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# Use of the internet and digital technology to manage health in Wales: past, current, and future preferences

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# Contents

Summary	2
Background	3
Our Approach	4
Our Findings	5
Patterns of internet use for health in Wales	5
Exploring differences across population groups	8
Implications and Next Steps	14
References	16

# Summary



- In the winter of 2021/22, Public Health Wales carried out a survey with a national sample of 2,448 residents in Wales aged 16+ years to understand how people used digital technologies in relation to their health in Wales, how this has changed since the COVID-19 pandemic began, and their preferences for the future.
- 6% of people reported being without access to the internet at home, and we found no evidence that internet access changed since the pandemic began.
- We asked people with access to the internet about five health-related activities and how often they used the internet for each of these;
  1. tracking healthy behaviours,
  2. finding health information,
  3. requesting appointments or prescriptions,
  4. receiving clinical care or
  5. for COVID-19-related activities (e.g. symptom tracking, booking a COVID-19 vaccination)
- Since the pandemic began, 46% of people used the internet frequently for at least one of these five activities; COVID-19-related activities were most often completed online (27% of respondents did so frequently), while receiving clinical care was least often completed online (only 8% of people used the internet frequently for this).
- If we exclude COVID-19-related activities, 40% have used the internet frequently for health since the pandemic began. This is an increase from 25% in 2019/2020, prior to the pandemic.
- Younger users and those with long-term conditions were more likely to use the internet frequently for their health, but patterns differed across the specific activities considered.
- Amongst internet users, there were no consistent differences in health-related frequent internet use by gender and area-level deprivation.
- 53% of people would like to use the internet frequently to manage their health in the future, mostly driven by 30-44 and 45-54 year old age groups; the greatest areas for potential growth are in requesting appointments or prescriptions and in receiving clinical care. Variation observed between those with and without long-term conditions was no longer evident when looking at future preferences.
- People viewed convenience and anonymity as potential advantages of frequent internet use to support health, while responding that digital resources do not meet their needs is seen as a disadvantage by infrequent users.
- Concerns around the accuracy of information and privacy and security of data online were evident regardless of frequency of internet use to manage health.

# Background



When the national COVID-19 lockdown was introduced in March 2020, accessing digital technology and the internet became critical for many to continue employment, education and to access up-to-date health information (spanning symptom management and self-care for COVID-19 and other conditions) and healthcare services [1].

Many of the digital health resources and services (e.g. NHS app, video consultations, etc.) that were created or adapted as a response to the pandemic are now becoming embedded in existing systems of care in Wales, the UK, and internationally [2-3]. As a response to the pandemic, Welsh Government set up the Digital Services for Patients and the Public in March 2021 to help co-ordinate the rapid delivery of digital solutions and health and care applications across Wales, including the patient-facing NHS app [4].

However, engagement with digital health varies, with some preferring not to use digital tools, alongside those who experience digital exclusion (more often older adults and those experiencing social and economic deprivation) [1]. While Welsh Government continues its commitment to reduce digital exclusion via the Digital Communities Wales programme [5], increased application of digital technology within healthcare without consideration of these differences in engagement could worsen existing health inequalities [6]. This includes building a stronger understanding of the perceived advantages and disadvantages of the internet as a tool to support health, and how these might impact the use of digital technology.

In 2018, Public Health Wales carried out the first Digital Technology and Health Survey, a nationally representative household survey asking adults (16+ years) in Wales about how they use digital technology to support and monitor their health. At that time, 1 in 10 adults in Wales were not online, and while two thirds (66%) of the population used digital technology to support and monitor their health, some groups were less likely to engage. Specifically, men, those of older age, living in the most deprived areas in Wales, and with poorer underlying health [7]. Welsh Government's Digital Inclusion Strategy (2020) drew on these findings, recognising the need to address digital inclusion for health [8].

Given the push to move online during 2020/21 due to the COVID-19 pandemic, we need to understand the impact this has had on digital health activity in Wales. This includes an understanding of which groups remain excluded from or are not using digital health, alongside the key enablers and barriers for people using the internet frequently to manage health. This will help inform future strategies to provide equitable digital health solutions in a post-COVID-19 era, aligned with the Welsh Government's digital priorities [9] (See Box 1).

## Box 1. Key definitions

- **Digital technology** includes all devices which connect to the internet; such as mobile phones, computers, tablets, personal assistant technology and wearable devices.
- **Digital health** was defined as the use of digital technology to manage illness and health risks and to promote wellness.
- **Internet users** include all individuals who have access to the internet at home via broadband, mobile data or both.

# Our Approach



**Digital Technology and Health II Survey** was a nationally representative<sup>1</sup> household survey of adults (16+ years) in Wales, conducted between November 2021 and February 2022. N=2,476 individuals completed the survey; 82% via telephone and 18% via in-street face-to-face interviews<sup>2</sup>. Of those, N=2,448 (99%) provided complete demographic details and were included in the analysis. As the sample was representative of the Welsh population, no weightings were applied (see Table S1 –Technical Supplement). Unless specified, the population sample with access to the internet at home (see Box 1) and with complete demographic data (N=2,312) was used in all analyses. In some cases, we present a slightly smaller sample size due to missing values. Full results from analyses are available in the Technical Supplement.

The survey covered access to the internet at home, how frequently the internet was used for health-related activities, and the perceived advantages and disadvantages of using the internet in relation to health (see Box 2). We focused on the use of digital health since the COVID-19 pandemic began in March 2020 and when the survey was completed (November 2021 – February 2022). To understand the impact of the pandemic, we also asked people to reflect on their experiences in the year prior to the pandemic (March 2019 – March 2020), and their preferences for the future. Further details on the questions are provided in the Technical Supplement (see Table S2).

## Box 2. Health-related activities covered in this survey

- Tracking healthy behaviours  
*e.g. step counts, diet, or recording health symptoms*
- Finding health information  
*e.g. about symptoms, health conditions and health services*
- Requesting a health appointment or prescription
- Receiving clinical care
- COVID-19 activities  
*Such as symptom tracking, booking a vaccination, Test & Trace; note this activity was only included when asking about the period since the pandemic began.*

<sup>1</sup> Representativeness of the sample was confirmed by comparison to ONS mid-year (2020) population estimate figures.

