AOSIS

University staff intentions to adopt e-health tools for digital mental health services in post-pandemic South Africa

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Authors:
Rhodrick N. Musakuro[1] ⓘ
Liiza Gie[1] ⓘ

Affiliations:
[1]Department of Human Resource Management, Faculty of Business and Management Science, Cape Peninsula University of Technology, Cape Town, South Africa

Corresponding author:
Rhodrick Musakuro,
rmusakuro@gmail.com

Background: The recent coronavirus disease 2019 (COVID-19) significantly contributed to mental health issues globally, and South African higher education institutions (HEIs) experienced unique stressors, prompting the adoption of e-health tools for digital mental health services (DMHS).

Objectives: The study aimed to determine factors that influence future intention to adopt e-health tools for DMHS based on the experiences of university staff during the COVID-19 pandemic in South Africa (SA).

Method: A case study research design, complemented by a survey was employed to collect data from 348 respondents using a voluntary response sampling technique from one South African HEI. Data were analysed through Statistical Package for the Social Sciences (SPSS) version 28 and it involved frequency distribution, descriptive statistics and multiple regression analysis.

Results: The results showed that the perceived usefulness of e-health tools, user experience and satisfaction, post-COVID-19 delivery mode preference and ethical considerations are significant determinants that influence the future adoption of e-health tools for DMHS.

Conclusion: The study provides human resources professionals, university management, mental health practitioners and policymakers with actionable insights into the key determinants of the future adoption of e-health tools for DMHS.

Contribution: Theoretically, the study contributes to the limited body of knowledge on the determinants that influence future intention to adopt e-health tools for DMHS, particularly in the context of university staff experiences during COVID-19 within the South African HE context. Practically, the results provide actionable insights that can be used to inform and guide policy-making within South African HEIs.

Keywords: e-health tools; digital mental health services; technology adoption; universities; South Africa; Sustainable Developmental Goal 3.

Introduction

The World Health Organization (WHO 2001) asserts that mental health refers to a state of good health in which each individual understands their own capacity, can manage life's regular pressures, can perform effectively and meaningfully, and can participate in society. This definition includes three basic aspects: well-being, effective functioning in an individual's life and successful functioning in a community, all of which contribute to mental health (Lamers et al. 2011). These aspects are interconnected and influence one another. For example, if an individual can manage life's pressures, they are more likely to function effectively in their life, which in turn leads to increased productivity in the workplace or successful functioning in the community.

However, the recent coronavirus disease 2019 (COVID-19) significantly contributed to global mental health challenges, and South African higher education institutions (HEIs) experienced unique stressors. Studies indicate that the global pandemic presented unprecedented challenges to South African HEIs and further necessitated a rapid transition to emergency remote learning to ensure the continuation of academic programmes (Du Plessis et al. 2022). Nevertheless, historically black institutions have struggled to adapt and this exposed and accentuated the existing inequalities in the South African higher education system (Mtshweni 2022). Moreover, the digital divide, worsened by continuous electricity disruptions, commonly known and referred to as

'load shedding' in South Africa (SA), further challenged the sustainability of online teaching and learning. In addition, the introduction of hybrid learning models exacerbated by insufficient training reshaped the academic roles of academic staff and this led to increased workload. Furthermore, COVID-19 restrictions disrupted traditional farewell rituals and grieving processes, contributing to the difficulty of grieving while at the same time adding to emotional difficulties (Chen 2022). In response to these challenges, information and communication technologies (ICTs), or more widely, electronic health (e-health) tools have been proposed as solutions for public health issues including mental health in HEIs (Safi, Thiessen & Schmailzl 2018; Sharma et al. 2018). The WHO (2016) endorses and recommends the use of e-health tools in strengthening health systems, ensuring equal, affordable healthcare. During the COVID-19 pandemic, e-health tools were globally leveraged to address mental health issues in workplaces including South African HEIs (Chilunjika & Chilunjika 2023; Fagherazzi et al. 2020).

It is evident from the foregoing discussion that the future adoption of e-health tools in delivering digital mental health services (DMHS) is important and warrants investigation, as it can ensure the continued provision of mental healthcare in the South African HEIs. Research shows that the issue of sustainable adoption of e-health tools has emerged to become one of the most crucial concerns in the long-term delivery of DMHS throughout the world (Fanta & Pretorius 2018; Van Velthoven & Cordon 2019). Recent studies concur and further predict that the future of public healthcare will be digital, therefore recognising the value of e-health tools is important especially towards the delivery of DMHS and future pandemic preparedness planning (Fagherazzi et al. 2020; Rudd & Beidas 2020).

Despite the growing attention to the adoption of e-health tools for DMHS, there is limited scientific evidence on the determinants of their future adoption in South African HEIs, particularly concerning university staff experiences during the COVID-19 pandemic. Previous studies investigating the adoption of e-health tools for mental health were mostly conducted before the COVID-19 pandemic (Batterham et al. 2015; Ramtohul 2015). Furthermore, studies reporting on the adoption of e-health tools for mental healthcare, overlooked emerging economies such as SA, which has many public HEIs and significant potential for large-scale sustainable adoption (Anastasiadou et al. 2019; Tudor et al. 2022).

