

## Acceptability and attitude towards use of digital interventions in substance use disorders psychosocial treatment: a study of healthcare providers at a Methadone Clinic in Kenya

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### ABSTRACT

Digital interventions have been used for psychosocial treatment in substance use disorder but there is limited research on their application in Kenya. Determining the acceptability and attitude towards use of digital intervention in substance use disorder psychosocial treatment is important. The aim of this study was to assess the acceptability and attitude of healthcare providers towards use of digital interventions for psychosocial treatment at a methadone clinic in Kenya. A descriptive cross-sectional survey was carried out among healthcare providers. A structured self-administered questionnaire was used to collect data on sociodemographic variables and acceptability and attitude towards use of digital interventions in substance use

disorder treatment. Technology acceptance model (TAM) was used as conceptual basis for this study. Data was analyzed using SPSS whereby a descriptive analysis was conducted and Pearson's coefficient used to assess the relationship between the TAM constructs. The data is summarized in tables, figures and a graph. Twenty-one health care providers participated comprising 76.2% females and mean age of 33 (SD 6.9) years, of which 66.7% had training in addiction and 23.8% had ever used digital intervention previously. Acceptability was high with 90.5% agreeing that psychosocial treatment can be provided through digital interventions, 80.9% reported digital intervention would improve access to treatment and 76.2% viewed a digital intervention as cost effective. Majority (76.2%) agreed that digital intervention can influence substance use and patients would benefit from the intervention. Using the technology acceptance model, perceived ease of use was associated with perceived usefulness and attitude toward using; and perceived usefulness was associated with attitude towards use. These findings show a high acceptability and positive attitude towards use of digital interventions in substance use disorder treatment among the health care providers at a methadone clinic. This can inform design and implementation of digital interventions among individuals with substance use disorders in Kenya to improve patient outcome.

**Keywords:** *Acceptability, attitude, digital intervention, healthcare providers, Kenya, methadone clinic, substance use disorder.*

## INTRODUCTION

Substance use disorders (SUDs) are prevalent globally and locally. According to the world drug report 2023, 5.8% of the population aged 15-64 (296 million people) had used drugs in 2021 (United Nations office on drug and crime (UNODC), 2023). In Kenya data shows a high prevalence with the commonest substances used being alcohol, cannabis and cigarette smoking (Jaguga et al., 2022; National Authority for the Campaign Against Alcohol and Drug Abuse, 2022). Whilst opioid use is less prevalent, it is associated with the most burden of disease and mortality attributed to SUDs (United Nations office on drug and crime (UNODC), 2023). Treatment for SUDs include pharmacotherapy and psychosocial treatments. Psychosocial treatments have been traditionally offered as face to face treatment and are effective in improving outcomes among people with SUDs (Boumparis et al., 2019; Dugosh et al., 2016; Rice et al., 2020). However, despite available effective interventions there still remains a huge treatment gap that can be addressed using digital interventions (Boumparis et al., 2019; United Nations Office on Drugs and Crime, 2020; Wu et al., 2017).

Digital interventions involve use of electronic communication and information

technology in delivery of healthcare services. These interventions can be through use of computers or mobile phones and delivered via web-based approaches, text message or smartphone applications (10,11). Digital interventions have been used in the management of several conditions including mental illness and in SUDs treatment (Hamideh & Nebeker, 2020; Ramirez-Correa et al., 2020). Digital interventions in healthcare improve treatment access by enhancing the shortage of skilled healthcare providers which helps to reduce referrals and minimize barriers of access to healthcare (Butzner & Cuffee, 2021; Ramirez-Correa et al., 2020). Healthcare providers report these interventions as valuable due to increased access to care resulting in less missed appointments, wait times and readmissions; convenience and flexibility of care; enhanced adherence to medication; and better quality of patient care (Butzner & Cuffee, 2021; Martin et al., 2021; Molfenter et al., 2018; Riedel et al., 2021).