<sup>2</sup> In-street, face-to-face interviews were implemented to boost the sample of younger respondents. These different models of data collection may result in some response bias.

# Our Findings



## Patterns of internet use for health in Wales

### 1. Access to the internet at home did not change significantly with the COVID-19 pandemic.

Since the pandemic began in March 2020, **6% of people in Wales reported not having access to the internet at home** (see Table S3 – Technical Supplement); this figure is similar to the most recent ONS estimates for Great Britain, which found 4% of households did not have access to the internet in January-February 2020 [10], but is a reduction from the 13% of people in Wales without access in the first Digital Technology and Health Survey in 2018 [7].

Our data do not suggest access to the internet increased since the pandemic began, with less than 1% of people reporting gaining access through 2020/21 (See Table S4 – Technical Supplement). The UK Consumer Digital Index 2021 (a telephone survey of 2,700 people), did report that more people were using the internet<sup>3</sup> in 2021 than in 2020, although these increases were not significant in Wales. The Digital Index also found that Wales had the lowest levels of digital enablement when compared with regions across the UK [11].

The inequalities in access to the internet at home reported previously in Wales [7] as well as in other reports [12-13] were also evident in our data. We found lack of internet access at home was highest amongst (See Table S3 – Technical Supplement):

- older respondents (27% of those over 75 years, compared to 0.4% of 16-25 year olds),
- those living in the most deprived areas (8% compared to 2% in the least deprived areas),
- those with long-term health conditions (7% compared to 4% without long-term conditions).

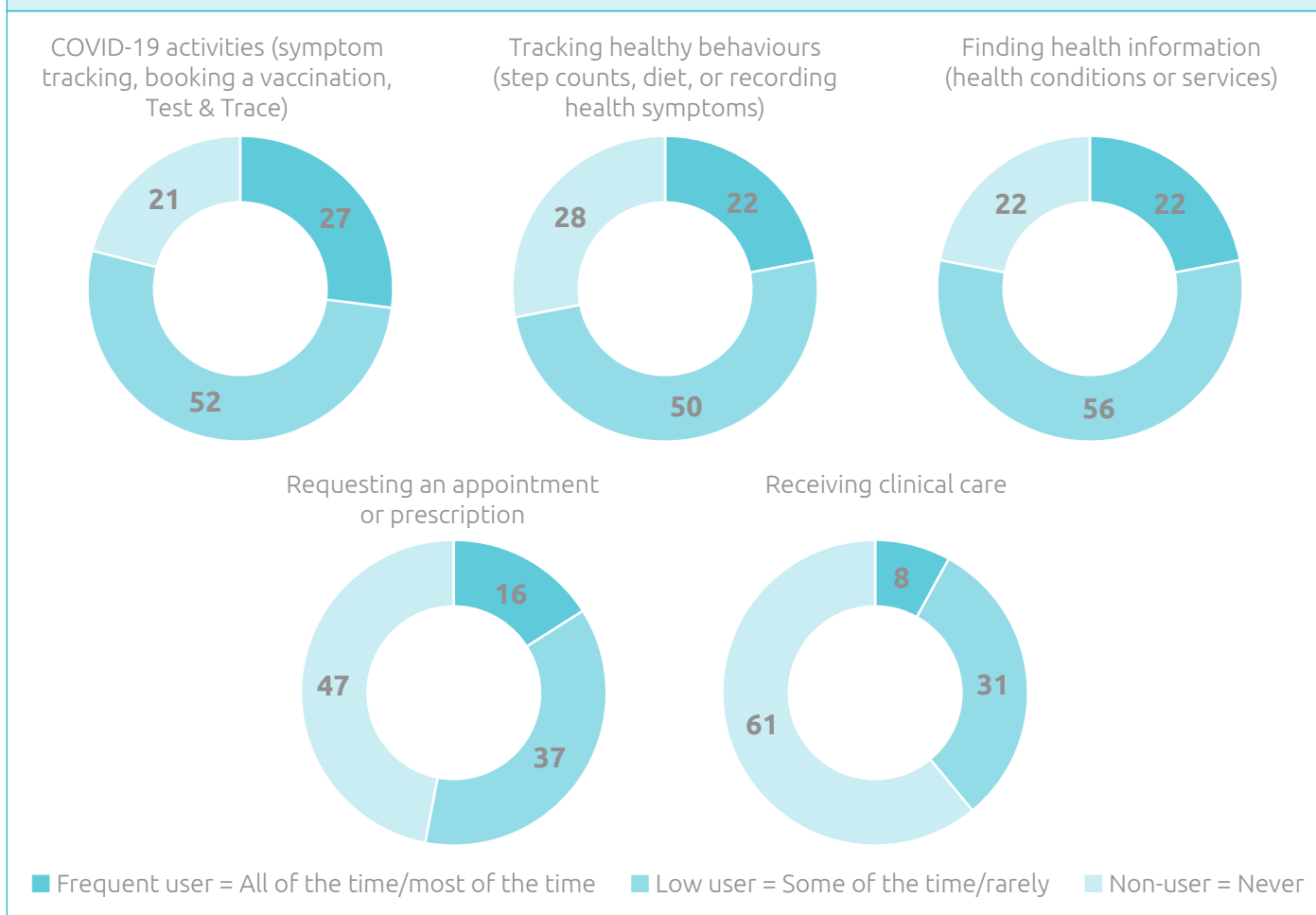
<sup>3</sup> The UK Consumer Digital Index survey asked “Have you used the Internet in the last three months?”

## 2. A minority of people in Wales are using the internet frequently in relation to their health; most are low or non-users of digital health.

We asked those with access to the internet (N=2,312) how frequently they had used the internet for five specific health-related activities since the pandemic began (Figure 1). Responses were given on a 5-point Likert scale; we had focused our analysis on **frequent use** of the internet to understand the degree to which using the internet is an embedded option for people.

COVID-19-related activities were most commonly completed using the internet (27% of people did so frequently); fewest people reported using the internet to receive clinical care (8% of people did so frequently). Overall, 46% of people used the internet frequently for at least one of these five health-related activities (40% if excluding COVID-19 activities) (see Tables S5-S6 – Technical Supplement).