Taking into consideration the pivotal role e-health tools played during the pandemic, this study aimed to determine factors that influence future intention to adopt e-health tools for DMHS based on the university staff experiences gained during COVID-19 in SA. As a result of addressing this research gap, the study provides valuable insights into various stakeholders including human resources professionals, university management, mental health

practitioners and policymakers, thus guiding and informing future decisions and policymaking. Consequently, study insights will enable the integration of e-health tools into DMHS to enhance and advance their sustainable adoption within the South African higher education landscape.

Literature review
Defining electronic-health tools and behavioural intention to use them

The term 'electronic health', or e-health, became popular in academic journals in early 2000, and ever since definitions of the term have differed in the literature depending on the functions, technology uniqueness and the stakeholder perspective (Pagliari et al. 2005). However, in this study, e-health refers to a broad category of health-related ICT tools that process information electronically and are utilised to support and care for patients' mental healthcare. In other words, e-health tools are ICT-based systems designed to support the delivery of DMHS in personalised or group mental health initiatives (Gooding 2019). Examples of e-health tools include desktop computers, laptops, smartphones, tablets and other mobile devices and applications. This also extends to other various forms of e-health health tools that help to deliver DMHS including mobile health also known as m-health, telehealth, social media and Fourth Industrial Revolution (4IR) technologies such as artificial intelligence (AI), robotics, gaming, machine learning (ML), virtual reality, Internet of Things (IoT) and cloud computing. These e-health tools perform different functions, which include but are not limited to communication, mental health information sharing, online mental health promotion, mental health literacy, information storage and access, clinical decision support, patient and/ or population monitoring, internet-delivered cognitive behavioural therapy, diagnosis, prevention and treatment of patients (Asi & Williams 2018; Gooding 2019; Schueller, Washburn & Price 2016). The use of e-health tools enables mental health service delivery in the workplace by impacting how mental health services are designed and accessed, but more importantly how mental health services are delivered in a formal and informal workplace setting (Howarth et al. 2018).

Davis (1989) postulates that behavioural intention to use reflects the likelihood of embracing technology and in this study e-health tools for DMHS. As a key component influencing how a person utilises a technology, behavioural intention to use ties together the perception of the technology and the actual behaviour of the user. The results from a recent study conducted by Gbollie et al. (2023) revealed a high behavioural intention to use e-health tools for DMHS. This demonstrates the potential for e-health tools for DMHS to be widely used in the future. This study thus postulates that a key influencing factor of the sustainable adoption of DMHS by university staff is their behavioural intention to use e-health tools.

## Theoretical framework and hypotheses development

The Technology Acceptance Model (TAM) is a widely accepted model used to explain and predict user behaviour concerning the acceptance and use of technology. Davis (1989) designed and theorised TAM to explain user acceptance or rejection of technology. The TAM posits that two primary factors, perceived usefulness (PU) and perceived ease of use (PEOU), determine an individual's intention to use a technology, which subsequently influences actual usage behaviour.

Using TAM, the study focussed on the core constructs of PU and PEOU as key determinants of behavioural intention to use e-health tools for DMHS. These constructs are influenced by various external variables relevant to the context of e-health tools for DMHS. Perceived usefulness relates to the extent to which a person, and in this study a university staff, believes that using e-health tools will enhance their job performance and effectiveness in the provision of DMHS (Davis 1989). Perceived ease of use refers to the degree to which a person, and in this study a university staff, believes that using e-health tools will be free of effort (Davis 1989). These constructs lead to the establishment of a future behavioural intention to use e-health tools for DMHS, which in the due course impacts actual usage. However, the study guided by the main constructs of TAM, further integrated other various constructs (external variables) from the literature intentionally to provide a robust theoretical foundation for determining factors that influence the future intention to adopt e-health tools for DMHS, which then enhanced the credibility and interpretation of the results of the study. A theoretical framework for the future intention to adopt e-health tools for DMHS is shown in Figure 1. This is followed by an explanation of the hypotheses that underpinned the study.

Perceived usefulness of electronic-health tools

A study conducted by Murphy et al. (2021) found that the use of DMHS as an alternative to in-person consultations accelerated during COVID-19. This reflects that e-health tools are becoming more widely accepted for mental healthcare, especially during a crisis. In this regard, several authors concur that this trend is likely to continue in the future, as more people become comfortable with the idea of accessing mental healthcare remotely (Bierbooms et al. 2020; Fagherazzi et al. 2020; Rudd & Beidas 2020). As a result, it is essential to leverage digital technologies to address mental health needs in the post-COVID-19 era. This view is supported by Ellis et al. (2021). The researchers believe e-health tools will likely continue to play a significant role in the delivery of mental health services in the digital age as they demonstrate the cost-effectiveness and efficacy of e-health tools. Based on this discussion, this study hypothesises that:

> **H1:** Perceived usefulness of e-health tools influences the future intention to adopt e-health tools for DMHS.
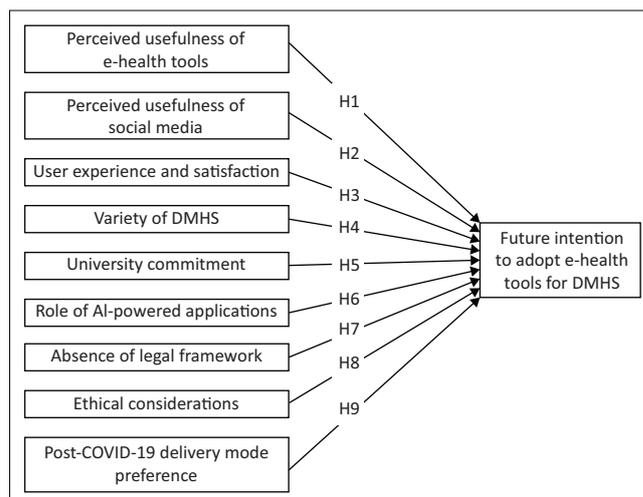
DMHS, digital mental health services; COVID-19, coronavirus disease 2019; e-health, electronic health; AI, artificial intelligence.