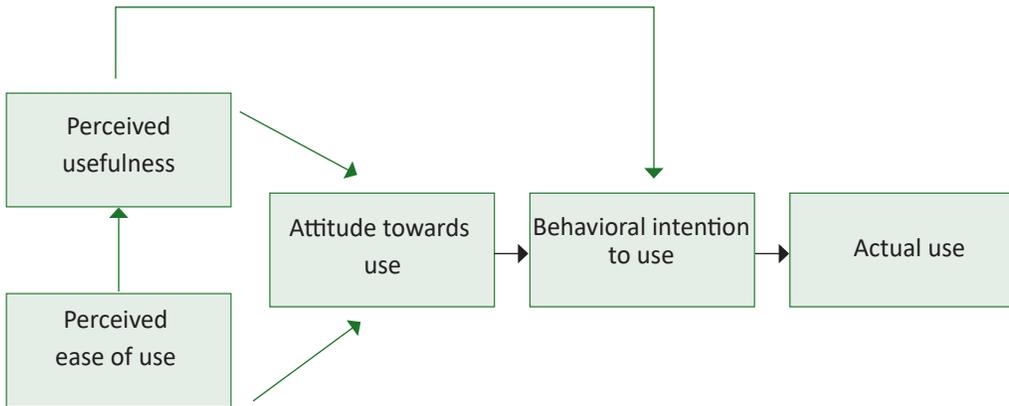
Technology acceptability refers to the likelihood of using an innovative approach to deliver health care as indicated by one's view and intention to use a specific technology and perception that an intervention is agreeable and satisfactory. This acceptance is important at all stages of an intervention from design to implementation (Alqudah et al., 2021; Proctor et al., 2011). Attitude refers to an individual's negative or positive feeling towards a behaviour or intervention. Both acceptability and attitude can be prospective, concurrent or retrospective if the assessment is done prior, during or

after the implementation of an intervention, respectively (Sekhon et al., 2017; Zhang et al., 2008). Assessing acceptability and attitude of healthcare workers to the use of new technologies is important since low acceptability of digital interventions may delay implementation which can negatively impact the expected outcomes (Alqudah et al., 2021). Research shows high acceptability of telemedicine by healthcare providers with most reporting that it should be used more frequently for both new and stable patients (Riedel et al., 2021). Several reviews also report ease of use, acceptability and positive attitude towards digital interventions in SUD treatment in both high income and low and middle income countries (Butzner & Cuffee, 2021; Carreiro et al., 2020; Carter et al., 2021; Nesvag & McKay, 2018; Ojeahere et al., 2022).

Digital technology acceptability has been explored using technology acceptance model (TAM), a theory proposed by Davis to assess the acceptance of new technologies and innovations in information and technology systems (Davis, 1989). Four elements comprise the constructs of TAM: behavioral intention (INT), perceived ease of use (PEOU), perceived usefulness (PU) and attitude and/or actual use [ATT] (Davis, 1989; Kissi et al., 2020). The TAM theory posits that intention to use and actual use of a technology depends on individual's perceived usefulness (benefit from using the technology) and perceived ease of use as reported by users. Hence, if a technology is perceived as easy to use, the acceptability is likely to be higher and a higher perceived

usefulness is associated with greater attitude towards use and actual use of the technology (Portz et al., 2019; Weng et al., 2018). TAM has been applied in various settings including in healthcare (Alqudah et al., 2021; Harst et al., 2019; Ketikidis et al., 2012; Kissi et al., 2020). A summary of TAM is shown in Figure 1.

Implementation of digital interventions depends on health care providers' attitude in addition to their knowledge and skills hence it is important to assess their acceptability and attitude prior to introducing these interventions to routine care (Ramirez-Correa et al., 2020). Determining the acceptability and attitudes towards use of psychosocial digital interventions by clinicians in SUD treatment, can help inform guidelines and policy in delivery of digital healthcare services to individuals with SUD. Despite the shift in use of digital interventions in SUD treatment, little is known about acceptability and attitude among healthcare providers in opioid use disorder (OUD) treatment especially in low- and middle-income countries (Ojeahere et al., 2022). The aim of this study was to assess the acceptability and attitude towards the use of digital interventions for psychosocial SUD treatment among healthcare workers at a methadone clinic.



**Figure 1: Summary of the Technology Acceptance Model (Ketikidis et al., 2012).**

## METHODS

### Study design and setting

This was a cross-sectional descriptive study carried out prior to implementation of a digital intervention among individuals with OUD. The study site was Ngara methadone clinic, a public facility in Nairobi, Kenya. In addition to methadone treatment, services include assessment and treatment for psychiatric and physical co-occurring disorders. This study site was chosen as this was a part of a larger study assessing the use of digital interventions among individuals with OUD, the findings of which have been published elsewhere (Kiburi et al., 2022, 2023).

