Living on the edge of the digital poverty

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Key Definitions

Digital poverty. The 'inability [of individuals] to interact with the online world fully, when, where, and how an individual needs to. It exacerbates and is exacerbated by other socio-economic, educational, racial, linguistic, gender, and health inequalities. It is both the product and the cause of other forms of socio-economic disadvantage' (Allman, 2021).

Digital Equity. Enhancing digital equity means helping citizens to use digital technologies to find the resources and services they need when they need them the most (Ragnedda, 2020)

Digital Inclusion. Digital inclusion projects are crucial in creating digital equity and, therefore, giving everyone the possibility to use new technologies to enhance their quality of life. Digital equity is the ultimate goal, while digital inclusion initiatives, by reducing and addressing digital poverty are the means to achieve this goal.

Digital Divide. Modality of exclusion, which in turn is connected to different levels of social exclusion. The first level of the digital divide identifies differences in access to the digital realm. The second level refers to the differentiation of users in terms of skills. The third level refers to the benefits/outcomes that can be gained from using digital technologies.

Key Points

Digital equity is a new civil and social right, and both public and private actors should work to enhance it and reduce digital poverty.

Digital Poverty should not be seen in dichotomous terms, but as a continuum where different degrees of digital poverty could be observed. It is not enough to access the Internet to be digitally included.

Family. The risk of becoming digital poor is higher in a household with a higher number of members and in a family with a single parent.

Education. The pandemic has reduced the egalitarian role of education as students without the tools or connections have suffered this modality of distance learning.

1. Introduction

This report investigates the links between digital poverty and social inequalities in England, by exploring themes at the intersection between resilience, recovery from COVID-19 and prosperity and innovation for the future. The pandemic has exacerbated digital inequalities in the UK, highlighting how millions of people in the UK live, or are risking to live, in digital poverty. Digital poverty is accrued across the life course and increases the risk of exclusion, particularly for the most disadvantaged and vulnerable groups in society. The shift to online due to the COVID-19 pandemic has exposed massive digital disparities in terms of reliable digital connectivity, level of digital skills/competencies, and digital equipment needed to fully participate in a digital society. Three layers/levels of digital inequalities are commonly recognised (Ragnedda, 2017), relating to poor access to digital technologies (first level of the digital divide), poor digital literacy/skills (second level of the digital divide) and a reduced ability to exploit digital resources and transform it into tangible social benefits (third level of the digital divide). For each level, the disadvantage is heightened by already existing vulnerabilities such as low income or low level of education, which work to create a vicious circle in which offline inequalities reinforce digital inequalities which in turn reinforce further social inequalities, in what has been defined as the "double loop of inequalities" (Ragnedda and Ruiu, 2020). Digital poverty reflects cultural, social, and political contexts (Robinson et al., 2020) and it can be seen as a product of Socio-Economic Status (SES), age, gender, race, education and place. The pandemic has dramatically accelerated the need to use the Internet for everyday activities, exacerbating fragility and inequalities already present in society and highlighting new ones. With the advent of online learning and the increasing number of people forced to work from home, today more than ever having a reliable internet connection, a digital device and proper digital skills are crucial to engaging with education, employment and the health system. By contrast, those who do not have these effective primary assets can remain excluded from society, becoming "second class" citizens. For this reason, accessing and properly utilising ICTs can be defined as a civil and social right, a necessity to fully participate in society. Although digital technologies have been fundamental for overcoming the COVID19 pandemic, two years after the first lockdown it is necessary to address the issue of digital poverty in relation to crucial aspects of our everyday life. The overall access to the Internet in the UK has improved since the advent of COVID-19 (UK Consumer Digital Index, 2021), but there are still dark spots that need to be addressed, not only in terms of access and infrastructure but also in terms of digital skills and competencies, that are recognised to be associated with benefits for individuals and the economy, in terms of improved employment prospects, financial capability and better health outcomes (UK Parliament, 2021).

This report identifies the main drivers of digital poverty by focusing on a combination of secondary and primary data. It follows the conceptual framework developed by the Digital Poverty Alliance (2021), which is based on *Structural determinants*, such as socio-economic and political context, and *Circumstantial determinants*, such as living conditions, economic stability, family, health, social context, psychosocial factors, lifestyle and behaviours. Specifically, we investigate the structural determinants – the overall context in which our research takes place – through data provided by, amongst the others, the Office for National Statistics, 2021, Ofcom, 2021, The Nominet Digital Youth Index 2021, and Lloyds Bank, 2021. Furthermore, to intercept those on the edge of digital poverty, we conducted an online survey with 2000 parents of children aged between 5 and 18 who attend school and live in England. This survey focused on users who do not entirely fall into the category of digital poverty but, due to the pandemic, might be on the edge of digital poverty. These citizens are often classified as digitally included, since they have access to the internet, have some basic skills, and are, therefore, under-considered by policymakers. However, they are risking being left behind in the digital society because of the

drastic techno-acceleration imposed by the pandemic. Despite not being categorised as digitally disadvantaged, they might be living on the edge of digital poverty.

1.1 Structure of the Report

The report, after a brief discussion about the concept of digital poverty, will review the policies that, over the years, attempted to contrast and reduce digital poverty in the UK. Then the report will present some secondary data to shed light on the digital transformation, the barriers to access, the importance of digital skills and the impact of the COVID-19 pandemic on health, employment and education systems. In the third section, the report will present the main finding of the survey conducted in England on 2000 families. By collecting and analysing this data we will dig deeper into understanding the impact of digital technologies on families' daily life, in terms of e.g., limited (online) access to education, and to economic, social and cultural activities/opportunities. The survey uses a representative sample of English families who access and use the Internet. The aim is to investigate how English families are coping with the abrupt adoption of technologies in their life, how they are managing to work, socialize, use ICTs for health and educational reasons, and what factors made them digitally vulnerable. This cohort is often understudied in terms of digital poverty because it is assumed to be digitally included and not in need of specific policies or attention from policymakers. Finally, in the last section, we will provide policy recommendations to national and local policymakers on how to prevent new forms of digital poverty and reduce the risk that those at the margin of digital poverty will become digitally poor.

2. State of the art - Structural Determinants

2.1 Defining Digital Poverty

The COVID-19 pandemic has often been cited as a force that has exacerbated existing inequalities and ushered them into mainstream attention (Cardoso et al., 2020). This is particularly true for digital poverty, given that numerous functionalities of society moved online in order to comply with regulations intended to prevent the spread of COVID-19. Those living in digital poverty tend to be excluded from the digital realm and, consequently, excluded from a world full of services, resources and opportunities, further reinforcing their socially disadvantaged position in society. Social and digital inequalities are, in fact, strongly intertwined (Ragnedda, 2020) and they tend to reinforce each other.

A lack of general concurrence on what constitutes digital poverty has at times hindered the implementation of an effective policy aimed at reducing the impact of this societal phenomenon rooted in inequalities. One of the first attempts to conceptualize digital poverty has been provided by Barrantes (2007) who noted that "contrary to the [digital] divide concept, the digital poverty concept tries to find the minimum ICT use and consumption levels as well as income levels of the population necessary to demand ICT products." Similarly, Nesta (2020) labels as data poverty "those individuals, households or communities who cannot afford sufficient, private and secure mobile or broadband data to meet their essential needs". However, digital poverty should not be seen only in terms of economic poverty, given the fact that not all monetarily poor are also digitally poor individuals and vice-versa. Only recently Digital Poverty Alliances has proposed a working definition that has widespread acceptance amongst academics, and relevant parties engaged in the creation of public policy. Digital Poverty is defined as the 'inability [of individuals] to interact with the online world fully, when, where, and how an individual needs to. It exacerbates and is exacerbated by other socio-economic, educational, racial, linguistic, gender, and health inequalities. It is both the product and the cause of other forms of socio-economic disadvantage' (Allman, 2021).

Digital Poverty encompasses the multidimensionality prevalent in the literature surrounding the theoretical propositions of the digital divide, and the three levels associated with it. Therefore it cannot be seen in dichotomic terms (i.e., digitally poor versus digitally rich) but as a continuum where different degrees of digital poverty could be observed. Rather, Digital poverty may be seen as the culmination of the three levels of the digital divide, namely different variations in accessing digital devices (First Level of the Digital Divide), differentiating degrees of digital skills/competencies (Second level of the Digital Divide), and, finally, the tangible outcomes an individual receives from the utilisation of ICTs (Third level of the Digital Divide). In this report, we are following the theoretical approach delined by the Digital Poverty Alliance and we connect to the three levels of the digital divide. We will examine the determinants relating to the first level of the divide (Device & Connectivity, Access, and Motivation), to the second level (Capability, relating to skills, and Support, relating to one's ability to further accumulate skills as a result of their peers' knowledge) and finally the impact of digital technologies in enhancing or reinforcing social positions (third level).

In addition to the specific digital determinants of digital poverty, two further layers are seen as rooted in issues relating to socio-economic factors composing more traditional forms of social stratification (Figure 1).

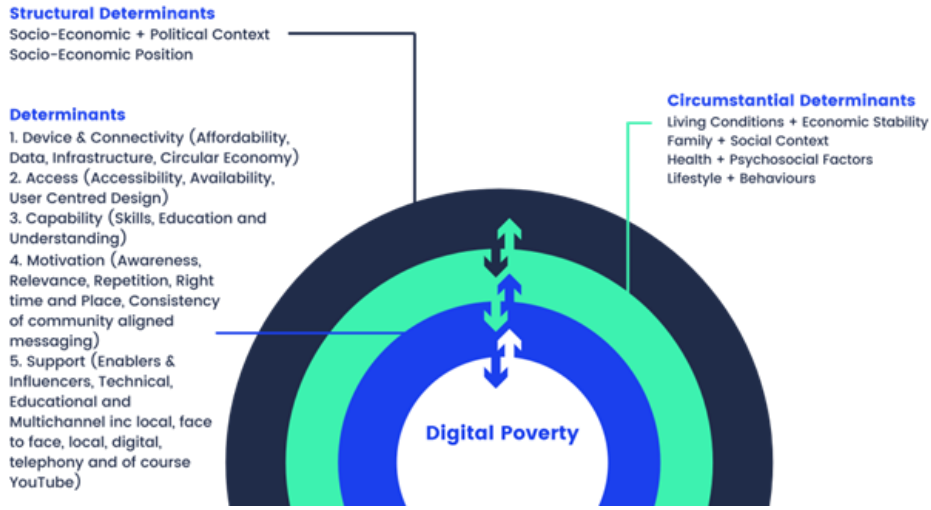

Figure 1: Determinants of Digital Poverty (DPA, 2022)

This model was developed based upon Dahlgren and Whithead's 'determinants of health' (1991) framework, used to understand the varying socio-economic intricacies related to health outcomes. This healthcare model was in turn, retrofitted in order to help contextualise the field of study by highlighting the differing social and economic issues that may have direct effects on digital poverty.

Previous articulations into the concept of the digital divide highlight the manner in which it is wholly reflective of wider inequalities prevalent within society. Similarly, the framework we are adopting in this report postulates that digital poverty is constituted by structural determinants and circumstantial determinants and is strongly connected to wider inequalities in society.

2.2 Digital Poverty – Policy context

Since the end of the 1990s, the UK Government have implemented digital inclusion policies aimed at bringing every citizen, company, and school online (Cabinet Office, 2012) to provide everyone with the digital competencies needed to be fully engaged citizens in a digital society. They advocate a focus on marginalised populations, but often fail to take into account the cumulative digital and social disadvantages that arise from the intersection of e.g. income, age and ethnicity. The U.K. government, over the years, attempted to understand and fight the implications of digital poverty, framing the contrast of this issue as an opportunity to empower those socially disadvantaged individuals to connect with the digital world, and subsequently derive benefits that allow them to transcend their socio-economic conditions (Davies et al., 2016). Although the numerous attempts to combat digital poverty have up until now, mostly fallen short of their intended purpose, with a few notable exceptions. To shed light on those policies the following sections will examine a few such policies implemented by both the British government, and the private sector, in an attempt to mitigate the societal effects derived from living in digital poverty.