FIGURE 1: Theoretical framework for the future intention to adopt e-health tools for digital mental health services.

Perceived usefulness of social media

Social media is an interactive technology that facilitates the creation and sharing of information through online platforms (Wankel, Marovich & Stanaityte 2010). It is often regarded as a platform where people connect, exchange ideas and interests, and establish relationships, especially among people who may have similar interests or backgrounds. For example, social media platforms such as Instagram, WhatsApp, X (formerly known as Twitter), YouTube, LinkedIn, TikTok, Facebook and many others allow users to post photos, videos and messages, and interact with others (Duffett 2015). With this, users can engage with one another and create online communities of people with similar interests. Sawyer and Chen (2012) argue that through connecting people, social media can foster a sense of community and allow for the exchange of information in a way that can be beneficial to all involved. For example, online discussion forums, Facebook groups, WhatsApp groups and X hashtags provide people with a platform to share their experiences and gain knowledge from others in the community. In the delivery of DMHS in South African HEIs, social media platforms can be used to create online support groups for individuals with similar mental health issues. Korda and Itani (2013) continue further and state that the use of social media makes it possible to create content and share information with a much broader audience than is possible through conventional media.

According to Sparta (2012), a key characteristic of social media platforms as interactive technology is their pervasiveness, which makes them fascinating. In line with this, Gwaka (2015) asserts that millions of individuals have embraced social media platforms as a result of their proliferation, accessibility and affordability. In the context of mental healthcare, Kruzan et al. (2022) point out that social media platforms have become increasingly popular among individuals who use them to connect, engage and seek help when they are experiencing mental health problems.

Researchers have demonstrated, for instance, that people share in social media their mental health problems, such as depression, eating disorders and self-harm, as well as seeking assistance from their colleagues (Cunningham, Hudson & Harkness 2021; Padín et al. 2021; Saud, Mashud & Ida 2020).

As stated earlier, many countries including SA adopted numerous containment and mitigation measures to prevent the spreading of COVID-19 virus transmission and limit the movement of people. To this end, social media platforms were particularly effective in connecting individuals, spreading awareness, and disseminating information about mental health issues during the pandemic (Saud et al. 2020). This suggests that social media allows people to easily connect with their peers and discuss their challenges in a safe online environment. It also implies that social media allows people to access educational resources, such as articles and videos, which provide information about mental health issues. This may have increased awareness and encouraged more people to seek mental health help. This study therefore, hypothesised that:

H2: Perceived usefulness of social media influences the future intention to adopt e-health tools for DMHS.

User experience and satisfaction

In developed countries, e-health tools in the form of telemedicine have seen significant success, particularly during the COVID-19 pandemic, as evidenced by their widespread adoption in Europe and America, even though they are still facing challenges towards sustainable adoption (Mbunge et al. 2022a). The success of e-health tools can be attributed to the convenience, cost-effectiveness and accessibility they provide to patients, as well as the increased efficiency and accuracy of diagnosis and treatment, which all together contribute to user satisfaction (Tebeje & Klein 2021). In their study, Wang et al. (2022) revealed that users were largely satisfied with the healthcare services provided through e-health tools because of convenient procedures, excellent service attitudes, professionalism and reasonable costs. Therefore, user experience and satisfaction can serve as significant indicators of the efficacy of e-health tools in delivering DMHS. In the light of this, it is hypothesised that:

H3: User experience and satisfaction influence the future intention to adopt e-health tools for DMHS.

Variety of digital mental health services and university commitment

It can be argued that the previous 3 years (2020–2022) have been noteworthy. During the COVID-19 pandemic, the selected South African HEI referred to as 'UniversityX' for ethical reasons, developed and launched various DMHS in collaboration with Higher Health and the South African Depression and Anxiety Group (SADAG). With SADAG as a key partner, Higher Health led a comprehensive response to COVID-19 as the national agency of the Department of Higher Education and Training (DHET) dedicated to staff well-being. The intervention addressed the mental health needs of

university employees across all South African HEIs. Furthermore, Momentum Wellness, a brand of Momentum Metropolitan Holdings Limited, also provided employee well-being services to UniversityX in 2022. The employee well-being services consisted of psycho-social counselling, medical support, trauma support, family care, legal advice, financial advice, debt restructuring and on-site mobile medical clinics. Along with digital mental health and employee well-being services provided by Higher Health, SADAG and Momentum Wellness, UniversityX also provided several online mental health initiatives including webinars, online workshops and online resources. From this, it appears that UniversityX went above and beyond to ensure that the university staff had access to DMHS throughout the COVID-19 pandemic, enabling additional care and support through a variety of DMHS. This arguably demonstrated UniversityX's commitment to creating a safe and supportive environment for all staff during an unprecedented time. Given this, the study therefore proposes the following two hypotheses:

H4: A variety of DMHS influence the future intention to adopt e-health tools for DMHS.