### Study population and sampling

The study population were health care providers based at the methadone clinic comprising different cadres such as medical officers (six years training in medicine), clinical officers (three years training in

medicine), nurses, pharmacists, addiction counselors, clinical psychologists, laboratory technologists and medical social workers. The number of health care providers at the time of the study was 25, they were all eligible and were invited to participate in the study. All the health care providers were provided with an information document and were required to sign an informed consent. Exclusion criteria included staff who are not involved in provision of clinical care directly to patients and those not willing to provide informed consent. A total of 21 of the 25 health care providers (84%) participated. Among the four who did not participate, one declined to participate and three were on leave and not able to respond to questionnaire at the time of the study.

### Instruments and procedures

A researcher-designed structured self-administered questionnaire was used. The questionnaire was based on literature review and contained questions on sociodemographic data, questions on attitude and acceptability of digital interventions for psychosocial treatment of SUD in general and specific for

a text-based intervention among individuals with OUD. The researchers focused further on a text-based intervention because the planned intervention was delivery of a psychosocial intervention via text message. In this study, digital intervention refers to delivery of psychosocial treatment using digital technology. The data variables were as measured as follows:

**Sociodemographic data:** The questions included age, gender, cadre, prior training in mental health or addiction and prior experience of any digital interventions with patients.

Attitude was assessed by asking participants perception on various treatment for substance use disorder or opioid use disorder. These questions included perception of treatment for substance use disorder and opioid use disorder in general; perception on use of digital intervention for substance use disorder treatment; perceived effectiveness of digital intervention for substance use and/or opioid use disorder and perception on cost effectiveness of using digital interventions.

Acceptability was measured using questions on willingness to use or refer patients to receive a digital intervention for psychosocial treatment of opioid use disorder and having confidence in use of a text-based intervention. This was initially measured using a 5-point Likert scale ranging from “1= disagree” to “5= agree”. During analysis, due to low number of responses for some scores (partly due to the small sample size), “partly disagree” and “disagree” were combined to one variable “disagree”; and

“agree” and “partly agree” were combined as one, “agree” while the response “neutral” remained unchanged. The questionnaire used is attached as supplementary material.

### **Categorization of TAM constructs**

The questions were further summarized to different TAM constructs as follows.

**Perceived usefulness (PU):** this was defined as health care providers belief that digital interventions would be useful in treatment of individuals with SUD/OUD. This included five questions.

PU-1: It is my judgment that it is possible to influence patients’ substance use patterns using a digital intervention

PU-2: It is my judgment that it is possible to influence patients’ substance use patterns with aid of the text-based intervention

PU-3: It is my opinion that a text-based intervention is effective for treatment of substance use disorders

PU-4: It is my opinion that a text-based intervention is effective for treatment of opioid use disorder

PU-5: It is my opinion that patients would benefit from use of a digital intervention in treatment of opioid use disorder

**Perceived ease of use (PEOU):** this is defined by how simple and easy to use digital interventions by the health care providers and patients. In our study we used the construct of external factor influencing use (ease of uptake by the users, in this case individuals with OUD) as used in previous

studies (Venkatesh & Bala, 2008).

PEOU: It is my opinion that individuals with opioid use disorder and/or other substance use disorder would use a digital intervention for treatment

Attitude to use (ATT): this is defined by the attitude to use digital intervention by the health care providers. This was assessed with two questions.

ATT-1: It is my opinion that using the text-based intervention is well supported by the staff

ATT-2: I have confidence in use of a text-based intervention for provision of psychosocial treatment in opioid use disorder.

Intention to use (INT): this was defined as the healthcare providers' intention to use the digital intervention. This was assessed with two questions.

INT-1: I would feel comfortable using digital intervention to offer psychosocial treatment to patients with opioid use disorder

INT-2: I would feel comfortable referring patients to receive a digital intervention

## DATA ANALYSIS

Data was analyzed using Statistical Package for Social Sciences (SPSS). First, we examined the distribution of sociodemographic and prior experience in digital technology for SUD treatment across the sample. Data on participants' perception towards use of various technologies for treatment was then summarized in a table

with a mean and range provided. For TAM theory analysis we assessed the coefficient reliability of the different items in each TAM category and Pearson's coefficient used to assess the relationship between the TAM constructs. The statistical significance was set at  $p < 0.05$ .

## Ethical consideration

Ethical approval was granted by the University of Nairobi and Kenyatta National Hospital ethics committee and the University of KwaZulu Natal (UKZN) Biological Research Ethics Committee. Additional approval was obtained from National Commission for Science Technology and Innovation (NACOSTI), the Nairobi County research committee and facility administration. Written informed consent was obtained from the participants prior to enrolling in the study.

