specific barriers they face) which in turn makes it difficult to target these populations with interventions tailored to the specific barriers they face. This is partially because these studies use national-level surveys as secondary data sources rather than going through the expensive process of collecting primary data. What is counted counts. Incorporating questions about the *after access* barriers that disadvantaged users face will provide a more accurate picture of the extent of digital exclusion, enabling policymakers and civil society to design more effective and tailored approaches to tackling this issue. Qualitative research is also needed at a national level to help understand these barriers and uncover new barriers that emerge amidst technological change. Without answers to such questions, we are left in the dark regarding how non-binary digital inequalities play out and what to do about it.

---

## References

- Abularour, S., Ajjan, H., Fedorowicz, J., & Köster, A. (2021). ICT support for refugees and undocumented immigrants. *Communications of the Association for Information Systems*, *48*, 456–475. <https://doi.org/10.17705/1CAIS.04840>
- Baker, C., Hutton, G., Christie, L., & Wright, S. (2020). *COVID-19 and the digital divide* (UK Parliament POST Raid Response) [Research report]. UK Parliament. <https://post.parliament.uk/covid-19-and-the-digital-divide/>
- Beaunoyer, E., Dupéré, S., & Guitton, M. J. (2020). COVID-19 and digital inequalities: Reciprocal impacts and mitigation strategies. *Computers in Human Behavior*, *111*, Article 106424. <https://doi.org/10.1016/j.chb.2020.106424>
- Blank, G. (2019). *2019 OxIS questionnaire* [Survey]. Oxford Internet Institute. <https://oxis.oii.ox.ac.uk/wp-content/uploads/sites/16/2019/11/OxIS-Questionnaire-2019.pdf>
- Blank, G., Dutton, W. H., & Lefkowitz, J. (2019). *Perceived threats to privacy online: The internet in Britain, the Oxford internet survey, 2019* [Survey summary]. Oxford Internet Institute. <https://www.ssrn.com/abstract=3522106>
- Chunara, R., Zhao, Y., Chen, J., Lawrence, K., Testa, P. A., Nov, O., & Mann, D. M. (2021). Telemedicine and healthcare disparities: A cohort study in a large healthcare system in New York City during COVID-19. *Journal of the American Medical Informatics Association*, *28*(1), 33–41. <https://doi.org/10.1093/jamia/ocaa217>

de Lanerolle, I., Walton, M., & Schoon, A. (2017). *Izolo: Mobile diaries of the less connected* [Research report]. Making All Voices Count. <https://www.makingallvoicescount.org/publication/izolo-mobile-diaries-less-connected/>

Díaz Andrade, A., & Techatassanasoontorn, A. A. (2020). Digital enforcement: Rethinking the pursuit of a digitally-enabled society. *Information Systems Journal*, 31(1), 184–197. <https://doi.org/10.1111/ij.12306>

Eberly, L. A., Khatana, S. A. M., Nathan, A. S., Snider, C., Julien, H. M., Deleener, M. E., & Adusumalli, S. (2020). Telemedicine outpatient cardiovascular care during the COVID-19 pandemic: Bridging or opening the digital divide? *Circulation*, 142(5), 510–512. <https://doi.org/10.1161/CIRCULATIONAHA.120.048185>

European Commission. (2020a). *Digital economy and society index (DESI) 2020: Use of internet services* [Report]. <https://digital-strategy.ec.europa.eu/en/library/digital-economy-and-society-index-desi-2020>

European Commission. (2020b). *The digital economy and society index (DESI)*. Shaping Europe's Digital Future. <https://digital-strategy.ec.europa.eu/en/policies/desi>

Eurostat. (2021a). *Digital economy and society* [Database]. <https://ec.europa.eu/eurostat/web/digital-economy-and-society/data/database>

Eurostat. (2021b). *Survey on the use of ICT in households and by individuals: 2021 model questionnaire version 1.3—Response burden* [Survey]. European Commission. [https://circabc.europa.eu/sd/a/c3ee2f7a-7cbe-454a-ae74-09a633da7dc1/MQ\\_2021\\_HH\\_IND.pdf](https://circabc.europa.eu/sd/a/c3ee2f7a-7cbe-454a-ae74-09a633da7dc1/MQ_2021_HH_IND.pdf)