2.2.1 The New Labour Initiatives - (1997-2010)

A magnitude of initiatives dealing explicitly with the issues relating to the digital divide – mainly framed at that time in terms of access to ICTs - were implemented during the New Labour years (1997-2010). The aim was to 'prevent the emergence of a society with information haves and have nots' (Cabinet office, 1998). These policies are framed almost exclusively from the

dichotomous rhetoric that underpinned discussion of the first level of the digital divide, specifically that of access and expanding infrastructure. Policies implemented include, yet, are not limited to:

National Grid for Learning (1998-2006). Overseen by the British Educational Communications and Technology Agency (BECTA), the specific function of this policy was to integrate ICTs into the educational setting by providing the necessary infrastructure for schools to become connected via the provisions of broadband connectivity and/or computers, along with an allocation in funding for the training of teachers to use and subsequently implement ICTs into lesson planning. In addition, a learning portal was created to facilitate the dissemination of relevant content via educational websites. Funding was procured from both public expenditures, and from private companies with vested interests in the proliferation of ICTs within society, mainly from the telecommunications and technology industry.

Harnessing Technology: Next Generation Learning (2008-2014)*. The *National Grid for Learning* did not succeed in providing a grasp of digital skills to individuals within the educational setting. Therefore, the next step for BECTA was policy explicitly dealing with supplementing the creation of personalised learning as facilitated through the use of ICT adoption, which given the mode of its deliverance, necessitated possessing digital skills. This piece of policy acted as the blueprint in which ICT integration in the educational settings, specifically dealing with incorporation into teaching, would be conducted. The main goals set out in the policy paper (2008) were:

- Narrow the gap and raise educational attainment
- Improve health and wellbeing of children/young people
- Increase the number of young people on the path to success
- Improve the skills of the population throughout their working lives
- Build social and community cohesion
- Strengthen the Further and Higher Education systems.

It can be seen here that the goals outlined in this policy paper deal with the conceptions behind the second level of the digital divide, as it deals with the notion that there exists a lack of digital skills amongst certain groups engaged in education, thus affecting educational performance. Although those factors that constitute social stratification are not explicitly mentioned by name, the reference to individuals from 'disadvantaged' backgrounds indicates the effects determinants of inequalities (as seen in Figure 1) have in affecting educational outcomes and thus acting as an influence in the creation of this specific policy. This specific outline for the integration of ICTs in the educational setting was intended to form the contextual framework until 2014 when it was intended for review. However, with the election of the Lib-Dem/Conservative coalition in 2010 and the implementation of austerity measures, public funding for BECTA ceased, causing the functions of the non-departmental organisation to go into liquidation the following year (Arthur, 2010).

Extending Opportunity Final Report of the Minister's Taskforce on Home Access to Technology (2008) - the notion of Home Access framed within this report deals with the manner in which students of all age groups access educational material from the confines of their own homes utilising ICTs. Findings within this report reveal that an appreciable amount of educational benefits are associated with students having a greater choice in how, where, and when they study, especially when a student's close contacts (i.e. parents) are able to take an active role within their child's education. It must be noted that this specific proposal does not exclusively deal with what we call remote learning in the current context, as in learning exclusively delivered via the internet. Rather, the educational benefits derived from accessing content from home are seen as a supplementary channel for content delivery that allows for students to take an active role in achieving their educational goals outside of designated school hours. A clear linkage between increased educational attainment and home access is reported in the study, however, the majority of recommendations are composed based upon the rhetoric of the first level of the divide, specifically, the variations in physical access at home, in which at the time of publication, a reported 1.4 million pupils had no internet access in their home. Therefore, the proposals within this piece are call for the bridging of the conceptualised first level of the divide in relation to access, however, the authors do highlight the way in which existing structural determinants affect the issue of access, and interestingly the way in which students utilising these technologies from their home will ultimately engage with this form of remote learning.

Framing digital policies aimed at bridging early conceptions of the digital divide (both first and second level) are key in understanding the introduction of current initiatives and policies aimed at mitigating the effects of the more multidimensional concept of digital poverty, that has proliferated as a result of COVID-19. The following sections will elucidate more contemporary and widely influential policies aimed at reducing the concept of digital poverty.

2.2.2 Government Digital Inclusion Strategy - 2014

This policy paper explicitly sets out to consolidate the numerous efforts of the public, private, and voluntary sectors in creating an equitable internet that allows for all its users to become fully capable of achieving beneficial results from its usage, via the implementation of a unified strategy. This piece of policy could be argued as being the most influential in terms of its relevance to current discussions surrounding digital poverty, as they indirectly acknowledge the concept of digital poverty, albeit from a more limited formulation, as being digital exclusion, namely being constituted via three immediate determinants based upon digital skills, connectivity, and accessibility. Specifically, an individual is considered digitally excluded when one of these issues directly affects their ability to retrieve beneficial outcomes of internet usage. Digital exclusion is thus constituted by factors that are essentially determined by wider structural forces that propagate and reproduce inequalities, however, researchers do isolate further complementary factors that to a certain extent, do derive from individuals' dispositions. When referring back to the determinants of digital poverty framework we can see that these four aforementioned determinants (digital skills, connectivity, accessibility, and motivation) are present, however with the inclusion of further supplementary factors in the digital determinant stage (support). Those individuals and groups at risk of facing digital exclusion within this report again follow the more traditional components of social inequalities, however, this piece specifically highlights those groups and individuals across the entire spectrum of society, as opposed to the aforementioned 'Harnessing Technology' policy paper that exclusively deals with students, and to some extent teachers. Highlighting a departure from New Labour's digital

policies that had a considerable focus on ICTs in the educational setting, in which the actions proposed within this paper point toward a broader application throughout society.

The 10 proposed actions this policy paper wished to see implemented:

- Make digital inclusion part of wider government policy, programmes and digital services
- Establish a quality cross-government digital capability programme
- Give all civil servants the digital capabilities to use and improve government services
- Agree on a common definition of digital skills and capabilities
- Boost Go ON UK's partnership programme across the country
- Improve and extend partnership working
- Create a shared language for digital inclusion
- Bring digital capability support into one place
- Deliver a digital inclusion programme to support SMEs and VCSEs
- Use data to measure performance and improve what we do

The quantitatively analysable goal of this policy was to reduce the number of people offline (offline framed via the three aforementioned determinants of digital exclusion) by 25% every 2 years, with all those able to become digitally included expected to have done so by 2020. Initial success in meeting these goals was seen from 2014-to 2016, however, an analysis of this policy's effectiveness in meeting its end goals concluded that between 2017 and 2020, this target was not reached in any region except for the South West, although the ultimate achievement of this policy saw 5 million digitally excluded nationwide, diminish to 2.7 million (Taylor, 2021).

2.2.3 UK Digital Strategy - 2017

The creation of this paper was conceived as the logical continuation of the previously addressed digital inclusion strategy, to act as almost a review of the outcomes achieved by the magnitude of digital initiatives enacted thus far, ultimately informing the direction of further policy implementation. Initiatives addressed within this white paper directly associated with digital skills include:

The provision of £85 million for digital skills training from 2014-2015

Almost £10 million was provided to the Future Digital Inclusion and Widening digital participation programmes, overseen by the Good Things Foundation

Deliverance of free WiFi to all libraries in the U.K.

In addition to the partial review of initiatives up to this point, they propose a continuation of the specific policies outlined in the 2014 white paper by outlining their commitment to:

Providing free digital skills training to adults

The creation of a new Digital Skills Partnership, essentially the retrofitting of *GO ON UK* which had relinquished its direct governmental responsibilities the year prior to the publication of this white paper.

2.2.4 Universal Service Obligation - 2017 (Effective 2018)

One of the most important contributions in governance aimed at the reduction of digital poverty is the introduction of a Universal Service Obligation that was targeted to be ratified as legal legislation by 2020. Although not the first commitment to provide a standardised safety net on commercial internet broadband, as legislation dealing with this issue has existed since the Electronic Communications Order of 2003, The Universal Service Obligation (USO) acts as the most current iteration of previous obligations in the provision of universal internet access. specifically laid out in the legislation is the requirement of internet service providers (ISP) to provide as a minimum for their operation:

- Download speeds of 10 Mbps
- Upload speeds of 1 Mbps
- Effective voice calls (representative of the required Mbps)
- A contention ratio of 50:1 (meaning 50 households can use one network node)
- Data usage of 100 gigabytes a month
- Affordable (defined as an average of £45 a month)

In addition to the introduction of required basic functionality, this specific legislation provides the right of anyone without a connection that meets the aforementioned criteria to request an upgrade, with subsidisation of the costs up to £3,400 per household. Working within the parameters set out within this legislation, certain ISPs provide a social tariff for people conventionally defined as disadvantaged (claimants of benefits), acting as a discount for broadband and mobile connectivity. Criticisms around this proposed safety 'net' explicitly highlight the fact that both download and upload speeds are very slow, meaning that as time goes on, this base minimum will become obsolete. The designers of this policy recognise this as an apparent fact, therefore implementing the clause that once super high-speed internet is apparent across 75% of the UK, then this base provision will be reviewed.

2.2.5 The levelling Up Agenda - 2022

Framed as the flagship policy for the conservative party during the 2019 elections, only recently (February 2022), has the white paper been published, detailing the intricate manner in which the current administration intends on delivering on its election promises of 'making us more prosperous and more united by tackling the regional and local inequalities that unfairly hold back communities and to encourage private sector investment right across the UK'.

The mention of the concept of digital poverty is vague in comparison to the Digital Strategy (2017), as this white paper mainly addresses the issue of improving the U.Ks connectivity exclusively via the upgrading of infrastructure. Given that the entire Levelling Up Agenda deals with socio-economic disparities as a consequence of region, the issue of digital connectivity is framed in a similar manner, as being a by-product of those underpinning regional disparities. Those policies dealing with infrastructure can be seen below:

National Infrastructure Strategy - a commitment of £5bn to the rollout of gigabit broadband (1000 Mbps) to 85% of the country by 2025

Shared Rural Network Programme - partnership with the private sector to deliver wireless infrastructure, most notably 4g capabilities to 95% of the country by 2025

Wireless Infrastructure Strategy - aims to further review the feasibility in which 5G can be rolled out throughout the U.K.

It must be noted that the previous policy mentioned within this review focussed upon the presumption of a skills gap present within British society, however in this specific white paper, no new initiatives are conceived in which to tackle the further emergence of a skills gap. Instead, the only mention of any digital skills initiative is of the Local Digital Skills Partnership from 2018, a rendition of the Digital Skills Partnership conceived in 2014, but with a distinctly more regional approach.

2.2.6 Policy Review Summary

This policy review aims to provide a befitting formulation of the current and past policies that relate in one way or another to the concept of digital poverty. Provision of those policies aimed at the empowerment of citizens with training in digital skills can almost be seen as the first step into digital poverty reduction, with later policies aimed at infrastructural upgrades and standardisation of minimum provisions for ISPs can be seen as tackling another area related to digital poverty. However, policies dealing explicitly with the existence of digital poverty need to be fostered and enhanced. Any future policy will undoubtedly have to address the notion of digital poverty, given the ongoing cost of the living crisis currently exacerbating the existence of this phenomenon rooted in social inequalities.

2.3 Covid context and techno-acceleration

Access to the Internet alone cannot ensure digital inclusion and prevent digital poverty. This is supported by the fact that 10 million people in the UK do not have the most basic digital skills, and 14.9 million people have very low levels of digital engagement (Lloyds EDS, 2021). Furthermore, 16% of the total adult population (8.7m employed people) have the Essential Digital Skill for Life but lack the Essential Digital Skill for Work (Lloyds Bank UK 3rd Essential Digital Skills Benchmark, 2021). This data suggests that digital poverty needs to be revised by considering digital skills and competencies to use the Internet properly, safely, and confidently. This is particularly true in relation to the pandemic and consequent shift in almost all activities.

Due to the so-called techno-acceleration, those who struggle to access and use ICTs properly, risk being left behind and excluded from a world full of opportunities and resources.
Due to the COVID-19 pandemic and the increase in online demand for goods and services, many companies, in particular trade companies, have increased the workforce to ensure the efficiency of existent supply chains. The prospect of digital transformation had spread a romantic vision of the future as early as the 1970s when it was assumed that technology would "bring" between 50 and 70 per cent of workers back home. At the time, it was thought that if technical equipment existed, the adoption of new technologies would be inevitable, regardless of politics, economy, or territorial contexts. However, take-up has been slow due to the lack of trust-based labour agreements. Telework was perceived as an exclusive privilege for managers if we consider that in 2019 only 5% of the UK workforce worked remotely. The abrupt acceleration due to the pandemic and the necessity to suddenly migrate jobs, services, resources and education online, spike a concern over the impact that Covid has on those inequalities existing before the COVID-19 pandemic. The risk is that for some categories, such as socially and economically disadvantaged citizens, the beneficial effects of policies' support for businesses and families are not sufficient to repair the damage of lower education and erosion of skills due to post-pandemic working conditions. Therefore, it is worthy to investigate if those who were "digitally excluded" before the pandemic, will also be in the future.
In the following sections, we will see how the digital transformation impacted the country and how, barriers and limitations, if not addressed, reinforce already existing inequalities.