**Figure 1. Percentage of those with internet access using the internet to manage health since the pandemic began by frequency of use**



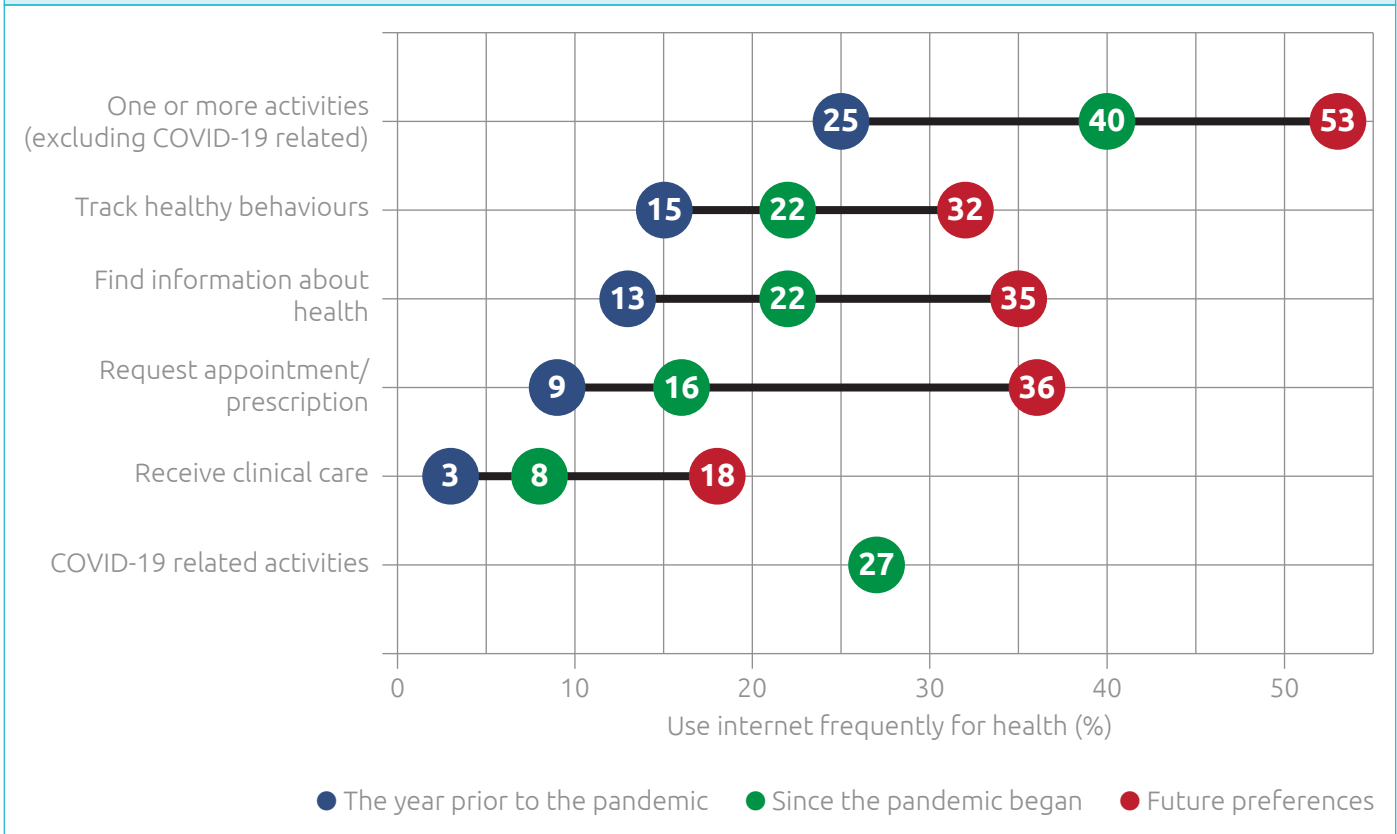
## 3. With the pandemic, increased health-related internet use was seen across health-related activities; the largest fold change was in receiving clinical care.

Since the pandemic began, 25% reported using the internet frequently for health; the increases reported since the pandemic were similar across most health-related activities (1.5-1.8 times higher), but 2.6 times higher for receiving clinical care (Figure 2).

From other sources, it was evident that there was high demand for online sources of health-related information and services during the pandemic. For example, the public COVID-19 dashboard [14] was receiving 19 million page views each week by March 2021, and Welsh Government reported that 250,000 NHS video consultations had been undertaken by October 2021, using the new “Attend Anywhere” NHS Wales video consultation service [15]. During this time, the shift to digital technology was partly driven by the marked increase in the public need for information [16], but also by the suspension of face-to-face delivery of many health services in March 2020 as a response to the pandemic [17].



**Figure 2. Percentage of those with internet access using the internet frequently to manage their health by period**



#### 4. More people would like to use the internet frequently in relation to their health in the future than are currently doing so.

To inform efforts to embed digital health going forward, we asked people how often they would like to use the internet in relation to their health in the future (Figure 2; Table S6 – Technical Supplement)<sup>4</sup>:

- *Accessing healthcare services*: 36% would like to use the internet frequently when requesting healthcare appointments/prescriptions and 18% would like to when receiving clinical care. In both cases, this is 2.3 times higher than those who have done so since the pandemic began.
- *Self-management of health*: 35% would like to use the internet frequently for finding information about health, and 32% for tracking healthy behaviours. This is 1.6 and 1.5 times higher, respectively, than those who have done so since the pandemic.
- Overall, 53% of people would like to frequently use the internet for one or more of the four listed health-related activities in the future; 1.3 times higher than those who have done so since the pandemic began.

This data shows that there is potential for growth in demand for digital health-related resources, over and above what we have seen since the COVID-19 pandemic. Nevertheless, there is still a substantial proportion of the Welsh population who do not wish to use the internet as the primary route to manage or support their health; this is particularly evident in relation to receiving clinical care.

This highlights the importance of understanding users' needs, involving them in the development of new digital resources, and ensuring that non-digital options remain valued and available. As resources and services develop, ongoing evaluation of changing attitudes to digital health, as well as on the impact of digital health on health service access and health outcomes is essential to provide insights into what works, when, and for whom, across the full complement of digital tools available to support health [18].