Eynon, R. (2021). Becoming digitally literate: Reinstating an educational lens to digital skills policies for adults. *British Educational Research Journal*, 47(1), 146–162. <https://doi.org/10.1002/berj.3686>

Faith, B. (2018). Gender, mobile, and mobile internet| Maintenance affordances, capabilities and structural inequalities: Mobile phone use by low-income women. *Information Technologies & International Development*, 14, 66–80. <https://itidjournal.org/index.php/itid/article/view/1556.html>

Faith, B., Hernandez, K., & Beecher, J. (2022). *Digital poverty in the UK* (Policy Brief No. 202; IDS Policy Briefing). Institute of Development Studies. <https://doi.org/10.19088/IDS.2022.057>

Faure, L., Vendramin, P., & Schurmans, D. (2020). A situated approach to digital exclusion based on life courses. *Internet Policy Review*, 9(2). <https://doi.org/10.14763/2020.2.1475>

Girl Effect & Vodafone Foundation. (2018). *Real girls, real lives, connected: A global study of access and usage of mobile, told through 3000 voices* (pp. 1–21) [Executive Summary]. <https://girleffect.org/real-girls-real-lives-connected-a-global-study-of-girls-access-and-usage-of-mobile-told-through-3000-voices-2/>

Gonzales, A. (2016). The contemporary US digital divide: From initial access to technology maintenance. *Information, Communication & Society*, 19(2), 234–248. <https://doi.org/10.1080/1369118X.2015.1050438>

Grošelj, D. (2021). Re-domestication of internet technologies: Digital exclusion or digital choice? *Journal of Computer-Mediated Communication*, 26(6), 422–440. <https://doi.org/10.1093/jcmc/zmab017>

Hernandez, K., & Roberts, T. (2018). *Leaving no one behind in a digital world* (K4D Emerging Issues) [Report]. Institute of Development Studies. <https://assets.publishing.service.gov.uk/media/5c17837>

1ed915d0b8a31a404/Emerging\_Issues\_LNOBDW\_final.pdf

Holpuch, A. (2020, April 13). US's digital divide 'is going to kill people' as Covid-19 exposes inequalities. *The Guardian*. <https://www.theguardian.com/world/2020/apr/13/coronavirus-covid-19-exposes-cracks-us-digital-divide>

Jane, E. A. (2017). Gendered cyberhate: A new digital divide? In M. Ragnedda & G. W. Muschert (Eds.), *Theorizing digital divides* (pp. 158–198). Routledge. <https://doi.org/10.4324/9781315455334-15>

Kuntsman, A., & Miyake, E. (2022). *Paradoxes of digital disengagement: In search of the opt-out button*. University of Westminster Press. <https://doi.org/10.16997/book61>

Lai, J., & Widmar, N. O. (2020). Revisiting the digital divide in the COVID-19 era. *Applied Economic Perspectives and Policy*, 43(1), 458–464. <https://doi.org/10.1002/aep.13104>

Litchfield, I., Shukla, D., & Greenfield, S. (2021). Impact of COVID-19 on the digital divide: A rapid review. *BMJ Open*, 11(10), Article e053440. <https://doi.org/10.1136/bmjopen-2021-053440>

London Office of Technology and Innovation. (2021). *Mapping digital exclusion with data* (Digital Inclusion Innovation Programme) [Study]. <https://loti.london/projects/cif-data/>

Martin, M. (2021). *Computer and internet use in the United States:2018* (American Community Survey Reports, pp. 1–14) [Survey report]. US Census Bureau. <https://www.census.gov/content/dam/Census/library/publications/2021/acs/acs-49.pdf>