2.3.1 Digital transformation

The pandemic has highlighted the centrality of digital transformation in many sectors of our society, pertinent data relating to this ongoing transformative process can be observed below:

Around 36% of the British population worked from home because of the Pandemic
Many schools have been able to adapt to online learning and healthcare has also benefited from digital technology by promoting remote assistance for non-Covid patients
The increase in online spending has forced entire supply chains to double the speed of digitisation processes to make companies resilient and to adapt to the strong increase in demand for goods and services remotely

Source: Census 2021

Despite an increase in digital ownership and educational programs, the digital divide remains a persistent social issue and an obstacle to any agenda of social inclusion. If on the one hand technology has made possible many activities that otherwise would have stopped completely, on the other hand, it has not had the same impact on the categories that suffered from economic and social emergence before. Those who had problems with access to broadband previously experienced this problem in an amplified manner, suffering further exclusion from social and work activities. Furthermore, buying products online may seem normal for those with credit or debit cards, but for those who live on cash or do not have digital training to shop safely, this is not that normal. Finally, not all companies have managed to carry out their work remotely. For some, it was very difficult or even impossible. This has created inequalities between workers

who have been enabled to work remotely and those who, either due to the inadequacy of companies or the impossibility of using a stable connection, have not been able.

2.3.2. Barriers to access, skills and opportunity

Internet access in Great Britain is not homogeneous

- 4% of British households do not have internet access (Census 2021)
- 6.3% of adults in the UK had never used the internet in 2020 (Internet users, UK: 2020)
- 13% of the population (about 9 million people) is unable to use the internet without assistance (UK Consumer Digital Index, 2021).

This data serves to highlight uneven access to the internet framed within the domestic context, as a direct consequence of issues relating to social, cultural, and economic factors. Further elucidation of these barriers can be seen in the following section. Many studies relating to the use of digital technologies show how interventions to mitigate the effects of social isolation are delivered digitally, and consequentially this represents a problem for those who suffer from the digital divide (UK Consumer Digital Index, 2021).

77% of the over 70s have a low level of digital engagement (UK Consumer Digital Index, 2021)

48% of people currently offline do not feel encouraged to "go online" (UK Consumer Digital Index, 2021)

The UK Government's 'Essential Digital Skills Framework' identifies a Foundation Level - the ability to access the Internet by yourself. Several things must be true for this to be the case, including an individual being able to use a device, connect to a Wi-Fi network and create and update passwords (there are seven essential tasks in total).

The estimated 10 million lacking the Foundation Level are most likely to be people in three distinct groups: those aged 65+, people with impairments and those with no formal qualifications

For disadvantaged young people, the experience is less about ability or desire, but more a divide in reliable digital access

Ofcom's Technology Tracker 2021 research showed that 20% of children who studied from home during the pandemic did not have access to an appropriate learning device (this is six times more likely in children of the same age from more disadvantaged socio-economic backgrounds).

Fair by Design's analysis of the poverty premium shows that digital access can cost a lot more for those on lower incomes (Fair by Design 2021).

There are some initiatives to overcome this first barrier, such as the controlling prices of the provider's tariffs, equipping the lower families with appropriate devices to acquire basic digital skills (Social Mobility Commission 2021 State of the Nation report) or the lowering prices for those who declare Universal credit (BT)

87% of young people have smartphones, but 15% (approximately 2.2 million) of young people have a smartphone but no access to a laptop or desktop; (32%) of young people do not have access to home broadband (The Nominet Digital Youth Index 2021)

J.R Foundation research shows that most employers advertise vacancies online and close them as soon as they have sufficient applicants to select from. Jobseekers found that they needed to respond to vacancies quickly, and those without internet access at home were at a significant disadvantage (The Joseph Rowntree Foundation 2012)

2.4 Digital skills: why it matters?

Despite an increase in digital ownership and access to ICTs, digital poverty remains a persistent social issue and an obstacle to any agenda of social inclusion. Owning a device and accessing the internet, is not enough to be digitally included. Citizens need the capacity and skills to use digital infrastructures and not only the possibility to access to the Internet. Digital skills are becoming vital for everyday activities and an essential necessity to fully engage in a digital society. Considerations on digital skills are affected by the breadth of meaning that is often too broad to be treated only through a specific dimension. Digital skills range from the ability to turn on a computer, laptop, or smartphone to the ability to use complex programming languages. Digital skills represent a crucial topic for the economic and social stability of the country. A lack of digital skills may have both social and economic implications that go well beyond the single individual but affects the whole country.

It is necessary to ensure that people living in disadvantaged conditions can undertake a training path that will lead them to be able to participate in online education, access digital health care and enter the job market (at least with basic digital skills).

2.4.1. Education. During the first wave of COVID-19 in the spring of 2020, it is estimated that around 1.6 billion young people were affected by closures and the blocking of face-to-face education. For those who were experiencing situations of economic and social inequality even before the pandemic, this was a further blow.

Teachers, students and families suddenly had to obtain digital skills to cope with the emergency:

- The pandemic has reduced the egalitarian role of education as students without the tools or connections have suffered this modality of distance learning
- The Greater Manchester Combined Authority has introduced an educational strategy through specific pathways. The strategy is aimed at ensuring support for all children and young people, with particular attention to those who are most vulnerable to under-achievement, marginalization and exclusion

The strategy was applied in order to acheive two objectives:

- **Moving knowledge around**: supporting families and limiting the inconveniences of low digital competence providing the necessary structures and tools for distance learning
- **Providing support**: recent research suggests that 18% of families with an annual income below £13,500 do not have access to a desktop or laptop computer while only 50% of households earning between £6,000 and £10,000 have any internet access at all (Armstrong et al., 2021).

2.4.2 Healthcare. In terms of the digital healthcare revolution, digital poverty risks leaving the most vulnerable behind. The NHS Long Term Plan (2019) identifies technology development as a pillar of the NHS strategy. Chapter five of the plan highlights the digital priorities for the NHS, by emphasising the need for digitally-enabled care that will go mainstream across the NHS by 2029. The digital revolution of the National Health System (NHS) has allowed people to continue their care (e.g. the increase in telemedicine consultations). This is testified by the increase in the number of visits to the NHS website, which doubled from 1 million a day to 2 million a day in March 2020 (NHS Digital, 2020). However, low-income patients, patients living in areas with limited digital infrastructure (e.g., rural areas), and those with limited digital skills are at risk of being excluded from digital healthcare (Stephens and Williams, 2021).

Key Question: Is the road to the digitalisation of health services likely to further increase inequalities? This side of the question should be analyzed through various implications that the ongoing process can have on the equality of opportunities for access to health services:

- According to the Information Commissioner's Office the health data breaches represent 19.7% of the total;
- There is concern about the ability to maintain high ethical standards in this sector compared to the digital innovations adopted;
- If patients were "forced" to accept this change, what would become of the freedom of self-determination?

2.4.3 Work. The lack of core capabilities (e.g. Employability skills, self-confidence, self-efficacy), which present barriers to disadvantaged young people finding employment more broadly, often compounds digital barriers to work, including the development of "Digital Skills for Work".

92% of employers say that so-called "soft skills" (creativity, persuasion, collaboration, adaptability, and time management) are equally or more important than hard skills. Digital skills are only one aspect of the digital divide.

The acquisition of digital skills presupposes the existence of skills that are more widely needed in life. Core capabilities include adaptability, creativity, agency and analytical capacity;

Confidence in oneself and one's abilities play a crucial role in the job search. Low self-confidence could undermine one's motivations and represent an additional employment barrier (Institute for Employment Studies Report, 2015);

Digital skills need to be embedded in the development of core capabilities like employability skills, and vice versa. This research indicates they should not be regarded as separate types of skills, but as a digital lens on pre-existing barriers to work;

The acquisition of core capabilities does not only concern digital skills but a series of broader aspects (the ability to analyze, make mistakes, question and be creative). Where there are situations of initial disadvantage, the digital divide is further widened

Sources: Catch22 and Nominet (November 2021)

The lack of digital skills, in addition to representing a barrier to entry into the world of work, also represents a threat to the country system as a whole, representing an element of concern for competitiveness with other countries. Basic digital skills are essential for employers, to be able to build advanced skills and progress in a career.

92% of businesses stated that a basic level of digital skills is important for employees in their organisation
jobs vacancy data showing that four in five (82%) job vacancies require digital skills;
Excluding IT roles, over two in three (68%) roles require digital skills, including many lower-skilled roles;
87% of employers in the manufacturing sector (the sector with the lowest digital skills needs) say it is important to have employees with basic digital skills;
88% of young people realise that their digital skills will be essential for their careers;
Enrolment rates across formal IT training (GCSE, A-Level, Further Education and Apprenticeships) have fallen significantly over the past five years;
27% of employers report that the majority of jobs require advanced digital skills (the role of software developer, for example, was among the 5 most sought after jobs in 2019);
60% of employers say they rely on advanced digital skills;
The number of advertised tech jobs in 2021 was 42% higher than pre-pandemic levels
Microsoft research shows that 69% of UK business leaders believe that their company has a digital skills gap and that 44% are worried this would hurt their success in the next 12 months;

Sources: Catch22 and Nominet (November 2021)

2.4.4 Digital Native. Digital natives are perceived as possessing a broad array of digital skills. Almost all (97%) 18-24-year-olds possess “Foundation Level” digital skills (93% for those without higher-level qualifications) which includes skills such as finding and opening different applications/programmes on a device or opening an Internet browser to access websites.

81% of 11-17 year-olds and 76% of 18-24 year-olds believe that technology has helped them in “all areas of their lives”, but also that the vast majority of young people (83%) have experienced “something that they found upsetting” online

48% of young people recently reported feeling isolated online and 32% of 17–19-year-olds said the internet has hurt their mental health

People who come from situations of marginalization are more likely to have negative experiences online

58% of young LGBTQ+ people, and 43% of young people who are Black, Asian or another ethnic minority, have experienced hate speech online, compared to 37% of young people overall;

67% of young people have someone available to help them out if they need support with ICT-related issues; less than 25% have asked for that help. This figure highlights the crucial role of agency for 1 in 3 young people;

Unlike what happened for generation X and generation Y, the young people interviewed had more experience with digital through the use of mobile devices rather than computers (smartphones, tablets, etc.) and this made them less confident when it came to using software on computers needed in work;

Young people who are not in any form of education, employment or training are far more likely to be teaching themselves (73%);

All interviewees expressed the need to integrate digital skills during traditional teaching paths (eg Excel during mathematics lessons, or the use of e-mail instead of writing a letter);

This supports the Ofsted requirement through the Education Inspection Framework that “at each stage of education, the provider prepares learners for future success in their next steps”;

The Department of Education’s 2021’s ‘Skills for Jobs: Lifelong Learning for Opportunity and Growth’ paper sets out how employer-led skills can support post- 16 education, but our research shows that these behaviours need to be taught much earlier;

Catch22 teachers advocate for a laptop to be as much essential as paper and pens are for school children;

Sources: Catch22 and Nominet (November 2021)

The switch from basic skills to the necessary to work completely changes the scenario. The ‘Hidden Middle’, the report by FutureDotNow, reveals limited recognition and understanding of the role ‘Digital Skills for Work’ play in business productivity and highlights the scale of the ‘hidden middle’. It also shows the gap between digital exclusion and advanced digital skills (2021). Secondly, *Learning & Work Institute research* shows that fewer than half of British employers believe young people are leaving full-time education with sufficient digital skills and 76% of firms believe this lack of digital skills would hit their profitability (Learning and Working Institute 2021). This is something policymakers need to take into account. Furthermore, *Lloyd’s Essential Digital Skills framework* (2021) explores the level of “Work Essential Digital Skills” - Work EDS (broadly translatable to our definition of ‘Digital Skills for Work’) - but only for those already in employment. Whilst this shows that across the UK workforce 52% (c.17.1m people) currently lack Work EDS, it does not give us a picture of young people out of work.

Lloyd's Essential Digital Skills framework (2021) shows that the majority (62%) of young people (16-24) believe they have the basic 'Digital Skills for Work' that employers are looking for, leaving a large percentage of young people (38%) without even the basic skills increasingly required for work. Finally, *Lloyd's Essential Digital Skills framework* (2021) noted how 78% of businesses surveyed said that young people leaving education have the basic 'Digital Skills for Work' that they need, although even this still leaves over 20% of young people (c.1.3m) potentially locked out of employment opportunities that require these skills.

