

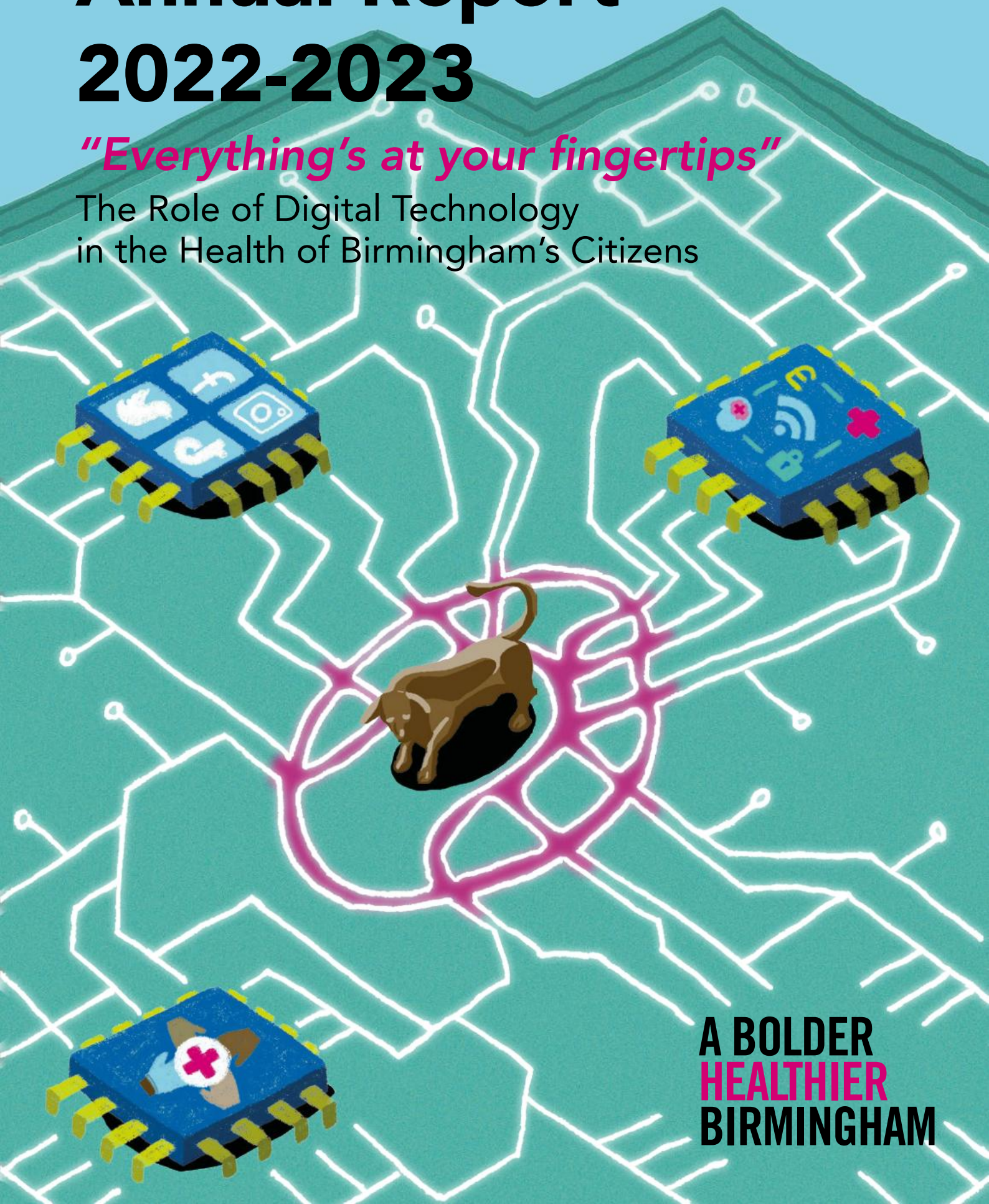
Director of Public Health



Annual Report 2022-2023

"Everything's at your fingertips"

The Role of Digital Technology
in the Health of Birmingham's Citizens



**A BOLDER
HEALTHIER
BIRMINGHAM**

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About the illustrations

In January 2023, the Birmingham Public Health Division ran a design competition with students from the School of Visual Communication at Birmingham City University. Winning illustrations were chosen for the front cover and chapter covers for the report. Each illustration is original and inspired by the students' interpretation of the report.

Front cover illustration by Stephanie Shaw from Birmingham City University

Forewords

Director of Public Health

Digital has moved in my lifetime from a new innovation with clunky buzz of dial up internet and basic pixelated gaming to a normality where the information is almost accessible as quickly as electricity to turn on a light and animations can substitute for real people in movies, this world has changed faster than at almost any other point in history and it continues to evolve.

This evolution offers us huge potential. At a population level the ability to access and analyse large volumes of information has already started to change the way we practice medicine and provide more personalised treatment decisions. At a personal level the introduction of apps and telehealth provides motivation for behaviour change as well as monitoring and diagnostics in the palm of the hand. There is huge potential for benefits for the health and wellbeing of the city.

Children born today will be inherent digital natives who grow up able to access information immediately in ways that work for them, they will be globally aware with friendships and connections across the world as well as across the street and the equipment around them will be silently interacting to make their lives healthier and easier. As they grow, we will need to be mindful of equipping them to navigate this digital space positively and reap the rewards while avoiding the dangers. This vision of the future is not without risk, and we have seen the damage that current algorithms in social media can do to young people, the tragic case of Molly Russell highlighted in the report demonstrates the need to be conscious of these risks. We have also seen the risks around digital creating more opportunities for risk behaviours like gambling addiction which we are only just starting to understand in adults, and the growth of digital scams and fraud, so this conscious awareness of risk is a lifetime challenge.

There also remain significant inequalities driven by digital exclusion and data poverty. As we have moved rapidly to 'online first' which risks excluding those who aren't comfortable using the internet or apps, don't have devices or can't afford data. The Birmingham City Council Digital Inclusion Strategy, and the collaborating NHS Integrated Care System strategy, is doing brilliant work with partners in this space, mobilising to both address access to equipment and data, increasing high speed broadband coverage and supporting and growing confidence and skills among residents, but we need to be broader in our approach to the opportunities in this space.

The digital world offers huge potential benefits for health and wellbeing at an individual, organisation and city-wide level but we cannot ignore the risks and challenges in making this real for everyone. I hope as you read this report and its recommendations you will take up the challenge to help us make the most of the benefits of this rapidly evolving digital world safely and responsibly, so we reduce inequalities and give all of our citizens the opportunities to lead happier, healthier lives.



Dr Justin Varney

Director of Public Health

Birmingham City Council

Cabinet Member for Health and Social Care

I am pleased to receive this year's annual report from the Director of Public Health, which focuses on the role digital technology plays in the health and wellbeing of Birmingham's citizens and communities.

Digital technology undoubtedly presents a significant opportunity to positively transform the delivery of health and care services. However, accelerating the transformation of health and care through digital approaches simultaneously carries the potential risk of widening the health inequality gaps that exist within our communities. With so many of the things that people rely on to survive and thrive now taking place online, those of us who are not online are becoming increasingly disadvantaged and disconnected.

Social media is now a part of most people's lives and is transforming how we communicate with each other. It has the potential to be positive for our health but continues to be associated with an impact on emotional wellbeing and mental and physical health.

There is no doubt that digital is here to stay. The pandemic has demonstrated how rapidly services can move to digital channels to ensure the continuation of supporting health and wellbeing in Birmingham. But if we are to truly unlock the power of digital for all our communities, then we must always be watchful of the potential risk that the digital divide brings.

Digital technology and its impact on health is an essential social issue of our time. It is time for all of us to come together, realise the potential of the digital world, and most importantly ensure no one is left behind.



Councillor Mariam Khan

Cabinet Member for Health and Social Care

Birmingham City Council

Executive Summary

Purpose and Methodology

The purpose of this report is to highlight the potential and tangible impacts that digital technology has on the health and wellbeing of Birmingham's residents and on inequalities. COVID-19 pandemic brought forth a rapid acceleration in the use of digital technology in clinical and non-clinical settings. The full effects of this transition are not yet apparent. However, there remains a section of the population who are digitally excluded. These individuals usually fall into groups that are in greater need of health and social care. They risk a disproportionate impact on their health and wellbeing as a result of their exclusion and the increasing digitalisation of services and society.

The report provides an overview of key terms, approaches and evidence. It presents primary research (a light touch ethnographic study on digital exclusion and focus groups on attitudes towards digital technology and health) alongside published evidence and case studies of approaches already implemented in Birmingham. The findings have been compiled, input sought from a range of stakeholders and recommendations made.

Context

Directors of Public Health (DPH) in England have a statutory duty to produce an annual report on the health of their local community. This year's report focuses on the role digital technology plays in the health and wellbeing of Birmingham's population.

Key Findings

1. Digitalisation, Health and Social Care

Digitalisation of health and social care is well under way with the NHS Long Term Plan¹ prioritising digital technology, including patient access to their own records and management of care, as well as joining up of patient records for professionals across the health system. The COVID-19 pandemic accelerated the use of digital technology, including in General Practice. Although a degree of anxiety has been reported before using online consultations, older patients have reported their satisfaction with online appointments, with reduced waiting times and savings on transport costs.²

In terms of supporting individual health and wellbeing, our research highlighted that participants often think of using digital technology in the context of apps rather than websites. Whilst apps can be useful, a 2019 review of health and wellbeing apps concluded that the majority are effective at achieving only low-to-moderate levels of behaviour change.³ Improvement in app design (with understanding of behaviour change theory) and widescale adoption have potential benefit but cannot deliver change in isolation.

2. Social media and Health

Social media has transformed how we communicate and is now a part of most people's lives, especially younger people.⁴ It has become invaluable for public health. Information can spread quickly to diverse groups of people and interactive, two-way dialogue held between citizens, organisations and authorities. It can also be a means of gaining social peer support. Spreading health misinformation through social media has however become a major public health concern.⁵ Our focus group participants thought

it was becoming more difficult to judge if health and wellbeing information was incorrect or misleading.⁶ A local example to counter misinformation was the establishment of a COVID-19 Community Champions Network consisting of trusted volunteers who shared accurate information with their communities and the use of consistent, prominent branding ('HealthyBrum').

In contrast however is the negative impact on emotional wellbeing and mental and physical health that can be associated with aspects of social media including increase time online or in front of digital screens and destructive algorithms, leading to sedentary behaviours, being overloaded with information and promotion of harmful material.

3. Data and Digitalisation

There is enormous potential for digital technology and data to improve population health and reduce health inequalities. Through improved quality, quantity and linkage of data, together with analysis, insights and working with communities, we can improve outcomes. The potential comes from understanding factors that influence health, targeting populations and individuals and improving services.

To maximise the potential of digital technology and data, there is a need to build public awareness and literacy of how data is used to improve an individual's health and the health of the wider population.⁷ Data are already being used, but citizens can be concerned with the use of their data and privacy.⁸ This was highlighted by our research, where participants consistently reiterated concerns about the sharing and security of personal data, particularly health-related data.⁹

4. Digital exclusion

Digital exclusion is the lack of digital skills, connectivity, or accessibility that prevents an individual from using digital technology or accessing the Internet.¹⁰ In Birmingham (2020), an estimated 8.6% of people (~75,000 people) have never used the internet or have not used it in the previous three months. Population groups more at risk of digital exclusion include older people, people in lower income groups, people without a job, people with a disability and people with no/fewer educational qualifications.²

There is a real risk that, without mitigation, some aspects of digitalisation could widen health inequalities. This comes both from the risk of individuals not having access to the information and services they need, and thereby exacerbating the inverse care law, but also from the increased use of data to inform and develop services where groups contributing less data will be less visible. Analyses and understanding needs to always consider who is not included in the data and include insights from the community to gain a full picture.

The three primary findings from the research we undertook with digitally excluded people were:

1. Participants did not see themselves as digitally excluded although they did recognise gaps in their knowledge and confidence with digital technology (referring to themselves as old-school or traditional) and they relied on help from their support network to become digitally engaged.
2. Most felt able to go through their daily lives without using digital technology and had a preference for and routine of going to local amenities to meet their needs. Difficulties

and challenges arose more for those who needed technology and saw it increasing in their job

3. Digital technology used for health and wellbeing purposes was particularly low e.g. very low uptake of main NHS app and the COVID-19 app, preference for visits to pharmacy for information.

Barriers to accessing digital services can be considered in the context of:

1. Lack of awareness of the service for those who do not get their health information from online sources;
2. The service cannot be accessed if only available through a digital platform (i.e. is restricted for those who do not have the means or confidence to access it);
3. Target users chose not to engage with the service; for example, due to lack of trust or concern over information.

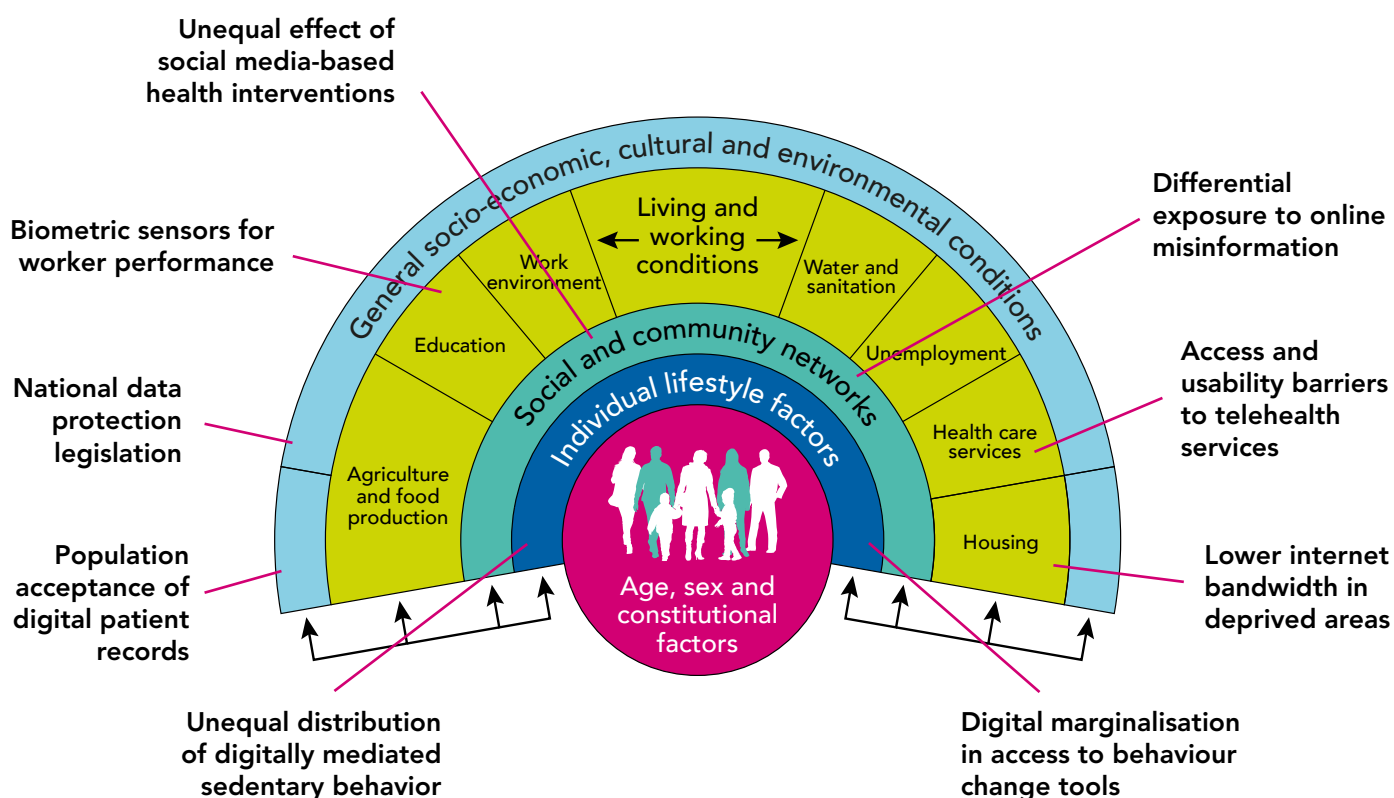
Findings from our research with people who are digitally excluded suggest digital exclusion can be reduced with:

1. Hybrid approaches that balance in-person services with a digital option. Participants expressed a clear appetite for being explicitly taught how to use digital services.¹¹
2. Digital health literacy for the public to enable individuals to find, understand and use health information from trusted digital sources to make decisions.
3. Personal support networks to enable some level of digital engagement through trusted family and friends.

