Digital health access, uptake, literacy and trust in people with experience of homelessness

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Background and objective
Although digital health promises improved healthcare efficiency and equity, access and uptake might be low in disadvantaged populations. We measured access to digital health technology, the uptake of digital health, digital health literacy and COVID-19 vaccination intentions in an inner-city Australian population experiencing homelessness.

Methods
An existing Australian survey, including a validated digital health literacy measure (eHealth Literacy Scale [eHEALS]), was modified and distributed in three general practices specifically targeting the homeless population. Data analysis used appropriate descriptive statistics and correlation coefficients.

Results
Eighty-three respondents completed the survey in 2021. Digital health uptake was much lower than in the general Australian population in 2019–20, despite good access to working smart phones and connectivity. Digital health literacy was positively associated with uptake. Internet-sourced information was trusted less than information from a general practitioner.

Discussion
Further work is needed to understand the perceived usefulness and sociocultural compatibility of digital health in different subpopulations experiencing homelessness, including susceptibility to misinformation.

DIGITAL HEALTH encompasses any information and/or communication technology used to facilitate patient participation in healthcare and improve patient health and wellbeing.[1] Examples used in Australia include searching for health information online, telehealth consultations (both telephone and video), online appointment booking systems, mobile phone health apps, communication between patients and healthcare providers using text or email and accessing electronic health records. The increasing utilisation of digital health in Australia, due in part to the COVID-19 pandemic context and the establishment of Medicare benefits for telehealth items,[2] brings the promise of improved healthcare efficiency and equity, as well as consumer empowerment.[3]

Despite this promise, there is also widespread concern and emerging evidence that socioeconomically disadvantaged populations, already experiencing social exclusion and poor health outcomes, might benefit less from digital health technologies,[4–6] and, indeed, that the increased digitisation of healthcare might even worsen health outcomes for patients with low digital health uptake.[7] Key factors that influence the uptake of new technology in health and education are its perceived usefulness (including relative advantage over existing options), perceived ease of use (including access and cost) and sociocultural compatibility with existing norms, values, beliefs and felt needs (acknowledging the broader context in which consumers operate).[8–10] It is important to understand how these factors play out to influence the uptake of digital health in already disadvantaged populations, so that its promise can be realised.

People experiencing homelessness have high rates of socioeconomic disadvantage, and both acute and chronic mental and physical illness.[11] They access general practice care relatively infrequently,[12,13] and might have a relatively lower uptake of digital health.[14] Lack of access to digital health technology might be an important factor in this low uptake, although many people experiencing homelessness have access to a mobile phone with internet access, both in the USA[15] and Australia.[16] However, phone turnover due to loss, theft or damage is high, phone numbers might change frequently,[15] and access to affordable data and power to charge phone batteries might be limited.[15,16] Little is known about either perceived usefulness and other aspects of perceived ease of use (including digital

health literacy) or the compatibility of digital health with existing values and beliefs (including trust in authorities and technology) in this population.

This survey-based study aimed to address this gap in the literature by: (1) measuring access to digital health technology, the uptake of digital health and digital health literacy in an urban Australian population experiencing homelessness; and (2) enhancing our understanding of how the usefulness, ease of use and sociocultural compatibility of this technology is perceived. We also compared intentions to receive COVID-19 vaccination with digital health access and literacy.

Methods

We modified an existing Australian survey of digital health access in adult Australian primary care (Choy M, Barnes K, Sturgiss E, Rieger E, Douglas K, unpubl. obs.) to enable the comparison of responses from a general adult Australian population surveyed between November 2019 and February 2020 in general practice with those of our smaller population with experience of homelessness (Choy M, Barnes K, Sturgiss E, Rieger E, Douglas K, unpubl. obs.). We refer henceforth to this broader population as the comparison population and this survey as the original survey. The comparison population consisted of attendees of 34 mainstream Australian general practices in south-east New South Wales and the Australian Capital Territory before the COVID-19 pandemic. The survey included a validated instrument for measuring digital health literacy.

Participants were informed that the researchers wanted to understand how people with experience of homelessness use technology for their healthcare, and that participation was anonymous and voluntary, with no consequence for their health or social care. They were informed that they were eligible to participate whether or not they used or liked technology.