In this section, we have seen the importance of both mitigating the barriers to access to the digital world, but also the importance of enhancing digital skills for everyone.

3. Digital Poverty Survey

The survey uses a representative sample of English families who access the Internet, stratified per socio-economic status, parents' education, and family composition. These stratifying variables are generally recognised in the literature to be the main factors correlated to different degrees of digital inclusion. The additional stratifying variables were chosen following the Determinants of Digital Poverty and Inequality Framework developed by the Digital Poverty Alliance (Fig. 1). It draws upon some *Access determinants,* such as device and connectivity, access, capabilities, and motivation and *Circumstantial determinants,* such as support and living conditions, economic stability, family, health, social context, psychosocial factors, lifestyle and behaviours.

3.1 Sample

The survey was conducted in March-April 2022 on a randomised stratified sample of English parents (1988 valid respondents) between 20-55 users with children at school. The stratifying variables were being an internet user, age, education, gender, income and family status. The choice of focusing on this specific segment of the population derives from the evidence that many studies have identified in terms of digital inequalities among young users and the general dependence on the Internet for healthcare and finance financial wellbeing (Digital Poverty Alliance, 2021). Moreover, it is based on those who already use the Internet to identify how the pervasive role of technology in everyday life has affected users' exposure to digital poverty.
More specifically, the sample was particularly young, given that the average age is 39 years old (Fig 2) with an equal distribution between males and females (50/50%). Age is one of the main axes of digital inequalities and given the young age of our sample we did not expect to find huge differences in terms of how they access and use technologies.

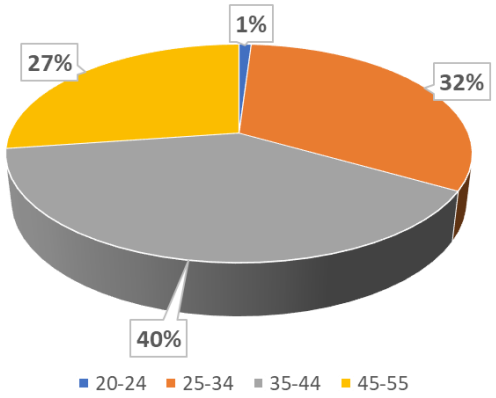

Figure 2. What is your Age?

In terms of family status, 74% are legal parents living together while 19% are single parents, while around 5% are divorced or separated (Fig 2). Family status and composition play a key role in determining (digital) poverty, both in terms of supporting family members to access (digital) resources and acquiring (digital) skills and competencies.

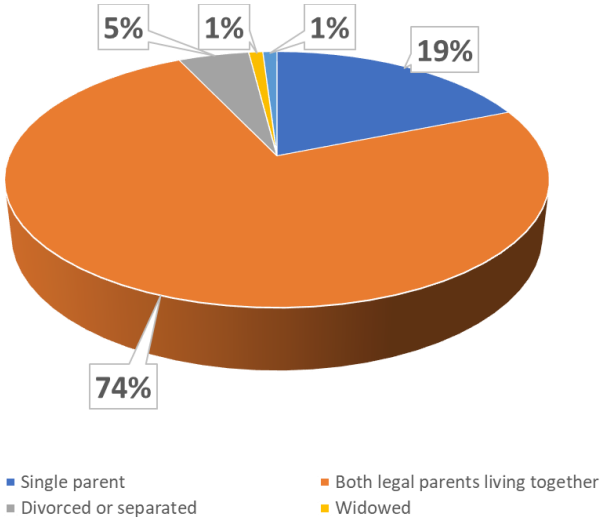

Figure 3. Please choose the option that best describes your situation

In terms of household members, 40% of the interviewees live in households with a maximum of 3 people, while 55% with 4 or 5 people. Particularly important, as a determinant that might influence the risk of digital poverty, is the number of children. In our sample 30% of respondents have only one child, 44% have two and 18% have three. The average age of the first-born is 11 years old, while that of the second-born is 10 years. In terms of disability 6% of respondents have at least one child with a disability, and among these, autism (29%), ADHD (17%), ASD (8%), and diabetes (5%).

Another stratifying element in determining the social position of the family is the level of education. 45% of our sample has either a Bachelor's degree, a Master's degree or a PhD. degree, while 55% have a lower level of education (Fig 3).

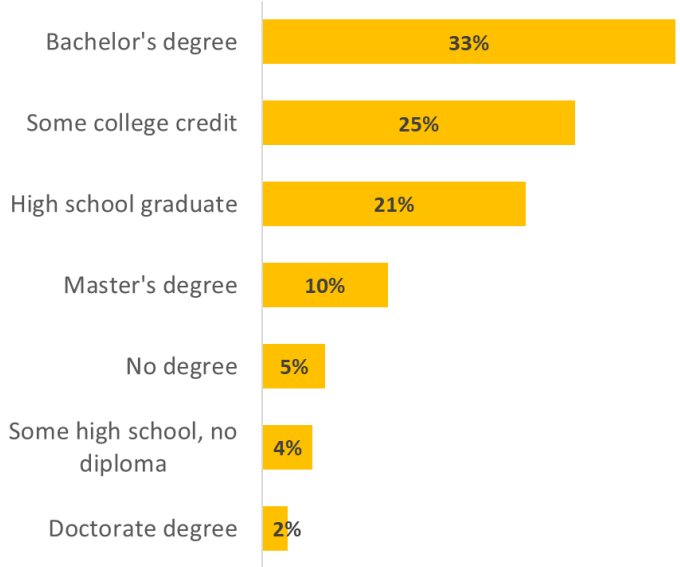

Figure 4. What is the highest level of education you have completed?

Employment status also plays an important role in determining the social position of the family. 62% of our sample is employed in a full-time job and 17% are employed in a part-time job (Fig 5).

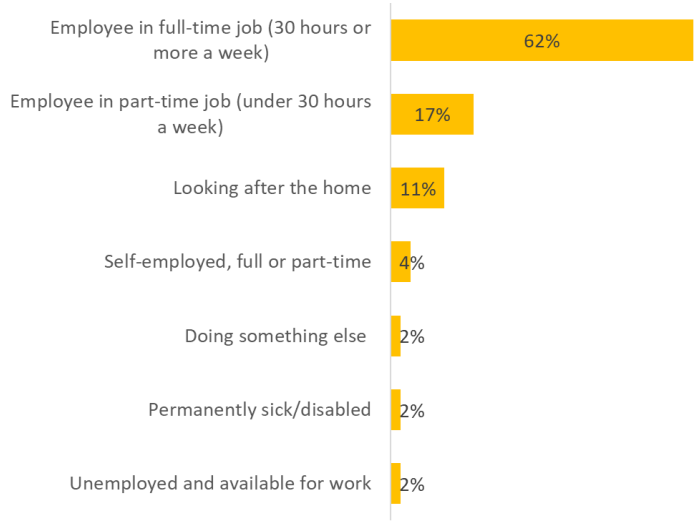

Figure 5. What is your current employment status?

When respondents were asked "*On a scale from 0 to 10, please state if your household's income is sufficient to see you through the end of the month*. (Please, note that 0 means with great difficulty and 10 means very easily)", around 1 out of 3 (29% of the sample) consider their income not enough to see them through the end of the month (0-4) while 59% consider it sufficient (6-10). More specifically, in terms of income (Fig 6) around one third (31%) earn less than £25k a year, while 42% between £26 to £50K a year and more than 1 out of 4 (27%) more than £ 51K a year.

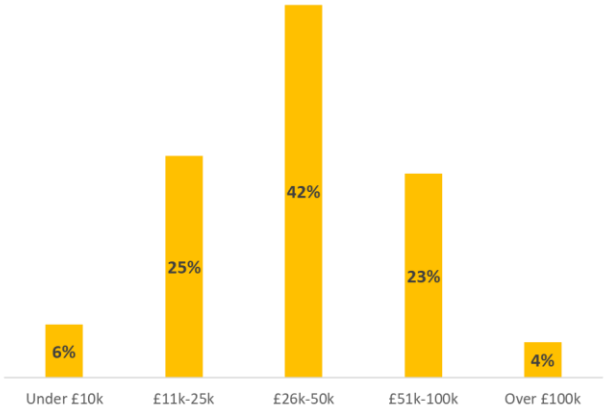

Figure 6. What is your annual household income after taxes?

Digging deeper into the expense to keep up to date with the latest technologies, when we asked "how much money do you spend on digital technology on average in a month (including things like online TV, home Internet access, mobile phone service and digital subscriptions?)" more than half our sample (56%) said between £50 and £150 a month, while 16% does not know how much they are spending on digital technologies (Fig 7).

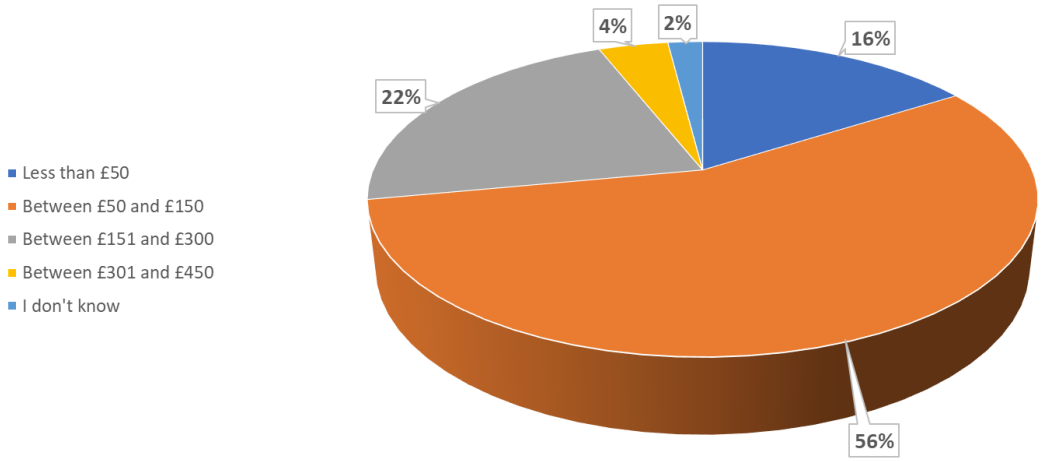

Figure 7. how much money do you spend on digital technology on average in a month (including things like online TV, home Internet access, mobile phone service and digital subscriptions?)

In terms of geographical location (Fig 8) 13% of the sample lives in London while 87% around the country.

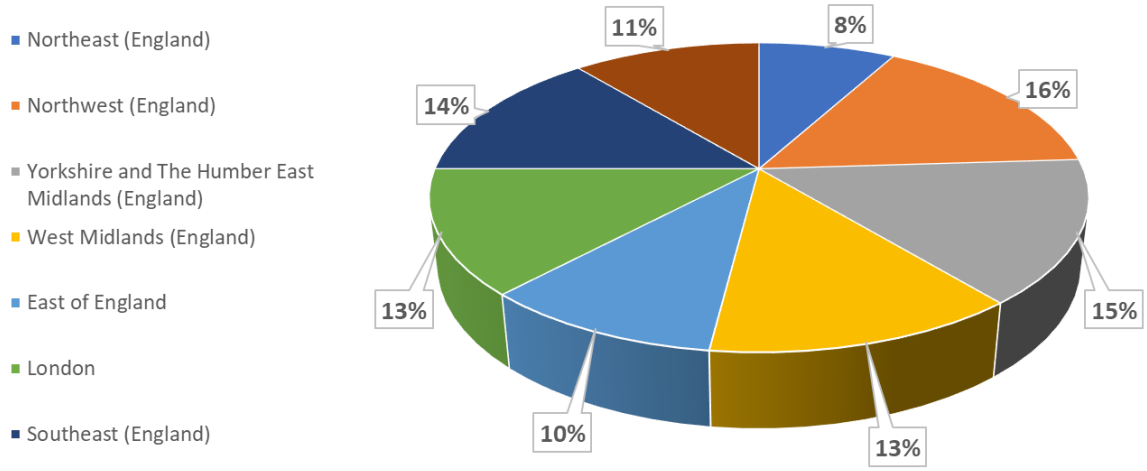

Figure 8. Where do you live?

Finally, in terms of where they are currently living (Fig 9) 30% of our sample live in urban areas, while 70% live in the suburbs (33%), small towns (23%) and rural areas (14%).