Conclusion

Given that digitalisation impacts all aspects of life, Jahnel et al.¹² proposed the visualisation of digital exclusion using Dahlgren and Whitehead¹³ wider determinants of health model. This model helps articulate how digital exclusion has differential impact of individual, social and community and socioeconomic cultural and environmental factors influencing health.

The rainbow model with examples for digital entry points of health inequality



In summary, it is clear that digital technology can help to enable healthier and happier lives. It can provide a positive impact by empowering individuals with their care and wellbeing while helping to reduce the burden on healthcare systems. However, using it is not without risk as it can create harm, both because of the way it works and whom it may exclude.

Recommendations

Digitalisation, Health and Social Care

- Health and care systems should develop a set of principles which mitigate digital exclusion
- Health and care staff need to be skilled at engaging digitally hesitant citizens
- Trusted behaviour change apps should be integrated into current health interventions

Social Media and Health

- Healthy and safe use of social media should be promoted across the population
- Health interventions must be developed and delivered based on understanding the target populations, with face-to-face options considered for some groups.

Data and Digitalisation

- Existing practices in population health management should be expanded to improve data quality and link data to reduce health inequalities.
- The benefits of shared health records should be communicated clearly for Birmingham's population.

Digital Exclusion

- Barriers to equitable access to digital technology need to be reduced, with initial step of mapping Birmingham's digital assets to identify barriers to equitable digital access.
- Health, social care and voluntary/community staff require the skills to engage and signpost citizens to digital assets.
- Targeted health promoting campaigns should be developed to combat online health misinformation.



Introduction

Purpose

Directors of Public Health (DPH) in England have a statutory duty to produce an annual report on the health of their local community. This report provides insights and recommendations to professionals and the public. Birmingham's DPH Annual Report 2022/23 focuses on the role digital technology plays in improving the health of the population in Birmingham. Specifically, it asks:

- 1. How can digital technology improve health?**
- 2. How does social media positively and negatively impact health?**
- 3. How can digital technology and data assist in reducing health inequalities?**
- 4. What is the impact of digital exclusion, and how can it be mitigated?**

This report provides an overview of key terms, approaches and evidence. It illustrates the range of digital approaches with examples already being implemented in Birmingham. It presents the experience and insights of a sample of citizens. It does not provide a systematic scientific review of the evidence on digital technology in health, nor does it provide a comprehensive list of examples. The report rather shows the impact of digital technology on the determinants of health. It concludes by introducing a new conceptualisation of public health, the 'digital rainbow', based on Dahlgren and Whitehead's original model.¹² This integrates digital technology across all determinants and identifies factors which risk increasing inequality. These factors resonate with those we identify in Birmingham. The 'digital rainbow' provides a sound theoretical basis to structure our recommendations and assess the efficacy of digitalisation now and in the future.



Digital Technology

In recent years, we have experienced the digitalisation of our everyday lives through increased technological innovation. Digital technology and internet connectivity have transformed how we interact with each other and the world around us, helping connect people, improving access to information, and driving economic and social growth.¹⁴



Digital technology includes digital devices, like computers and smartphones, and the features that these devices can access, like the Internet or applications.¹⁰

Digital technology can include¹⁵:

Digital technology	Definition
Artificial intelligence (AI)	Artificial intelligence is the simulation of human intelligence processes by machines, especially computer systems.
Mobile computing or smartphone technology	The field of wireless communication and carry-around computers, such as tablets or smartphones.
Personal and wearable devices	These devices include smartwatches, fitness trackers, implants, or patches with the ability to connect to other devices. Generally, they are in direct contact with the wearer for long durations and generate large quantities of data on specific biometrics or behaviours.
Internet of things	The use of everyday objects as connected devices that provide an additional function through digital technology, e.g., smart home technology, such as smart thermostats or other connected devices.

Local Context

Digital technology contributes to health, impacting physical, mental, and social health.¹⁶ The converse is also true: our health, demographic characteristics and the wider determinants of our health contribute to digital technology use across the city.

Demographics

Between 2011 to 2021, there has been¹⁷:

An increase of

8.9% in people aged 65 years and over

An increase of

4.1% in people aged under 15 years

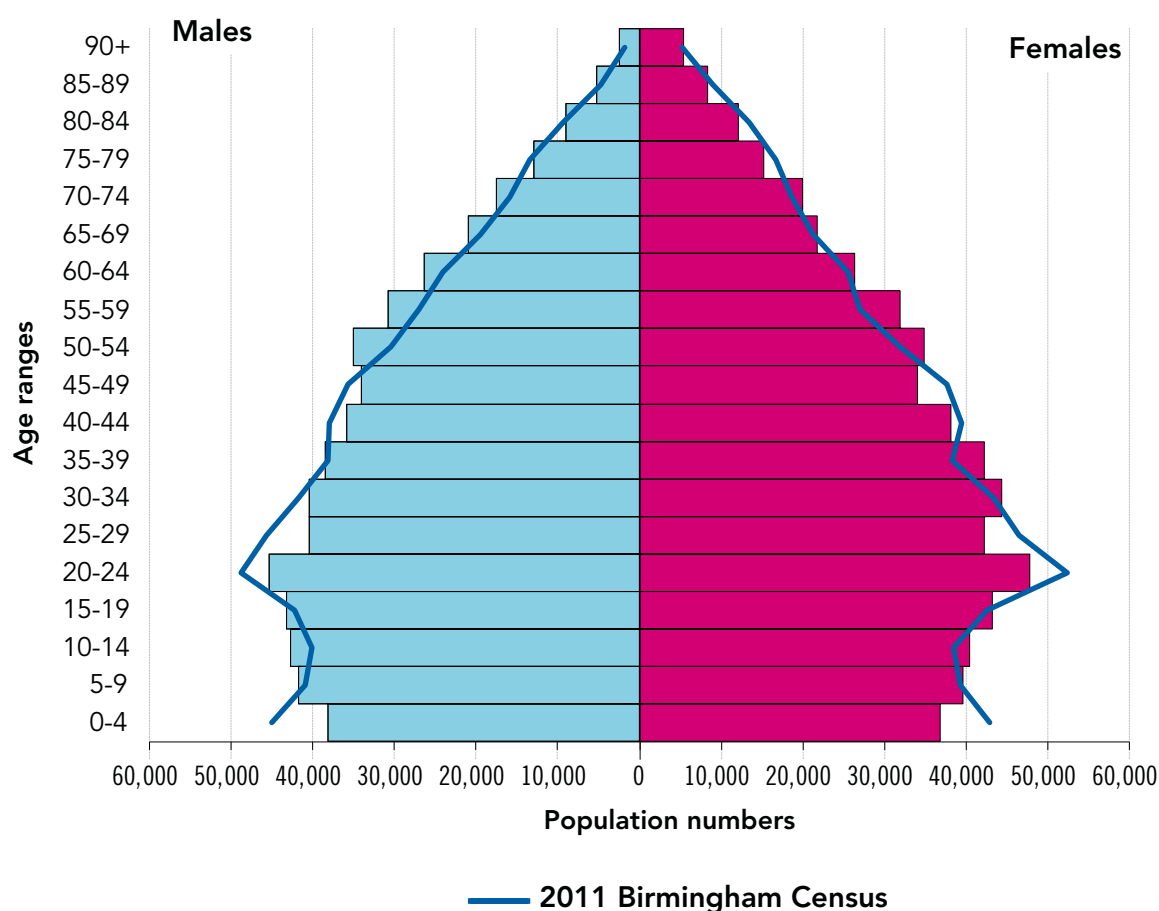
An increase of

7.1% in people aged 15 to 64 years

Approximately

51% of the city's population is ethnically diverse, making it one of the most vibrant and multicultural cities in the UK¹⁷

Figure 1. 2011 v 2021 census population: Birmingham age structure compared with England¹⁶



Health Outcomes

Healthy life expectancy from birth
(male) in 2018-2022 in Birmingham is

59.2 years
compared to England's
average of 63.1 years.¹⁸

Inequality in life expectancy from birth
(male) in 2018-2020 in Birmingham is

9.5 years 
compared to England's average of 9.7 years.¹⁸

Healthy life expectancy from birth
(female) in 2018-2022 in Birmingham is

60.2 years
compared to England's
average of 63.9 years.¹⁸

Inequality in life expectancy from birth
(female) in 2018-2020 in Birmingham is

6.2 years 
compared to England's average of 7.9 years.¹⁸

Wider Determinants of Health

38.1



Birmingham is one of the most deprived
local authorities in England. Birmingham's
DEPRIVATION SCORE (IMD 2019) is 38.1
compared to England's average of 21.7.¹⁸

8.5%

The percentage of **16-17-YEAR-OLDS NOT IN**
education, employment or training (NEET) in
Birmingham is 8.5% (2021). England is 5.5%.¹⁸

34%

The percentage of **OLDER PEOPLE** (+65 years
old) **LIVING ALONE** in Birmingham is 34.4%
(2022). England is 31.4%.¹⁸

25.8%

The percentage of **OLDER PEOPLE** (+65 years
old) **LIVING IN POVERTY** in Birmingham are
25.8% (2019). England is 14.2%.¹⁸

36.6%

The percentage of **CHILDREN IN RELATIVELY**
LOW-INCOME FAMILIES (under 16s) in 2020-
2021 in Birmingham is 35.6% compared to
England's average of 18.5%.¹⁸

Only **50%** of residents in Birmingham
EAT FIVE FRUIT AND VEG A DAY.¹⁹

65.7%

is the percentage of
PEOPLE IN EMPLOYMENT in Birmingham
compared to England's average of 75.1%.¹⁸

Digital Infrastructure and Access in Birmingham

Birmingham has seen a rapid increase in digital access, which may reflect recent investments in the city's digital infrastructure. The percentage of people with digital access (whether a person has accessed the internet in the previous three months) increased from 88.6% (2018) to 91.4% (2019). However, it remained the same the following year at 91.4% (2020).²⁰ This means that as of 2020 in Birmingham, an estimated 8.6% of people have never used the internet or have not used it in the previous three months. Given

Birmingham's population size and demographics, this proportion means there may be approximately 75,000 people who have either never used the internet or not used it in the past three months.

The West Midlands 5G Infrastructure Acceleration Programme analysed the 5G (5th generation mobile network) coverage across the UK's Combined Authority.²¹ In 2020, the West Midlands (7.34%) had the highest percentage of 5G coverage of the UK Combined Authorities. At 11.2%, Birmingham ranked the highest for 5G coverage among the core cities in 2020.²²

Figure 3. 5g coverage of uk combined authorities (%)²²

Combined Authorities

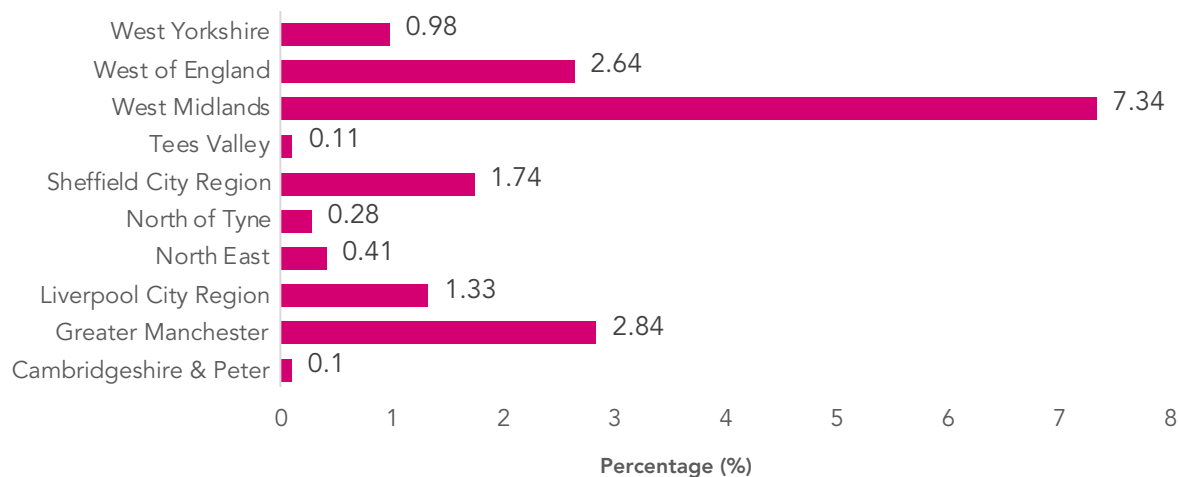
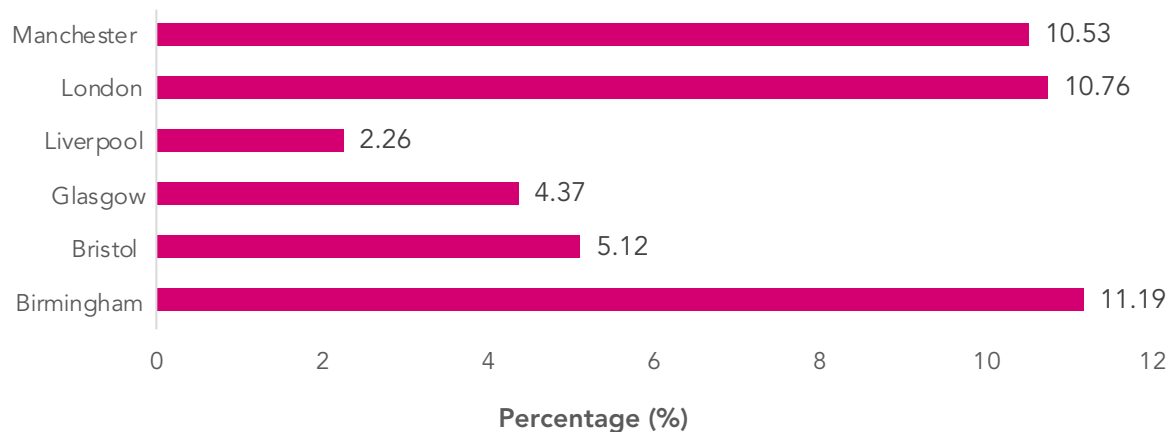


Figure 4. Geographical 5g uk coverage of core cities(%) in 2020²²

Core Cities



In 2019, **8.6% OF PEOPLE** in Birmingham **HAD NOT BEEN ONLINE** for three months, compared to 11.2% in 2018. While there is an improvement, there are still high levels of exclusion.²³

In Birmingham, there have been increased activities delivered by local organisations. **THE NEIGHBOURHOOD NETWORK SCHEME (NNS)** supports digital inclusion activities, such as; setting up computer loan schemes, recycling devices, digital champions programmes and digital skills courses.²⁰



In the UK, **23.3% OF ADULT INTERNET NON-USERS** were **DISABLED** compared to 6.0% of those without a disability (2019).²⁴

Local Strategies

Birmingham City Council Digital Inclusion Strategy

In November 2021, Birmingham City Council published their Digital Inclusion Strategy and Action Plan, 'Connecting our communities – Enabling a Digital Birmingham'. The strategy aims to increase digital inclusion within Birmingham's population to address issues that digital poverty can exacerbate within deprived communities. It states that "(it) is the Council's first step in developing a comprehensive and holistic approach to address the digital divide".²⁴

The strategy identifies several challenges the Council and local partners face in addressing digital exclusion.

