

PEER REVIEW HISTORY

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ARTICLE DETAILS

TITLE (PROVISIONAL)	BARRIERS AND FACILITATORS TO USE OF DIGITAL HEALTH TOOLS BY HEALTH CARE PRACTITIONERS AND THEIR PATIENTS, BEFORE AND DURING THE COVID-19 PANDEMIC: A MULTI-METHODS STUDY
AUTHORS	Turnbull, Sophie; Dack, Charlotte; Lei, Jiedi; Aksu, Irem; Grant, Sabrina; Lasseter, Gemma; Silarova, Barbora; Ainsworth, Ben

VERSION 1 – REVIEW

REVIEWER	Gunasekeran, Dinesh Visva Singapore General Hospital
REVIEW RETURNED	02-Oct-2023

GENERAL COMMENTS	<p>General comments =====</p> <p>This study presents a qualitative study of professional perceptions of digital health tools (DHTs) in the UK.</p> <p>Specific comments =====</p> <ol style="list-style-type: none">1. The study size is small, particularly for the patient group.2. Participant selection is not clear, and criteria for selection needs to be clarified (e.g. snowballing via social media). How were suitable patients specifically invited and identified/recruited?3. Additional relevant studies in the literature should be cited and results discussed in the context of these findings. Several examples are added below for reference; <p>A] This is not the first study to examine acceptance of digital health/related tools before-/during- COVID-19, it would be worthwhile citing other relevant literature in this context and discussing the unique contribution from the authors' findings. See: Gunasekeran DV, Zheng F, Lim GYS, et al. Acceptance and Perception of Artificial Intelligence Usability in Eye Care (APPRAISE) for Ophthalmologists: A Multinational Perspective. Front Med (Lausanne). 2022 Oct 13;9:875242. doi: 10.3389/fmed.2022.875242. PMID: 36314006</p> <p>B] Explore in greater detail how specific findings within patient and provider groups in this study compare with previous relevant literature e.g. see - Xiang Y, Zhao L, Liu Z, Wu X, Chen J, Long E, Lin D, Zhu Y, Chen C, Lin Z, Lin H. Implementation of artificial intelligence in medicine: Status analysis and development suggestions. Artif Intell Med. 2020 Jan;102:101780.</p>
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	<p>C] For the benefit of international readers, explore how the authors findings compare with similar research at an international level e.g, see - Grundy Q. A Review of the Quality and Impact of Mobile Health Apps. Annu Rev Public Health. 2022 Apr 5;43:117-134. doi: 10.1146/annurev-publhealth-052020-103738.</p> <p>4. How do the author's findings tie in with existing literature for future directions in HIT implementation? See: Shachak A, Kuziemy C, Petersen C. Beyond TAM and UTAUT: Future directions for HIT implementation research. J Biomed Inform. 2019 Dec;100:103315. doi: 10.1016/j.jbi.2019.103315. Epub 2019 Oct 17. PMID: 31629923.</p>
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REVIEWER	Dash, Sambit
REVIEW RETURNED	14-Oct-2023

GENERAL COMMENTS	<p>This is a very important study and the pre-post survey makes it fairly sound.</p> <p>However, because of the fact that essentially the two groups i.e. before COVID and after COVID are different and that the methodology used i.e. Telephonic interview vs. online survey are essentially different, a direct comparison does not fundamentally sit well as a study design. There is also a difference in the primary researcher in both methods (i.e. JL vs. ST).</p> <p>The abstract gives an impression that the two groups interviewed and surveyed are the same.</p> <p>The respondents could have been matched for their profession largely because the use of DHTs would be very specific to the domain, and their of work and can vary.</p> <p>The thematic analysis section is quite rich with deep insights about the biases of HCPs, their familiarity with DHTs, etc.</p> <p>I would suggest the paper be modified to embark on its strengths, that is the interview part and make the COVID survey a minor part of the paper drawing insights from it regarding policy and practice implications.</p>
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VERSION 1 – AUTHOR RESPONSE

Reviewer 1

Comment 1: The study size is small, particularly for the patient group.

Response: We thank the reviewer for their comments. We agree that the sample is relatively small. All health care professionals who expressed an interest were invited to interview. However we now acknowledge this in our discussion:

‘There were challenges recruiting the sample of healthcare professionals, meaning both survey and interviews had (relatively) small samples. However considering both datasets using principles of information power (Malterud et al., 2016), suggests that the findings are still relevant and valuable, although some experiences related to DHT access and use may not have captured.’