Mason, K., Wagg, S., Ge, B., Harrison, B., Hayes, N., Perez, D., Walker, T., Wilkes, M., & The Work Foundation. (2022). *Digital poverty transformation: Accessing digital services in rural northwest communities* (Policy Brief Appendix seven; National Policy Briefing). The British Academy. <https://www.thebritishacademy.ac.uk/publications/digital-poverty-transformation-accessing-digital-services-in-rural-northwest-communities-national-policy-briefing/>

Mathers, A. (2020). Apps, appointments, panic and people. *Internet Policy Review*, 9(2). <https://policyreview.info/articles/news/apps-appointments-panic-and-people/1476>

Napoli, P. M., & Obar, J. A. (2014). The emerging mobile internet underclass: A critique of mobile internet access. *The Information Society*, 30(5), 323–334. <https://doi.org/10.1080/01972243.2014.944726>

Nimrod, G. (2018). Technophobia among older Internet users. *Educational Gerontology*, 44(2–3), 148–162. <https://doi.org/10.1080/03601277.2018.1428145>

OECD. (2020). *Digital transformation in the age of COVID-19: Building resilience and bridging divides* (Digital Economy Outlook 2020 Supplement, pp. 1–7) [Report]. <https://www.oecd.org/digital/digital-economy-outlook-covid.pdf>

Ofcom. (2020). *2020 adult MLA questionnaire—Final* [Survey]. [https://www.ofcom.org.uk/\\_data/assets/pdf\\_file/0024/217833/adults-media-use-and-attitudes-report-2020-21-questionnaire.pdf](https://www.ofcom.org.uk/_data/assets/pdf_file/0024/217833/adults-media-use-and-attitudes-report-2020-21-questionnaire.pdf)

Ofcom. (2021a). *Adult's media use and attitudes report 2020/21* (Making sense of media, pp. 1–22) [Report]. [https://www.ofcom.org.uk/\\_data/assets/pdf\\_file/0025/217834/adults-media-use-and-attitudes-report-2020-21.pdf](https://www.ofcom.org.uk/_data/assets/pdf_file/0025/217834/adults-media-use-and-attitudes-report-2020-21.pdf)

Ofcom. (2021b). *Adults' media use and attitudes report 2020/2021—Respondent-level data CSV* [Dataset]. <https://www.ofcom.org.uk/research-and-data/media-literacy-research/adults/adults-media-use-and-attitudes>

Office for National Statistics. (2020a). *Internet access—Households and individuals dataset* [Dataset]. The UK Statistics Authority. <https://www.ons.gov.uk/peoplepopulationandcommunity/householdcharacteristics/homeinternetandsocialmediausage/datasets/internetaccesshouseholdsandindividualsreferencetables>

Office for National Statistics. (2020b). *MAZ internet access documentation 2020* [Survey]. The UK Statistics Authority.

Pavez, I., & Correa, T. (2020). "I don't use the internet": Exploring perceptions and practices among mobile-only and hybrid internet users. *International Journal of Communication*, 14, 2208–2226.

Pew Research Center. (2021). *Internet/broadband fact sheet* [Factsheet]. Pew Research Center: Internet, Science & Tech. <https://www.pewresearch.org/internet/fact-sheet/internet-broadband/>

Pew Research Center & Abt Associates. (2019). *Core trends: Mobile technology and home broadband* [Survey]. <https://www.pewresearch.org/internet/dataset/core-trends-survey/>

Qiu, J. L. (2009). *Working-class network society: Communication technology and the information have-less in urban China*. MIT Press. <https://doi.org/10.7551/mitpress/9780262170062.001.0001>

Ragnedda, M., & Ruiu, M. L. (2017). Social capital and the three levels of digital divide. In M. Ragnedda & G. Muschert (Eds.), *Theorizing digital divides* (1st ed., pp. 21–23). Routledge. <https://doi.org/10.4324/9781315455334-3>

Reisdorf, B. C., Petrovčič, A., & Grošelj, D. (2020). Going online on behalf of someone else: Characteristics of internet users who act as proxy users. *New Media & Society*, 23(8), 2409–2429. <https://doi.org/10.1177/1461444820928051>