H5: University commitment influences the future intention to adopt e-health tools for DMHS.

Role of artificial intelligence-powered applications

Modern smartphones have a broad range of useful features and may connect to mental healthcare applications. In this regard, Sinha, Meheli and Kadaba (2023) analysed real-life data to determine the relationship between mental health needs, the COVID-19 pandemic and whether AI-led mental health interventions (Wysa) are acceptable and effective. In their study, they found that emotional distress increased significantly during the pandemic, which led to increased utilisation of an AI-powered mental health application (Wysa). The Wysa application was also shown to reduce anxiety and depression symptoms significantly when utilised by users. Also, their research showed the value of contextualising interventions and provided evidence that digital health initiatives can improve the delivery of evidence-based mental healthcare to large populations. Considering these latest research findings, it is pertinent to notice that e-health tools through smartphone applications have the potential to revolutionise mental health services on a large scale. Also, these research findings highlight the value of mental health applications (Wysa) in providing mental health support to users in times of crisis, demonstrating the need for more AI-driven mental health applications in the future. Based on this, the study hypothesised:

H6: The role of AI-powered applications influences the future intention to adopt e-health tools for DMHS.

Absence of legal framework and ethical considerations

According to Ngcobo-Sithole and Mabusela (2022), one of the major lessons learned from the COVID-19 crisis is that all

healthcare services should establish standard protocols and systems capable of handling a wide range of remote interventions. In the context of mental healthcare in South African HEIs, such protocols and systems could help to ensure that university staff receive the DMHS they need in a timely manner in the event of a similar crisis in the future. In addition, protocols and systems will also help to reduce the spread of viruses such as COVID-19, as more people would be able to receive digital mental healthcare without having to leave their homes. However, Ngcobo-Sithole and Mabusela (2022) argue that it will take significant investments and commitments from governments and other key stakeholders to ensure that people in remote areas and the most vulnerable receive DMHS through e-health tools.

Ethical concerns, such as privacy and data protection, have become more prominent with the increased use of e-health tools. Ngcobo-Sithole and Mabusela (2022) report that as the use of e-health has increased during the COVID-19 pandemic, so too the concerns about the security of patient data and the risk associated with its misuse. Moreover, the scholars report that patient information was of concern during COVID-19 over the use of e-health tools as users feared that their data may be compromised, which may impact patient-provider trust. There have also been studies that demonstrate e-health users were concerned about their personal information and medical records being shared with third parties (Tagde et al. 2021). In line with this finding, Bassan (2020) also reported that users were concerned about the risk of their data being used for purposes other than the ones it was originally intended for, such as marketing. Apart from these ethical concerns, Naidoo et al. (2022) argued that SA currently lacks specific laws governing the use of AI in healthcare. This means that there are no specific legal frameworks to help guide policymakers and other stakeholders on the ethical implications of using AI in healthcare including DMHS.

For UniversityX, the lack of legislation leaves them vulnerable to potential misuse of AI in the provision of DMHS, as well as legal repercussions for those who may be affected. Notwithstanding this, Naidoo et al. (2022) recommend that the SA government should establish a national policy framework to ensure that AI is developed and utilised in healthcare in an ethical, responsible and controlled way. Consequently, for UniversityX, the main lesson here is that all these ethical issues and the lack of AI legislation can hamper the sustainable adoption of e-health tools for the delivery of DMHS. Thus, it is of paramount importance for UniversityX to ensure that all ethical considerations and regulations are taken into account when adopting e-health tools for the provision of DMHS. Based on this discussion, the following two hypotheses were formulated:

H7: The absence of a legal framework influences the future intention to adopt e-health tools for DMHS.

H8: Ethical considerations influence the future intention to adopt e-health tools for DMHS.

Post-coronavirus disease 2019 delivery mode preference

The landscape of digital mental healthcare has changed as a result of COVID-19 (Mbunge, Muchemwa & Batani 2022b). In contrast to the hesitation and scepticism that was evident before the pandemic, the literature indicates that COVID-19 significantly increased the incorporation of e-health tools in the delivery of DMHS (Reingold et al. 2021). This suggests that, even with the challenges of the pandemic, mental health care providers and users were rapidly embracing e-health tools to provide better mental healthcare. Moreover, the transformation reflected the potential of digital interventions to bridge the gap between the need and access to mental healthcare. As Feijt et al. (2023) reported in their study, many practitioners are looking forward to using DMHS in the future, because they have become major options of preference for integrating mental healthcare practices in the post-COVID era. Thus, e-health tools are expected to play an integral role in the future of DMHS post-COVID-19. Accordingly, the study hypothesised that:

H9: Post-COVID-19 delivery mode preference influences the future intention to adopt e-health tools for DMHS.

Research methodology
Research design and approach

To determine factors that influence future intention to adopt e-health tools for DMHS based on the university staff experiences gained during the COVID-19, a case study was adopted, leading to the investigation of a single public university located in Cape Town, SA, which offers various contact-based higher education courses. The case study was chosen to gain in-depth quantitative insights into the experiences of university staff at a selected university. The case study was complemented by a survey research design using quantitative research methods. This means that the positivist research paradigm embraced in this study entailed the collection, analysis and interpretation of statistical data, as supported by Crowther and Lancaster (2009) and Bryman and Bell (2011).