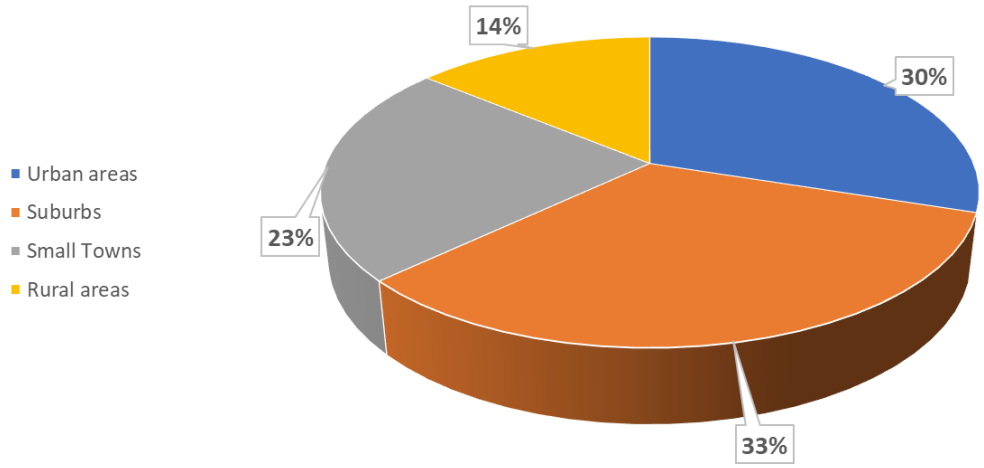

Figure 9. Where are you currently living?

4. Technological acceleration during COVID

COVID-19 has widened inequalities in a situation that has seen, on the one hand, a sudden shift towards the online delivery of many services (including public utility) and, on the other hand, a part of the population that does not have the skills and tools suitable to make use of these opportunities, effectively creating "second class" citizens. The pandemic has imposed a technological acceleration, meaning that services, activities and resources - e.g., learning, shopping, paying bills, keeping in touch with friends and family, and working – migrated online (Townsend et al., 2020). Working from home means putting more pressure on digital devices and digital infrastructure and increasing the risk of becoming digitally poor. By moving education, work, socialization, and almost all aspects of their daily life online, some families might have, for the very first time, experienced poor internet experiences due to the limited number of digital devices available for both their children's education and their work, unreliable internet connections, limited digital skills to support their children and conduct their work online.

The data show that during all three waves, both parents worked from home in 66% of cases, therefore increasing the pressure on two of the five determinants of digital poverty, namely device and connectivity and access to the Internet (Fig 10).

In this vein, it should be noted that 96% of our sample claims to have consistent and reliable access to the internet, while 4% of our sample attributes this gap to signal and broadband problems. 86% of the sample mainly uses a domestic connection while almost all of the remaining part uses mobile data. Furthermore, 90% of the sample does not need an assistive technology device. In terms of how often the sample uses digital devices to access the Internet, 3 out of 4 claim to use the smartphones "always" to access the Internet compared to 25% that always use the Personal Computer.

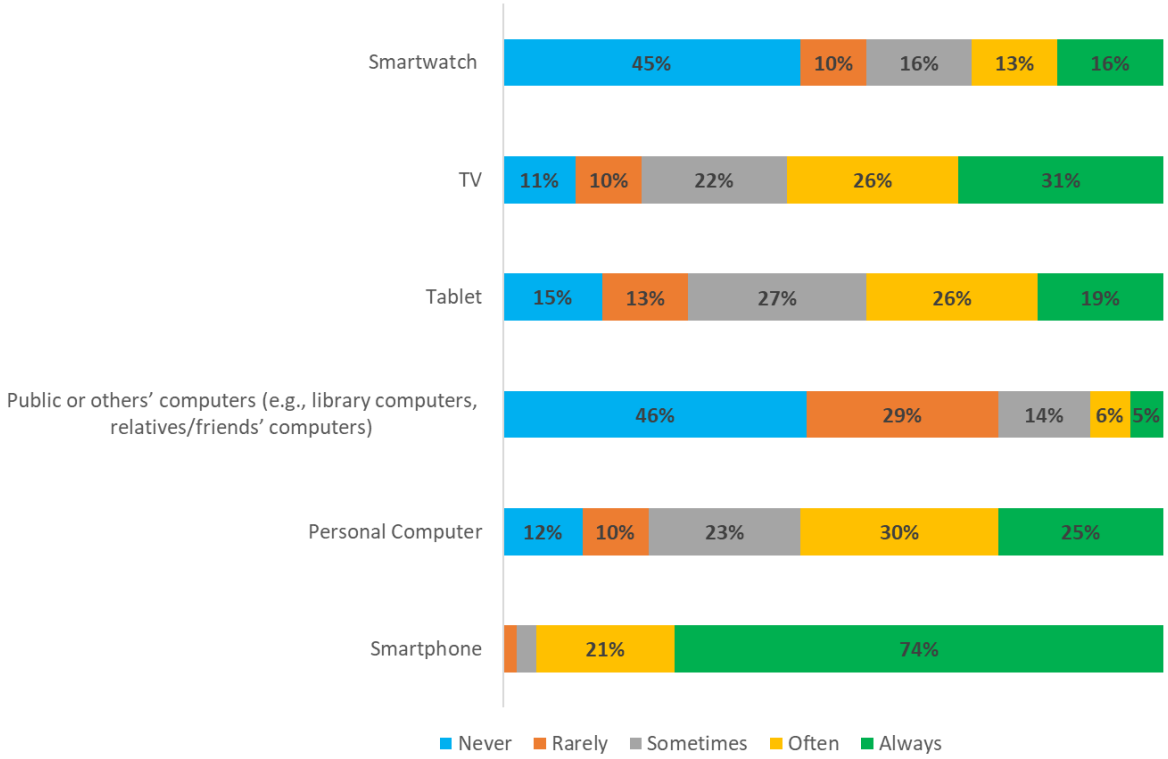

Figure 10. How often do you use the following devices to access the Internet?

In 84% of the families surveyed, each member has a digital device to access the Internet. This means that in 16 % of the families, members of the households need to share the devices to access the Internet. While this might not be an issue before the pandemic when parents were at work outside the house and children were studying at schools, it became an issue during the national lockdowns, given the necessity to move online both jobs and education. In fact, having to share the device means that family members could not use the devices simultaneously even when they needed them most, thus having limited access to digital resources and opportunities (despite having a device and an internet connection). Furthermore, we also need to consider that some of these personal devices used to access the Internet are smartphones and this affects the quality of the access and the type of activities that can be done online.

The types of activities carried out on the internet vary from online shopping (88%) to streaming video or music (75%) and socializing (75%), while 37% use it to look for a job and 1 out of 4 (27%) use the Internet for medical consultation (Fig 11).

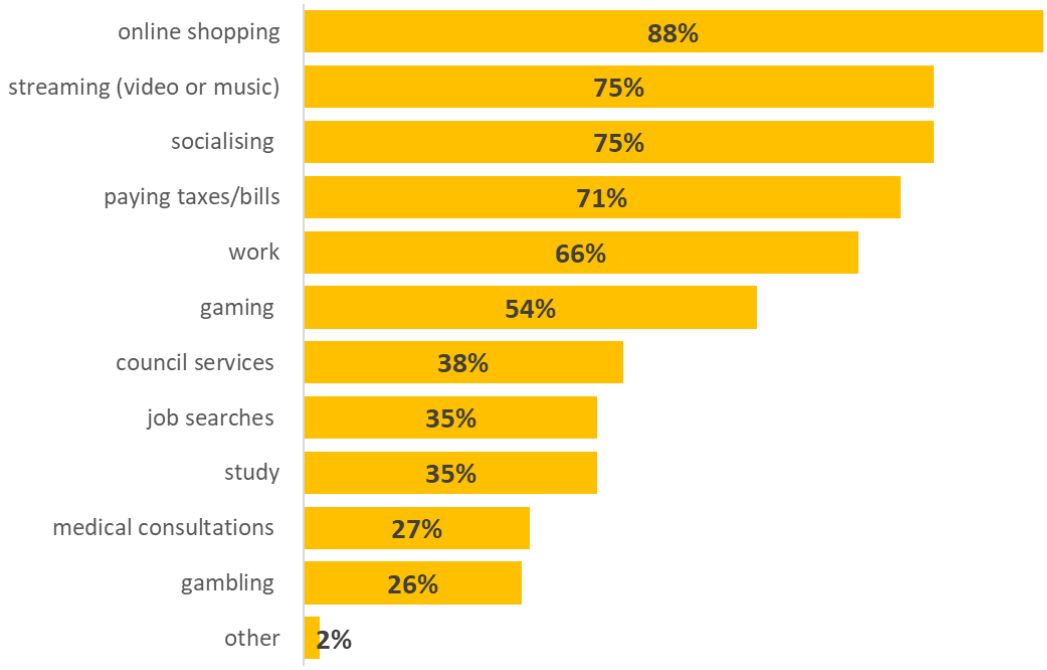

Figure 11. What do you currently use the internet for?

When it comes to barriers to access to the Internet, 61% of the sample state that they do not have any barriers to using the Internet more than they do. This means that around 4 out of 10 of our sample would like to use more of the Internet, but they experience some obstacles or barriers that prevent them from using more. It should be noted that the sample is particularly young (and on average they are better equipped both in terms of devices and skills and tend to spend more time than their older counterparts on the Internet) and already has access to the Internet. However, around 40% of them have some barriers that limit their access and use of ICTs. Amongst this cohort that would like to access the internet more, 19% said that the cost is the main barrier/obstacle, while 18% consider the privacy and 17% their understanding of the technologies as the main reasons why they do not access the Internet more. Finally, 8% mention safety and 7% confidence in using technologies as their barriers. Therefore, while the cost is the main barrier to accessing the Internet more, other barriers, related to digital literacy, are evident.

4.1 How did the Covid affect the access and the uses of the Internet?

Overall, the advent of the COVID-19 pandemic and the necessity to use digital devices and the Internet for everyday life activities improved digital skills. 42% of our respondents said yes to the question "*Thinking about accessing the information on the Internet or through computers/laptops or other devices (e.g., tablets, smartphones) … Since the start of the pandemic, do you think your ability has improved*?".
Furthermore, since the start of the pandemic, respondents tend to highly agree to have supported their children's online education (Fig 12), more than what schools did. This shows the importance of families in supporting the development of digital competencies and skills required for daily activities. In fact, parents with an adequate understanding of the digital skills necessary for capital enhancing activities can lend their existing competencies to their children to make the best use of ICTs, in this case, specifically for educational purposes which go on to positively affect their child's life chances. However, a parent with a lack of digital capital (Ragnedda and

Ruiu, 2020) is unable to provide that sense of direction to their child, meaning that their children are essentially left to utilise the internet in a manner that suits them best, mainly leading them to engage in more leisure-centric activities as a result. This might create a gap between those families whose parents have a high level of digital capital and can transfer it to their children and those families who do not.

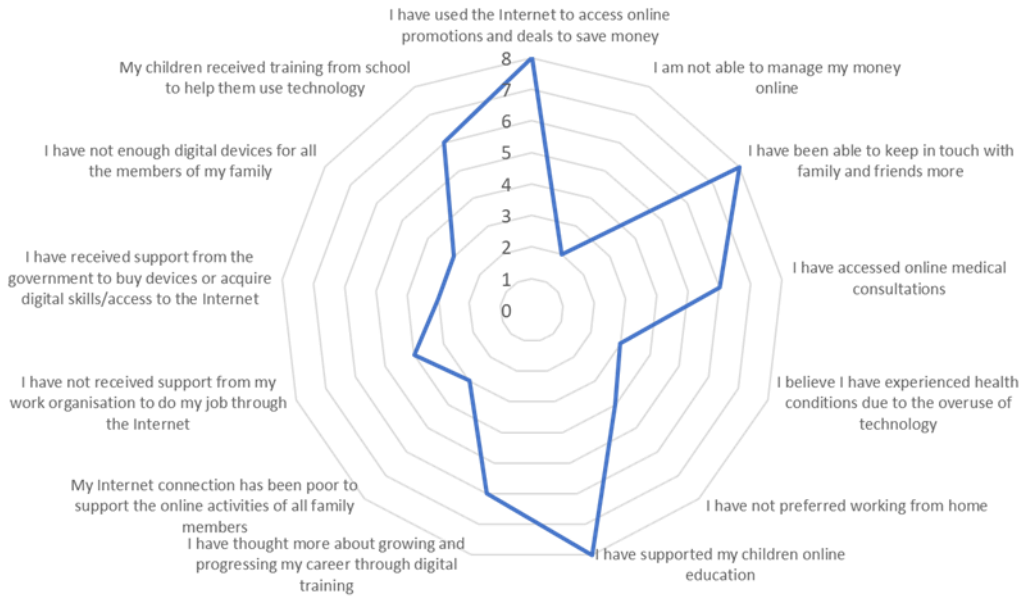

Figure 12. Since the start of the pandemic, on a scale from 0 (totally disagree) and 10 (totally agree), how do you agree with the following?