Demographic information was collected and respondents were asked whether they were planning to have a COVID-19 vaccine when these became available. The original survey was also modified to include more detailed questions about accommodation and access to technology and telehealth, given our target population and pandemic context. Survey items addressed the frequency of use of face-to-face and telehealth healthcare options over the past 12 months, as well as access to mobile phones, email and the internet. Respondents using mobile phones were asked about the availability of charging, credit, data and cost of repairs, and whether the phone had been lost or stolen in the prior 12 months. If they used the internet, they were asked about the quality and extent of their internet access, the devices and locations used, and how often they performed various health-related activities, including searching for health information, using a health-related mobile phone app or online forum and accessing their My Health Record. My Health Record is a consumer-controlled online personal health record operated by the Australian Government that is accessible by authorised healthcare providers.[17] Respondents then rated their trust in information and advice provided by the internet, mobile phone apps, online health forums and a general practitioner (GP). The eight-item validated eHealth Literacy Scale (eHEALS)[18] was used verbatim for the final questions, measuring self-reported knowledge, skills and confidence in finding and using internet health information and resources. Scores are averaged across the eight items, with higher scores indicating higher digital health literacy. The full survey was piloted by one of the authors (NS) in person with one client, who advised, including additional accommodation response options.

Adults attending three inner-city Brisbane general practices that target people with experience of homelessness were approached by the medical student investigator (GC) while waiting to consult with a GP and invited to participate in a paper-based survey. The three practices receive funding from multiple sources, including private donations and government and non-governmental organisations. Patients might attend more than one GP and/or general practice. Different GPs work at each practice. Healthcare consultations are provided free of charge and mostly subsidised by Medicare. The patient gap charge for some medications was further subsidised by two of the services. Two of the practices share medical records to reduce fragmentation of healthcare.

Potential participants who appeared to be acutely distressed, psychotic or otherwise agitated were not invited to participate. Two of the three practices are located within drop-in centres providing laundry and shower facilities, food, and access to allied health and social care services. The third practice provides access to allied health and dental and social care services. The medical student investigator (GC) assisted with the completion of most surveys by reading out items and recording responses.

Counts and percentages were used to summarise categorical variable responses, whereas means and 95% confidence intervals were used to summarise responses to continuous variables. Appropriate correlation coefficients were used to calculate bivariate relationships between variables. Responses to the eight eHEALS items were combined to produce an eHEALS scale score for each respondent. Mean response scores were also calculated across the whole sample for individual eHEALS items using item response scores of 1=strongly disagree to 5=strongly agree.

Approval for the study was obtained from the University of Queensland (2020/HE002904).

Results

Data were collected between April and October 2021 during weekday daylight times, at the medical student investigator's convenience, from 83 participants. The medical student investigator had the impression that most respondents comprehended and answered the questions without difficulty, although concentration sometimes waned during the final items. Approximately one-third of the clients who were invited to participate consented to complete the survey. Table 1 provides respondent demographic information, as well as information for the comparison population, where available.

Access to digital health technology

Fewer than 5% of respondents did not currently have a mobile phone, and nearly all respondents sent and received texts. Nearly all of those with a mobile phone had charge and some credit, and most currently also had data.

Two-thirds of respondents used email, and four in five used the internet. The most common device used to access the internet was a personal mobile phone, followed by

a free public laptop or computer (eg public library or drop-in centre), although 55% of respondents disagreed or strongly disagreed that they were 'comfortable dealing with health information online in a public place' (Table 2).

Uptake of digital health

Face-to-face contact with a GP was the most frequent uptake of healthcare reported, and all participants had seen a GP at least once in the previous 12 months. Of telehealth options, 53% of respondents had never had a telephone consultation with a GP, and 98% had never had a video consultation with a GP.

In terms of other use of digital health, over half the respondents never searched for health information online and more than 90% had never used a health app, accessed their My Health Record, used online health forums/groups or emailed a healthcare provider (Table 3). Forty-nine per cent of respondents replied 'Never' to all five of these questions about their digital health use (see Table 3, which includes data for the comparison population).

Digital health literacy

Mean eHEALS digital health literacy scores were significantly lower for respondents than for the comparison population (23.3 [95% CI: 21.7, 24.9] vs 27.8 [95% CI: 27.2, 28.4], respectively; mean difference=4.45, t_{516}=5.39, P<0.001). A significant relationship was found between using the internet and the eHEALS score (ie people who used the internet reported higher digital health literacy; r=0.304, P=0.006).