Roberts, T., & Hernandez, K. (2019). Digital access is not binary: The 5'A's of technology access in the Philippines. *The Electronic Journal of Information Systems in Developing Countries*, 85(4), Article e12084. <https://doi.org/10.1002/isd2.12084>

Robinson, L., Schulz, J., Khilnani, A., Ono, H., Cotten, S. R., McClain, N., Levine, L., Chen, W., Huang, G., Casilli, A. A., Tubaro, P., Dodel, M., Quan-Haase, A., Ruiu, M. L., Ragnedda, M., Aikat, D., & Tolentino, N. (2020). Digital inequalities in time of pandemic: COVID-19 exposure risk profiles and new forms of vulnerability. *First Monday*, 25(7). <https://doi.org/2013>

Ruthven, I., Robinson, E., & McMenemy, D. (2022). The value of digital and physical library services in UK public libraries and why they are not interchangeable. *Journal of Librarianship and Information Science*, 1–12. <https://doi.org/10.1177/09610006221127027>

Schradie, J. (2011). The digital production gap: The digital divide and Web 2.0 collide. *Poetics*, 39(2), 145–168. <https://doi.org/10.1016/j.poetic.2011.02.003>

Selwyn, N. (2002). 'E-stablishing' an inclusive society? Technology, social exclusion and UK government policy making. *Journal of Social Policy*, 31(1), 1–20. <https://doi.org/10.1017/S0047279402006487>

Tsetsi, E., & Rains, S. A. (2017). Smartphone internet access and use: Extending the digital divide and usage gap. *Mobile Media & Communication*, 5(3), 239–255. <https://doi.org/10.1177/2050157917708329>

Turner Lee, N. (2020, March 17). What the coronavirus reveals about the digital divide between schools and communities [Brookings]. *Techtank*. <https://www.brookings.edu/blog/techtank/2020/03/17/what-the-coronavirus-reveals-about-the-digital-divide-between-schools-and-communities/>

UNESCO, Fau, S., & Moreau, Y. (2018). *Building tomorrow's digital skills—What conclusions can we draw from international comparative indicators?* (Working Paper No. 06; Working Papers on Education Policy). UNESCO Education Sector. <https://unesdoc.unesco.org/ark:/48223/pf0000261853>

United States Census Bureau. (2021). *The American community survey questionnaire* [Survey]. <http://www2.census.gov/programs-surveys/acs/methodology/questionnaires/2021/quest21.pdf>

Van Dijk, J. A. G. M. (2006). Digital divide research, achievements and shortcomings. *Poetics*, 34(4–5), 221–235. <https://doi.org/10.1016/j.poetic.2006.05.004>

Warschauer, M. (2003). Demystifying the digital divide. *Scientific American*, 289(2), 42–47. <https://doi.org/10.1038/scientificamerican0803-42>

Watts, G. (2020). COVID-19 and the digital divide in the UK. *The Lancet Digital Health*, 2(8), 395–396. [https://doi.org/10.1016/S2589-7500\(20\)30169-2](https://doi.org/10.1016/S2589-7500(20)30169-2)

Weber, E., Miller, S. J., Astha, V., Janevic, T., & Benn, E. (2020). Characteristics of telehealth users in NYC for COVID-related care during the coronavirus pandemic. *Journal of the American Medical Informatics Association*, 27(12), 1949–1954. <https://doi.org/10.1093/jamia/ocaa216>

Whaley, C. M., Pera, M. F., Cantor, J., Chang, J., Velasco, J., Hagg, H. K., Sood, N., & Bravata, D. M. (2020). Changes in health services use among commercially insured US populations during the COVID-19 pandemic. *JAMA Network Open*, 3(11), Article e2024984. <https://doi.org/10.1001/jamanetworkopen.2020.24984>

Yates, S., Carmi, E., Lockley, E., Pawluczuk, A., French, T., & Vincent, S. (2020). Who are the limited users of digital systems and media? An examination of UK evidence. *First Monday*, 25(7). <https://doi.org/10.5210/fm.v25i7.10847>

Published by



in cooperation with