<sup>4</sup> COVID-19 specific activities were not included when asking about future preferences.

## Exploring differences across population groups

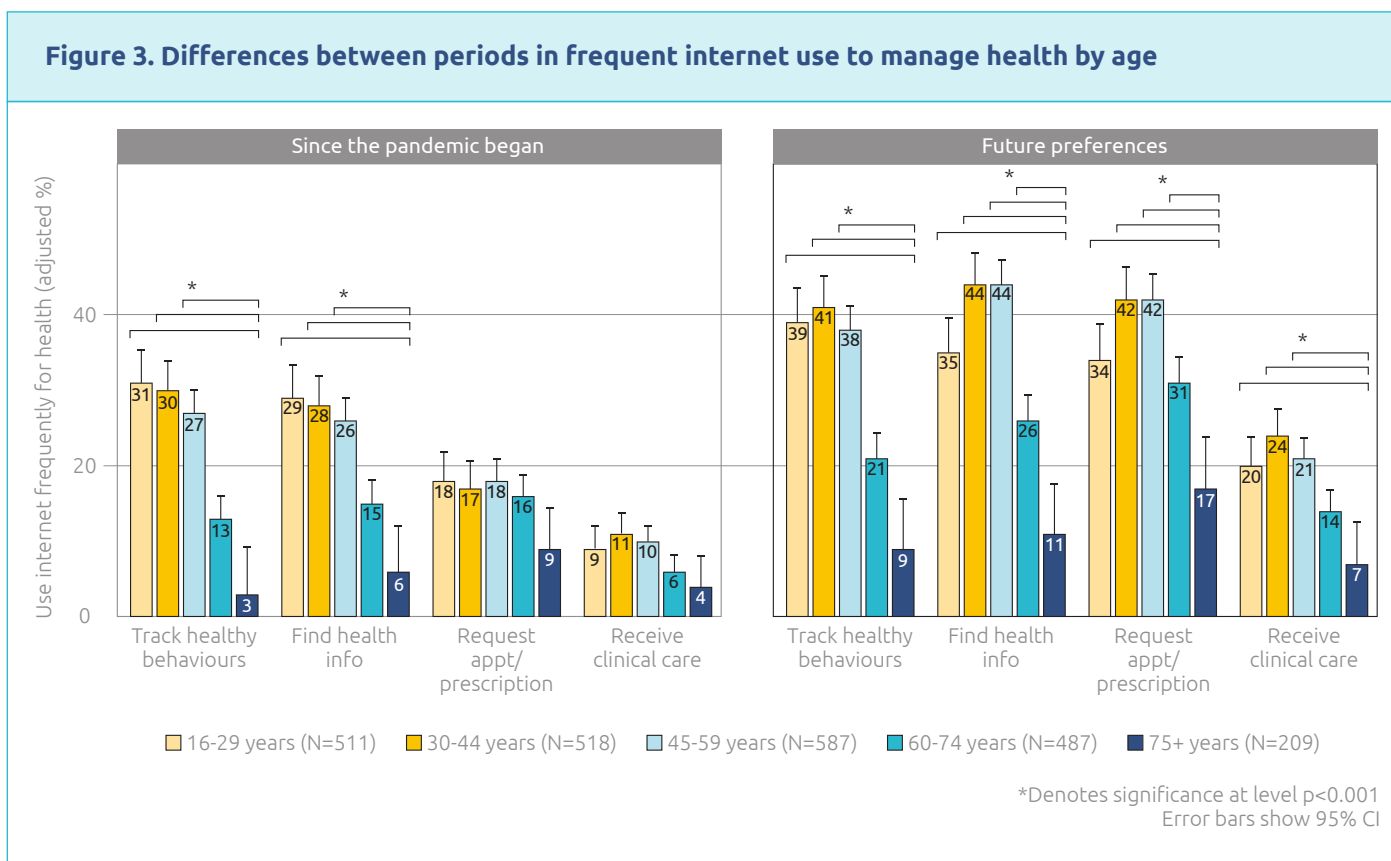
### 5. The largest differences in digital health use were by age group and long-term conditions, but patterns varied across health-related activities.

To understand differences in the proportion of frequent internet use for health across population groups in Wales, we used a generalised linear model to adjust for age, gender and deprivation<sup>5</sup>. We looked at both use since the pandemic began, and future preferences. While the number of frequent users was lower in 2019/20, variation by demographic and health characteristics showed similar patterns of inequalities as those reported since the pandemic began, so are not shown here.

#### Variation by age and gender

Compared to over 75 year olds, the youngest three age groups (16-29, 30-44 and 45-59 years) were more likely to use the internet frequently when tracking healthy behaviours and finding health information since the pandemic began, but differences in using the internet to request appointments or prescriptions, or receive clinical care were not significant (Figure 3).

This variation by age increased when asked about future preferences. The youngest three age groups (16-29, 30-44, 45-59 years) were more likely to want to use the internet frequently across all four health-related activities and 60-74 year olds were also more likely than to use the internet frequently to find health information or request appointments or prescriptions as compared to over 75 year olds (See Tables S7-S8 – Technical Supplement).