Perceived usefulness and sociocultural compatibility

Nearly 90% of respondents agreed or strongly agreed that they were 'interested in using the internet and technology in general', and two-thirds agreed or strongly agreed that they were 'interested in using the internet and technology for health needs'.

Information provided by GPs was trusted significantly more than information found on the internet (mean rating 3.67 [95% CI: 3.56, 3.78] vs 2.37 [95% CI: 2.19, 2.55], respectively; mean difference=1.31, t_{82}=23.94, P<0.001). Trust in mobile phone health-related apps and online health forums was similar to trust in information found on the internet,

Table 1. Participant characteristics (n=83)

Characteristic	No. respondents[A]	%	Comparison (%)[B] (n=487)
Year of birth (approximate age in years)			
Prior to 1945 (>76)	0	0.0	11.5
1945–49 (72–76)	2	2.4	8.4
1950–54 (67–71)	4	4.9	7.7
1955–59 (62–66)	8	9.8	9.1
1960–64 (57–61)	13	15.9	8.6
1965–69 (52–56)	11	13.4	6.8
1970–74 (47–51)	8	9.8	6.4
1975–79 (42–46)	15	18.3	4.9
1980–84 (37–41)	9	11.0	5.7
1985–89 (32–36)	8	9.8	9.1
1990–95 (27–31)	4	4.9	8.8
>1995 (<27)	0	0.0	13.0
Country of birth			
Australia	74	89.2	78.5
Other	9	10.8	21.5
Gender			
Female	16	19.3	69.5
Male	66	79.5	29.3
Other/prefer not to say	1	1.2	1.3
Employment status			
Employed	11	13.3	57.4
Not employed, seeking work	27	32.5	5.0
Not employed, not seeking work	33	39.8	8.8
Retired or unable to work currently	10	12.0	28.4
Prefer not to say	2	2.4	0.4
Current accommodation			
Sleeping rough or in car	11	13.3	–
Couch surfing	6	7.2	–
Crisis accommodation (eg homeless hostel)	4	4.8	–
Temporary accommodation (eg backpackers/motel)	7	8.4	–
Supported accommodation	22	26.5	–
Boarding house	13	15.7	–

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Table 1. Participant characteristics (n=83) (cont'd)

Characteristic	No. respondents[A]	%	Comparison (%)[B] (n=487)
Own home or apartment	11	13.3	–
Private rental	6	7.2	–
Other	3	3.6	–
Accommodation 6 months earlier			
Sleeping rough or in car	16	19.5	–
Couch surfing	2	2.4	–
Crisis accommodation (eg homeless hostel)	2	2.4	–
Temporary accommodation (eg backpackers/motel)	8	9.8	–
Supported accommodation	22	26.8	–
Boarding house	11	13.4	–
Own home or apartment	8	9.8	–
Private rental	6	7.3	–
Other	6	7.3	–
Prison	1	1.2	–
Health condition that has lasted at least 6 months			
Yes	67	81.7	74.2
No	15	18.3	25.8
Mental health condition that has lasted at least 6 months			
Yes	62	75.6	–
No	20	24.4	–
Problem with using substances including alcohol			
Yes	39	47.6	–
No	42	51.2	–
Prefer not to say	1	1.2	–

[A]Counts do not always sum to 83 because not all respondents answered every question.

[B]Comparison population data are only available where the same items were used in both surveys.

with mean trust ratings of 2.32 (95% CI: 2.14, 2.50; mean difference=0.05, t_{78}=0.59, P=0.56) and 2.29 (95% CI: 2.11, 2.47; mean difference=0.08, t_{78}=0.86, P=0.40), respectively. Eighteen per cent of respondents disagreed or strongly disagreed that they were 'confident that healthcare providers use my health data appropriately' (Table 4, including data for the comparison population).

More than half the respondents were planning to have the COVID-19 vaccine, with almost one-third planning not to, and almost one in five unsure (Table 3). No significant relationship was found between the order in which surveys were entered into the dataset (as a proxy for date of survey completion in 2021) and plans to have the vaccine (r=–0.12, P=0.16). There was no significant relationship between eHEALS score and planning to have the vaccine (r=0.094, P=0.447). No significant relationship was found between searching for health information online and vaccination plans, although respondents who did not search tended to be more likely to be planning to have the vaccine (85%) than those who did use the internet (61%; χ^2_1=2.57; P=0.102). Several respondents misinformed the medical student investigator (GC) of adverse effects from COVID-19 vaccinations, and related conspiracy theories they had sourced online.