LACK OF COORDINATION and STRATEGIC PLANNING

LACK OF ACCESS to digital devices and AFFORDABLE CONNECTIVITY

PROVISION OF EQUIPMENT

DEPENDENCY on grant funding

Addressing DIGITAL SKILLS

ALIGNING AND DEVELOPING complementary provision

The strategy also notes that the recovery from social and economic damage of the COVID-19 pandemic is fundamentally tied to increasing digital inclusion. Therefore, there are clear benefits to be realised in ensuring the city's population is digitally included. A rise in the number of residents working and studying from home will

require reliable infrastructure and adaptations. Equally, as discussed in this report, there are greater employment opportunities open to individuals with digital confidence and skills. The strategy states that "every £1 invested into digital inclusion delivers a £15 rate of return over ten years".²⁴

Birmingham City Council Digital Strategy 2022 – 2025

In January 2022, Birmingham City Council published their 'Digital Strategy 2022-2025'. This strategy defines the council's approach to digital working for the next 3 years. It defines digital as "a way of working, a way of thinking and a way of doing. It is about people as much as it is about how we manage and implement technology".²⁵

The strategy has 5 priorities that have been shaped through engagement with citizens, council employees, and businesses:

- A. Creating online services that are easy to use**
- B. Improving our data and evidence-based decision making**
- C. Giving our Council teams the right digital tools to do their jobs**
- D. Building the Council's digital and data skills**
- E. Building the best technology to support Council services**

The strategy acknowledges that unreliable, unresponsive, and under-informed council services are not tolerated by citizens and businesses, especially when these relate to critical services. Working from this point, the strategy envisages the "digital building blocks"²⁵ to enable the desired end state. This goal is defined as wanting "technology to be an enabler rather than a barrier to service improvements, and services to be a delight for citizens".²⁵

Birmingham and Solihull Integrated Care System: Digital, Data, and Technology Strategy

The Birmingham and Solihull Integrated Care System (ICS) recently published their strategy which detailed their approach to digital, data, and technology over the next 4 years. The purpose of this strategy is to set out how the ICS will reduce care inequalities, adopt a 'digital by default' approach, and facilitate co-operation across the ICS.

Their approach has included 4 stages of development for the strategy:

- 1. Understanding national frameworks and the demographics of Birmingham and Solihull.**
- 2. Assessing the current state of digital maturity in the ICS.**
- 3. Creating a model for the intended future state of the ICS, including the ideal experience of the population.**
- 4. Developing actions and recommendations to reach the future state of the ICS. This has included broad cost estimates for specific areas of the strategy.**

The strategy identifies plenty of opportunities for partnership working on the areas of digital inclusion and exclusion. As part of its priority to empower citizens, it states an initiative as "collaborate with local authorities who have produced valuable insights about combatting digital exclusion". It also acknowledges that an expected outcome of this priority will be a bespoke ICS Digital Inclusion Strategy to complement those published by local authorities.



Digitalisation, Health and Social Care



Illustration by Matthew Gleeson from Birmingham City University

Digitalisation, Health and Social Care

Digitalisation, the process by which we use digital technology for our systems and activities, interacts with health across multiple areas. Firstly, there is its use in healthcare settings for the treatment and care of patients. More broadly, there is the use of digital technology by individuals to monitor and improve their own health. Finally, there is its application to improve the public's health in general.

Digital Technology, Health and Social Care

There has been an unprecedented shift towards the greater use of digital technology in health and social care. This has been driven by policy, demand, and the COVID-19 pandemic.

The NHS Long Term Plan¹ prioritises digital technology to give patients more control over their health and care. There is a commitment for the NHS App to act as the new digital 'front door', giving people secure access to their own medical records. It aims to ensure patients can find trusted information about their health, book appointments, and even view their test results online. In the future, it will provide medical advice and consultations securely. In addition to patient access and experience, the prioritisation of digital technology will support health and care staff to complete simple administrative tasks more quickly. This will allow more time to be spent with patients. NHS IT systems will also ensure that staff can quickly and easily access joined-up patient records.

The COVID-19 pandemic has accelerated the use of digital technology across health, including in General Practice (GP). Millions of GP appointments in England are now delivered through telephone and video calls. With record high patient demand, digital tools can help general practices manage this pressure, enabling them to triage patients and prioritise face-to-face consultations. Text messages provide information to service users. Back-office functions can now be shared across much larger geographies supported by cloud-based software and virtual meetings.¹⁴ Despite this, most virtual appointments take place over the phone, and many people still attend appointments in person.²⁶

760,532

NHS Birmingham and Solihull Integrated Care Board total appointments in General Practice for October 2022 is 760,532²⁷

48,477

October 2022, Birmingham and Solihull (BSol) primary care had a total of:²⁸

- Online consultation/triage definition: This is if a patient completes a form on a digital channel (e.g. a NHS Website or NHS App)

Total online consultation/triage: 48,477.

583

October 2022, Birmingham and Solihull (BSol) primary care had a total of 538 video call consultations. Video call consultations definition: consultation with the patient when done via video.

Initial concerns about the shift from face-to-face to virtual consultations, particularly for older people, were not founded. Older patients have reported their satisfaction with online appointments, with a reduction in waiting times and the savings they make on transport costs.² However, there is a degree of anxiety before using online consultation.² With the transformation of digital technology, clinicians have had to adapt and learn new skills on the job.

Digital technology is transforming the way social care is delivered. A process accelerated by the COVID-19 pandemic and increasing demand, it is used in adult social care to maintain independence and improve outcomes. Digital technology can support people’s care through remote monitoring (caring for patients by monitoring them in their homes or care homes).²⁹ It has huge potential to predict risks and prevent incidents from occurring. This technology can ensure an effective response when avoidable events occur, such as a fall.³⁰ More than 1.7 million people in England are already using assistive technologies.³¹

Digital technology can support teams and practitioners, giving them the right information

at their fingertips. Digital social care records can improve transfers of care and allow staff to have the most up-to-date information as soon as they need it. Providers are preparing to link to the shared care record when it is available. Fundamentally, it will improve the quality of care and create time for more meaningful interactions. To maximise the potential of digital technology in social care, skills need to be developed in the workforce as well as the infrastructure of care settings.¹⁴ The digital switchover (retirement of analogue phone lines) will take place by 2025 and has implications for the delivery of telecare. The switch emphasises the need to test equipment, inform residents and procure compatible devices for delivering care.³²

Birmingham’s Adult Social Care team is co-producing a transformed Technology-Enabled Care (TEC) service. The aim is for technology to be used daily as part of care and support, and data-led practice will be instinctive and embedded. The transformation of TEC will include digitising social care records and interventions such as Brain in Hand (case study).

Table 1: The benefits of digital inclusion for individuals and the health and care system ²

Benefits to individuals
<ul style="list-style-type: none">• Physical and mental wellbeing• Prevention of illness• Self-care• Shared care and shared decision-making• Long-term condition management• Appropriate use of urgent and emergency care
Benefits of the health and care system
<ul style="list-style-type: none">• Lower cost of delivering services digitally• More appropriate use of services, including primary care and urgent care• Better patient adherence to medicines and treatments



Digital Technology and Individual Health

Millions of individuals already use digital technology to improve their health and wellbeing.³³ This may take a variety of forms, such as applications (apps), websites, chat services and video calls. Websites can offer expert advice, tips and personalised actions to promote health, such as Every Mind Matters (NHS), which helps people look after their mental health. The NHS website is a resource to provide information and education, with content written by healthcare professionals with patients. There are many IT systems gathering data on services and from surveys. Examples include NHS Digital, OHID Fingertips dashboards, and the NHS Foundry platform. These are used by commissioners, data analysts, and clinicians to analyse and interpret data to improve health at an individual and a population level. These platforms exist to provide access to health information in different ways and to different audiences.¹⁰

"It (fitness app) tells you how many (steps) you've done and I've come to rely on that... I'm borderline diabetic and I've been told to lose weight"

Faith communities focus group

Our ethnographic research and targeted focus groups highlighted that participants, and researchers, often think of using digital technology in the context of apps rather than websites to support their individual health. This may reflect the interventional nature of most app models and that individuals may not describe research and self-education as behaviours that influence their health. They may discount websites as less important to their health. However, it may also reflect the limited research into how gaining knowledge and understanding can be utilised as a health improvement methodology or intervention.³⁴

There is already a considerable saturation of apps and websites available in the commercial market that can be used overtly for health and wellbeing purposes.³³ In a recent quarter (October-December 2022), 41,517 apps on the Apple App Store focussed on health and care.²⁸ This is alongside apps which may provide an indirect health benefit, such as the example used by the focus group participant below.⁶

"I listen to Apple Music every single day because music is therapeutic for me and helps my mental health"

Adults with a physical or mental health condition focus group

It is important to recognise that most apps are for-profit innovations and have a pay element. This may be a barrier to access but also create bias or skew regarding the health support provided. Some may also have a health benefit without being designed or marketed as a health app. Pokemon Go is an app that encourages walking to find virtual monsters and has been shown to increase step counts in adult men and positively impact mental health. However, it is not marketed as a health-promoting app.³⁵



While digital technology can monitor an individual's health or boost their wellbeing, one of its more impactful qualities is the potential to establish long-term behaviour change.³⁶ A 2019 review of health and wellbeing apps concluded that the majority of apps in Apple App and Google Play stores were effective at achieving only low-to-moderate levels of behaviour change. They did, however, encourage users to practice behaviours.³ The review concluded that improvements in app design could achieve sustained behaviour change.³ NHS apps, such as the NHS Quit Smoking App³⁷ or Change4Life's Food Scanner app, seek to achieve sustained behaviour change.³⁸ Widescale adoption of these apps has the potential to reduce the burden of disease across the whole population. However, this cannot deliver change in isolation and is not a panacea for health inequalities. It requires significant improvement in the adoption of behaviour change theory and evidence to achieve sustained outcomes and improvements in people's lives.

Digital Technology and Public Health

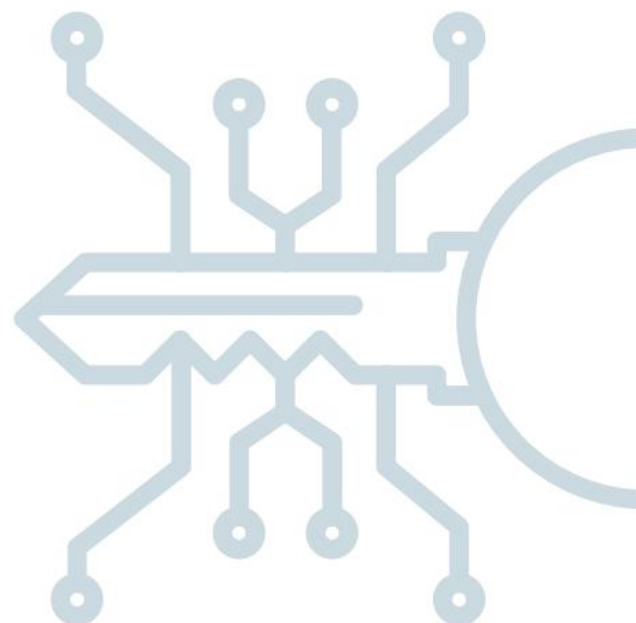
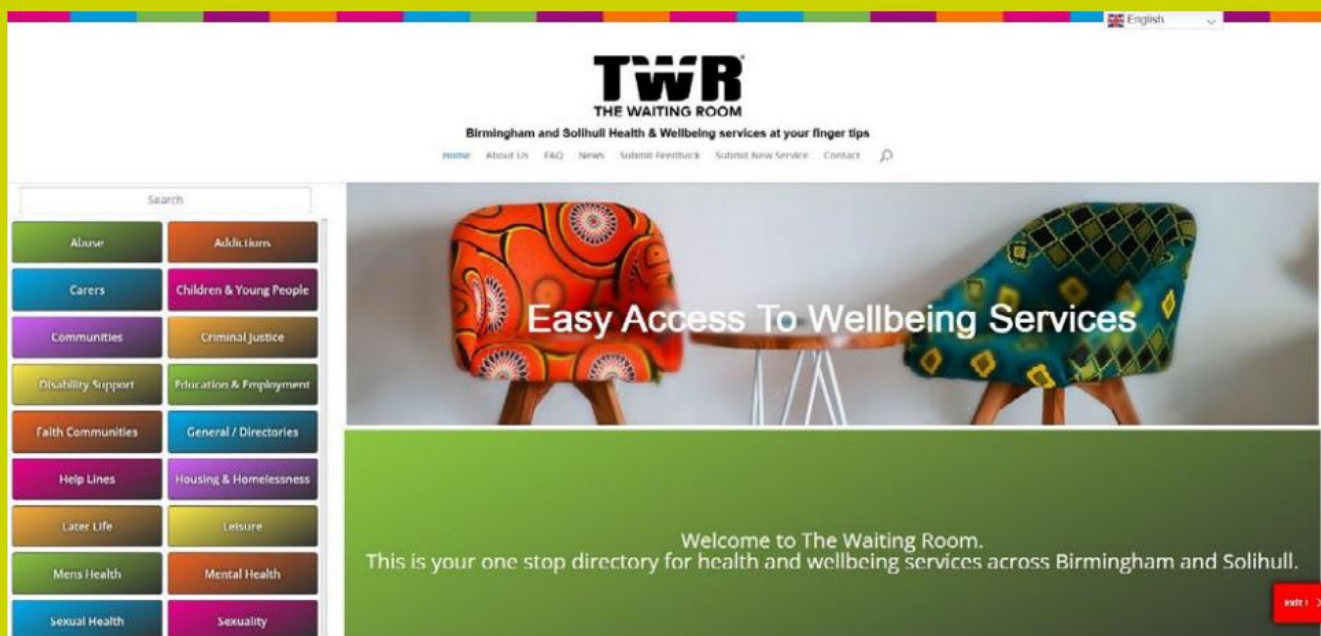
A public health intervention aims to promote good health and prevent ill health by influencing behaviours and habits.³⁹ Apps are one of the most common and widely used tools for digitally-led public health interventions. They are readily available for the public to access, download, and install on their digital devices.⁴⁰ They often emphasise positive messaging and giving proactive control to the user, thereby giving them more power to control their life choices.⁴¹ Equally, websites, digital interactive platforms and forums can provide specific health information and allow individuals to communicate with professionals on various health topics. There are many examples from Birmingham of Public Health and our partners already utilising digital technology to promote positive health and wellbeing.



The Waiting Room

The Waiting Room (TWR) is an online directory for health and wellbeing support in Birmingham and Solihull. Developed by local social enterprises, Common-Unity and Forward For Life, this directory now welcomes over 200,000 hits per year by local communities and professionals. TWR links people to a raft of services utilising 24 categorised areas that host over 1000 local and national services. TWR can also translate into 104 languages and is utilised heavily by local health and social care services across the system to link communities with the appropriate support. During lock-down (2020)

TWR was instrumental in providing support to communities through the distribution of 1000's of QR Coded Key Fobs within emergency packs distributed through Birmingham Public Health. These key fobs and posters have also been distributed across the Third Sector, to universities as part of the Welcome Packs for new students and to all 200+ GP practices within Birmingham and Solihull. TWR is also downloadable as an app and for its 10-year anniversary celebration has just launched the new and improved TWR website.