To overcome these inequalities, schools offered some sort of support to access/use digital technologies in a capital enhancing manner. During the pandemic, families searched for support from their companies or the government. In fact, on average our sample did not agree to have received some support from the Governments to buy devices or acquire digital skills (Fig 12). Not only government or charities, but also schools tried to help close digital inequalities. However, only 1 out of four (27%) claimed that their children received training from their school to help them to use the technologies, even though only half of children/teenagers of school ages (49%) had no problems accessing the internet (Fig 13). As already noted, accessing the internet is not the only issue related to the digital divide. Skills and competencies from one side (second level of the digital divide) and the uneven distributions of tangible outcomes or the capacity to cope with the negative outcomes of the internet (third level of the digital divide) should also be mentioned. Specifically, in terms of the (in)capacity to cope with the negative consequences, our data show that, according to their parents, children are experiencing some negative issues related to the overuse of digital technologies due to the pandemic. For instance, 36% of our respondents said that their children preferred spending time using technologies rather than doing physical activities and 14% of them increasingly avoid the members of their households and 10% did not get in touch with the rest of the family (Fig 13). Moving online meant also facing the new reality of online learning. Our data shows that 31% were unhappy to learn from home and 15% got worse results at school (Fig 13). Finally, 2% of our sample claimed that their children experienced some health issues related to the overuse of digital technology (diagnosed by the

doctor). These data show, once again, the multi-layered and multidimensional aspect of digital inequalities, where not everybody accessed the internet in the same way (first level), has different digital skills and competencies (second level) and finally gets different benefits or copes differently with the negative outcomes (third level).

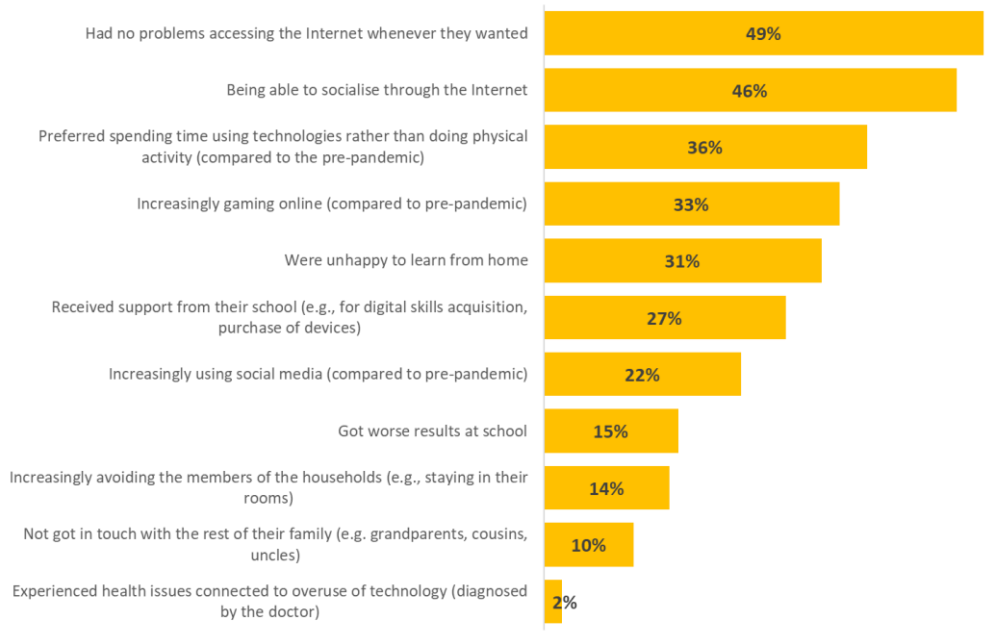

Figure 13. Since the start of the Pandemic, have your children:

5. Living on the edge of Digital Poverty

In this section, by reflecting on the data we collected through the online survey, we want to shed light on those users/citizens who do not entirely fall into the category of digital poverty, since they have access to the internet and have some basic skills but, due to the pandemic, might be on the edge of digital poverty. The aim is to identify emerging features of digital poverty by looking at those already "connected", but somehow struggling in the digital society, and identifying their challenges in digitally engaging in economic, social and cultural activities.

5.1 Risk of Digital Poverty Index (RDPI)

Following the definition of digital poverty, the first step consisted of creating a Risk of Digital Poverty Index (RDPI) that consists of the five determinants - device and connectivity, access, capabilities, motivation and support - identified by the DPA (see the Appendix "Methodological notes" to see how we created this index). The risk of Digital Poverty Index (RDPI) consists of five determinants and it shows the degree of digital poverty. As aforementioned, digital poverty does not occur as a dichotomy (e.g., poor versus rich), but as a continuum. Secondly, we created a Digital Poverty typology by grouping people according to different and combined levels of connectivity, access, motivation, capabilities, support, barriers and COVID-19 related obstacles. The result of this procedure was a typology of respondents according to their Risk of Digital Poverty. We have identified three different clusters that can be labelled as "digitally empowered", "on the edge" and "digitally disadvantaged". Table 1 shows the distribution of the three clusters in our sample.

Cluster	count	%
Digitally Empowered	968	48,7
On the Edge	420	21,1
Digitally Disadvantaged	600	30,2
Total	1988	100

Table 1. The three clusters

5.1.1 Digitally empowered

The first cluster is the largest, as it comprises 48.7% of the respondents. We called this group 'Digitally empowered' because the patterns of the variables that characterize it suggest that the people in this cluster have high motivation, high capabilities, feel they have no digital barriers, they did not need digital support and have not experienced COVID-related problems in terms of online education and jobs.

The "Digitally Empowered" cluster is formed by 52% of females and 48% of males. In terms of age, 45% are between the ages of 25 and 34, 35% between 35 and 44, 13% between 20 and 24 and 7% between 45 and 55, while 25% live in urban areas, as well as in small towns, while 35% live in suburban areas and 15% in rural ones. Concerning the level of education, 46% are graduates (either bachelor's, master or PhD), while 54% are undergraduates. In terms of family status, 77% are "legal parents living together", 16% are single parents, 6% separated or divorced and 1% widowers. Looking at the number of children, we see that 48% have 2 children, 28% have only one and 24% have 3 or more children. Finally, in terms of income, this cluster is also characterized by 44% having a medium family income (26K-50K), 29% high family income (over 50K) and 27% low family income (under 25K).

5.1.2 On the edge

The second group, the smallest one as it includes 21.1% of the sample, is composed of people who are in limbo with respect to digital poverty: while sharing some common traits with the previous cluster, especially in relation to motivation, capabilities and autonomy with respect to potential digital problems, the grouped respondents experienced many COVID-related issues that undermined certainties around their ability to cope with the challenges posed by the family's daily digital activities.

In terms of gender, the "On the Edge" cluster is formed by 59% of females and 41% of males. 40% are between the ages of 25 and 34, 36% between 35 and 44, 12% between 20 and 24 and 12% between 45 and 55. This cluster is not strongly characterized by the place of living. In fact, 26% live in urban areas, 25% in small towns, while 36% live in suburban areas and 13% in rural ones. Looking at the family status, we see how 69% are "legal parents living together", 24% are single parents, 7% separated or divorced and 1% widowers, while 43% of the parents belonging to this group have 2 children, 27% have only one and 30% have 3 or more. This cluster is also characterized by 43% having a medium family income (26K-50K), 29% high family income (over 50K) and 34% low family income (under 25K).

5.1.3 Digitally Disadvantaged

The third cluster (30.2% of the sample) could be considered the opposite of the first as people belonging to it are characterised by low digital capabilities and low motivation in using digital technologies. That is why we named this cluster “Digitally Disadvantaged”.

The "Digitally disadvantaged" cluster is formed by 43% of females and 57% of males. In terms of age, 46% of people belonging to this cluster are between the ages of 25 and 34, 33% between 35 and 44, 16% between 20 and 24 and 5% between 45 and 55. 40% live in urban areas, 20% in small towns, while 27% live in suburban areas and 13% in rural ones. Looking at the family status, 75% are "legal parents living together", 20% are single parents, 4% separated or divorced and 1% widowers, while 39% have 2 children, 37% have only one and 24% have 3 or more. This cluster is also characterized by 39% having a medium family income (26K-50K), 25% high family income (over 50K) and 36% low family income (under 25K).

5.3 Risk of Digital Poverty Index and family income

One of the main differences between the clusters is, unsurprisingly, the level of income. The digital disadvantaged group includes, on average, the highest percentage of low incomes across the three clusters. Even if in this case the age-old problem of correlation emerges. Based on the data, it is difficult to understand the nature of this relationship since both options might be valid. In fact, it might be the income that influences the acquisition of skills and competencies, but it could also be true the opposite where higher digital skills and competencies positively influence the income. Or, more likely, on average those with higher income tend to have more opportunities to learn new skills and competencies, and then work in highly retributed jobs, further reinforcing their socially privileged position in society. This reinforces the so-called “double loop of inequalities” where social inequalities drive digital inequalities and in turn this further increases social inequalities. If we focus on the income and consider three different groups, namely low (under 25K), medium (26-50K) and high (over 50K) incomes we can observe how the "digitally empowered" increase with increasing income (here the income effect has a greater force), the number of "on the edge" and "digitally poor" decreases for high incomes. In fact, digitally empowered people go from 53% (for high incomes) to 42% for low incomes. The "On the edge" go from 19% to 23%, while the digitally disengaged go from 28% to 35%.
The Risk of Digital Poverty increases with the decrease in income. However, as noted throughout the report, this should not be seen in binary terms (monetarily poor does not necessarily mean digitally poor), and income is not the only factor influencing digital poverty.

5.2 How much does family status impact digital poverty?
Another key variable against which to analyse the RDPI is the family status. National statistics show that single parents are more likely to be in poverty than any other type of household. Our data confirms this trend, by showing how single parents are at risk of digital poverty. 59% of

single parents can be classified either as "on the edge" (27%) or as "digitally disadvantaged" (32%) and they are, therefore, more likely to have a higher risk of digital poverty. Furthermore, given that socioeconomic inequalities tend to be maintained and transmitted across generations in a family (Bertaux, 1981; Bourdieu, 1984; Biblarz and Raftery, 1993; Putney and Bengston, 2002), the risk of their children living in digital poverty increases as well. This suggests that single parents require specific investment and support from policymakers and stakeholders, as they are amongst those who are suffering the most and are struggling to cope with the digital revolution.

5.4 Digital Poverty and work/study remotely

During the different lockdown waves between 2020 and 2021, work from home has been consolidated and distance learning has been added. The survey shows how digital learning and empowered learning possibilities are severely hindered by a family context where more people work and study from home. We note a reduction in the number of the "digitally empowered" cluster as the number of people who work or study at home increases and, at the same time, an increase in that of the "on the edge" and "digitally disengaged" clusters. The range that was analyzed goes from 0 (no one works / studies at home) to 3 or more people (see Table 2).

Table 2. Digital Poverty in relation to the number of people working/studying from home

Cluster	No one studies/works at home	1	2	3 or more
Digitally Empowered	51%	49%	45%	35%
On the edge/Digitally Disadvantaged	49%	51%	55%	65%

These results show how the increasing number of people working or studying from home, coincides with a higher number of respondents being in the “disadvantaged” or “on the edge” group. This suggests the necessity to put families with 3 or more children at the centre of any digital inclusion initiatives that aim to reduce or eliminate digital poverty.

5.5 Digital Poverty in London

A specific focus data that is certainly interesting is that on digital poverty in London. The administration of the questionnaire throughout England makes the results comparable between the various areas and what emerges is a substantially worse situation in the “City”. In fact, while the average of the "Digitally empowered" of the whole sample is 49%, in London it is 38% and the situation worsens further if we look at the "Digitally Disadvantaged" cluster where the total average is 30% while in London the “digitally disadvantaged” cluster reaches 46%.

This suggests that even if perceived as in a more advanced technological/digital state, large urban areas, in the end, probably due to the higher cost of living, suffer more than other parts of England. Living as a family in a big city like London which, on average, is more expensive than other cities or towns, increases the risk of becoming digital poor, therefore suffering the negative consequences of being digitally excluded.

5.6 Archetypes

Based on the analyzes carried out on our sample, two "typical" profiles were created that represent people we can all meet in everyday life. The aim was to understand how people from different backgrounds, with different socio-demographic and family conditions, have changed their lifestyles due to the pandemic and how much these have affected their children's behaviour.