Population and sampling technique

Because of time, financial, resource, and accessibility limitations, the research population was limited to all public HEIs in SA that offered a contact mode of teaching and learning. This criterion resulted in the inclusion of 25 out of 26 public HEIs in SA (Quinlan et al. 2015). However, the target population for this study was narrowed down to one university located in Cape Town, SA, with a combined staff complement of approximately 2840. For ethical reasons, the selected university for this study will not be revealed.

The sample units included management, academic and non-academic support staff who used or intended to use e-health tools for DMHS. The study utilised a voluntary response sampling technique, which is a non-probability sampling technique to collect data from 348 respondents. This sampling

technique allowed respondents from the case study to self-select themselves into the survey concerning determinants of future intention to adopt e-health tools for DMHS (Murairwa 2015). The sampling frame composed of three groups:

1. *Management staff*: Vice-chancellor, deputy vice-chancellors, executive directors, registrar, deans of faculties, the student's dean and senior directors.
2. *Academic staff*: Junior lecturers, lecturers, senior lecturers, associate professors, professors and research fellows.
3. *Non-academic staff*: Administrative assistants, managers, technicians and other non-academic staff.

Research instrument

The study relied on self-completed online questionnaires through Microsoft Forms. Online questionnaires are widely recognised for their cost-effectiveness and speed, and have the potential to ensure high response rates (Bryman & Bell 2011). The questionnaire design was informed by the theoretical framework of the study (see Figure 1). The data collection instrument adopted in this research was uniform and consistent for all the respondents as recommended by other scholars (Bryman & Bell 2011). The questionnaire was accompanied by a cover letter providing a brief description of the study including the study objective and clear instructions regarding how to respond to questions and statements. The questionnaire also included a personal request from the researcher encouraging respondents to complete all sections of the questionnaire as openly and truthfully as possible.

The questionnaire included a Likert scale style and format to measure the respondents' degree of agreeing or disagreeing with a known statement regarding factors that may influence future intention to adopt e-health tools for DMHS based on the university staff experiences gained during COVID-19 at a selected SA university. It also included a 5-point Likert scale where the rating was 1 – strongly agree, 2 – agree, 3 – neutral, 4 – disagree and 5 – strongly disagree. The online questionnaire was uniform and consistent for all the respondents, commencing with a cover letter that outlined the objective of the study, a request from the researchers for honest responses, with clear options and instructions on how to respond.

Before data collection, a pilot study was conducted to ensure the validity and reliability of the research instrument (Quinlan et al. 2015). Bayat and Fox (2007) assert that pilot studies are helpful because they ensure that research instruments are reliable, trustworthy and consistent in data collection, and this was precisely the reason for conducting a pilot study in this research. The pilot study involved 18 non-respondents from the selected university who provided valuable suggestions and recommendations on the questionnaire's structure, design, layout, font size and content.

The research instrument underwent rigorous review by the research supervisor, a statistician, two academic experts and

the Faculty Research Ethics Committee at the Cape Peninsula University of Technology. This process helped to create well-structured questions that captured essential information while minimising bias. The data collection instrument was organised into different sections with the first section collecting biographical data. This section comprised of seven statements. The second section collected data regarding university staff experiences gained during the COVID-19 pandemic. This section comprised of nine statements.

Data analysis

The study employed frequency distribution to describe the demographic information, descriptive statistics to elucidate key features and characteristics of the data including measures of central tendencies and variability of the observed values, and multiple regression analysis to examine the relationships between multiple variables of the study (Quinlan et al. 2015). Moreover, Cronbach's alpha reliability coefficient that assesses how multiple scale items are correlated was employed to measure the internal consistency of the items (Quinlan et al. 2015). Cronbach's alpha coefficient values range from 0 to 1, where higher values indicate greater internal consistency. Guided by the recommendations of Hair et al. (2010), a Cronbach's alpha coefficient value of 0.6 was adopted as a criterion for determining the reliability of the factors in this study.

Ethical consideration

Several ethical considerations were rigorously upheld throughout the study including informed consent, permission to conduct the research, anonymity and confidentiality, avoiding harm to the respondents, honesty in presenting study results and data management plan. The study received ethical clearance from the Faculty of Business and Management Sciences Research Ethics Committee of the Cape Peninsula University of Technology (Faculty Ethics Committee Approval Reference Number: 2021_FBMSREC 083.

Results

The demographic profile of the university staff who responded to this study is depicted in Table 1. A total of 348 usable questionnaires were obtained. It is evident from Table 1 that a good spread among the different demographic variables of the study participated in this study.

Reliability results

The reliability results (Table 2) indicated Cronbach's alpha values were greater than 0.6 for all the items. Accordingly, the reliability results indicated moderate internal consistency.

Descriptive statistics

In light of the descriptive statistics for the experiences gained during COVID-19, it is clear that respondents had a

TABLE 1: Demographic information.