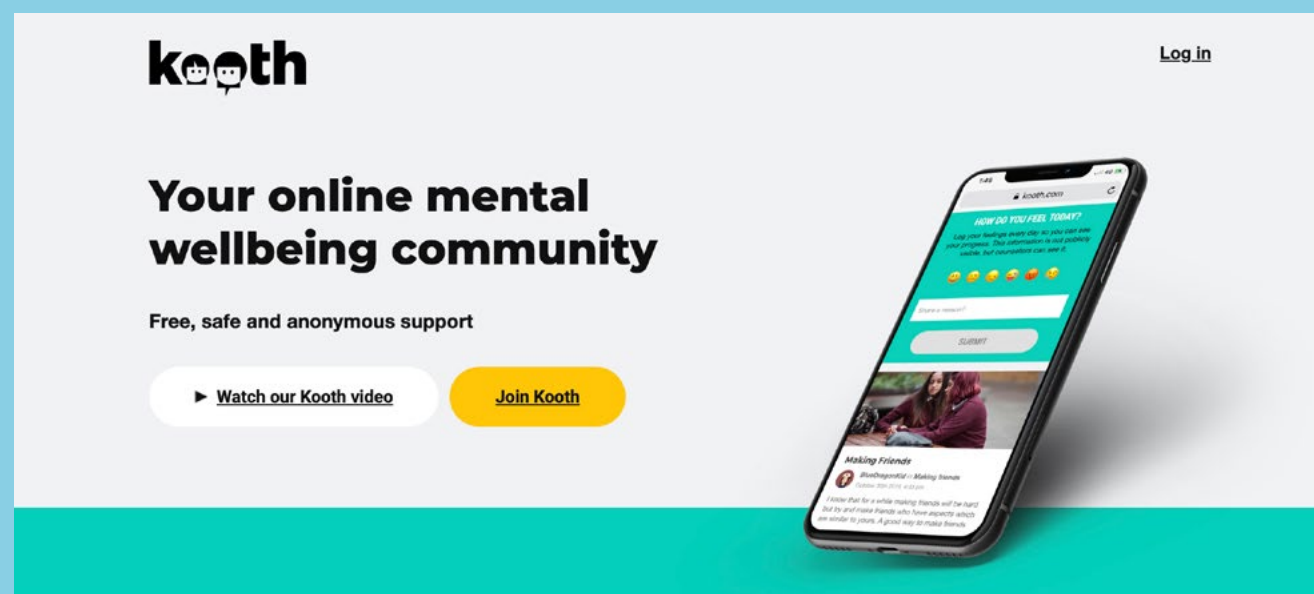
Kooth – Birmingham Children’s Partnership

Kooth is an online counselling service available to all children and young people in Birmingham, creating a welcoming space for effective and personalised digital mental health care. The app preserves anonymity and removes the barrier of stigma and access. Accessibility is at the heart of product design and clinical delivery.⁴² Kooth offers many services, including drop-in and one-to-one chats with fully trained counsellors, a themed moderated message forum, a secure web-based email, and an online magazine. Users can register on the site using an anonymous username. The themed moderated forums on Kooth are relationships, bullying, eating disorders, depression, self-harm, health, friends, family, and ideas for Kooth.⁴³

The COVID-19 pandemic presented many challenges for children and young people in Birmingham. There is a persistent gap between need and provision, and poverty puts children at greater risk of mental health problems.

When COVID-19 and the first lockdown hit Birmingham, the Birmingham Children’s Partnership (BCP) responded to worries about mental health, safeguarding issues, domestic abuse and poverty that affected so many families. One of their actions was to establish a new online mental health service. The BCP rolled out Kooth in two weeks, the largest roll-out they have done in the shortest time.

In its first two years (April 2020 – March 2022), 13,788 children and young people registered with the online platform. In December 2020, Kooth users sent 2,130 messages, had 240 therapeutic chat sessions, viewed articles 750 times, and accessed forums 3,390 times. It is expected that Kooth will continue to be a key part of the universal offer to the city’s children and young people in the future. The aim is for 10% of Birmingham’s children and young people (approximately 30,000) to register on the platform by the end of 2023.



Whisk App – Public Health Food System Team

Whisk is an app which aims to help residents make healthier food choices by sharing healthy recipes on a community platform.⁴⁴ The app was developed in Birmingham for the 'Cook the Commonwealth' project that forms part of Birmingham City Council's legacy work to celebrate the 2022 Commonwealth Games.

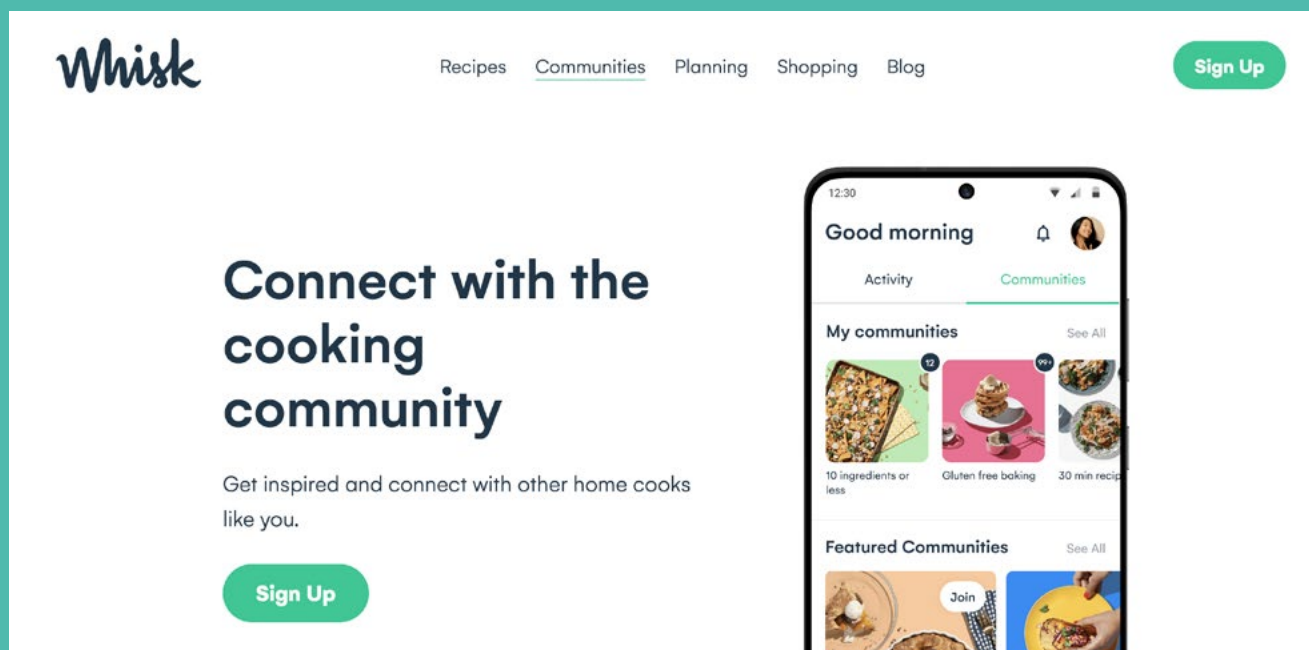
The first stage of this project involved capturing recipes from 72 different Commonwealth countries. More than 250 food businesses, community groups, tourist agencies and other organisations were contacted for recipes. Some organisations, such as the British Dietetics Association (BDA) and Healthy Brum, shared the call for recipes on their social media. Nearly 800 recipes were uploaded onto the Whisk platform in different communities of recipes such that each country had at least ten recipes. Around 70 recipes came from local chefs, members of the community and tourist agencies, making these recipes accessible to all citizens of Birmingham. Once on the platform, citizens can search 'CWG', where they would find the community pages for each country containing the recipes.

To keep healthy eating at the heart of this project, it was ensured that the majority of

recipes had a health score of greater than 7/10 (the Whisk app generates the health score), with some leniency regarding baked items.

Through a link with the BDA, freelance dietitians applied to test, tweak and photograph recipes, also giving positive feedback around their contribution: "I enjoyed cooking all the recipes and discovering new foods and techniques and others that felt quite familiar". Overall, the dietitians tested and tweaked 180 recipes (the remaining 90 were photographed only). In doing this work, they increased the median health score of these recipes from 5.1 to 7.3. They also removed a total of 11,000 calories and 1,370g of fat whilst adding 380g of protein to these recipes.

Whisk has an analytics function measuring the app's use through clicks and views. There are approximately 900 recipes in CWG communities, and they have been viewed over 20,000 times in 2022 (25k in total) and saved almost 5,000 times. Almost 20% of actions are within Birmingham, and the short-term success can be measured by the take-up of the app and use of specific Commonwealth recipes for the length of the campaign and encouraging healthier eating (using recipes with a health score of 7/10 or more) in the long term.



Quit with Bella –Public Health Adults Team

In June 2020, Birmingham City Council launched an on-demand Artificial Intelligence (AI) stop-smoking service called “Quit with Bella”. “Quit with Bella” is a mobile app that includes:

- Bella - your stop smoking coach
- Bella Community - a community of users supporting each other to be smoke-free
- Nicotine replacement therapy (NRT) provision with local pharmacy integration

The rationale for using an app rather than the conventional approach was that stop-smoking services struggle to reach individuals who cannot commit to weekly/fortnightly cessation meetings due to personal or work commitments. An app changes this dynamic by providing support and motivation on the user's terms and at their own pace. Equally, natural language processing enables Bella to create a real rapport with users, thus enabling a personalised conversation. These all combine to provide an engaging service with unique benefits, such as the peer support function, making it easy to encourage and motivate empowerment and self-management. Historically, the decline in smoking rates among higher-income groups has been much greater than among lower-income groups, and smoking rates are highest in the routine and manual groups. Therefore, deliberate measures for these particular groups were built into the app.

The initial six months have shown that over 1,500 individuals have accessed the service as a standalone service delivery offer. From 1 June to 31 December 2020, there have been 272 4-week quits and 47 12-week quits. App users have had vouchers issued; however, they have not collected them but are still registered as quitting smoking. Therefore, if app users can quit smoking without using NRT or e-cigarettes, this would achieve overall financial savings in service delivery. At present, the average number of quit attempts an individual will have is approximately 6 or 7. AI can reduce this by at least 50%, reducing costs around NRT and e-cigarettes.

Beat the Street – Sport England

‘Beat the Street Brum’ was a game accessed through the Beat the Street app and website. The aim of the game was to earn as many points as possible for yourself and your team by walking, cycling or rolling between ‘Beat boxes’ across East Birmingham.⁴⁵ The health benefits of the project would come from the increased physical activity of players as well as the wellbeing benefit of a fun and engaging competition.

Players, depending on their age, could collect a ‘Beat the Street’ card from their school or local distribution point and use this to create a player profile on the app. Players could then use the app to locate ‘Beat boxes’ near or on their route. If a player visited two ‘Beat boxes’ within an hour, they collected 10 points for each box. If they continued their journey, they scored an extra 10 points for each extra box they visited.⁴⁵

Beat the Street aimed to improve:

- Local air quality
- Players’ health
- Community cohesion

Throughout the six-week game (28 September - 9 November 2022), 3,519 registered players travelled a total of 5,637.5 miles, which equates to an average of 1.6 miles per person.⁴⁵ The project was particularly impactful with target communities, with 39% of less active children becoming more active, while 97% of players were from IMD groups 1-4.⁴⁵



Brain in Hand – Adult Social Care

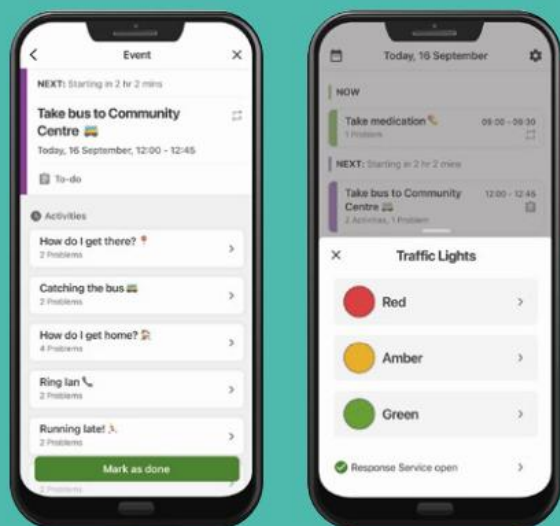
Brain in Hand is a subscription-based digital self-management support system (app). It supports people who need help remembering things, making decisions, planning, or managing anxiety. It can help with planning, organisation, establishing and maintaining routines; problem-solving; memory; communication & social interaction; managing money; mobility and travel confidence; and managing anxiety.

Birmingham City Council's Adult Social Care division is piloting Brain in Hand with 20 young adults. These young adults are known to the 'Transitions & Preparation for Adulthood Service' and meet the criteria for using the app. Participants in the pilot will have easy access to coping strategies developed during personal planning sessions. They will have self-management tools via the Brain in Hand website and mobile software. They will have additional round-the-clock support from Brain in Hand responders if needed.

By reviewing the young person's solutions and problems, they and their supporters can work together to identify patterns, discuss difficulties, and emphasise successes and achievements. As needed, they will develop new strategies that work for the user.

Brain in Hand and the pilot aims to enable young adults to live more independent lives, improve their quality of life and reduce the likelihood of crisis incidents. The project will also aim to evaluate the impact of using Brain in Hand on Adult Social Care services to identify potential cost savings and cost avoidance savings. If the young adult can live more independently, escalation of their care needs is avoided.

The pilot started in January 2023 and will end after one year. Alternative funding sources will be investigated for those who would benefit from continued access to Brain in Hand after the end of the pilot.



Social Media and Health

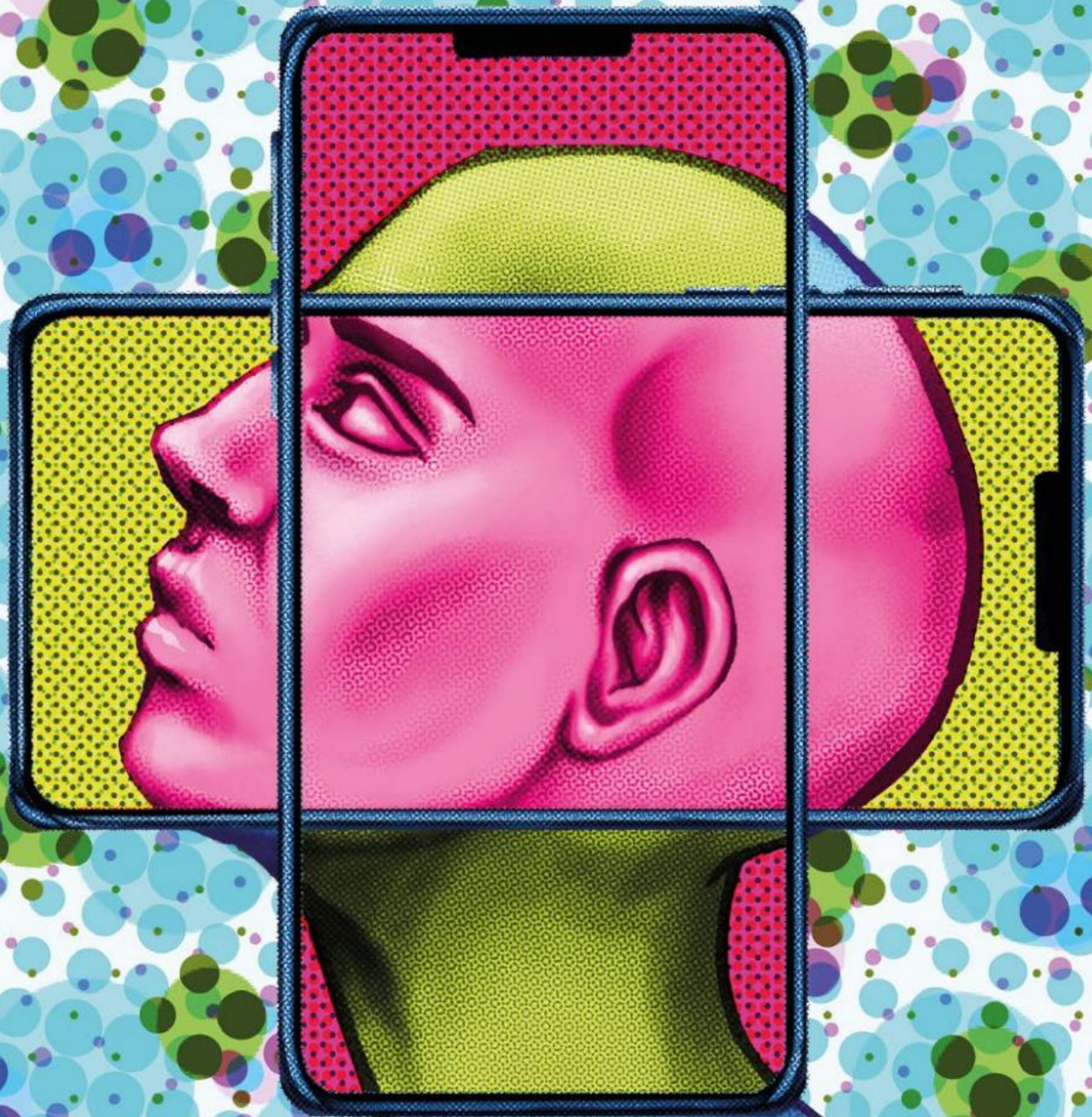


Illustration by Rose Leedham from Birmingham City University

Social Media and Health

Social media has transformed how we communicate and is now a part of most people's lives, especially younger people.⁴ Social media can be defined as websites and applications that allow people to communicate and share information on the internet.⁴⁶ Popular social media platforms include Facebook, Twitter, Instagram, TikTok, YouTube and WhatsApp. They can be accessed on digital technology devices such as computers, tablets or mobile phones, and there are different types for different uses.⁴ In the wake of a sudden loss of social contact during the COVID-19 lockdown, people were encouraged to turn to social media to stay connected with friends and family.⁴⁷ It is already integral to many people's lives, and increasingly it plays an important role in managing their health.⁴⁸

The Role of social media in Public Health

Social media has become invaluable for public health, especially in recent years. It can spread information very quickly to diverse groups of people. This can be vital when the information is scientifically correct, clear, and helpful.⁴⁹ Social media use also helps provide social peer support for people experiencing similar health conditions.⁴⁹

Social media provides a cost-effective way of informing audiences about health issues, enhancing communication during public health emergencies or outbreaks, and responding to media about a particular public health issue.⁵⁰ This was reflected in the experience of focus group participants during the COVID-19 pandemic.⁵¹

"When it's (social media) is used for good, it's definitely good. You've only got to look at the pandemic and the times that they needed to act fast and get information to certain groups"

Adults in receipt of Universal Credit and/or unemployed focus group

Social media is also beneficial for increasing citizens' awareness of public issues, allowing them to take a more active and better-informed role in their communities.^{52 53} These communication channels are continually updated and can provide a two-way dialogue between citizens and the relevant authorities.⁵⁴ As a result, social media platforms can use their display functions to direct users to reliable information sources such as the World Health Organization websites and the websites of local health authorities.⁴⁸



COVID-19 Pandemic Misinformation

Spreading health misinformation through social media has become a major public health concern.⁵ For example, misinformation about the COVID-19 vaccines is spread on social media platforms at such a rate that the World Health Organization coined the phrase 'infodemic' to describe it.⁵⁵ Focus group participants thought that it was becoming more difficult to judge whether or not health and wellbeing information was incorrect or misleading.⁶

"Who monitors the information that's online and who puts the information on there to start with?"