Comment 2. Participant selection is not clear, and criteria for selection needs to be clarified (e.g. snowballing via social media). How were suitable patients specifically invited and identified/recruited?

Response: We have provided details of how we recruited eligible health care professionals in the manuscript:

'Participants for the interviews were recruited through a range of networks, including National Institute of Health and Care Research School of Primary Care Research, community networks, social media (snowballing), and Academic Health Service Networks across England. We recruited HCPs who represented primary and secondary care health professionals from a range of backgrounds from across England, working in locations that varied in their level of socioeconomic deprivation (Table 1).'

For the surveys we have the following details:

'Participants were invited to complete the survey through advertisements on social media (Twitter) and email, disseminated through academic primary care research networks and departments.'

Comment 3. Additional relevant studies in the literature should be cited and results discussed in the context of these findings. Several examples are added below for reference;

A] This is not the first study to examine acceptance of digital health/related tools before-/during-COVID-19, it would be worthwhile citing other relevant literature in this context and discussing the unique contribution from the authors' findings. See: Gunasekeran DV, Zheng F, Lim GYS, et al. Acceptance and Perception of Artificial Intelligence Usability in Eye Care (APPRAISE) for Ophthalmologists: A Multinational Perspective. *Front Med (Lausanne)*. 2022 Oct 13;9:875242. doi: 10.3389/fmed.2022.875242. PMID: 36314006

B] Explore in greater detail how specific findings within patient and provider groups in this study compare with previous relevant literature e.g. see - Xiang Y, Zhao L, Liu Z, Wu X, Chen J, Long E, Lin D, Zhu Y, Chen C, Lin Z, Lin H. Implementation of artificial intelligence in medicine: Status analysis and development suggestions. *Artif Intell Med*. 2020 Jan;102:101780.

C] For the benefit of international readers, explore how the authors findings compare with similar research at an international level e.g, see - Grundy Q. A Review of the Quality and Impact of Mobile Health Apps. *Annu Rev Public Health*. 2022 Apr 5;43:117-134. doi: 10.1146/annurev-publhealth-052020-103738.

Response 3a) We have edited the Article Summary and Strengths and Limitations section to reflect the article being the first to explore decision-making around the use of digital health technologies before and during COVID in the United Kingdom:

'This is the first study to explore the impact of decision making around the use of Digital Health Technologies (DHTs) by health care practitioners on access to DHTs for patients, before and during the COVID-19 pandemic in England.'

Thank you for bringing our attention to Gunasekeran et als' large rigorous survey.

We have referenced the suggested article in the background:

'DHT's include smartphone apps, digital tools for diagnosing or treating conditions (including those that use Artificial Intelligence (2)), wearable devices (e.g. pedometers) and platforms that provide remote healthcare (3).'

We have added the following to the 'Interpretations in the Context of Existing Literature' section:

'Our study found that during and prior to the pandemic, HCPs had concerns about accessibility of online consultations, and made adaptations to support patients who were less digitally literate or did not have internet access. These findings are similar to those of recent qualitative studies conducted before (21), and during the pandemic (30), where HCPs reported that remote consultations could improve access for some groups (e.g. those with caring responsibilities, not able to leave their homes) (21, 30). However, they also had concerns about digital exclusion and accessibility for some patients (21, 30), and described providing face-to-face appointments for those who they perceived to be less able to use the digital services (e.g. older adults)(21). A multinational survey found that ophthalmologists felt clinical Artificial Intelligence would improve accessibility of eye care services, but were less convinced about whether it would result in improvements in quality or affordability (2). They were unsure about whether the COVID-19 pandemic would increase adoption of digital technology in the health system, or result in the increased in implementation of the technology through investment, training healthcare workers or educating the public (2).'

b) We thank the reviewer for supplying this reference- we read it with interest but as AI was not mentioned by our HCPs we feel it was sufficient to reference the Gunasekeran et al paper above.

c) Thank you for highlighting this reference. We have now included the following in the 'Interpretations in the Context of Existing Literature' section:

'Concerns about the quality and reliability of DHTs cited by the HCPs in the interviews in this study, reflect previous review findings that the majority of commercially available health apps are not evidence based or do not reflect public health guidelines (30). The same review reported that in surveys from Germany and (31) the United States (32, 33) agreed with the HCP views in this study that those who used health apps were more likely to be younger, in good health, higher income, education and health literacy (30). Although some HCPs in our interviews described how their presumptions about age-related technology uptake was challenged when older patients were highly engaged with DHTs, and younger patients were disinterested in technology.'