Item	Category	Frequency	%
Gender	Male	156	44.8
	Female	192	55.2
Race	African people	161	46.3
	White people	44	12.6
	Mixed race people	89	25.6
	Indian people	51	14.7
	Asian people	3	0.8
Age group (years)	20–29	10	2.9
	30–39	83	23.9
	40–49	149	42.8
	50–59	93	26.7
	60 or older	13	3.7
Highest level of qualification attained	National senior certificate	2	0.6
	Diploma	16	4.6
	Undergraduate degree	47	13.5
	Postgraduate degree	39	11.2
	Master's degree	180	51.7
	Doctoral degree	63	18.1
	Other	1	0.3
Occupation	Academic staff	205	58.9
	Non-academic staff	124	35.6
	Management staff	19	5.5
Employment category	Permanent employment	242	69.5
	Fixed-term contract employee	106	30.5
Length of service at the current institution (years)	0–5	74	21.3
	6–10	103	29.6
	11–15	67	19.3
	16–20	76	21.8
	More than 21	28	8.0

TABLE 2: Reliability results.

Cronbach's alpha	N of items
0.618	9

generally positive experience with regard to the use of e-health tools for mental health services during the COVID-19 pandemic at their university as shown in Table 3. Specifically, the data revealed a general trend of respondents' agreement and strong agreement with statements regarding the PU of health tools (1.69), social media (1.77) and preferred post-COVID-19 delivery modes (1.74). Moreover, the respondents showed agreement and were also neutral about their user experience and satisfaction (2.02), university commitment (2.26) and the variety of DMHS (2.66). Concerns regarding the role of AI-powered applications (3.21) and the absence of a legal framework (3.23) were relatively higher, with respondents inclining towards neutrality or disagreement and this indicated uncertainty or mixed views. Ethical considerations (2.03) were generally agreed upon with moderate variability in responses.

Model summary

The model summary, as presented in Table 4, provides important information regarding the overall fit and explanatory power of the regression model. The R-squared value (0.350), as shown in Table 4, indicates that the model explains 35% of the variance in the future adoption of e-health tools. Additionally, the R-value of 0.592 suggests a moderate

TABLE 3: Descriptive statistics.

Descriptive statistics	N	Mean	Standard deviation
Perceived usefulness of e-health tools	348	1.69	1.010
Perceived usefulness of social media	348	1.77	1.103
User experience and satisfaction	348	2.02	1.260
University commitment	348	2.26	1.365
Variety of DMHS	348	2.66	1.504
Post-COVID-19 delivery mode preference	348	1.74	1.089
Role of AI-powered applications	348	3.21	1.432
Absence of legal framework	348	3.23	1.524
Ethical considerations	348	2.03	1.238
Valid N (listwise)	348	-	-

AI, artificial intelligence; DMHS, digital mental health services; COVID-19, coronavirus disease 2019; e-health, electronic health.

TABLE 4: Model summary.

Model	R	R-square	Adjusted R-square	Standard error of the estimate
1	0.592[a]	0.350	0.333	0.908

[a], Predictors: (Constant), Ethical considerations, Variety of DMHS, Role of AI-powered applications, Perceived usefulness of social media, Absence of legal framework, Post-COVID-19 delivery mode preference, User experience and satisfaction, University commitment, Perceived usefulness of e-health tools.

and positive correlation between the multiple predictors and the dependent variable of the study (future intention to adopt e-health tools for DMHS). More importantly, the adjusted R-square value of 0.333 provides a more accurate measure of the model's explanatory power as it accounts for the possibility of overfitting with multiple predictors. In this study, the adjusted R-square value of 0.333 was slightly lower than the R-square value and this means that the model's explanatory power remained robust even after adjusting for the number of predictors.

Analysis of variance results

Table 5 shows that the overall regression model is statistically significant at $F_{(9.338)} = 20.264$, $p < 0.001$ and this means that the predictors collectively have a significant impact on the dependent variable (future intention to adopt e-health tools for DMHS).

Regression results

Table 6 presents the regression results and these indicate which hypotheses are accepted or rejected based on the significance levels of the coefficients. The study found that the PU of e-health tools (B = 0.148, $p = 0.018$) is a significant predictor. This led to the acceptance of H1 that PU influences the future adoption of e-health tools for DMHS. However, the PU of social media (B = 0.080, $p = 0.152$) was not found to be a significant predictor, resulting in the rejection of H2 that the PU of social media influences the future adoption of e-health tools for DMHS.

In addition, the results revealed that user experience and satisfaction (B = 0.115, $p = 0.017$) are significant predictors, supporting the acceptance of H3 that user experience and satisfaction influence the future adoption of e-health tools for

TABLE 5: Analysis of variance results.

ANOVA[a]					
Model	Sum of squares	df	Mean square	F	Sig.
Regression	150.352	9	16.706	20.264	< 0.001[b]
Residual	278.645	338	0.824	-	-
Total	**428.997**	**347**	-	-	-

ANOVA, analysis of variance; Sig., significance; df, degree of freedom.

[a], Dependent Variable: Future intention to adopt e-health tools for DMHS.

[b], Predictors: (Constant), Ethical considerations, Variety of DMHS, Role of AI-powered applications, Perceived usefulness of social media, Absence of legal framework, Post-COVID-19 delivery mode preference, User experience and satisfaction, University commitment, Perceived usefulness of e-health tools.

TABLE 6: Regression results.