Coli

Coli is aged between 25 and 34, he lives with his wife (Marilu) and two children (Christine and Patrick, aged 7 and 5) in a suburban area of Yorkshire and the Humber East Midlands.
Coli holds a bachelor's degree and is employed in a full-time job and earns between 25K and 50K annually.
Coli uses the internet for work, to socialize, to use streaming services, to shop online, to pay taxes and bills, for online games (including online bets), and also for medical consultations. He does not think he has particular barriers to using the internet, just like his children who have no particular problems using the internet as and when they want and socializing with others through the use of social media. Coli represents a typical member of the Digitally Empowered group and, on average, they can use ICTs to improve their life chances and consolidate their social advantages. They do not only access the Internet whenever they needed the most, but on average, they tend to have higher digital competencies/skills and they also tend to get the most out of it, by using the Internet for capital enhancing activities and supporting their children online education. Coli is, therefore, sitting on the right side of the digital divide, since they can enjoy proper access to the ICTs (closing the first level of the digital divide), have enough digital skills to use ICTs confidently (bridging the second level), and enhancing and or consolidating their social position through the use of ICTs.

Eleonore

Eleonore is also aged between 25 and 34, but she raises her 10-year-old daughter (Sara) alone. She lives in an urban area of the Northwest and continues her studies alternating it with work experiences, sometimes full-time and sometimes part-time. She earns between 11K and 25K annually. She uses the internet for work, studying, socializing, council service, streaming services, paying taxes and bills and gaming. She believes that the main limitation in using the internet is the cost. During the pandemic, her daughter slightly worsened her school results. She sensed that her daughter was sadder to learn from home. Eleonore says that unfortunately, her daughter could not access the internet often as she wanted, and this did not help her in socializing through the use of the internet. She noticed on the one hand an increase in the time spent on social media and playing online, but on the other a form of isolation as she spent much more time locked in her room. Eleonore belongs to the digitally disadvantaged group and therefore, they have fewer opportunities to use the Internet when they needed them most and they are equipped with lower digital competencies. They experience some barriers to access to the Internet (first level of the digital divide) and lower skills (second level of the digital divide) missing important opportunities to enhance their social position (third level of the digital divide).

Eleonore and Coli are both young (99% of their cohort age access to the Internet) and they already have some basic digital skills, since they replied to our online survey they are part of an

online marketing pool dataset. Despite this Eleonore and Coli have a completely different internet experience as they are not exploiting the Internet in the same way. While representing a sort of archetype, Coli and Eleonore can be considered as the two extremes of our sample. However, as noted throughout this report, the phenomenon of digital poverty cannot be dichotomized. In fact, between Eleonore and Coli there is a continuum of nuances that make digital poverty a complex phenomenon to observe and manage. In this sense, our cluster analysis is a snapshot of the steps in which a citizen (including children) or a family may find themselves.

Overall, these results are in line with those studies that underline how, despite their access to the Internet, those at risk of social exclusion (especially less educated and low-income users) are more likely to have a poor digital experience, further reinforcing the intertwined relationship between social and digital exclusion. Finally, it suggests that the three levels of the digital divide are not only deeply interconnected but generate a vicious circle that might be difficult to break if each level (access-skills-benefits) is considered individually and independently from the structural and circumstantial determinants.

6. Policy recommendations

The new challenges posed by the pandemic and the shift to the digital realm cannot be addressed using old paradigms. It is essential that policymakers and stakeholders continue to promote and finance digital literacy programs to guarantee excluded citizens' social inclusion paths that allow them to catch up with skills and the digital tools required today.
As long as there are people who are digitally excluded or at risk, politics cannot focus its efforts only on digital technology but must also identify and propose alternative forms of promoting sociality with citizens who would otherwise experience not only disadvantage but also further marginalization.
Policymakers, both at the local and national levels, play a key role in avoiding a widening of digital inequalities, especially for those living on the edge of digital poverty.

Recommendation 1. Support single parents. Create ad hoc measures providing affordable broadband Internet service for single parents, and provide them with specific support in terms of digital skills training and digital devices.
Improve the quality of and the type of support for single parents. Our research shows that they are among those who risk the most to become digitally poor.

Recommendation 2. Digital London weighting allowance
Provide more support, both financial and training, to those who are living in expensive cities such as London.

Recommendation 3. Education. Specifically, children from numerous families need further support to use technologies, both in terms of having suitable tools to use and valid technical support, and in terms of digital competencies for capital enhancing activities.
Implement educational paths in the use of the Internet and technologies at all educational levels, which encourage the user to be autonomous.

Recommendation 4. Policies should be tailored to tackle different levels of digital poverty. There is still a need to further explore the distinct characteristics of groups that are on the edge of digital poverty or can be considered digital poor to some extent (e.g., lack of specific skills needed to get benefit from the use of technologies).
Provide funding for investigating the multiple facets of digital poverty to address the limitations of specific groups through ad hoc interventions.

Recommendation 5. Decentralisation of intervention to address the local needs of users that wish to use technologies to gain benefits and enhance their position in society.
Include central Government support to local authorities to identify local needs and provide differentiation of programmes based on different levels of digital poverty.

Recommendation 6. Technologies must be integrated into every school activity. Not only students but also their parents should be involved in the acquisition of skills.
Enhance the acquisition of digital competencies of both children and parents through school programmes that involve both.

Recommendation 7. NHS programmes targeted at vulnerable users
Implement training for vulnerable users aimed at making them autonomous in using technologies for health-related needs.

7. Conclusion

Addressing digital poverty is vital for addressing social justice and improving government online services and resources. This report attempted to analyse the level of digital poverty by proposing a model that conceives digital poverty as a multi-layered issue and by investigating its relationship with social inequalities. Understanding digital inclusivity and its relation to social disparities have become essential given the increasing number of activities and opportunities in different areas of daily life, migrated online. Socially disadvantaged citizens are those who are affected the most by digital poverty, therefore missing chances and resources which cannot be accessed otherwise, thus further reinforcing social inequalities.
Even though disadvantaged citizens are at the core of digital inclusion strategies, there exist additional citizens that are not yet under the radar of digital inclusion programmes: those living *on the edge of digital poverty*. Often policymakers do not consider in the policies those citizens who have access to the internet and have some basic skills – often classified as digitally included – but are risking being left behind in the digital society.

A long-term and structured vision of the digital inclusion process can help the government reimagine the actions to be taken to implement the digital endowment of businesses and families and do so with a view to human, social and economic growth of all. It is crucial, for the recovery from Covid-19 and for the productivity, to intercept those who are at risk to become digital poor and enable them to fully take advantage of the opportunities offered by digital

technologies. Knowing how they are coping with their digital fatigue, working remotely, how safe their digital environment and how confidently navigate the Internet might support policymaking to improve their digital life/health, but also reduce the pressure on the NHS systems while boosting the economy and business.

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APPENDIX. Digital Poverty Methodological notes

1. The Digital Poverty Index

The first step was to create an index to measure the Digital Poverty; following the theoretical model shown in figure 1 (Determinants of Digital Poverty - DPA, 2022), we created 5 indexes (Device & Connectivity, Access, Capabilities, Motivation, and Support) and we performed an Exploratory Factor Analysis (EFA) to extract a factor that could represent Digital Poverty. EFA results showed that a Device & Connectivity's factor loading is very low (-0.084), so it was removed from the set of variables that could be considered representative of the Digital Poverty (Table 1).

Table 1. Extraction Method: Principal Component Analysis.

Digital Poverty	
Device & Connectivity	-0.084
Access	0.770
Capabilities	0.888
Motivation	0.799
Support	-0.793

The Digital Poverty Index was then developed by combing the 4 remaining variables with the EFA procedure and then transformed into a variable whose values range from 0 to 100.

1.1 The Device and Connectivity index was built by first combing respondents' answers to the set of questions reported in Table 2.

Table 2. How often to use the following devices to access the Internet?

How often to use the following devices to access the Internet?	Never	Rarely	Sometimes	Often	Always	Total
Smartphone	0,4	1,2	3,1	21,3	73,9	100
Personal Computer	12,5	9,9	23,1	29,5	25	100
Public or others' computers	46,3	29	13,4	6,4	4,8	100
Tablet	14,8	12,9	27	25,9	19,4	100
TV	11,3	10,2	21,7	25,7	31,2	100
Smart Watch	45,9	9,6	15,9	13,2	15,5	100
Other	0	72,8	10,4	7,8	9,1	100

Respondents were asked to rate on a Likert-type scale the usage frequency of some devices. The more "often" and "always" answers are chosen by a respondent, the higher is her/his score on the Device and Connectivity index.

Respondents' scores were then classified into three modalities: Focused (low score meaning one or two devices used intensively), Large (medium score meaning three or four devices used intensively) and Extended (high score meaning five or six devices used intensively). Table 3 shows the distribution of the three modalities in the sample.

Table 3. Distribution of the three modalities related to the number of devices used by respondents

Device and Connectivity	Count	%
Focused	589	29,6
Large	664	33,4
Extended	735	37,0
Total	1988	100,0

1.1.1 Range of online activities

Respondents were asked to indicate what activities they use the Internet for on a multiple response set. The range of online activities was then measured in this way: the more answers a respondent chooses, the greater his or her range of online activities (Table 4).

Table 4. What do you currently use the internet for?

What do you currently use the internet for?	%
Work	11,1
Study	6,0
Job searches	5,9
Socialising	12,7
Streaming (video or music)	12,7
Online shopping	14,9
Council services	6,4
Medical consultations	4,6
Paying taxes/bills	11,9
Gambling	4,3
Gaming	9,1
Other	0,4
Total	100,0

As for the previous variable, respondents' scores were then classified into three modalities: Focused (from 1 to 4 activities chosen), Large (from 5 to 7 activities chosen) and Extended (8 or more activities chosen).

1.2 Access Index

The Access dimension was analyzed through Exploratory Factor Analysis, as shown in Table 5.

Table 5. Access Index

I can find and open different applications/programmes on a device	**0,729**
I cannot update and change a password when prompted to do so	
I can turn on a device and log in to any accounts/profiles	**0,770**
I cannot open an Internet browser to access websites	
I can connect a device to a Wi-Fi network	**0,722**
There are some things I want to do online that I can't do because of slow or no internet	
I am able to use the internet to complete all the tasks I want to do	**0,707**

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

EFA results indicate 4 variables (in bold) with high and significant factor loadings (more than ±0.6) on the first factor. These variables were then selected and combined together in an index using the "factor score saving" SPSS procedure. The resulting Access Index. was then normalized on a new variable whose values range from 0 to 100 in order to simplify the interpretation of the results.

1.3 Capabilities Index

Capabilities were conceptualized as a composition of 4 sub-dimensions: Communicating (Table 6), Transacting(Table 7), Handing Information and Content (Table 8), and Safety (Table 9). Thus, the operational definition of this dimension was the most complex and articulated, as it takes into account 4 different sets of items (see following tables).

Table 6. Communication

Communicating *Index*	
I cannot communicate with others digitally using email or other messaging applications (e.g., WhatsApp or Messenger)	**0,860**
I can share documents with others by attaching them to an email	
I can set up an email account	
I cannot communicate with others using video tools (e.g., FaceTime or Skype)	**0,856**
I can use word processing applications to create documents (e.g., a CV or a letter)	
I cannot post content on social media platforms (e.g., Facebook, Instagram, or Snapchat) for example messages, photographs, videos etc.	**0,881**

Table 7. Transacting Index

Transacting	
I can set up an account online that enables me to buy goods or services (e.g., Amazon account, eBay, John Lewis etc.)	**0,704**
I cannot use credit/debit cards or other forms of online payment to buy goods/services online (e.g., PayPal, WorldPay)	**-0,765**
I can access and use public services online, including filling in forms (e.g., vehicle tax, voting registration, ordering repeat prescriptions, booking doctor appointments)	**0,747**
I cannot upload documents and photographs when this is required to complete an online transaction	**-0,760**
I can manage my money and transactions online securely, via websites or Apps (e.g., bank account)	**0,767**

Table 8. Handing Information and Content Index

Handing Information and Content	
I can use search engines to find the information I am looking for	
I cannot recognise what information or content may, or may not, be trustworthy on websites/apps	
I can organise my information and content using files and folders	**0,790**
I cannot use the Internet to stream or download entertainment content (e.g., films, music, games or books)	
I can use bookmarks to save and retrieve websites and information	**0,817**
I can store information online and access content from a different device (e.g., using the Cloud)	**0,838**

Table 9. Safety Index

Safety	
I can respond to requests for authentication (e.g., reactivate an account when I've forgotten my password)	**0,744**

I cannot recognise and avoid suspicious links in email, websites, social media messages and pop-ups and know that clicking on these links is a risk	
I am careful with what I share online as I know that online activity produces a permanent record that can be accessed by others	**0,780**
I can keep the information I use to access my online accounts secure, by using different and secure passwords for websites and accounts	**0,789**
I make sure not to share or use other people's data or intellectual property without their consent	**0,729**
I can identify secure websites by looking for the padlock and 'https' in the address bar	**0,750**
I cannot set privacy settings on my social media and other accounts	
I can update my computer security systems when necessary to prevent viruses and other risks - How do you agree with the following?	**0,692**

The 4 sub-dimensions were measured separately with a set of statements: respondents were asked to rate their agreement towards every sentence on a Cantril scale from 0 to 10. The 4 sets of items were then analysed through an EFA in order to extract a factor representing each sub-dimension. Only variables with a factor loading higher than ±0.6 were considered (highlighted in bold). The 4 resulting factors were subsequently combined, using the "factor score saving" option available in the EFA procedure, as shown in Table 10.#

Table 10. Capability Index

Capabilities	
Communicating	0,865
Transacting	0,891
Handing Information and Content	0,787
Safety	0,819

Similarly, to the Access Index procedure, the Capacity Index was also rescaled to a measure from 0 to 100.