## RESULTS

### Socio demographic characteristics

Table 1 provides a summary of the sociodemographic characteristic of the participants. A total of 21 health care providers participated with a mean age of 33.9 (SD 6.9) years and majority (76.2%) were females. Majority of the participants were psychologists or counselors and 15 (71.4%) participants had received mental health training while 14 (66.7%) had received training in addiction. Five (23.8%) reported use of a digital intervention for treatment previously.

**Table 1: Sociodemographic characteristics of study participants**

Variable	Category	Frequency(N=21)	Percentage (%)
Gender	Male	5	23.8
	Female	16	76.2
Age (years)	Mean±SD; Median; Range	33.9±6.9; 34.0; 23-48	
Role at the clinic/ cadre.	Medical and clinical officers	3	14.3
	Pharmacist\ pharmaceutical technologist	4	19.0
	Nurses	3	14.3
	Psychologists and counsellors	6	28.6
	Medical social workers	3	14.3
	Laboratory technicians	2	9.5
Received training in mental health	Yes	15	71.4
	No	6	28.6
Received training in addiction	Yes	14	66.7
	No	7	33.3
Ever used a digital intervention in treatment of patients with SUD	Yes	5	23.8
	No	16	76.2

### General attitude towards treatment for substance use disorder

Twenty participants (95.2%) agreed that substance use disorder and specifically opioid use disorder can be treated. All participants agreed that both psychosocial treatment and pharmacotherapy are required for treatment of substance use disorder. This is summarized in Table 2.

**Table 2: Health care providers general attitude on SUD treatment**

Health Workers Perceptions	Disagree n (%)	Neutral n (%)	Agree n (%)	Mean±SD	Range*
Substance Use Disorder can be treated	0(0)	1(4.8)	20(95.2)	4.7±0.6	[3-5]
Opioid use disorder can be treated	0(0)	1(4.8)	20(95.2)	4.6±0.6	[3-5]
Pharmacotherapy is effective in treatment of opioid use disorder	0(0)	1(4.8)	20(95.2)	4.7±0.6	[3-5]
Psychosocial treatments are effective in treatment of opioid use disorder	0(0)	1(4.8)	20(95.2)	4.9±0.5	[3-5]
Both pharmacotherapy and psychosocial treatments are required for treatment of opioid use disorder	0(0)	0(0.0)	21(100)	5.0±0.0	[5-5]

\*: this shows the range of scores between 1-5, from the participants responses on Likert scale.

### Attitude towards digital intervention in SUD treatment

Nineteen of the 21 participants (90.5%) agreed that psychosocial treatment can be provided via digital platform. Seventeen (80.9%) reported that use of a digital intervention can improve access to care and 16 (76.2%) considered a digital intervention to be cost effective. More than three quarters (76.2%) agreed that a digital intervention can help influence substance use and a similar percentage also agreed that patients would benefit from a digital intervention. This is summarized in Table 3.

**Table 3: Health care providers' attitude towards use of digital intervention in SUD treatment**

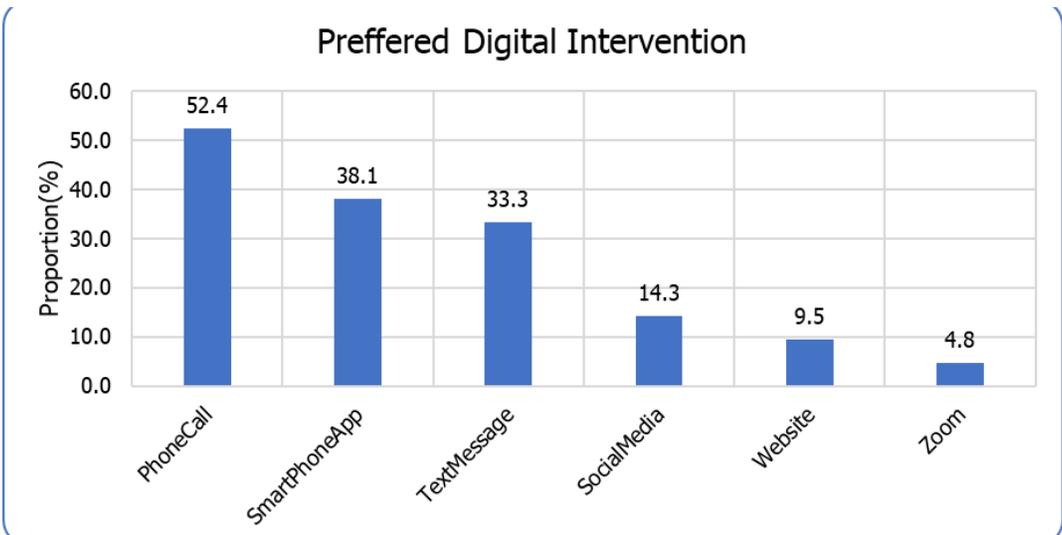
Health Workers Perceptions	Disagree n (%)	Neutral n (%)	Agree n (%)	Mean ±SD*	
Psychosocial treatment can be offered using digital platforms such as phone, computer and internet	0(0)	2(9.5)	19(90.5)	4.4±0.7	[3-5]