Adults in receipt of Universal Credit and/or unemployed focus group

A response to misinformation in Birmingham was the establishment of a COVID-19 Community Champions Network. It consisted of trusted volunteers who shared accurate information with their communities. Birmingham City Council used the Public Health 'HealthyBrum' brand across platforms to keep champions informed of the latest advice and guidance and to help their communities make sense of the latest information about the virus. 'HealthyBrum' was also used for several campaigns using different messages to promote public safety.

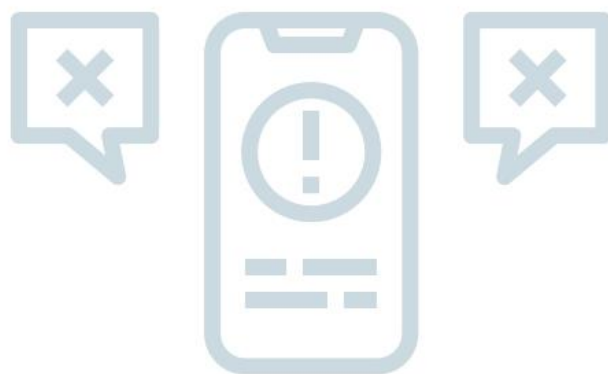


Figure 5. 'It's no bull' social media campaign poster⁵⁶



#Passthefact - Beatfreeks & Birmingham City Council

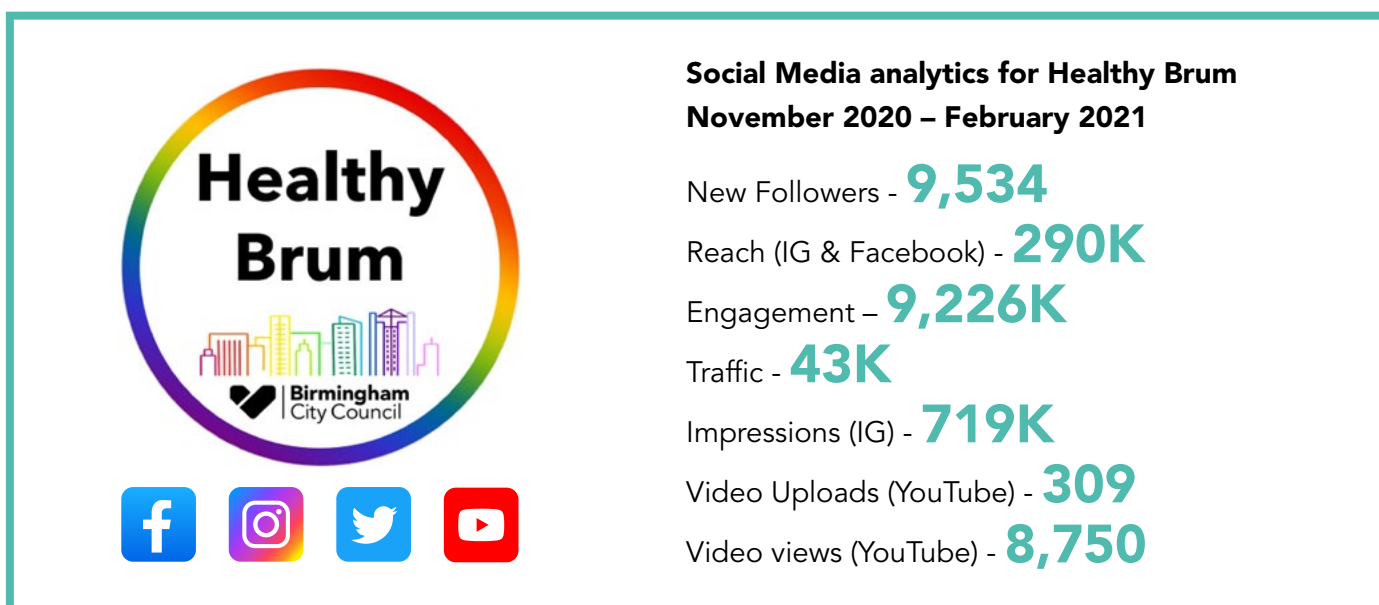
During the first lockdown, the Public Health team partnered with a local research organisation, Beatfreeks, for an information campaign targeted at young people to challenge misinformation about COVID-19 on social media.⁵⁷

#Passthefact was a social media campaign co-designed and delivered with ten young Birmingham residents. It aimed to encourage young people to promote facts and guidance about COVID-19 while stopping the spread

of false information. The campaign involved myth-busting on platforms such as Instagram, Facebook and TikTok.⁵⁷

Within 24 hours of starting the campaign, there were already 50 original pieces using the #Passthefact. There were overall 1,303,638 online impressions on social media, and the campaign received positive news coverage from local sources such as Birmingham Live, Birmingham Mail, and BBC West Midlands.⁵⁸

Figure 6. 'Healthybrum' analytics for all social media platforms Facebook, Instagram, Twitter & YouTube from November 2020 – February 2021⁵⁶



By regularly receiving trustworthy and clear information, Birmingham residents could make more informed choices and stay safe during the pandemic. According to the social media analytics, engagement with Birmingham residents was effective (Figure 7), as social media was used to inform them of essential health information when in lockdown and during the lifting of restrictions. The focus group research for this report agreed that the ability of digital technology to connect people socially was picked up as an opportunity for public health.⁵¹

"I think we have experienced that a lot with Covid, using games and apps. I think it brings social connectiveness with it as well, even if you aren't fully social"

Young adults focus group

The Risks of Social Media on Health and Wellbeing

The use of social media has been demonstrated to have a negative impact on emotional wellbeing and mental and physical health. Increased time online, in front of digital screens, and being overloaded with information have been associated with reduced wellbeing, including isolation and anxiety.⁴⁷ The time spent on social media has been shown to correlate with mental health problems, including depression and suicidal feelings, in teenagers, particularly in young females.⁵

Increased time on social media increases the risk of exposure to harmful content. This is evident in the case of Molly Russell, a 14-year-old from Harrow who died by suicide in November 2017. The coroner concluded that she had been suffering from depression and interacting with harmful social media content.⁵⁹ In addition to searching out content related to self-harm and death by suicide, the algorithms within the platforms directed additional harmful content to her account. The high-profile national case raised the issue of regulating online content by age verification.⁵⁹

Research has also linked social media to higher body dissatisfaction, anorexia, and eating disorders, particularly among those with depression.⁵ Social media can also encourage sedentary behaviour rather than health-promoting behaviours such as, physical activity, learning new skills and developing talents.⁵⁴ Parents' concerns about their children's use of social media negatively affecting them were also reflected in our focus groups.³⁴

"We should protect younger generations because you can see eating disorders spreading... you see all these models and it makes them feel like they're not good enough"

Faith communities focus group

"It's too accessible for younger people to access... I have big concerns about victimisation, body shaming, child exploitation"

LGBTQ+ focus group



Data and Digitalisation

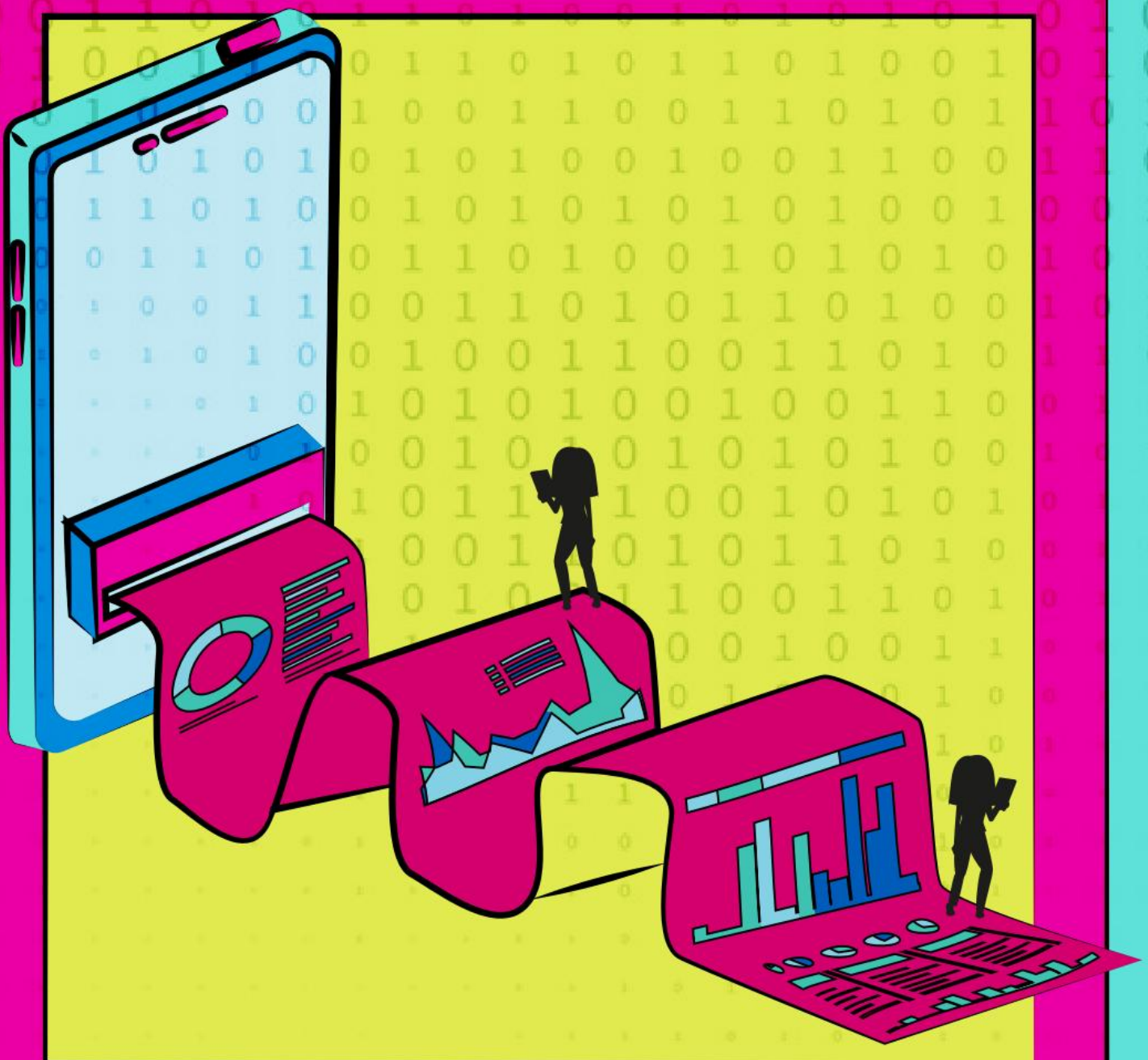


Illustration by Rosanna Smith from Birmingham City University

Data and Digitalisation

Digital Technology and Data

Data plays an essential role in public services, and its use is increasing as we collectively attempt to solve complex problems now and in the future. Data generates intelligence and insights across public health to improve and protect the health of populations. Advances in digital technology have improved the accessibility, quality and increased the quantity of data collected. Progress in physical devices and software has increased our capacity and capability to analyse and generate insights that support effective and evidence-based interventions.¹⁵

As progress is made, we are responsible for ensuring that digital technology and data use improves outcomes for Birmingham's population. Electronic Health Records (EHRs) and existing data are improving our understanding of the protective and risk factors affecting our health. The increase in data collected is improving local services and sharing and linking data will enable further understanding of our population. Improving and protecting health and treating ill health continues to require collaboration between decision-makers, analysts, practitioners and populations.⁶⁰

Electronic Health Records

Digital technology has transformed healthcare using EHRs. EHRs help providers better manage care for patients and provide better healthcare by providing accurate, up-to-date, and complete information about patients at the point of care.⁶¹ EHRs have been positively associated with contributing to the earlier detection and better treatment of chronic diseases by improving the accuracy and accessibility of patient data.⁶² For example, digital patient records can be used for practice-level interventions such as identifying patients who have not received bowel cancer screening or mammograms. The information provides feedback to primary care providers about

the quality of their care, such as screening rates and preventative target achievements.⁶³ The NHS Long Term Plan is committed to providing health and care staff complete access to joined-up patient records.⁶⁴

Electronic records are increasingly used by patients to understand and manage their health. In addition to equipping health and care staff, the NHS Long Term Plan also aims to enable everyone to access their own medical records via the NHS app and allow people to view information about their health online. As of 30 November 2022, nearly all patients aged 16 years and over in England will see new record entries on their GP record via the NHS App.⁶⁵ There is a growing need to understand the population's acceptance of digital patient records and the impact of increased access to health information.

Using Patient Data to Understand the Risks and Prevent Ill Health

Digital technology and data are essential to understand the factors that influence health. By understanding positive, protective, and risk factors, we can improve health outcomes and prevent ill health.⁷ The use of data to further our understanding of these determinants has been emerging for many years. Organisations such as Kaiser Permanente, a leading healthcare provider in the United States (US), started over 50 years ago by compiling anonymous patient data to research population health.⁶⁶ During this time, they have continued to use longitudinal data to increase our understanding of common diseases, such as breast cancer. Their studies, trials and analyses have furthered our knowledge of risk, including modifiable and non-modifiable risk factors.⁶⁷

One of the most high-profile studies was the Adverse Childhood Experiences (ACE) Study, initiated by working with the Centre for Disease Control (CDC).⁶⁸ The study occurred between 1995 and 1997 and was one of the largest investigations of childhood abuse, neglect, victimisation, disadvantaged household challenges, and later-life health and wellbeing. It was started from the clinical observation

that obese adults frequently reported abuse in childhood. Based on this observation, a systematic epidemiological investigation was conducted using data from frequent health reviews. The analysis identified a significant and stepwise association between exposure to four or more adverse childhood experiences and a range of health-harming, physical and mental health conditions. These findings were replicated in studies outside of the US. It led to the establishment of a WHO programme focussed on increasing the protection of children and developments in trauma-informed approaches. The study has been subject to criticism. However, the strength of Kaiser Permanente's approach is the collection, use and analysis of routinely collected administrative data.

Patient data is also used to further our understanding of the biological factors determining our health. In 2018, the 100,000 Genomes Project sequenced 100,000 genomes from 85,000 NHS patients.⁶⁹ In 2020, the UK Government published Genome UK: the future of healthcare.⁷⁰ By collating genomes, researchers can find patterns between genetic factors, a person's disease risk, experience, physical characteristics, and behaviour.