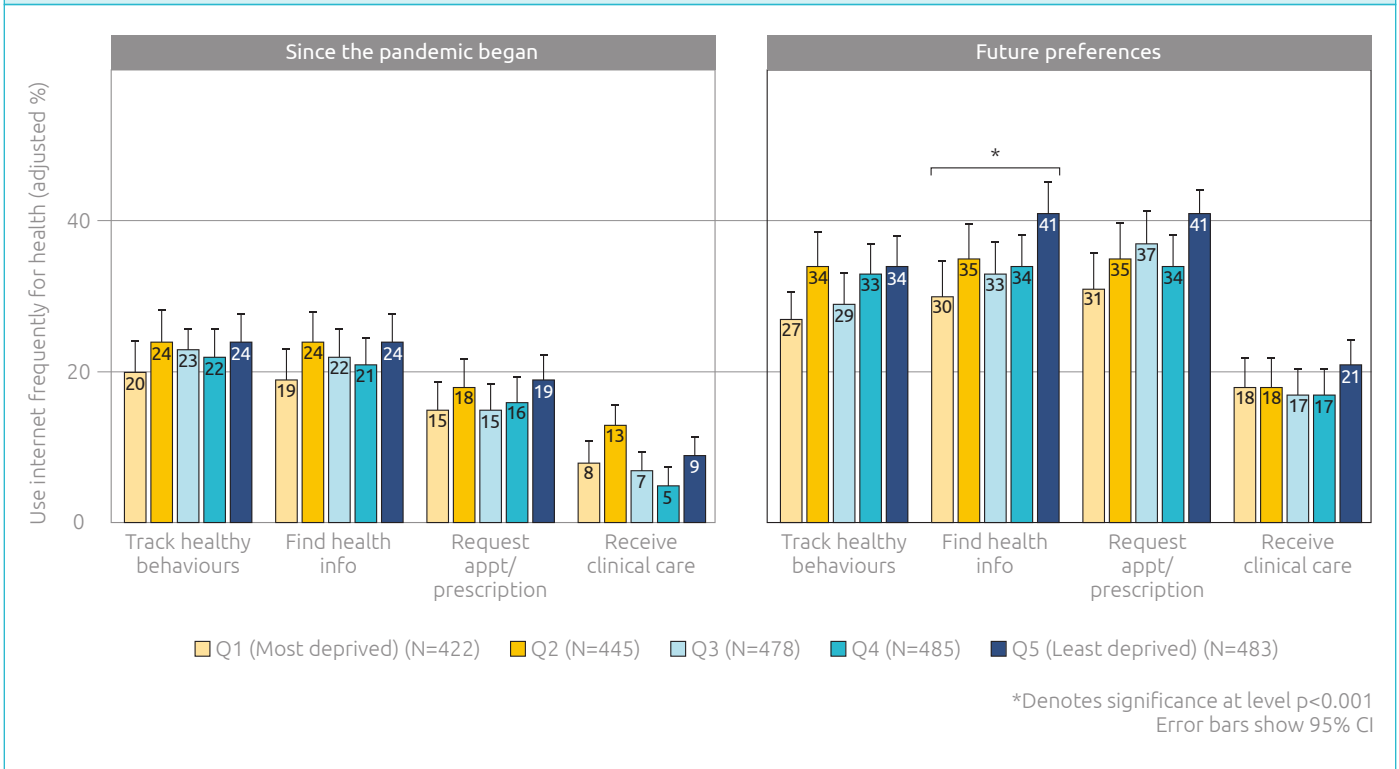
There was little variation by gender; women more often reported using the internet frequently when tracking healthy behaviours since the pandemic began (25% compared to 18% for men), but there were no differences in any other health activities. There were also no differences between the future preferences of women and men.

<sup>5</sup> A conservative significance threshold of  $p < 0.001$  was used (given the multiple comparisons made across sociodemographic and health characteristics).

### Variation by area-level deprivation

There was also little variation by area-level measures of deprivation<sup>6</sup>, with no differences in frequent internet use for any of the health-related activities since the pandemic began. The only significant difference by deprivation was that a higher percentage of those living in the least deprived areas (41%) would like to use the internet frequently to look for health information for one or more activities in the future, as compared to the most deprived areas (30%) (Figure 4; Table S7-S8 – Technical Supplement).

**Figure 4. Differences between periods in frequent internet use to manage health by area-level deprivation**

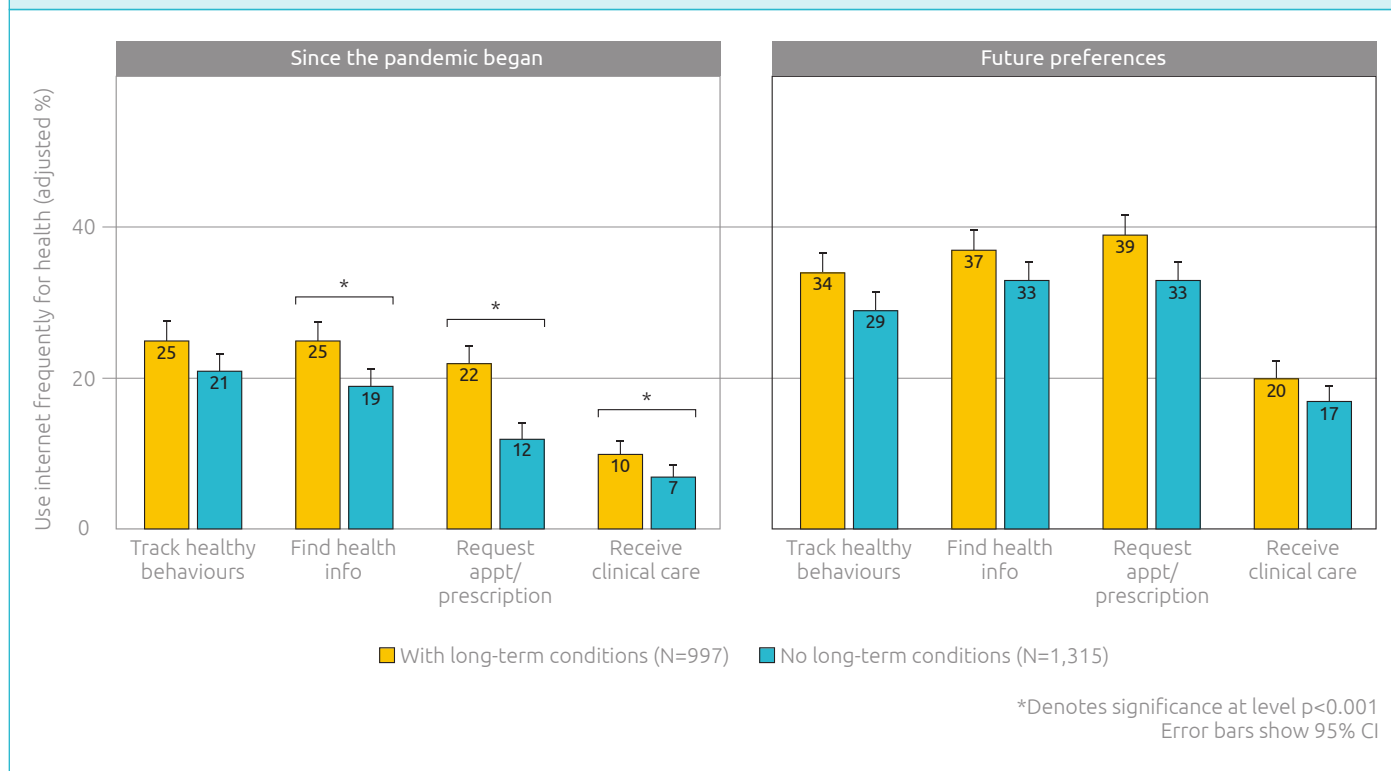


<sup>6</sup> Using the respondents' postcodes mapped to Welsh Index of Multiple Deprivation (WIMD; Welsh Government, 2019)