Use of a digital intervention in treatment of opioid use disorder can improve access to care	2(9.5)	2(9.5)	17(80.9)	4.2±1.1	[1-5]
Use of a digital intervention in treatment of opioid use disorder is cost effective	2(9.5)	3(14.3)	16(76.2)	4.0±1.1	[1-5]
Digital intervention can influence substance use pattern	0(0)	5(23.8)	16(76.2)	4.4±0.9	[3-5]
Patients would benefit from a digital intervention	3(14.3)	2(9.5)	16(76.2)	4.1±1.2	[1-5]
Individuals with opioid use disorder would use a digital intervention	5 (23.8)	4 (19.0)	12 (57.1)	3.5±1.2	[1-5]
I would feel comfortable using a digital intervention.	3(14.3)	4(19.0)	14 (66.7)	3.6±1.2	[1-5]
I would refer a patient for a digital intervention	1(4.8)	2(9.5)	18(85.7)	3.9±0.6	[2-5]

\*: this shows the range of scores between 1-5, from the participants responses on Likert scale.

Preferred method to provide digital intervention

As shown in Figure 2, eleven participants (52.4%) preferred digital intervention via phone call and only one (4.8%) preferred use of zoom platform.



## Figure 2: Preferred method to offer a digital intervention for SUD treatment

Attitude towards use of a text-message based intervention

Regarding use of a text- based intervention, 66.7% agreed that a text- based intervention can be used to influence substance use behaviour; 33.3% agreed that a text-message based intervention can be effective in opioid use disorder treatment and 47.6% reported to have confidence in use of a text-based intervention. This is summarized in Table 4.

**Table 4: Attitude towards use of a text- based intervention**

Health care perception	Disagree n (%)	Neutral n (%)	Agree n (%)	Mean±SD	Range*
Text-based intervention can be used to influence substance use behaviour	2(9.5)	5(23.8)	14 (66.7)	3.9±1.1	[1-5]
Text based intervention effective for SUD treatment	4(19)	6(28.6)	11 (52.4)	3.4±1.3	[1-5]
Text based intervention effective for OUD treatment	6(28.5)	8(38.1)	7 (33.3)	3.0±1.2	[1-5]
Text based intervention use is supported by staff	4(19.0)	8(38.1)	9 (42.9)	3.3±1.1	[1-5]
I have confidence in use of text-based intervention for SUD	4(9.5)	7(33.3)	10(47.6)	3.5±1.2	[1-5]

\*: this shows the range of scores between 1-5, from the participants responses on Likert scale.

### Acceptability based on TAM constructs

The Pearson's correlation showed that there was significant association of the TAM constructs with correlation coefficient ranging 0.606 to 0.819 ( $p=0.01$ ). The highest correlation was between PEOU and attitude towards using (0.819) followed by correlation between PEOU and PU. The lowest correlation observed was between PEOU and INT. This is shown in