Coefficients[a]					
Model	Unstandardised coefficients		Standardised coefficients	t	Sig.
	B	Standard error	Beta		
(Constant)	0.197	0.199	-	0.988	0.324
Perceived usefulness of e-health tools	0.148	0.062	0.134	2.368	0.018
Perceived usefulness of social media	0.080	0.056	0.079	1.436	0.152
User experience and satisfaction	0.115	0.048	0.131	2.390	0.017
University commitment	-0.006	0.045	-0.008	-0.141	0.888
Variety of DMHS.	0.065	0.040	0.088	1.647	0.100
Post-COVID-19 delivery mode preference	0.272	0.053	0.266	5.169	< 0.001
Role of AI-powered applications	0.018	0.038	0.024	0.489	0.625
Absence of legal framework	-0.007	0.035	-0.010	-0.206	0.837
Ethical considerations	0.169	0.044	0.188	3.829	< 0.001

DMHS, digital mental health services; COVID-19, coronavirus disease 2019; AI, artificial intelligence; Sig., significance; e-health, electronic health.

[a], Dependent Variable: Future intention to adopt e-health tools for DMHS.

DMHS. In contrast, the variety of DMHS (B = 0.065, p = 0.100) was not a significant predictor and this led to the rejection of H4 that the variety of DMHS influences the future adoption of e-health tools for DMHS.

The study also showed that university commitment (B = –0.006, p = 0.888) is not a significant predictor and this resulted in the rejection of H5 that university commitment influences future adoption. Similarly, the role of AI-powered applications (B = 0.018, p = 0.625) was not found to be a significant predictor and this led to the rejection of H6 that AI-powered applications influence future adoption of e-health tools for DMHS.

Furthermore, the absence of a legal framework (B = –0.007, p = 0.837) was not a significant predictor, which led to the rejection of H7 that the absence of a legal framework influences the future adoption of e-health tools for DMHS. On the other hand, ethical considerations (B = 0.169, p < 0.001) were identified as highly significant predictors, supporting the acceptance of H8 that ethical considerations influence the future adoption of e-health tools for DMHS.

Lastly, the study found that post-COVID-19 delivery mode preference (B = 0.272, p < 0.001) is a highly significant predictor and this led to the acceptance of the H9 that post-COVID-19 delivery mode preference influences future adoption of e-health tools for DMHS.

Discussion

The results of the study confirmed that the PU of e-health tools influences the future intention to adopt e-health tools for DMHS. In the light of this, the literature as highlighted earlier strongly supports the significant role of PU in the future adoption of e-health tools. For instance, a recent study showed that the COVID-19 pandemic accelerated the incorporation and acceptance of e-health tools in mental health services because of their ability to bridge gaps in healthcare access (Reingold et al. 2021). This transformation in the delivery of mental healthcare demonstrates an increasing acceptance, comfort and reliance on digital interventions (Murphy et al. 2021). Other scholars such as Fagherazzi et al. (2020), Rudd and Beidas (2020) and Bierbooms et al. (2020) hold the view that this upward trajectory concerning digital mental healthcare will keep growing post-pandemic and this demonstrates the PU of e-health tools in the current and future landscape of healthcare.

Researchers concur and widely recognise the role of social media in connecting individuals, building support networks and communicating information in a fast and speedy manner (Sawyer & Chen 2012; Wankel et al. 2010). Social media platforms such as Facebook and WhatsApp have been extensively used to create online communities for mental health support (Cunningham et al. 2021). The literature review revealed that during the COVID-19 pandemic, social media played a pivotal role in spreading awareness and providing support for mental health issues (Abbas et al. 2021; Saud et al. 2020). Despite the widely acknowledged benefits associated with social media as discussed in the literature, the results of the study indicated that the PU of social media did not significantly influence the future adoption of e-health tools. Accordingly, this disparity could be attributed to the specific context of university staff in SA where other factors or considerations may play a more dominant role in determining adoption decisions.

The study found that user experience and satisfaction are significant determinants of the future adoption of e-health tools for DMHS. The results of the study support the literature, which postulated that user experience and satisfaction are critical to the overall success and sustainability of e-health tools. In support of this, studies from developed nations demonstrate the importance of convenience, cost-effectiveness and service quality in user satisfaction with e-health services (Tebeje & Klein 2021). A recent study by Wang et al. (2022) revealed that there is a link between positive user experiences and higher satisfaction, and continued use of e-health tools. Therefore, the results of the study reinforce the need for organisations such as South African HEIs to prioritise user-centred design and high-quality service delivery to ensure sustained adoption and effectiveness of e-health tools for DMHS.

The extensive efforts of UniversityX to ensure the provision of a variety of DMHS during the COVID-19 pandemic illustrated the value of diversified services to address different mental health needs through Higher Health, SADAG and Momentum Wellness. However, the results of the study showed that the variety of DMHS did not significantly determine the future adoption of e-health tools for DMHS. In addition, the results demonstrated that university commitment is not a significant determinant of the future adoption of e-health tools for DMHS. The results suggest that while a variety of DMHS and university commitments are valued and appreciated, they are not sufficient enticements for the future adoption of e-health tools. In view of this, other factors such as user satisfaction and PU equally and collectively play more key roles.

There is evidence that AI-powered applications are capable of providing scalable and personalised interventions that can improve mental healthcare (Sinha et al. 2023). For instance, AI-powered applications such as Wysa have established effectiveness in reducing symptoms of anxiety and depression, and this is particularly important in the delivery of DMHS. Notwithstanding the promising findings in the literature, the results of this study showed that the role of AI-powered applications did not significantly influence the future adoption of e-health tools for DMHS. Therefore, the results of the study suggest a delay in the acceptance and understanding of AI-powered technologies among university staff in SA, or that concerns about data privacy and trust in AI systems may be contributing factors as observed in previous studies (Bassan 2020; Ngcobo-Sithole & Mabusela 2022).