## Variation by long-term health conditions

Figure 5 shows that significantly more people with long-term health conditions (either physical or mental) used the internet frequently to find health information, request appointments/prescriptions or receive clinical care since the pandemic began, compared to those without long-term conditions. There was no difference in tracking healthy behaviours. When asked about future preferences, there were no longer any significant differences between those with and without long-term conditions (see Table S7-S8 – Technical Supplement).

**Figure 5. Differences between periods in frequent internet use to manage health between those with and without long-term conditions**



Digital health has been suggested to offer particular benefits to older people and those with long-term conditions, who are likely to have more complex health needs [19-20]. Barriers related to functionality (e.g. small text, complex interface) and physical impairments (e.g. poor eyesight, hearing, or memory) as well as lack of support and training are common for older adults [21]. For people with long-term conditions, barriers to accessing and using the internet are more varied across health conditions [22]; the previous Digital Technology and Health Survey also reported varied patterns of different digital health-related actions from those reporting lower general health [7].

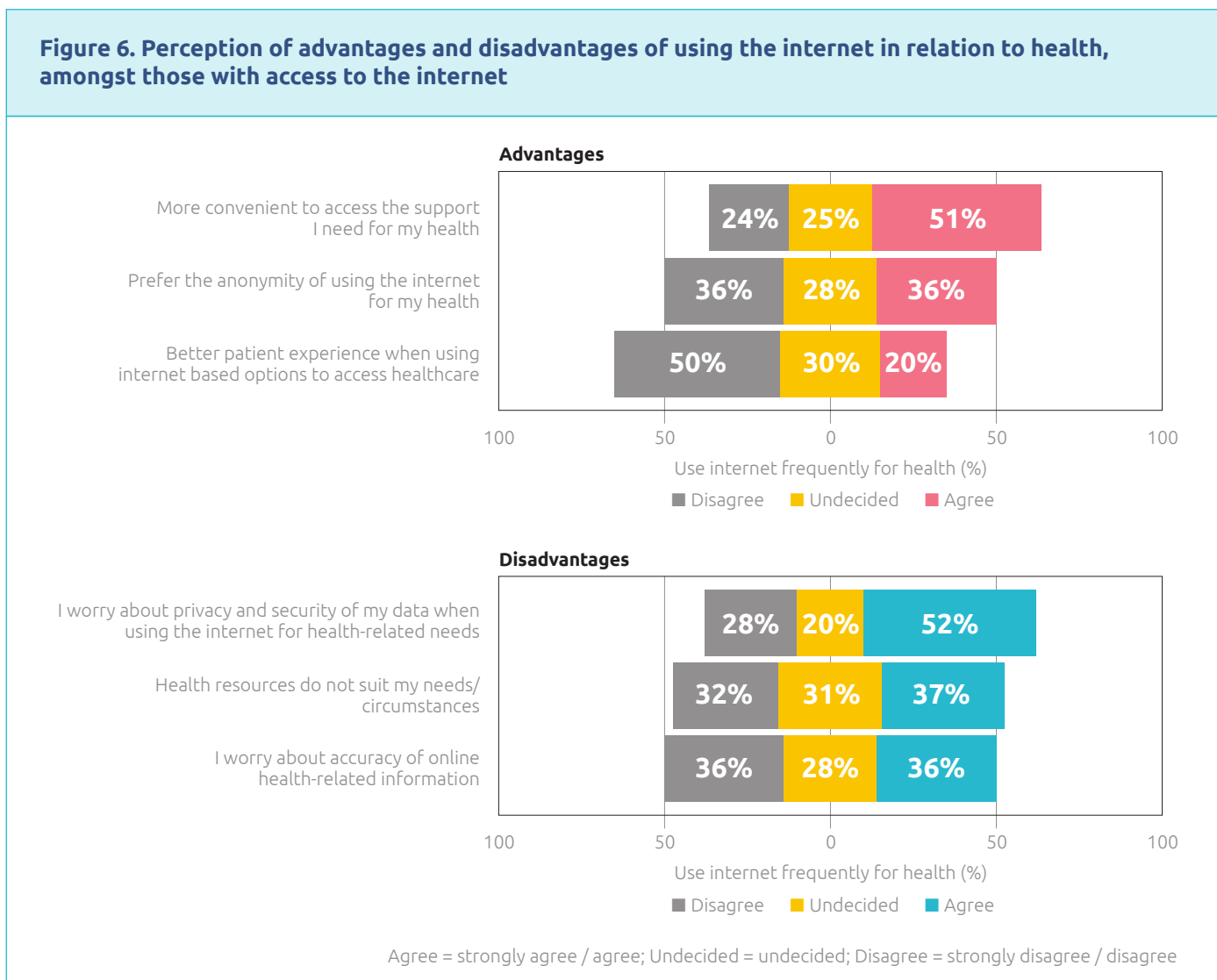
Our data highlights contrasting patterns of frequent internet use for health by age or long-term health conditions. Since the pandemic began, older people were less likely to report frequent internet use than younger people, those with long-term conditions were more often frequent internet users; and when asked about future preferences the differences by age increased while for long-term conditions these were no longer significant.