Comment 4. How do the author's findings tie in with existing literature for future directions in HIT implementation? See: Shachak A, Kuziemy C, Petersen C. Beyond TAM and UTAUT: Future directions for HIT implementation research. J Biomed Inform. 2019 Dec;100:103315. doi: 10.1016/j.jbi.2019.103315. Epub 2019 Oct 17. PMID: 31629923.

Response: Thank you for highlighting this excellent paper, which we now cite in our discussion:

"Such an approach is in line with recent recommendations to recognise variation in user needs to improve technology adoption and acceptance (38)."

Reviewer 2

Dr. Sambit Dash

Comment 1: This is a very important study and the pre-post survey makes it fairly sound.

However, because of the fact that essentially the two groups i.e. before COVID and after COVID are different and that the methodology used i.e. Telephonic interview vs. online survey are essentially different, a direct comparison does not fundamentally sit well as a study design. There is also a difference in the primary researcher in both methods (i.e. JL vs. ST).

Response: We thank the reviewer for their comments. We have re-written sections of the manuscript to reflect the telephone interviews being the primary study and the survey being the secondary study, used to confirm findings.

Abstract:

'A multi-methods study, comprising semi-structured interviews conducted prior to the COVID-19 pandemic. Supplemented with an online survey, that was conducted during the pandemic with a different sample, to ensure the qualitative findings remained relevant within the rapidly-changing healthcare context. Participants were recruited through HCP networks, snowballing and social media. Data were analysed thematically.'

Methods:

'The primary study was the semi-structured interviews that were conducted prior to the pandemic (November 2019-March 2020), the survey was a secondary study that was conducted with a different sample during the pandemic (July 2020-August 2020). Both studies explored how HCPs accessed and used DHT. However, the survey also explored how the COVID-19 pandemic affected HCP attitudes to and usage of DHTs. The qualitative findings from the survey were compared with the findings from the interviews to explore similarities and differences in DHT use that occurred due to the COVID-19 pandemic, and to ensure that the qualitative findings remained relevant within the rapidly-changing healthcare context.'

JL conducted the interviews and conducted primary coding. However, ST was responsible for the final thematic coding for both the interview and survey data. In the 'Data analysis' section we have included detail about ST's involvement in the coding of the interviews:

'Initial codes were developed by JL. Five members of the multidisciplinary research team also coded a sample of transcripts and then met to discuss and develop significant broader patterns of meaning (potential themes). ST organized the codes into final themes, which were agreed upon by the core team (ST, BA, and CD).'

Comment 2: The abstract gives an impression that the two groups interviewed and surveyed are the same.

Response: The abstract has been edited to read:

'Semi-structured telephone interviews were conducted prior to the COVID-19 pandemic with a purposive sample of HCPs. An online survey was conducted with a different group of HCPs during the pandemic, to ensure that the qualitative findings remained relevant within the rapidly-changing healthcare context.'

Comment 3: The respondents could have been matched for their profession largely because the use of DHTs would be very specific to the domain, and their of work and can vary.

Response: We thank the reviewer for their suggestion, and agree this would have provided some interesting data.

Unfortunately, we were not able to recruit the size of sample in the surveys (as discussed in the limitations section) that would have made this possible.

Comment 4: The thematic analysis section is quite rich with deep insights about the biases of HCPs, their familiarity with DHTs, etc.

I would suggest the paper be modified to embark on its strengths, that is the interview part and make the COVID survey a minor part of the paper drawing insights from it regarding policy and practice implications.

Response: We have re-written sections of the manuscript to reflect the telephone interviews being the primary study and the survey being the secondary study, used to confirm findings.

'The primary study was the semi-structured interviews that were conducted prior to the pandemic (November 2019-March 2020). This was supplemented with the survey, a secondary study that was conducted during the pandemic (July 2020-August 2020) with a different sample. Both studies explored how HCPs accessed and used DHT. However, the survey also explored how the COVID-19 pandemic affected HCP attitudes to and usage of DHTs. The qualitative findings from the survey were compared with the findings from the interviews, in order to explore similarities and differences in DHT use that occurred due to the COVID-19 pandemic, and to ensure that the qualitative findings remained relevant within a rapidly shifting healthcare context.'