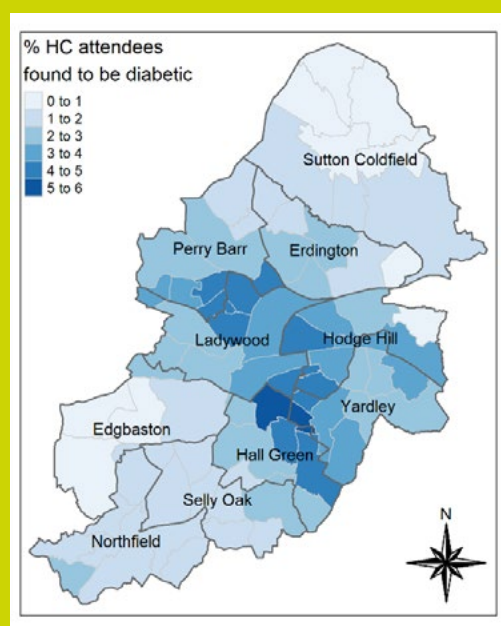
Using Data for Quality Improvement

Digital technology and data are essential to understanding and improving service quality. The following local case study is an example of how patient-level records can be analysed to understand local needs better and evaluate the equity of provision. Public Health analysed patient-level records from 144,562 health checks performed by GPs in Birmingham over five years (October 2016 and April 2022). By examining average blood glucose (sugar) levels and cholesterol rates across age, ethnicity, and local deprivation, a better understanding of local needs was achieved which could be used to target and improve the quality of local services.

Using Data to Guide the Recommissioning of NHS Health Check Services⁷¹

The NHS Health Checks (HCs) Programme is a mandated public health service commissioned by Birmingham City Council. A project was undertaken to study the overall health of Birmingham patients attending the checks and to evaluate the equity of provision provided by different practices. The study utilised patient-level records from 144,562 HCs performed during five years (October 2016 and April 2022). This included examining how high HbA1c (average blood glucose (sugar) levels) and cholesterol rates varied across age, ethnicity, and local deprivation. The study evaluated the performance of GPs by assessing their target achievements and the ethnic composition of patients.

Figure 7. The percentage of attendees found to be diabetic after attending an NHS health check in Birmingham across a five-year period (2016-2022)



The core research team analysed the rates of high cholesterol and pre-diabetic and diabetic blood glucose levels. For patients with HbA1c and cholesterol levels above normal, the team found expected correlations in age, ethnicity, and their local deprivation score. The team found differences by locality, where the percentage of attendees found to be diabetic

after attending an NHS HC was higher in some wards than others; this includes wards in East and Central Birmingham (Figure 8). The lowest percentages of attendees found to be diabetic after attending an NHS HC were in wards in the Edgbaston and Sutton Coldfield constituencies.

One of the findings was a significant difference in the rates of high HbA1c between broadly defined ethnic groups. The analysis showed that people who are Asian, Black or of mixed ethnicity are significantly more likely to be pre-diabetic or diabetic than White patients. This is similarly the case for those with unknown ethnicity. Ethnicity is a significant predictor of whether patients have HbA1c levels that meet the criteria for the diagnosis of diabetes or a pre-diabetic state. However, in the past five years, the ethnicity of patients attending HCs is only known in around 57% of cases. This demonstrates the importance of GPs maintaining a record of patient ethnicities that is as accurate and complete as possible. The team found significant differences in diabetes rates between patients at GPs with different indices of multiple deprivations (IMD). Those in the most deprived quintile (IMD = 1) are most likely to be diabetic and pre-diabetic.

Patterns were also identified regarding the size and location of GP practices, the number of HCs performed, and the quality of ethnicity recording. The team identified practices that possess the greatest opportunities for improvement in achieving targets and completeness of data collection.

This was the first study of this scope in Birmingham to investigate the overall health of patients attending an NHS HC and to evaluate the equity of provision provided by different practices. The study has provided potential links between the disparity of the service and whether it is fulfilling its aim to identify older adults at risk of cardiovascular disease (CVD), pre-diabetes and diabetes. The results have informed the recommissioning of the NHS HC Service in Birmingham, including a new target to recalculate the target number of HCs based on the number of registered patients aged between 40 and 75.

Data Sharing, Risk Stratification and Segmentation

To date, much of the data collected by the public sector is held on separate systems. Sharing and linking data provides an opportunity to undertake more holistic and sophisticated analyses of the population's health and social care needs. In particular, it allows us to identify groups experiencing poorer outcomes. It enables us to target those groups with interventions which better meet their multiple needs.⁷² The COVID-19 pandemic saw this in action as sharing data across the system allowed the UK Vaccination Programme to reach excluded communities and identify gaps in uptake across various demographics and localities.⁷³ There are specific techniques used to identify groups experiencing or at risk of ill health, including population segmentation and risk stratification.

POPULATION SEGMENTATION involves categorising a population into groups based on pre-defined criteria (e.g., age). It assumes that people with similar characteristics will interact similarly with the health and care system.

RISK STRATIFICATION aims to determine who (within the segmented groups) is at the greatest risk of poor health.⁷⁴

Again, these techniques were adopted during the COVID-19 Vaccination Programme. By segmenting the population based on a range of factors and determining who is most at risk (e.g., older adults and the clinically vulnerable), the operational roll-out of the programme, as well as targeted support and public health advice, could be delivered more effectively.⁷

The Potential of Digital Technology and Data

There is enormous potential for digital technology and data to improve population health and reduce health inequalities. By using the improved quality and quantity of data, we can improve outcomes for individual patients and facilitate the planning and delivery of interventions to a whole or specific population cohort. It is essential to respond appropriately to the increasing prevalence of preventable disease and co-morbidity across society.

To maximise the potential of digital technology and data, there is a need to build public awareness and literacy of how data is used to improve an individual's health and the health of the wider population.⁷ Data are already being used, but citizens may have legitimate concerns regarding data use and privacy.⁸ This was highlighted by our research, where participants consistently reiterated concerns about the sharing and security of personal data, particularly health-related data.⁹

"There is a certain level when I let my data go but then there is data that identifies me, as a person, my specific breathing patterns (for a sleep monitoring app), that is too far."

Young Adults focus group

There are things we can do to encourage a common understanding, such as the emerging 'Data Charter' developed by Birmingham's Digital Partnership. The Data Charter is committed to publishing more data openly to benefit citizens and local organisations.⁷⁵ By increasing awareness and demonstrating the value of data and digital technology through effective interventions and improved outcomes, we can build trust and further maximise its potential.⁷

Digital Exclusion



Illustration by Holly Steel from Birmingham City University

Digital Exclusion

Digital exclusion is the lack of digital skills, connectivity, or accessibility that prevents an individual from using digital technology or accessing the Internet.¹⁰

FACTORS CONTRIBUTING TO DIGITAL EXCLUSION ARE:

Type of exclusion

USAGE AND ACCESS:	A lack of internet or device access, which can be influenced by geography. ²³
SKILLS:	Not everyone can use the internet or online services. ⁷⁶
SOCIAL SUPPORT:	Refers to the intensity of support obtained from offline and online networks. ⁷⁷
SELF-PERCEPTION:	<ul style="list-style-type: none"> - Motivation – not everyone sees why using the internet could be relevant and helpful.⁷⁶ - Confidence – some people fear online crime, lack trust or don't know where to start.⁷⁸
FINANCIAL POVERTY:	Affordability of devices and connectivity costs causing digital poverty (exacerbated by the current cost of living crisis). ⁷⁹
DESIGN:	Not all digital services and products are accessible and easy to use. ⁷⁸
AWARENESS:	Not everyone is aware of the digital services and products available to them. ⁷⁸
STAFF CAPABILITY AND CAPACITY:	Not all health and care staff have the skills and knowledge to recommend digital services and products to patients and service users. ⁷⁸

Who is Affected by Digital Exclusion?

The NHS identifies the following groups as being at risk of digital exclusion¹⁰:

1. **Older People**; the Good Things Foundation notes that "older age remains the single strongest predictor of not using the Internet – especially among those over 75 years old".²
2. **People in lower income groups**; research by the Good Things Foundation has identified that "people in the poorest households are at least four times more likely to be digitally excluded".²
3. **People without a job**; in their Digital Consumer Index, Lloyds Bank identified that "31% of unemployed people have low or very low digital capability versus 19% who are in the workforce".⁸⁰
4. **People with a disability**; in a digital intervention run by the Department of Culture, Media, and Sport, 52% of participants reported having a disability or health condition as the most common barrier to using the internet.⁸¹
5. **People with no/fewer educational qualifications**; when asked, 71% of people with a degree said they would download the COVID-19 contact tracing app, compared to 38% with no formal qualifications.²

Digital Exclusion in Birmingham’s residents

To better understand the effects of digital exclusion on the health of Birmingham residents, we used ethnographic research to explore their everyday lives and behaviours. The three primary findings from the research were:

Participants did not see themselves as digitally excluded

- a. They preferred terms such as ‘old school’ or ‘traditional’.
- b. They recognised gaps in their knowledge and confidence with digital technology.
- c. They rely on help from their support network to become digitally engaged.

Most felt able to go through their daily lives without using digital technology

- a. A definite preference was expressed for going to banks, shops, doctors, and libraries to meet their needs.
- b. This was regarded as an important part of their routine.
- c. Among those who didn’t need to use technology for their working life, their digital exclusion seemed less acute.

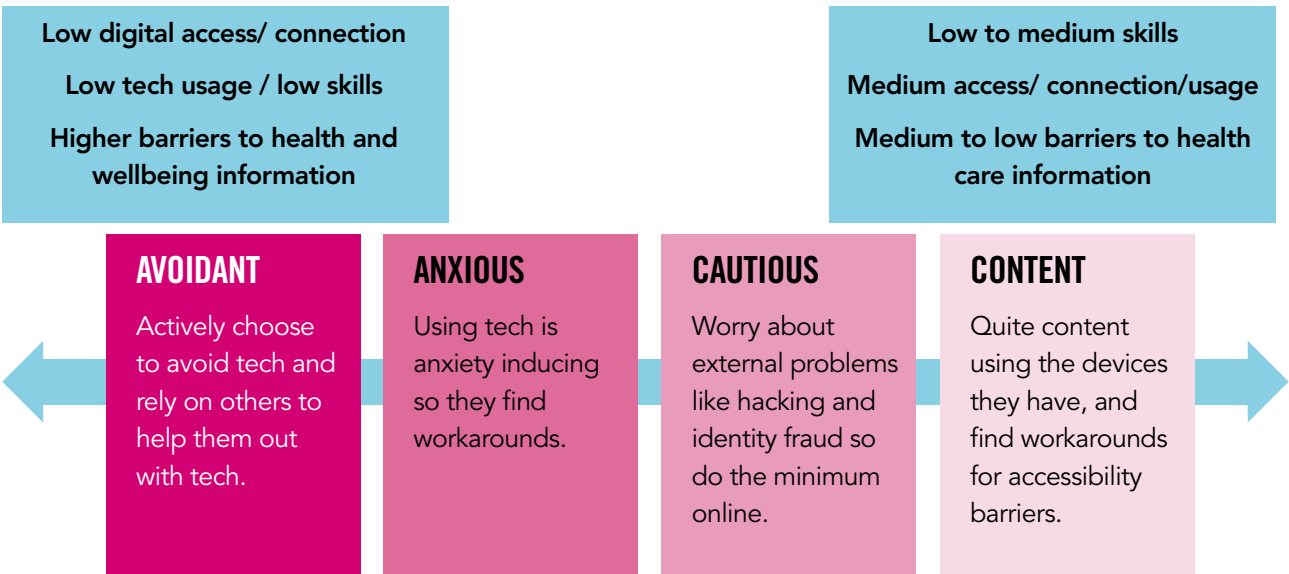
- d. Among those who needed technology and saw it increasing in their job, their digital confidence and ability created a challenge and burden for their lives.

Digital technology used for health and wellbeing purposes was particularly low

- a. Most participants had heard of the main NHS app and the COVID-19 app. However, there was low, if any, uptake with both.
- b. Preferences were always for in-person appointments, telephone booking systems, and paper-based communication.
- c. Drop-in visits to the pharmacy would be used to get medical and health information as the Internet was either overwhelming or not trusted.
- d. The benefits of activity trackers or wearable technology were acknowledged. However, most participants said they would not use one if offered.

The findings emerged from the research and developed into a continuum scale representing participants’ attitudes towards digital technology. This is illustrated in Figure 8 below:

Figure 8. Continuum of digital exclusion in Birmingham residents ¹¹



The continuum in Figure 9 illustrates that there are four categories that a digitally excluded resident could fall into, depending on their experience and attitude. Those most opposed to using digital technology, or have the greatest difficulties, are placed on the left-hand side of the scale. They are defined through the 'avoidant' or 'anxious' attitudes. Those who are more ambivalent are on the right-hand scale. They are defined through the

'cautious' or 'content' attitudes. The scale implies that residents who are closer to the 'avoidant' attitude are also more likely to encounter barriers to health and wellbeing information as well as access to services.

The participant's accounts below show how digital exclusion impacts their daily lives, and in particular, their health and wellbeing:



AVOIDANT

Sarita (Female, 42)

You wouldn't know it from talking to me, but I'm not all modern Asian like I seem, I'm a bundle of stress and doubt caused by my mental health condition. It runs my life, although at the moment I've got a handle on it... just. I'm very lucky as I have a supportive husband, wonderful young children and amazing sisters, but you know what it's like, I don't want to worry them. If I can feel an episode coming on, I'll go and drop into the mental health team and get what I need from them. They know me very well. They know what I'm like, and check on me and that my medication is ok. I'm very lucky, I don't think I'd be here if it wasn't for them and the trauma support they've given me. They also know that if they send me an email, I won't read it. So it's better to text or phone me! They tried to get me on a meditation app- no way, I'd rather do the cleaning to unwind.

There are lots of health teams looking after my family, thank god, My dad's slowly dying of a range of illnesses and my mum's got dementia. It means that I and my sisters need to take them to a lot of appointments and keep on top of everything. We've got

it sorted, my sisters do the admin and the online booking and updating, and I drive them to all their appointments. At least I can be useful, even if I'm as bad as my parents at tech. My husband helps with all my daughter's appointments and will print everything out for me so that I know what's going on for her too. She's been under CAMHS since the beginning of the summer, she has mental health issues that I missed. I have to forgive myself for that. I just thought it was her ADHD but wonder if this is the beginning of something else.

I know it sounds ridiculous not being online and sorting everything out that way, but I don't trust it and get overwhelmed by it. I have to find ways that I can cope and avoid tech is one way. I have had a go, but it has gone wrong. With online shopping, I tried, but I ended up with 11 packets of biscuits instead of one, and I couldn't change it, so I leave well alone. Tech does not make my life simpler. Once I tried to do a prescription online, but it didn't go through, so I ended up in a state as I was without my meds. No one told me it hadn't gone through, it was only when I went to pick it up that I found out. I can't function without my meds, it's not like taking paracetamol. I'd rather go in and pick up prescriptions, that way I know I've got what I need and I know where I stand. Different things work for different people and they need to remember that" ¹¹



ANXIOUS

Lorraine (Female, 58)

"I'm nearly 60 and I do my best, but tech totally stresses me out. It makes me feel really isolated and I already suffer with anxiety, having to use tech makes it worse. My brain doesn't see things on the screen as it should and it all jumbles up at me. I get panicky and just wish I didn't have to use it. But I do. I've always felt like this and thought it was me. But a few years ago, it was discovered that I have a type of dyslexia that makes basic processing really difficult. I don't have a problem reading simple text or writing myself, but screens are awful. I got help through college recently when I was doing a degree and it was online. I would struggle so much that my lovely tutor stepped in and found me support. I thought it was because I was stupid, but once they gave me software to help me with audio support I started thriving on my course.

I'm a Teaching Assistant and to tide me over I've also been doing some in-home care work. You'd think that both of those roles mean you don't need tech. Well, in today's world you do, we've had to fill out all our patient information on an app. It takes me ages, I don't see why I can't just write it down. It adds so much more to my workload and mental load as I know that I have to do it when I get home, instead of on the job as they intended. As a TA it's really stressful if the teacher leaves the room and asks me to teach off the white board. I try all sorts

of ways to cover up my inadequacies with tech, by getting the kids up to help. It's so stressful, I keep thinking. They've never given me training either, and now I feel too stupid to ask for help.