Our data did not allow us to explore specific needs amongst those reporting long-term conditions, but previous research also indicates that when digital solutions are co-designed and address the needs of patients, engagement increases [21, 23]. While digital inclusion strategies already include training and skills [2], a key challenge for digital health technologies is to improve usability and sustain health-related internet use as people age and their health needs increase, to ensure digital technology does not inadvertently widen health inequalities in Wales.

Contrary to other reports [7, 24], our data do not show consistent variation in frequent internet health-related by gender and deprivation. We note that findings from the evaluation of video consultations in Wales found that regardless of demographic and geographic factors, video consultations were accepted by patients [25]. This suggests that a more nuanced view of digital health is needed, not necessarily aligned with existing digital divide conceptualisations (e.g. access and usage).

## 6. More than half of the respondents considered convenience an advantage of digital health, but concerns about privacy and a poor perception of patient experience were also prevalent.

We also asked people for their perspectives on using the internet to manage their health. They were asked about the extent to which they agreed/disagreed with 3 possible advantages and 3 possible disadvantages (Figure 6).



Just over half agreed that digital health was convenient (with 51% agreeing and only 24% disagreeing), while perceptions around anonymity as an advantage were more mixed (36% agreed, 36% disagreed). Notably, only 20% agreed that they had a better patient experience when using internet based options to access health care (with 50% disagreeing).

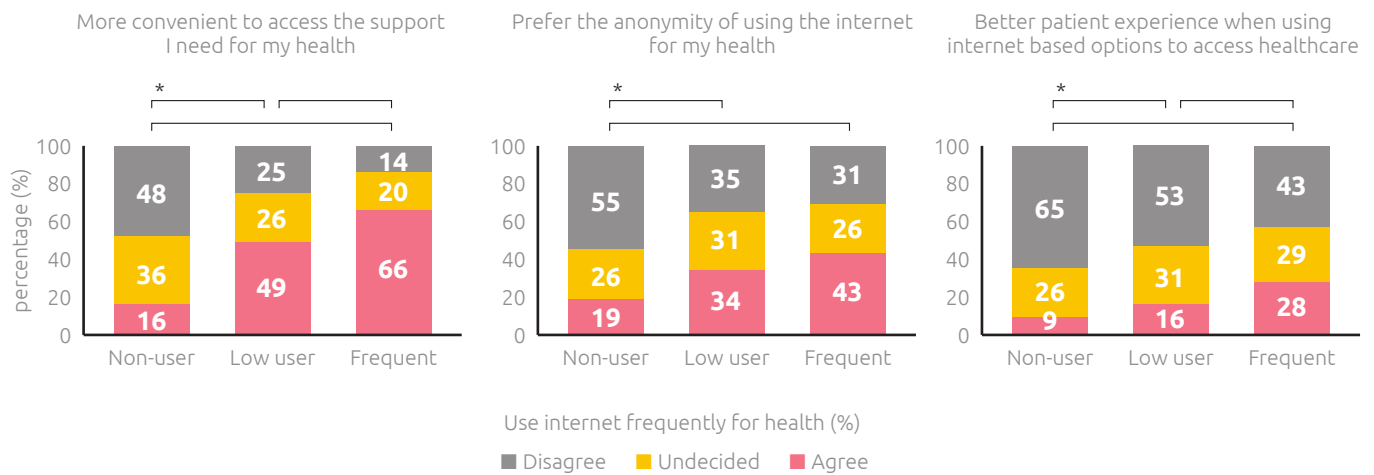
When asked about disadvantages, 52% agreed that they worried about the privacy and security of data while using the internet (28% disagreed that this was a worry). Perspectives on both worrying about the accuracy of health-related information or the suitability of health resources were mixed with approximately a third agreeing and a third disagreeing that these were disadvantages.

## 7. Frequent users of digital health are as likely to worry about the accuracy of the information, privacy and security online as low and non-users.

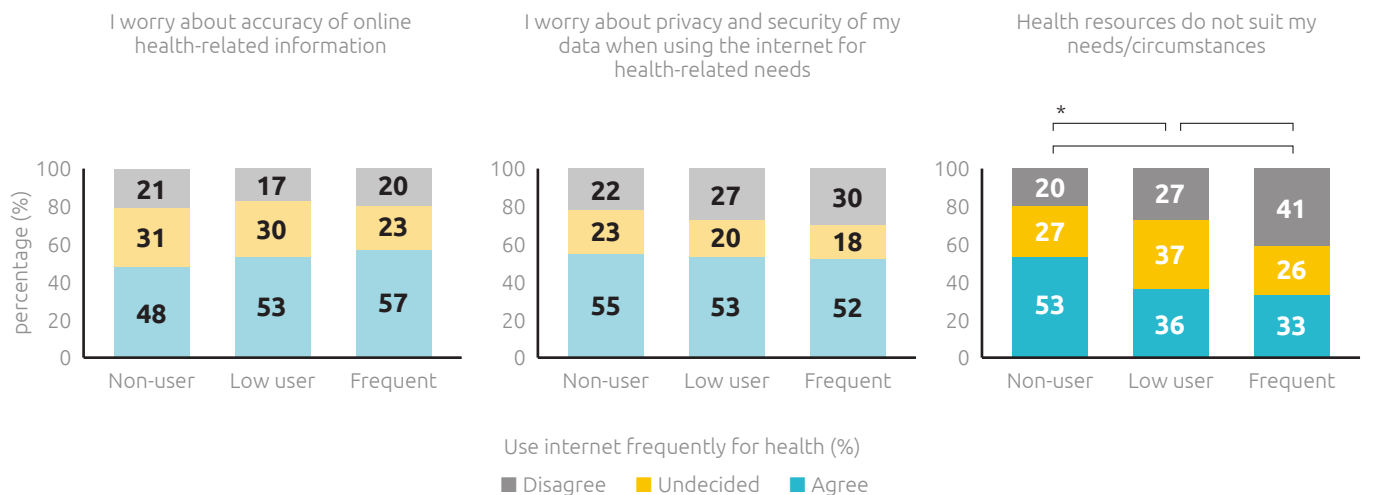
We tested the relationship between agreement with these advantages and disadvantages and frequency of health-related internet use<sup>7</sup>, using Chi-Square tests (Figure 7). Concerns over accuracy and privacy and security of data did not differ with the frequency of health-related internet use, but the frequency of use was inversely related to concerns that health resources do not suit people’s needs. Higher levels of agreement that digital tools are convenient and give a better patient experience was seen with more frequency of use; both frequent and low users were more likely than non-users to agree that digital services enable anonymity (see Table S9 –Technical Supplement).