Discussion

The overall uptake of digital health in our respondents was relatively low. We explored three key attributes influencing uptake of new technology in health and education: ease of use, perceived usefulness and sociocultural compatibility.[9,10] In terms of ease of use, we found that most respondents had at least some access to appropriate technology at the time of the survey (albeit lower than our comparison population), although many were uncomfortable accessing health information in public spaces. Low digital health literacy was associated with lower digital health use, confirming previous research findings that low levels of digital health literacy are associated with reduced internet use in disadvantaged populations.[4] In terms of perceived usefulness, most respondents were interested in using technology for health needs.

In terms of sociocultural compatibility, trust is likely to be a key concern for people experiencing homelessness. Trust is valued highly by patients with experience of homelessness, but they might have difficulty identifying trustworthy sources because of previous adverse experiences and trauma.[19,20] A previous Australian study with men accommodated in a homeless hostel reported mixed attitudes to the use of healthcare technology, with clients wanting their medical records integrated and accessible, but also impatient with an excessive focus on technology.[11] We found that most respondents trusted information from their GP more than from the internet. There were also respondents who appeared to be susceptible to online misinformation beliefs that might be socioculturally compatible in some people with pre-existing mental health conditions or institutional trauma. A recent Australian study found that lower institutional trust, greater rejection of official government accounts, less confidence in government,

Table 2. Digital health technology access and use (n=83)[A]

	Yes[B]	No
Do you currently have a mobile phone	78 (95.1)	4 (4.9)
Do you send and receive texts?	77 (93.9)	5 (6.1)
Is your mobile phone currently charged?	79 (95.2)	4 (4.8)
Is it difficult for you to charge your mobile phone?	23 (27.7)	60 (72.3)
Does your mobile phone currently have credit to make calls or texts?	77 (92.8)	6 (7.2)
Has your mobile phone been lost or stolen in the past 12 months?	35 (42.2)	48 (57.8)
Does your mobile phone currently have any data?	72 (86.7)	11 (13.3)
Do you use the internet at all?	66 (80.5)	16 (19.5)
Do you use email?	55 (67.1)	27 (32.9)

[A]Data are presented as n (%).

[B]Counts do not always sum to 83 because not all respondents answered every question.

less trust in scientific institutions and lower digital health literacy (measured by eHEALS) were all associated with stronger agreement with COVID-19 misinformation.[21] We recommend further qualitative studies to enhance understanding of the sociocultural compatibility of different digital health resources in various subpopulations of the homeless.

This study was conducted in 2021, during the COVID-19 pandemic. The first Queensland case of COVID-19 was in January 2020,[22] with the first death in March 2020.[23] COVID-19 vaccination was first available to Brisbane healthcare workers from late February 2021, with increasing access in the community (including many pharmacies) from mid-2021.[24] The pandemic increased the use of digital health by the general population, and temporary increases

Table 3. Digital health engagement

	Study respondents[A,B] (n=83)				
Healthcare over past 12 months	**None**	**Once**	**2–4 times**	**≥5 times**	**Never**
Seen GP face to face	0 (0.0)	11 (13.4)	32 (39.0)	39 (47.6)	
Had GP appointment over the phone	43 (53.1)	22 (27.2)	10 (12.3)	6 (7.40)	
Had GP appointment over video	79 (97.5)	1 (1.2)	1 (1.2)	0 (0.0)	
Got GP appointment text	51 (63.0)	8 (9.9)	10 (12.3)	12 (14.8)	
Seen hospital doctor face to face	34 (42.0)	18 (22.2)	20 (24.7)	9 (11.1)	
Had hospital doctor appointment over the phone	69 (85.2)	4 (4.93)	6 (7.4)	2 (2.5)	
Had hospital doctor appointment over video	81 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	
Got hospital appointment text	67 (82.7)	4 (4.9)	6 (7.4)	4 (4.9)	

	Study respondents[A,B] (n=83)				Comparison group (%)
Digital health use	**Never**	**At least once**	**Every now and then**	**Most days**	**Never**
Search for health-related information online (eg Google)	44 (53.0)	14 (16.9)	22 (26.5)	3 (3.6)	5.2
Book appointments online	69 (83.1)	8 (9.6)	5 (6.0)	1 (1.2)	20.1
Email a healthcare provider	81 (97.6)	1 (1.2)	1 (1.2)	0 (0.0)	57.7
Use a health-related mobile phone app (eg an app to help with smoking cessation, anxiety, diabetes)	75 (90.4)	3 (3.6)	5 (6.0)	0 (0.0)	32.7
Access your My Health Record	79 (95.2)	3 (3.6)	1 (1.2)	0 (0.0)	52.3
Access an online health forum (eg Facebook group)	80 (96.4)	2 (2.4)	0 (0.0)	1 (1.2)	57.1

[A]Data are presented as n (%).