The only person I feel I can ask is my daughter. She's used to all my anxiety. She's so good at helping me with things and will read them if I need to. I always ask her to go straight to the phone number so I can write it down and call the people if I need to. What if I delete the message and haven't printed it up? I like her by my side if I have to pay bills online, it stresses me out that we have to do it like that. I could be sending my money to anyone, anywhere. I'll always try and do things over the phone.



...tech totally stresses me out. It makes me feel really isolated and I already suffer with anxiety...

I've got long COVID. I've also got another condition that's been going on for while and I really need to see my GP. They keep giving me online appointments and I don't like that, I'd rather wait until the doctor can see me properly. I have letters from them that I've printed out, and the only bits I've read are the bullets. The rest is too much and I can't take it in. I'm ok if someone sits with me and goes through it. To be honest, I hope there's always an option to be face to face and speak to people otherwise health will become more stressful" ¹¹

**CAUTIOUS****Mahmood** (Male, 51)

"I work as a taxi driver. A lot of drivers have gone to Uber now but I'm still with my local taxi service so we use the old sat-nav system, rather than Uber or Bolt. If they wanted us to update they'd have to run some training, give some support. It's difficult because I'm old-school, my generation hasn't grown up with technology like the younger ones. I'm not confident with technology at all and I'm scared of making mistakes, especially with banking and health because that's your private information. I hear stories about people having money taken from their account and about scammers on Ebay and PayPal. That doesn't help with my confidence.

There are some things I can do though, I have WhatsApp on my phone and that's easy to use. There's only two or three features so it's self explanatory, I know that the picture of the phone means calls and the camera means videos. It helps me to keep in touch with my family abroad, although I wish I was better. My wife uses Snapchat and will show me videos of our family. I would love to know more about social media and what it does and then I could send videos to my family back home of birthday parties or weddings. I think I just need some training with the way the world is changing now but there's no support, and even when there are guides they're not user friendly. I ask my children but they don't have the time, patience or perseverance.

Usually they teach me once and by the time they walk off I've already forgotten what they showed me. When I went on holiday I had to show my Covid pass and fill out all the Covid locator forms but I don't know how to do it on my phone. My son did everything for me, emailed the form to the hotel and the hotel printed it all out for me to bring to the airport. Written paper is much easier.



It's difficult because I'm old school, my generation hasn't grown up with technology...

I don't use the internet to search things either. You search for one thing and a million different things come out in all medical terms, it confuses me. I don't know which is right and which is genuine. I really struggled during Covid when the GP was closed. I needed to be able to explain things to the doctor in my own way and with writing I can't explain it properly, English isn't my first language. Even now I struggle to get GP appointments, sometimes I ring in the morning and all the appointments are gone or I ring several times and the line cuts off. They're still using Covid as an excuse not to provide a good service. Sometimes I go to the pharmacist and tell them my symptoms and they can give me medication so I don't need to go to the doctor. I have a good pharmacist and I trust him. But for when I do need a doctor, maybe there could be a way to book it online or have options for what you need and you select yes or no. But you'd still need an in-person appointment because replacing the personal touch with digital doesn't provide the same experience" ¹¹



CONTENT

Zaineb (Female, 20)

"I live at home with my mum, dad and two brothers. They're younger than me. It's ok, a bit noisy but we have lots of fun on the weekend, trying to play tennis or going on huge family picnics. I've gotten really into baking, that's my hobby so I take lots of cake pops to give to my cousins. I'm not working at the moment. I'm sort of looking, I put in application forms to shops locally. I like retail as you get to meet people. I'd prefer clothes and shoes than the supermarket – I've just stopped working part-time at one and I don't miss the work, even though I liked the regular customers.

We don't have Wi-Fi at home, but we don't need it. We had it for about a year a few years ago, but the connection was so poor that it stopped working. We decided to stop purchasing it – my parents had mobile data so I used to hotspot from them. It was good as it meant we didn't grow up attached to phones. Searching up stuff for school work was so annoying. I ended up going to the library and using their computers if they were open. I still do if I'm doing an application form for a job, as it's hard to do on phones.

Lockdown for my brothers was bad, they couldn't really do work unless school sent it to us and they'd get in trouble but it wasn't our fault. My aunty tried to help by inviting us round to use her computer and Wi-Fi, but my cousins were also doing home school. It's fine now that we're back to normal.

We've got one tablet somewhere, but I think it's stopped and we have a laptop. All five of us have phones now, with data, not contract. We can go on apps if we want. My brothers play games but no one else is that into it. The only thing that we need is to be able to use WhatsApp for speaking to family in Bangladesh, which my mum does a lot. If we didn't have that it would be bad! No one needs it for work as my dad isn't working at the moment either.



I don't count me steps, I know if I've gone for a walk and that's what's important ...

If I'm worried about my health, which I'm not usually as I'm young, I'll ask my pharmacist as they have a private room in the shop. If there's something more serious then I could call my GP at eight in the morning and get an emergency appointment. It usually works, it's what we do for my mum. I don't know if they've got a website or if you can book online, but I don't think you need to when you can just ring up. Most people find that easier.

I don't use health or wellbeing apps, but I've tried journaling. That helps. The NHS one didn't work for me. I prefer my physical vaccine card. I don't count my steps, I know if I've gone for a walk and that's what's important, tracking steps doesn't make a difference. I tried the couch to 5k in lockdown and lasted two days, I also saw the sugar swap app advertised on TV, but we never do that, there's too much to buy at the supermarket and it'd take too long to scan. It's a good idea though" ¹¹

Risks from Digital Exclusion on Health

Exclusion from services

There are three possible explanations for why people become excluded from services and the problems this creates:

1. There is no awareness of the service; the Good Things Foundation reports that pre-pandemic, almost two-thirds of adults in England had not used the Internet or apps for health purposes. This rose to “79% among those with low digital engagement”.² This was evident in the findings from the ethnographic research where participants stated that they got relevant information from offline sources.¹¹ However, lack of awareness creates concern because there is a significant overlap between digitally excluded groups and the groups most likely to require the greatest amount of care and health knowledge.⁸²
2. The service cannot be accessed; if a service is only available through a digital platform, it may restrict those who do not have the means or the confidence to access it. This can vary in severity between digitally excluded groups. For example, Lloyds Bank’s Consumer Digital Index suggests that digitally excluded older adults may be missing out “on the benefits of screen readers, dexterity tools and other assistive technologies”.² Equally, as noted by Bob Gann, for those who rely on mobile data to provide their access, health information and service access is unlikely to be their priority.⁸³ The problem this creates is that a lack of digital access can “reinforce and amplify existing disadvantages often related to socioeconomic factors”.⁸⁴
3. The service is not being engaged with; if a service is provided digitally or becomes digitalised, then there will be those who will choose not to engage with it because they mistrust it or are concerned about the information it presents. This was an attitude expressed in different ways by participants during the ethnographic research.

“Even with doctors’ appointments, I’ve never used the Internet... I’ll just keep ringing until they give me an appointment”

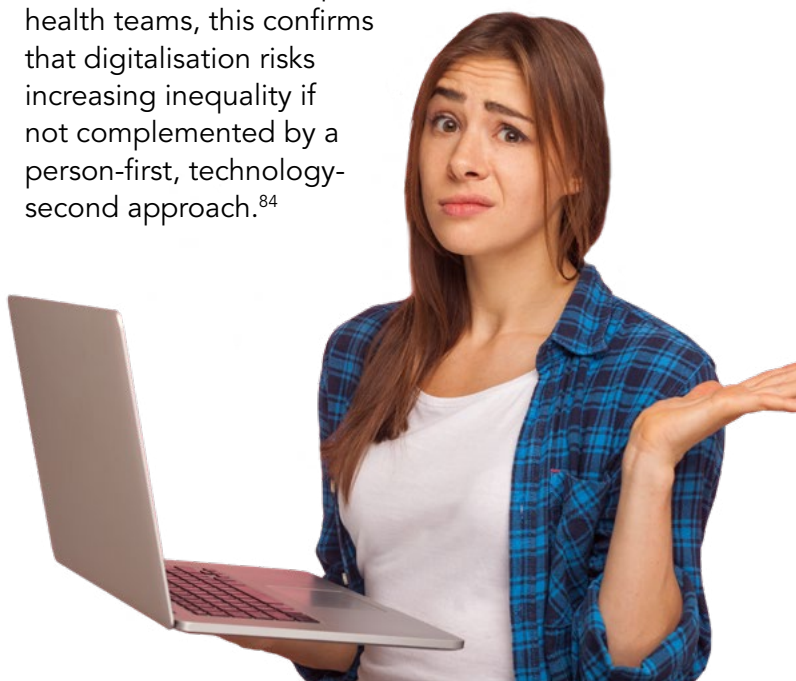
Lance, 68

For example, some participants were frustrated that ordering prescriptions now forced them to use the NHS app, while others stuck to their tried and tested methods.¹¹

The mistrust or refusal to engage with any facet of online health services is also partly attributable to digital media allowing the spread of misinformation, which can create doubt.⁸⁵

Less visibility for services

The Good Things Foundation reports that groups with a low digital presence can be exposed to additional risk when services are targeted and allocated using algorithmic data.² Equally, introducing technology that uses artificial intelligence for population health purposes may encounter the same problem as “public health activities target populations instead of individuals and require collective action instead of individual intervention”.⁸⁶ In both examples, the risk is that groups contributing less data will be less visible. This will create an unequal picture of the demand. For local public health teams, this confirms that digitalisation risks increasing inequality if not complemented by a person-first, technology-second approach.⁸⁴



Indirect effects on health

There is a correlation between the population groups with poorer health outcomes and those affected by digital exclusion. This has been evidenced most during the COVID-19 pandemic, where there was a “proportionally greater impact on communities experiencing social and economic deprivation”.⁸³ The predominant use of digital technology for contact tracing may have been a contributing factor, as this required individuals both to have an app-enabled device and to be able to follow its instructions.⁸³ Therefore, digital exclusion within deprived communities may have exacerbated the risk of COVID-19 as contact tracing may have been less potent at preventing an outbreak.

Reducing the Risk of Digital Exclusion

Hybrid approaches

Participants in our primary research expressed a consistent view of the need to retain in-person services balanced with a digital option. They gave two reasons for this view:

1. There were genuine concerns about people being ‘left behind’ by the pace of digitalisation. One participant from a focus group for unemployed adults observed that “even people who’ve grown up in the age of changing technology are now just struggling to keep up”.⁵¹ Equally, the concern that the growing costs of broadband contracts or new digital devices would be de-prioritised in favour of essentials like heating and food was raised, especially for those with little disposable income.⁵¹
2. A more widespread attitude was that using a digital service creates more problems than it solves. For example, several focus group participants mentioned their frustration with being unable to easily book GP appointments online.⁸⁷ It should be noted that many participants acknowledged the benefits that digital technology can have on health, including in monitoring physical activity, but added that unintuitive design for websites or apps could reinforce negative attitudes.⁹

While this is how many current services are delivered, ensuring that both options work together makes it a viable method for overcoming digital exclusion. Participants expressed a clear appetite for being more explicitly taught how to use digital services.¹¹

“I’d like them to invite us in and show us step by step how it works. I’d order my prescriptions online if I knew it was all safe and from the NHS.”

Jennifer, 66

Digital health literacy for the public

While levels of confidence and trust vary, particular concern was expressed in the research around online health information and guidance. For example, it was noted in several focus groups that it was difficult to differentiate between experts and non-experts when presented with online health advice.³⁴ Boosting confidence and trust can come from increasing the digital health literacy of the population. This requires an individual to understand and use health information from digital sources to make decisions.⁸³ This is similar to improving digital skills, but the health perspective should be stressed. Individuals want to feel reassured that they are not at risk if they access digital services or use online health information.⁸⁵

“I’m always worried about having a fall, but this (smartwatch) means I can access help if I need it. I think they should provide everyone with one”

Barbara, 73

The purpose of digital health literacy is to empower individuals to become “active custodians of their own health”.⁸⁴ This requires a stronger dialogue about the level of engagement individuals will need to have with their health. For example, wearables and fitness monitors only require a little input from the user, while accessing digital healthcare requires more concentration and understanding.⁸⁵ This was reflected in the ethnographic research where one participant was very sceptical about using online healthcare but much more positive about their fitness watch.¹¹ Ultimately, the value of improving the public’s digital health literacy is demonstrated through its recognition as a “super social determinant of health”⁸⁵ and its potential to reduce the burden on the health and care system through a better-informed public.

Personal support networks

A common factor across the ethnographic participants was the use of personal support networks to maintain some level of digital engagement (e.g. children who helped them book online appointments or neighbours who agreed to share their Wi-Fi).¹¹ Even participants who were ‘avoidant’ of technology acknowledged that they relied on these networks to function in their everyday lives.¹¹ These networks also increased some participants’ interaction with digital technology and online sources of information because they trusted the family and friends who guided them towards it. This may partially explain why some participants felt their exclusion was not profoundly affecting their health.¹¹ Equally, participants who were ambivalent towards using digital technology for health purposes were more positive about keeping connected so that they could talk to family abroad. This illustrates how a support network can motivate an individual to be more digitally engaged if they can see value in the activity.

“The only thing we need is to be able to use is WhatsApp for speaking to family in Bangladesh... if we didn’t have that, it would be bad!”

Zaineb, 20



Conclusion

This report has sought to explore a complex and evolving topic. We have investigated the potential, practical application, and concerns that accompany the use of digital technology for improving health. Ultimately, we have found that digital technology can help to enable healthier and happier lives. It can provide a positive impact by empowering individuals with their care and wellbeing while helping to reduce the burden on healthcare systems. However, using it is not without risk as it can create harm, both because of the way it works and because of whom it may exclude.

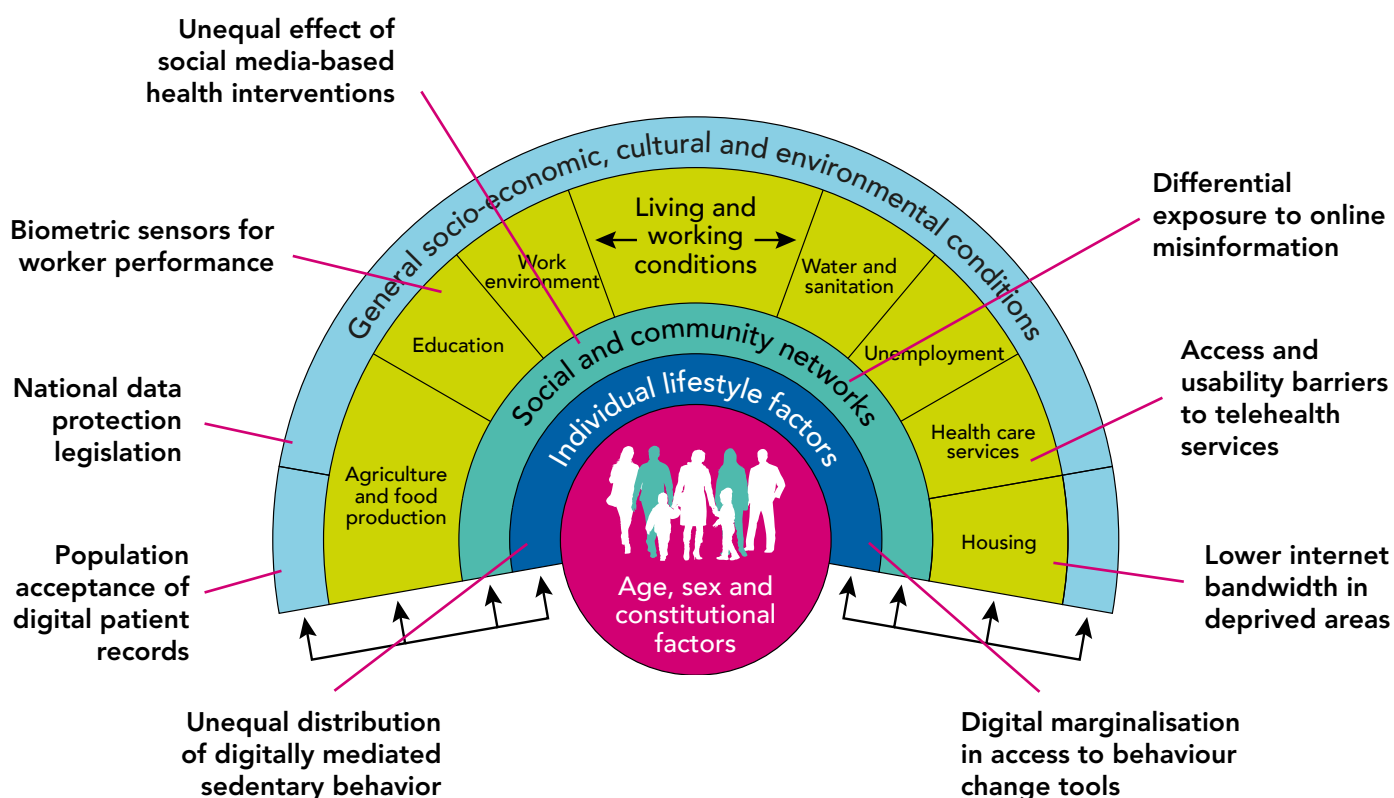
We have also sought to understand the impact of digital technology on public health. We have provided an overview of the growth and impact of digitalisation and social media on health. Equally, we have explored how digitalisation has been used to reduce health inequalities

through interventions. Finally, we have used the experience of citizens to understand digital exclusion and ways to overcome it.