The lack of a legal framework for e-health tools and AI in SA poses significant challenges to the sustainable adoption of e-health tools for DMHS. The literature illustrates concerns regarding privacy, data protection and the ethical use of AI in e-health tools (Bassan 2020; Ngcobo-Sithole & Mabusela 2022). Given this, the absence of specific regulations can hinder the confidence and trust necessary for adopting new technologies. However, the results of the study provided empirical evidence that the absence of a legal framework does not determine the future adoption of e-health tools for DMHS. It appears that other factors pose more immediate concerns for university staff, or that they are unaware of the implications of legal frameworks in determining the future adoption of e-health tools.

The results of the study confirmed the significant role of ethical considerations in the future adoption of e-health tools. The results are consistent with the literature review, which asserted that ethical considerations such as privacy and data security are vital to the adoption of e-health tools. Recent studies by Tagde et al. (2021) and Naidoo et al. (2022) stressed the need for robust data protection measures and clear ethical guidelines to build trust and ensure user confidence. Thus, addressing ethical concerns will be of paramount importance for the future sustained success of e-health initiatives.

The study found that post-COVID-19, delivery mode preference is a significant factor that influences future intention to adopt e-health tools for DMHS. As a result, this consequently aligned with the broader literature, which highlighted a significant shift towards the adoption of e-health tools in mental healthcare post-COVID-19. Supporting the results of this study, literature demonstrated that COVID-19 pandemic acted as a catalyst for the increased acceptance and adoption of e-health tools for digital mental health interventions, bridged the gap in mental healthcare delivery while overcoming prior scepticism and hesitation, and further laid a strong foundation for their continued utilisation in the post-pandemic era (Feijt et al. 2023; Mbunge et al. 2022b; Reingold et al. 2021).

Theoretical implications

This study contributes significantly to the existing body of knowledge by identifying key determinants of the future adoption of e-health tools for DMHS within South African HEIs. Grounded in the widely used TAM, this study extends the model by integrating factors such as ethical considerations, user experience and post-COVID-19 delivery mode preferences, thereby providing a more inclusive framework for understanding technology adoption in a post-pandemic context. The results highlight the evolving nature of technology adoption, particularly in resource-constrained environments such as SA, and this suggests that traditional models must adapt to incorporate context-specific elements.

Practical implications

The study also provides practical guidance for university management, mental health practitioners and policymakers within South African HEIs. The study stresses the importance of prioritising user experience and satisfaction in the design and implementation of e-health tools to ensure sustainable adoption. In addition, the study results accentuate the need for addressing ethical considerations, such as data privacy and security, to build trust among university staff. Higher education institutions are therefore encouraged to embrace post-COVID-19 delivery modes as these have shown a significant influence on future adoption intentions, which enables better digital mental health support for university staff.

Limitations and suggested areas for future research

Although this study has provided valuable information concerning the factors that influence future intention to adopt e-health tools for DMHS based on the university staff experiences gained during COVID-19 at a SA university, the research study focussed entirely on one SA public university located in Cape Town, SA. This limits the research findings' generalisability to other institutions of learning. It is therefore suggested that future research studies should explore studies involving multiple SA universities to address the limitations associated with the generalisability of the study findings. Doing so could produce valuable insights and a broader perspective on the various issues concerning the future

intention to adopt e-health tools for DMHS based on the university staff experiences gained during COVID-19.

Only quantitative methods were utilised in this study and this limited the complexities associated with the future intention to adopt e-health tools for DMHS. Although the exclusive application of quantitative methods provides robust statistical data that can solely serve as a basis for evidence-based policy decisions, there may have been some qualitative insights that would have contributed to the understanding of the subjective views and experiences of university staff. Accordingly, a mixed methods approach could be useful in future studies to incorporate both quantitative statistics and qualitative insights related to the future intention to adopt e-health tools for DMHS based on the university staff experiences gained during COVID-19.

Conclusion

The main objective of the study was to determine factors that influence future intention to adopt e-health tools for DMHS based on the university staff experiences gained during COVID-19 at a selected SA university. The results of the study showed that the PU of e-health tools, user experience and satisfaction, post-COVID-19 delivery mode preference and ethical considerations are significant determinants that influence the future adoption of e-health tools. Accordingly, the results of this study provide human resources professionals, university management, mental health practitioners and policymakers with actionable insights into the key determinants of the future adoption of e-health tools in a selected SA university.

The study contributes to the limited body of knowledge on the factors that influence future intention to adopt e-health tools for DMHS based on the university staff experiences gained during COVID-19 within the South African higher education context. In view of this, the study results can be used to inform the development and implementation of effective strategies to promote the mental health of the university staff, leading to improved productivity, reduced absenteeism and a more supportive work environment. Further to this and taking into consideration that e-health tools are fairly new in South African HEIs, the study results also offer valuable insights into the emerging and evolving future adoption intentions of e-health tools for DMHS. In conclusion, the results of the study hold practical implications for South African HEIs, other institutions and potentially other organisations intending to leverage and harness e-health tools to promote employee mental health.

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