1.4 Motivation Index

The motivation was measured with a set of items to which respondents were asked to rate their agreement on a Cantril scale from 0 to 10. EFA helped us to select 4 out of the 5 variables in order to build an index (scaled on a range from 0 to 100 like the other indices) (Table 11).

Table 11. Motivation Index

I don't enjoy trying out new and innovative technologies	**0,772**
I prefer not to use technology unless I have to	**0,879**
Technologies make my work harder	**0,839**
My digital skills don't fit my everyday needs	**0,878**
I use technologies to reduce my impact on the environment	0,208

1.5 Support Index

The need for Digital support was measured with 2 items (see the following table) that were then combined into a composite index.

Table 12. Support Index

	Mean
I need support to carry out some tasks on the Internet/ use my digital devices	3,1
During the pandemic, I asked for support to use my digital devices	2,7

2. The Digital Poverty typology

The next step of our analysis was to create a Digital Poverty typology by grouping people according to different and combined levels of connectivity, access, motivation, capabilities, support, barriers and COVID-19 related obstacles. This goal was pursued by adopting the so-called the "French way" to multivariate analysis (Di Franco, 2006; Greenacre & Blasius, 2006; Holmes, 2007; Migliaccio, Addeo & Rivetti, 2011; Delli Paoli & Addeo, 2011); this approach was developed by Benzecrì (1973) and was adopted worldwide thanks to the works of by Bourdieu, above all, "Distinction: a Social Critique of the Judgment of Taste" (1984). This approach implies the application of two multivariate techniques in sequence (Di Franco, 2006;): first, a multiple correspondence analysis (MCA) to synthesize variables into single factors, then a clustering method in order to group respondents according to the factors derived from the MCA. The result of this procedure was a typology of respondents according to their Digital Poverty.

2.1 1st step: Multiple Correspondence Analysis (MCA)

The first step of the French way of data analysis requires an MCA to synthesize the information contained in the categorical data we have collected in a few conceptual dimensions, also denoted as factors. This procedure distinguishes the variables to be analyzed into two categories: active and supplementary; the former has an active role in defining the factors, while the latter does not, although they contribute to interpreting them (Delli Paoli & Addeo, 2011).

MCA was carried out using the following active variables:

1) Device and Connectivity, with three modalities (focused, large, extended);
2) Range of online activities, with three modalities (focused, large, extended);
3) Barriers to using the internet more (Cost, Confidence, Privacy, Safety, Understanding of technology, Uselessness);
4) Support for digital activities (I need support to carry out some tasks on the Internet/ use my digital devices, two modalities: Yes/No);
5) COVID Support (During the pandemic, I asked for support to use my digital devices, two modalities: Yes/No);
6) COVID-related children problems;
7) Capabilities, as a synthesis of the capabilities index in three modalities: low, medium and high;
8) Motivation, as a synthesis of the motivation index in t modalities: low, medium and high,

The supplementary variables were: Area of living, Residence Cultural Capital of the Family, Family Income, Family Status, Number of Children, Children with a disability, Digital technology expenses, and Assistive technologies.

The results of the MCA (Table 13, Table 14, Table 15) suggested the extraction of three factors, reproducing the 29.4% of inertia, a satisfying value considering the high number of modalities usually involved in a MCA (Di Franco, 2006). After the extraction, we ran a procedure called "Description of

Factors" (DEFAC), the aim of which is to refine the interpretation of the extracted factors through a selection of the most representative modalities according to their test value.

Table 13. First Factor Description – Skills

NEGATIVE SEMI-AXIS		
Test value	*Modality*	*Active Variable*
-30.74	No	Support for Digital Activities
-30.36	No	COVID Support
-30.31	High	Motivation
-24.87	High	Capabilities
CENTRAL ZONE		
POSITIVE SEMI-AXIS		
Test value	*Modality*	*Active Variable*
30.31	Low	Motivation
30.36	Yes	COVID Support
30.74	Yes	Support for Digital Activities
31.90	Low	Capabilities

The first factor represents a distinction between low and high digital skills; in fact, a closer look at the most representative modalities underlines a contrast between the highest value (positive semi-axis) and the lowest value (negative semi-axis) of four variables representing the following sub-dimensions of the Digital Poverty: Motivation, COVID-Support, Support for Digital Activities, Capabilities.

Table 14. Second Factor Description – Social relationships

NEGATIVE SEMI-AXIS		
Test value	*Modality*	*Active Variable*
-25.10	No	Increasingly gaming online
-24.81	No	Increasingly using social media
-24.74	No	Increasingly avoiding the members of the households
-20.76	No	Preferred spending time using technologies rather than doing physical activity
CENTRAL ZONE		
POSITIVE SEMI-AXIS		
Test value	*Modality*	*Active Variable*
20.76	Yes	Preferred spending time using technologies rather than doing physical activity
24.74	Yes	Increasingly avoiding the members of the households
24.81	Yes	Increasingly using social media
25.10	Yes	Increasingly gaming online

The second factor describes the impact of COVID on social relations within the family context. In fact, the variables representing this dimension are related to activities that, if implemented, testify to a reduction in relationships and sociability (in the positive semi-axis).

Table 15. Third Factor Description – Safety and Privacy

NEGATIVE SEMI-AXIS		
Test value	*Modality*	*Active Variable*
-19.91	Yes	Got worse results at school
-17.37	No	Safety
-16.81	Yes	Were unhappy to learn from home
-15.75	No	Privacy
CENTRAL ZONE		
POSITIVE SEMI-AXIS		
Test value	*Modality*	*Active Variable*
15.75	Yes	Privacy
16.81	No	Were unhappy to learn from home

17.37	Yes	Safety
19.91	No	Got worse results at school

The last factor shows a mix of barriers to the use of the Internet (safety and privacy) and school problems related to the pandemic. Considering these results, the dimension probably represents the family's openness to digital.

2.2 2nd step: Cluster Analysis (CA)

The three factors described above were used as criterion variables to perform the cluster analysis through the SEMIS procedure, a clustering procedure based on an algorithm that applies in sequence a non-hierarchical technique and then a hierarchical one.
Cluster analysis results highlighted three potential solutions with 3, 4 and 5 clusters. The three clusters solution with three clusters appeared the most reliable from a semantic point of view (the groups are homogeneous within them and heterogeneous with respect to the others).
Table 16, Table 17 and Table 18 show the detailed analysis of each cluster; the information provided is the following: VALUE TEST is a significance measure: the highest is the most significant as a modality, the Value Test threshold is 2, and all the values higher than 2 are significant; CLA/MOD % is the percentage of the overall respondents with a specific modality and who are actually in the cluster; MOD/CLA % indicates the percentage of people in the cluster that have been classified into a modality; GLOBAL % indicates the overall percentage of respondents in the whole sample assigned to a specific modality; MODALITY is the modality of the variable that characterizes a cluster, VARIABLE indicates the variable the modality comes from.

Table 16. First Cluster: Digitally Empowered

VALUE TEST	CLA/MOD %	MOD/CLA %	GLOBAL %	MODALITY	VARIABLE
19.33	62.57	89.46	69.62	No	Support for Digital Activities
18.62	62.90	86.88	67.25	High	Motivation
18.38	61.15	90.39	71.98	No	Covid Support
16.66	55.68	98.24	85.92	No	Increasingly avoiding the members of
14.27	67.64	57.44	41.35	High	Capabilities
13.59	52.74	99.59	91.95	No	Understanding of technology
12.89	58.67	81.10	67.30	No	Increasingly gaming online
12.27	54.22	94.94	85.26	No	Got worse results at school
12.04	55.64	89.67	78.47	No	Increasingly using social media
11.83	54.67	92.56	82.44	No	Privacy
11.66	54.49	92.77	82.90	No	Safety
11.44	54.65	91.63	81.64	No	Cost
10.75	51.84	98.76	92.76	No	Confidence

The first cluster is the largest, as it comprises 48.7% of the respondents. We called this group 'Digitally empowered' because the patterns of the variables that characterize it suggest that the people in this cluster have high motivation, high capabilities, feel they have no digital barriers, they did not need digital support and have not experienced COVID-related problems.

Table 17. Second Cluster: On the Edge

VALUE TEST	CLA/MOD %	MOD/CLA %	GLOBAL %	MODALITY	VARIABLE
22.79	51.69	80.00	32.70	Yes	Increasingly gaming online
19.31	57.48	58.57	21.53	Yes	Increasingly using social media
19.30	69.64	46.43	14.08	Yes	Increasingly avoiding the members of the households
18.25	43.51	75.00	36.42	Yes	Preferred spending time using technologies
13.17	52.90	36.90	14.74	Yes	Got worse results at school
13.13	39.80	58.10	30.84	Yes	Were unhappy to learn from home
9.66	27.00	85.95	67.25	High	Motivation
8.33	25.65	87.38	71.98	No	Covid Support
8.31	25.94	85.48	69.62	No	Support for Digital Activities
7.66	33.60	40.71	25.60	Extended	Range of online activities
6.55	27.68	60.24	45.98	Yes	Being able to socialise through the Internet
6.41	28.22	55.24	41.35	High	Capabilities
6.15	22.51	98.81	92.76	No	Confidence

The second group is the smallest one as it includes 21.1% of the sample. It consists of people who are in limbo with respect to digital poverty: while sharing some common traits with the previous cluster, especially in relation to motivation, capabilities and autonomy with respect to potential digital problems, this cluster experienced many COVID-related issues that undermined their ability to cope with the challenges posed by the family's daily digital activities.

Table 18. Third Cluster: Digitally Disengaged

VALUE TEST	CLA/MOD %	MOD/CLA %	GLOBAL %	MODALITY	VARIABLE
29.57	78.50	74.83	28.77	Low	Capabilities
27.89	71.43	77.50	32.75	Low	Motivation
27.21	73.01	73.50	30.38	Yes	Support for Digital Activities
25.96	73.79	68.50	28.02	Yes	Covid Support
15.40	86.25	23.00	8.05	Yes	Understanding of technology
15.08	88.19	21.17	7.24	Yes	Confidence
14.93	65.59	37.17	17.10	Yes	Safety
14.82	64.76	37.67	17.56	Yes	Privacy
14.48	63.01	38.33	18.36	Yes	Cost
12.53	69.30	24.83	10.81	Yes	Assistive technologies
11.88	50.27	46.83	28.12	Focused	Range of online activities
11.76	41.93	71.00	51.11	Yes	Had no problems accessing
7.00	39.73	48.67	36.97	Focused	Connectivity

The third cluster (30.2% of the sample) represents the opposite of the first one. Users belonging to this cluster are characterized by low capabilities and low motivation. That is why we named this cluster “Digitally disengagement”.

The next tables show the distribution of the three clusters in our sample.

Table 19. Ther three Clusters: Digitally Empowered, On the Edge and Digitally Disengaged

Cluster	count	%
Digitally Empowered	968	48,7
On the Edge	420	21,1
Digitally Disengaged	600	30,2
Total	1988	100

Data analysis

Data analysis was carried out using SPSS 23 following several stages: first, univariate analysis explored the data quality and provided an overview; then bivariate and Exploratory Factor Analysis were performed to test the hypotheses.