**Figure 7. Differences in the perceived advantages and disadvantages of the internet by frequency of internet use to manage health**

### Advantages



### Disadvantages



\*Denotes significance at level  $p < 0.001$ , Dark shaded bars represent a significant ( $p < 0.001$ ) association between perceived advantages and disadvantages of the internet and frequency of use; light-shaded bars represent a non-significant association.

<sup>7</sup> Those who used the internet all of the time / most of the time for at least one of the four health activities were considered frequent users, those who never used the internet for all of the health activities were considered non-users. All others were categorised as low users.

Aligned with our data, convenience has been widely reported as an enabler of health-related internet use [26-28]. While overall agreement that patient experience is better with online options is low in our sample, it is also associated with more frequent use of the internet for health. Others have found patient satisfaction is high when using digital options, particularly when receiving clinical care [25, 29-30]. Currently, only a small proportion of our respondents report using the internet frequently for this purpose. However, it is possible that as more people engage and have positive experiences with digital clinical services, acceptability, and adoption may also increase.

In contrast, concerns about accuracy and privacy are prevalent (both in our survey and in other studies [26, 31]), but not associated with less frequent use of the internet in relation to health amongst our respondents. This does not mean that these concerns do not relate to behaviour in other ways – for example, the 2019 OxIS survey found that 31% of internet users have taken some action to protect their privacy in relation to medical issues [13]. While it is beyond the scope of what was measured in this survey, the wider, offline, impacts of digital technology on health behaviours and outcomes are also important to consider – including the impact of misinformation online on health.



# Implications and Next Steps



Our survey describes health-related digital technology use in Wales and how this has been impacted by the COVID-19 pandemic. We found little evidence of an increase in access to the internet since the pandemic began, but we did find increased use of the internet in relation to health. Nevertheless, only a minority of the Welsh population with internet access were frequently using the internet to support their health; younger people and those with long-term conditions were more likely to be frequent users.

The lack of significant variation in frequent health-related internet use by area-level deprivation (amongst those with internet access at home) is unexpected, particularly as the pandemic has brought into sharp focus the issue of “data poverty” [33]. Notably, our data was collected in the winter of 2021/22, and the cost of living crisis has developed significantly since then. Continued efforts are needed to monitor deprivation as a potential driver of digital exclusion, and the risk of widening existing health inequalities. This includes moving beyond area-level measures of deprivation.

Our data also shows that there is a gap between those who have been using the internet frequently in relation to their health and those that would like to do so in the future. This suggests there is scope for development in many areas of digital health in Wales. Older age groups continue to be the least likely to want to use the internet frequently, and the significantly higher levels of use we see among those with long-term conditions are not sustained when asked about future preferences. This has important implications for the health service and wider system, to ensure that the continued development and adoption of digital technologies serve the health needs of the whole Welsh population.

Our data also describes the perceived advantages and disadvantages that are associated with health-related internet use. Only a small proportion of those surveyed agreed that online options gave a better patient experience when accessing health care. In most cases, perceptions of health-related internet use were more positive amongst frequent users, specifically convenience, anonymity and better patient experience (albeit low). Non-users and low internet users were more likely to report that online health resources do not suit their needs compared to frequent internet users but concerns around the accuracy of information and privacy and security of data online were present, regardless frequency of internet use to manage health. Understanding how perceptions vary and impact the use of digital health technologies can help those developing online tools maximise the opportunities digital technology offers in supporting health.



## Key areas for future action include:

Despite the growing use of online technologies for health, continued efforts to reduce digital exclusion and embed digital health are needed. Wales is making progress towards a *digitally confident Wales* but Welsh Government has reflected that progress slowed down during the pandemic [2]. The digital inclusion strategies in Wales focus on basic digital skills, devices and connectivity, and include new initiatives specifically relevant within the context of a cost of living crisis – offering free data to people facing ‘digital poverty’, and providing free training, access to devices and signposting to local services via digital hubs [12]. While addressing these barriers is important in tackling digital health exclusion, **strategies to empower patients to engage with digital healthcare should be conceptualised beyond unequal digital access or basic skills**. For instance, the ‘Minimum Digital Living Standard for Wales’ proposed by The Digital Inclusion Alliance in Wales is moving towards adopting a new citizen and society focused approach in order to better understand digital inequalities in relation to individuals’ available social, cultural, and economic capital and the embedding of the digital within their everyday lives [35]. Furthermore, our data also suggest that motivation to engage with digital health technology needs to be considered. Although motivation or “willingness” to engage and use digital technology is recognised as a key issue, there is a paucity of research exploring this issue in greater depth and granularity [36]. There is also an important gap in evidence around engagement and motivation to use digital health technologies [37].

Here, we also show that a high proportion of internet users do not use digital options frequently to support their health, and many do not have the intention to change their behaviour. As such, **the option of non-digital resources should remain available alongside digital solutions to empower people to take control of their health as they see fit**. Those who express a lack of interest in using digital routes to support their health often also face barriers to access; understanding the individual support needed is critical to ensure digital tools do not exacerbate existing health inequalities [38]. More efforts to identify and support those who are or could benefit most from appropriately designed digital health technologies, particularly older people and those with long-term conditions, would help direct innovation to the areas where there is the potential for the greatest impact. **Focusing on the development of user-centric digital health and ensuring the usability and suitability of digital solutions is crucial to enable people to engage more easily than is currently the case and to remain engaged as their health needs increase**.

**Monitoring and evaluating the uptake, ongoing engagement, and health outcomes across different population groups is needed to ensure an evidence-informed approach to digital health**. To enable this, most critically, data systems must be able to capture who received a digital service, and indicators of equity. While there are ongoing digital service-specific evaluations (for example from TEC Cymru) [18-25], approaches that consider the wider impact of digital technologies on how and when people access support for their health across services are needed, as well as better integration into practice to generate robust evidence of the impact of digital health-related technologies on health behaviours and outcomes.



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