[B]Counts do not always sum to 83 because not all respondents answered every question.

GP, general practitioner.

Table 4. Opinions on technology and eHealth

	Study respondents[A] (n=83)				Comparison group
Technology use	**Strongly disagree[B]**	**Disagree**	**Agree**	**Strongly agree**	**Agree/strongly agree (%)**
I am interested in using the internet and technology in general	7 (8.4)	5 (6.0)	58 (69.9)	13 (15.7)	76.9
I am interested in using the internet and technology for health needs	10 (12.2)	18 (22.0)	46 (56.1)	8 (9.8)	56.9
I am confident that healthcare providers use my health data appropriately	5 (6.1)	10 (12.2)	53 (64.6)	14 (17.1)	N/A
Trust in information	**Wouldn't trust at all**	**Would trust a little bit**	**Would trust a reasonable amount**	**Would trust completely**	**Mean question rating**
GP	0 (0.0)	1 (1.2)	25 (30.1)	57 (68.7)	3.67
Information that I found myself on the internet	11 (13.9)	34 (43.0)	28 (35.4)	6 (7.6)	2.37
A health-related mobile phone program or app	12 (15.2)	35 (44.3)	27 (34.2)	5 (6.3)	2.32
Online health forums with peer support and advice	12 (15.2)	38 (48.1)	23 (29.1)	6 (7.6)	2.29

[A]Data are presented as n (%).

[B]Counts do not always sum to 83 because not all respondents answered every question.

GP, general practitioner; N/A, not available.

in government support were provided for vulnerable populations, including efforts to remove rough sleepers into hotel or motel accommodation and increased financial support for the unemployed. It is possible that current access to digital health devices in people experiencing homelessness is lower than in our study, or indeed that current uptake of digital health is higher as telehealth has increasingly become generally accepted. We used a widely validated self-report measure of digital health literacy, but this measure might not correlate strongly with tests of actual performance.[25]

Our study is limited by the number of respondents and convenience sampling, although this is typical of research in vulnerable populations with persistent mental illness.[26] Our sample might not fully represent the homeless population, especially interstate and outside inner-city settings. Our respondents were engaged in person (rather than via telehealth) with specialised homeless community-based services (which might attract different clients from mainstream services), were not acutely distressed or psychotic at the time of responding and agreed to complete the survey; they also appear to be older and more likely to be male than the 122,494 people (56% male, 44% female) classified as homeless in the 2021 Australian census (where the three age groups with the highest prevalence [in descending order] were 19–24, 25–34 and 12–18 years).[27] We note that only 17% of our respondents were roofless at the time of completing the survey, but that widely accepted definitions of homelessness include people rotating through crisis, insecure, marginal and precarious accommodation.[19,28,29] In the 2021 Australian census, for example, only 6% of people classified as homeless were sleeping rough.[27] We did not record how many people we approached declined to participate. The assistance of the medical student investigator (GC) might have increased the social desirability bias of responses, which might be relevant to the digital health literacy items and the question about trust in GPs, although the medical student investigator was not otherwise known to respondents and the surveys were anonymous.

We note that our comparator population was surveyed before the pandemic in 2019–20, and the digital health literacy and uptake of this population might have increased by 2021. Both populations were recruited from Australian general practices with paper-based surveys and have high rates of chronic disease (Choy M, Barnes K, Sturgiss E, Rieger E, Douglas K, unpubl. obs.). There are demographic differences between the two populations, which are not unexpected but limit conclusions from direct comparisons.

Conclusion

GPs should not assume that their own homeless patients lack access to, or the literacy to use, digital health technology (although both might be lower than in the Australian population overall). To understand, and potentially enhance, their uptake of digital health, we recommend exploring patient access, literacy and attitudes to the internet, including trust in potential sources of misinformation that might cause harm to those with mental illness or cognitive impairment.

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