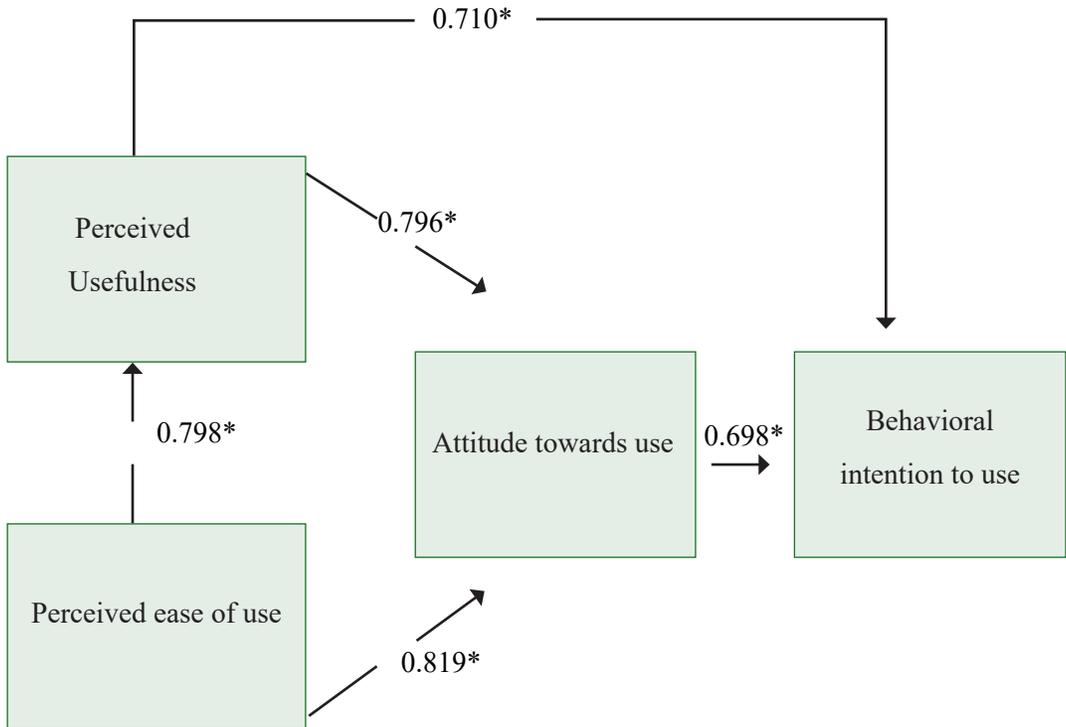
**Table 5 and further illustrated in Figure 3.**

**Table 5: Pearson’s correlation among the TAM variables**

Pearson’s Correlation	PU	PEOU	ATT	INT
PU	1			
PEOU	0.798**	1		
ATT	0.796**	0.819**	1	
INT	0.710**	0.606**	0.698**	1
Reliability coefficient	0.637	-	0.726	0.553

\*\*Correlation is significant at the 0.01 level (2-tailed).

PU: Perceived Usefulness; PEOU: Perceived Ease of Use; ATT: Attitude towards using, INT: Intention to Use



\*: denotes significant difference  $p < 0.01$ ; →: coefficient (path analysis).

Figure 3: Summary of research results based on TAM

## DISCUSSION

This study aimed to assess the acceptability and attitude towards use of digital interventions for SUD and OUD treatment among health care providers at a methadone treatment clinic. Overall, there was a positive attitude towards use and high acceptability of digital interventions use in SUD treatment with majority preferring phone calls. In addition, perceived usefulness and perceived ease of use were associated with attitude towards and intention to use the interventions.

Data on sociodemographic showed that majority of health care providers at the clinic were females and mean age was 33.3 years. In addition, psychologists and counselors were the majority per cadre and at least two third had been trained on addition training. This is almost comparable to findings from other studies among health care providers providing methadone treatment although with differences possibly related to difference in settings where the studies have been conducted (Chen et al., 2020; Nguyen et al., 2024). Also, the psychologists comprising majority indicate availability of psychosocial treatment at the clinic in line with the current national guideline on methadone treatment (Ministry of Health & National AIDS and STI Control Programme, 2021).

As shown in Table 2, all participants agreed that both pharmacotherapy and psychosocial treatment are effective in management of patients with OUD. This is consistent with the current recommendation that

pharmacotherapy is first line for treatment of OUD and should be offered together with psychosocial treatment (Carley & Oesterle, 2021; Dugosh et al., 2016; Rice et al., 2020). Attitude towards the holistic treatment for individuals with OUD is an important factor that affects adoption and sustainability of treatment whereby positive attitude is associated with more support by the clinicians (Bergman et al., 2020; Green et al., 2014).

Most participants (90.5%) agreed that psychosocial treatment can be offered through a digital intervention although only 23.8% had ever used a digital intervention in SUD treatment. This is comparable to previous studies that show high acceptability of digital interventions for SUD treatment (Mark et al., 2020; Molfenter et al., 2021; Sahu et al., 2020). The low use prior to the study could be since this is a new concept in our setting and as at the time of the study survey there were no digital intervention being offered to individuals at the clinic.