There is much that we still need to understand about the efficacy of digital advances. This requires an adequate conceptualisation of the influence that digitalisation has on our health and wellbeing. Given that digitalisation impacts all aspects of life, it has been proposed that it be integrated into the existing visualisation of the wider determinants of health developed by Dahlgren and Whitehead¹³ by Jahnelt et al.¹² As in the original model, inequalities arise from the differential impact of individual, social and community and socioeconomic cultural and environmental factors on the population. These factors can be mutually reinforcing.

The figure from Jahnelt et al.¹² below highlights many factors identified in this report that risk harm and widening inequalities. Each factor requires mitigating action. Our recommendations seek to address these factors.

Figure 9. The rainbow model with examples for digital entry points of health inequality¹²



Recommendations

Recommendation	Rationale	Examples of Entry Points for Health Inequity linked to the Digital Rainbow	Leadership for Action
Digitalisation, Health and Social Care			
Health and care systems should develop and abide by a set of principles, i.e. those being developed by NHS England, which mitigate digital exclusion.	The digitalisation of health-related services is not always accompanied by an understanding of how this would affect less digitally confident residents. Therefore, this creates a barrier to them from easily accessing the service.	HEALTH and CARE SERVICES: Access and usability barriers to telehealth services	Birmingham City Council BSol Integrated Care Board NHS Providers
Health and care staff need to be skilled at engaging digitally hesitant citizens. Face-to-face options need to be considered alongside digital solutions.	Digital access and online consultation tools are acceptable to many, but not all patients, and not all the time.	HEALTH and CARE SERVICES: Access and usability barriers to telehealth services	Birmingham City Council BSol Integrated Care Board NHS Providers in Primary and Community Services
Trusted apps that encourage healthy behaviour change should be disseminated and integrated into health interventions. Their efficacy should be communicated to overcome barriers to their use.	Behaviour change apps are available and accessible but may not be effective for all.	INDIVIDUAL FACTORS: Digital marginalisation in access to behaviour change tools	Birmingham City Council NHS Providers in Primary and Community Services
Social Media and Health			
Healthy and safe use of social media should be promoted across the population and to those at risk.	Social media is a valuable tool that can be utilised for rapid and effective communication of public health messages. Equally, though, its use is associated with mental and physical health harms linked to sedentary behaviour and content.	INDIVIDUAL FACTORS: Unequal distribution of digitally mediated sedentary behaviour and health harms	Birmingham Public Health Division Birmingham Children's Partnership Birmingham Children's Safeguarding Board Birmingham Adult's Safeguarding Board
Health interventions must be developed and delivered based on understanding the attitudes, skills and resources available to target populations. Resident types are a useful tool on which to base this understanding. Options to access interventions face-to-face are likely to be needed for some groups.	Personal support networks allow digitally excluded residents to access some of the benefits of digital technology. However, their capacity to access digital services varied depending on local and personal circumstances.	SOCIAL AND COMMUNITY NETWORKS: Unequal effects of social media-based health interventions	Birmingham City Council BSol Integrated Care Board

Recommendation	Rationale	Examples of Entry Points for Health Inequity linked to the Digital Rainbow	Leadership for Action
Data and Digitalisation			
Existing practices in population health management should be expanded to improve data quality and link data to reduce health inequalities.	Data protection allows sharing and linking of anonymised data for public health. Large, linked datasets are already being used to identify health inequalities across different groups in Birmingham.	GENERAL SOCIO-ECONOMIC, CULTURAL AND ENVIRONMENTAL CONDITIONS: Data protection	Birmingham City Council BSol Integrated Care Board
The benefits of shared health and care records must be communicated with Birmingham's population to build consensus and reduce the risk of misinformation.	Shared patient records are a key policy priority in the NHS Long Term Plan.	GENERAL SOCIO-ECONOMIC, CULTURAL AND ENVIRONMENTAL CONDITIONS: Population acceptance of digital patient records	BSol Integrated Care Board NHS Providers NHS England
Data Exclusion			
Barriers to equitable access to digital technology need to be reduced. A useful first step would be mapping digital assets. This would include bandwidth, publicly accessible computers, training and help in Birmingham and integrating this into plans for inclusive growth and asset-based community development.	Despite overall increases in digital access, a large portion of the population remains digitally excluded. This group are disproportionately deprived and likely to have a disability. Libraries and other public spaces were identified as locations where citizens could access computers and the internet free of charge. Citizens are not aware of means for improving their confidence in digital technology.	GENERAL SOCIO-ECONOMIC, CULTURAL AND ENVIRONMENTAL CONDITIONS: Lower bandwidth and lack of resources, for example, in deprived areas or amongst disabled people	Birmingham City Council Digital Inclusion Team
The health, social care and voluntary and community sector workforce need the skills to engage and signpost citizens to digital assets in the community.	The engagement of residents and patients in digital approaches requires the workforce, particularly those in patient-facing roles, to develop new skills and confidence.	GENERAL SOCIO-ECONOMIC, CULTURAL AND ENVIRONMENTAL CONDITIONS: Access and usability barriers to telehealth services	Birmingham City Council Adult Social Care BSol Integrated Care Board NHS Providers Social prescribers
A universal proportionate public health approach should be taken to reduce online harm and misinformation. Existing campaigns should be disseminated, and targeted health-promoting campaigns should be developed.	Exposure to harmful content, including misinformation, risks physical and mental health. Interventions like those which equip community champions with information have already proved effective.	SOCIAL AND COMMUNITY NETWORKS: Differential exposure to online harm and misinformation	Birmingham Public Health Bolder Healthier Champions Network Birmingham Children's Trust BSol Integrated Care Board NHS England

Glossary

5G - The 5th generation mobile network. In telecommunications, 5G is the fifth-generation technology standard for broadband cellular networks, which cellular phone companies.

Artificial intelligence (AI) - Artificial intelligence is the simulation of human intelligence processes by machines, especially computer systems.

British Dietetic Association (BDA) - Professional association and trade union for UK dietitians.

Deprivation and Poverty - Deprivation is the consequence of a lack of income and other resources, which cumulatively can be seen as living in poverty.

Digital Connectivity - access to a fast and reliable internet connection (fixed or mobile) which enables users to benefit from smart and digital services.

Digital Divide - the between those who have ready access to computers and the internet, and those who do not.

Digital Exclusion – describes the condition of adults who have either never used the internet or have not used it in the last three months.

Digital Health Literacy - the ability to seek, find, understand, and appraise health information from electronic sources and apply the knowledge gained to addressing or solving a health problem.

Digital Health Tools - The use of technology to enable care collaboration, using hardware and software tools (e.g. cloud, SaaS, and mobile technologies) to promote collaboration between patients, their carers and health and care providers.

Digital Inclusion - Being able to use digital devices (such as computers or smartphones and the internet).

Digital Inequalities - Differences in the material, cultural and cognitive resources required to make good use of information and communication technology (ICT).

Digital Poverty - The inability to interact with the online world fully, when where and how an individual might wish to.

Digital Services - Services provided over the internet including website hosting.

Digital Skills - Use devices like a computer, tablet or mobile phone for simple, personal and work tasks. find and use the information on the internet. understand how to be safe and responsible online. communicate socially and professionally using email, messaging and social media.

Digital Technology - includes smartphone apps, wearable devices (such as step trackers), and platforms that provide remote healthcare (telehealth).

Health Literacy - a person's ability to understand and use health information to make decisions about their health.

ICT - Information and communications technology.

IMD - Index of Multiple Deprivation is a relative measure of deprivation.

Internet of things - The use of everyday objects as connected devices that provide an additional function through digital technology e.g. smart home technology, such as smart thermostats or other connected devices.

Mobile computing or smartphone technology - The field of wireless communication and portable computers, such as tablets or smartphones.

NHS - The National Health Service

NHS App - The NHS App allows patients using the National Health Service in England to book appointments with their GP, order repeat prescriptions and access their GP record.

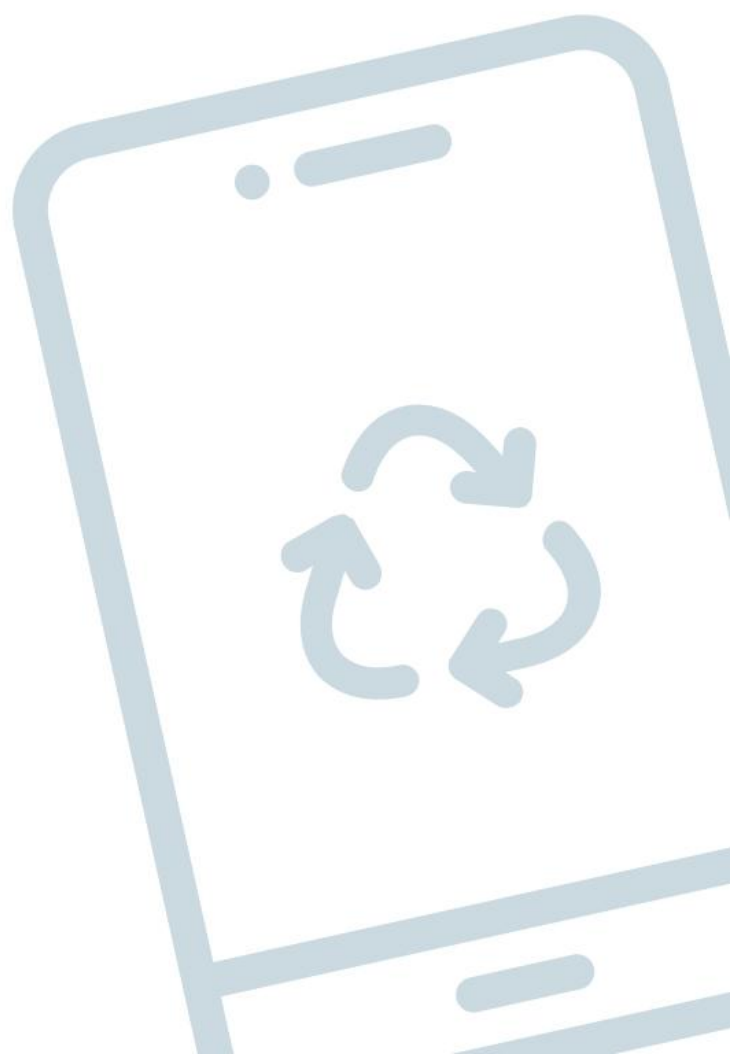
Personal and wearable devices - devices which are generally in direct contact with the wearer for long durations generate large quantities of data on specific biometrics or behaviours. Such devices include smartwatches, fitness trackers, implants, or patches with the ability to connect to other devices.

Social Determinants of Health - The social and economic environment, the physical environment, and an individual's characteristics and behaviours.

Socioeconomic Status - Encompasses a range of different factors, which can include education, income, and occupation.

Telemedicine - the remote diagnosis and treatment of patients using telecommunications technology.

Triage - The assignment of degrees of urgency to wounds or illnesses to decide the order of treatment of a large number of patients or casualties.



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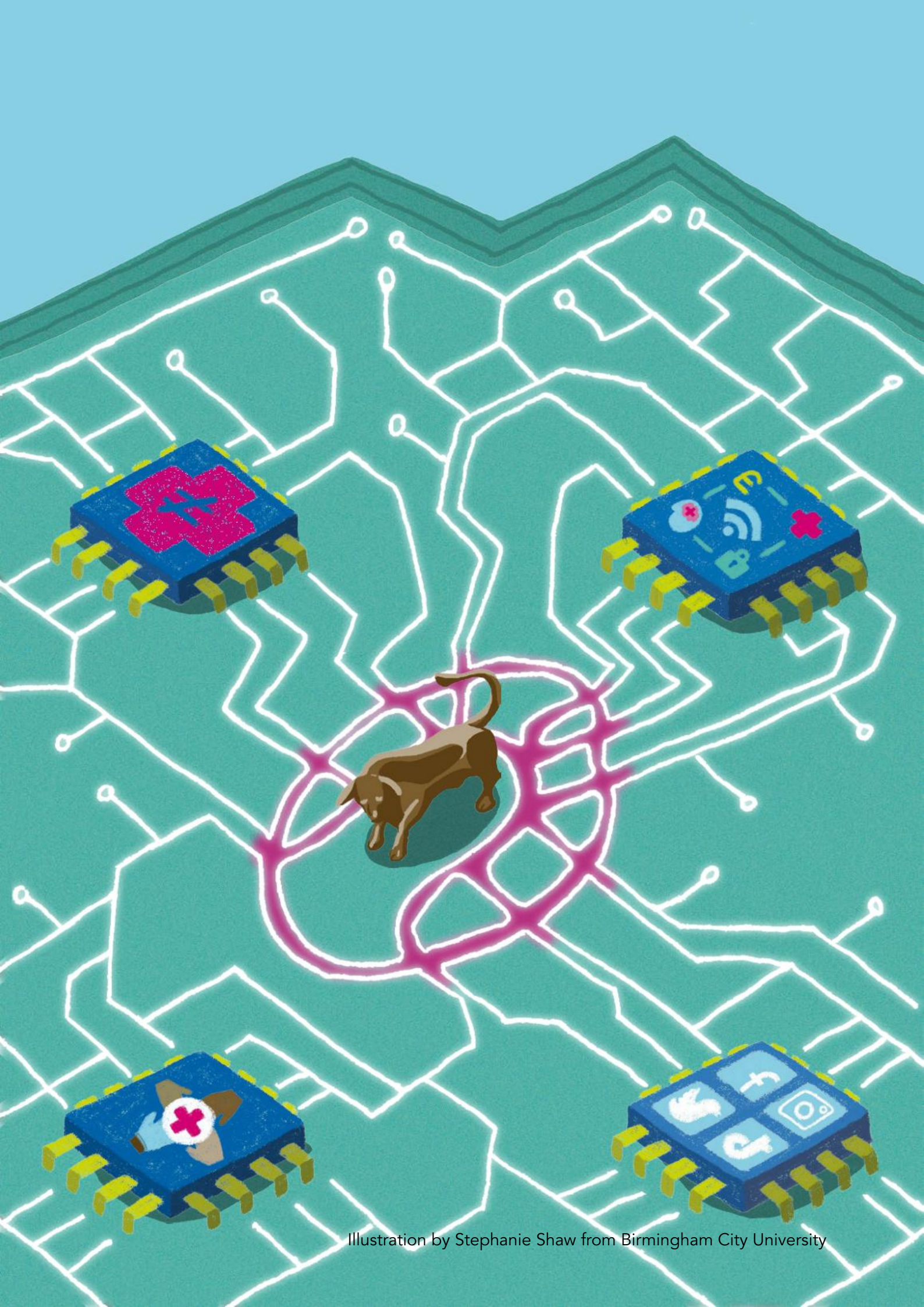


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