As illustrated in Figure 2, the preferred mode of delivery for a digital intervention by most healthcare workers was phone calls, followed by smartphone app while a minority preferred Zoom and website platforms. This is comparable to a study in the United States of America (USA) where most clinicians used telephone or video calls to deliver services with the use of telephone being considered more accessible, easier to use, affordable and more sustainable (Molfenter et al., 2021). The findings differ from a case study on telepsychiatry at a private hospital

in Kenya conducted at peak of COVID-19 pandemic whereby zoom calls was the most commonly used platform, followed by WhatsApp calls and phone calls (Njenga et al., 2022). This difference could arise since the current study was carried out at a public hospital, prior to implementation of a digital intervention with the questions limited for substance use disorder treatment while the study by Njenga and colleagues was at a private hospital and assessed experience with telepsychiatry use in general. However, there is role for different approaches to cater for diverse aspects of care with the view that some digital interventions used in SUD treatment are better for some outcomes and not (Mark et al., 2020; Molfenter et al., 2021; Riedel et al., 2021). For example, in one study screening was most commonly done via telephone while video calls were more used for outpatient treatment (Molfenter et al., 2021) and in another the participants also were reported to use audio calls differently from video approaches (Riedel et al., 2021) with the view that some digital interventions used in SUD treatment are better for some outcomes and not others (Mark et al., 2020).

In addition, the findings show that majority of health care providers (80.9%) in this study perceived that a digital intervention would improve access to psychosocial treatment for SUD and 76.2% considered the interventions to be cost effective. This is comparable to previous research (Mark et al., 2020). This perceived increased access is due to convenience offered to patients such that they do not need to travel to the facility and is associated with better outcomes such

as reduction in missed appointments and treatment adherence (Butzner & Cuffee, 2021; Ramirez-Correa et al., 2020; Uscherpines et al., 2020).

In this study, most participants (76.2%) perceived that digital interventions can influence substance use behaviour would be beneficial to patients. This is comparable to a study in USA where majority of participants also agreed that telemedicine is as effective as in-person care and 88.9% were comfortable conducting it on stable patients (Riedel et al., 2021). In this study, only 57.1% of participants agreed that patients would use a digital intervention. This may be due to perception some patients may not have access to phones or other technology and that some patients may not be conversant with use of technology as reported in other studies (Aronowitz et al., 2021; Garrett & Young, 2021). Further research is needed to explore this.

The study findings, summarized in Table 4, show that attitude and acceptability of a text-based intervention was low compared to the overall use of any digital intervention. This could be due to the finding that only a third of participants reported text message as a preferred mode of digital intervention. This agrees with past research that shows limited use of text message for treatment in OUD with most studies done for alcohol and smoking cessation (Berrouiguet et al., 2016; Keoleian et al., 2016). This can be due to limitations associated with text message as a SUD treatment approach such as lack of physical cues and possibility of participants

not able to express themselves fully through text messages (Suffoletto, 2016). This is an important finding that should inform design of a digital intervention in this patient population. This can include involving participants in the design of the intervention, to give their preferences prior to implementation of a text-based intervention for SUD treatment (Do et al., 2020; Gonzales et al., 2014; Luk et al., 2019; Muench et al., 2013).

In this study, significant correlation was observed between the TAM variables whereby PEOU and PU were associated with ATT. This is similar to what has been reported in past research and is significant because PU and PEOU by healthcare providers influences digital technology uptake (Harst et al., 2019; Kissi et al., 2020). The positive attitude towards use of digital technology reported by the participants shows possible uptake of a digital intervention if implemented. In addition, these findings highlight the importance of training of healthcare providers on digital interventions in terms of their benefits and implementation in SUD treatment. This will improve the perceived ease of use and the attitude towards use of these interventions for better uptake and use by healthcare providers. However, there are external factors that can influence intention to use a digital intervention in addition to TAM such as self-efficacy by healthcare providers, training, computer anxiety, trust and experience (Alqudah et al., 2021; Becker, 2016; Rahimi et al., 2018) that need to be considered in future research. In

addition, Zhang et al., report that attitudes towards information technology, can be viewed as two aspects. One is attitude towards a technology as a behaviour (ATB) or attitude towards technology as an object (ATO). ATB is reported as a better predictor of behaviour intention compared to ATO. Therefore considering only one aspect of attitude in a study may affect the findings (Zhang et al., 2008). This suggests need for further research is in this area.

### **Strengths and limitations**

The strengths of this study comprise that it is the first study in Kenya to assess and report acceptability of digital interventions use for SUD treatment among health care providers at a methadone treatment facility and inclusion of different cadres of health care providers based at the clinic.

Limitations to this study include: First, small sample size. However, this was limited by total number of staff at the clinic (25 in number) and 84% of the healthcare providers based at the clinic at the time of study were enrolled. Secondly, the use of a cross-sectional quantitative survey with a structured questionnaire which had fixed responses may have limited findings since the healthcare providers were not able to give any explanation. We hence recommend use of qualitative methods in future studies. This can allow triangulation of quantitative and qualitative data to better understand the factors associated with acceptability and attitude of health care workers. Thirdly, our findings are based on assessment done at one clinic which limits generalizability.

However, of note is that this study was carried out as an assessment of acceptability prior to implementation of a digital intervention among individuals on methadone treatment at the facility. Additionally, these findings were based on general beliefs and not experience since the study was conducted prior to implementation of any digital intervention at the facility.

## CONCLUSION

The findings in this study show overall high acceptability and positive attitude towards use digital interventions in OUD and other SUD treatment. In addition, perceived ease of use was associated with perceived usefulness and attitude towards use of the interventions. This indicates the need to explore use of these digital interventions in the study setting

These findings have practice implications by demonstrating that digital interventions are acceptable for OUD and/or other SUD treatment by health care providers. This can guide development of policy to implement digital interventions among individuals with SUD which is limited in the study setting and in Kenya. This can facilitate improvement in treatment outcomes among individuals with OUD and/or other SUDs.

## REFERENCES

- Alqudah, A. A., Al-Emran, M., & Shaalan, K. (2021). Technology Acceptance in Healthcare : A Systematic Review. *Applied Sciences*, 11(10537). <https://doi.org/10.3390/app112210537>
- Aronowitz, S. V, Rebitzer, E. E., Dolan, A., Oyekanmi, K., Mandell, D., Meisel, Z., South, E., & Lowenstein, M. (2021). Telehealth for opioid use disorder treatment in low - barrier clinic settings : an exploration of clinician and staff perspectives. *Harm Reduction Journal*, 1–9. <https://doi.org/10.1186/s12954-021-00572-7>

Further research is recommended to get additional insight on use of digital interventions in SUD treatment. Future studies need to include several health care facilities and larger samples to compare findings and allow for generalizability of results. Also, future studies need to include qualitative interviews to explore the various perceptions in more depth because involving participants (health care workers and patients) in the design of an intervention is recommended prior to implementation of the intervention for SUD treatment.

## Author contribution

SKK contributed in design of the study, data collection and analysis, drafting and review of the manuscript. SP and BC contributed in the design of the study, data analysis, drafting and review of the manuscript. All the authors have read and approved the final draft of the manuscript for publication.

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## Conflict of interest:

The authors have no conflict of interest to declare.

Becker, D. (2016). Acceptance of Mobile Mental Health Treatment Applications. *Procedia Computer Science*, 98, 220–227. <https://doi.org/10.1016/j.procs.2016.09.036>

Bergman, B. G., Ashford, R. D., & Kelly, J. F. (2020). Attitudes Toward Opioid Use Disorder Medications: Results From a U.S. National Study of Individuals Who Resolved a Substance Use Problem Brandon. *Experimental and Clinical Psychopharmacology*, 28(4), 449–461. <https://doi.org/10.1037/pha0000325>.Attitudes

Berrouiguet, S., Baca-garc, E., Brandt, S., Walter, M., & Courtet, P. (2016). Fundamentals for Future Mobile-Health ( mHealth ): A Systematic Review of Mobile Phone and Web-Based Text Messaging in Mental Health. *J Med Internet Res*, 18(6), e135. <https://doi.org/10.2196/jmir.5066>

Boumparis, N., Schulte, M. H. J., & Riper, H. (2019). Digital Mental Health for Alcohol and Substance Use Disorders. *Curr Treat Options Psych*, 6, 352–366. <https://doi.org/10.1007/s40501-019-00190-y>

Butzner, M., & Cuffee, Y. (2021). Telehealth interventions and outcomes across rural communities in the United States : Narrative Review. *Journal of Medical Internet Research*, 23(8), e29575. <https://doi.org/10.2196/29575>

Carley, J. A., & Oesterle, T. (2021). Therapeutic Approaches to Opioid Use Disorder : What is the Current Standard of Care ? *International Journal of General Medicine*, 14, 2305–2311. <https://doi.org/10.2147/IJGM.S295461>

Carreiro, S., Newcomb, M., Leach, R., Ostrowski, S., Boudreaux, E. D., & Amante, D. (2020). Current reporting of usability and impact of mHealth interventions for substance use disorder : A systematic review. *Drug and Alcohol Dependence*, 215, 108201. <https://doi.org/10.1016/j.drugalcdep.2020.108201>

Carter, H., Araya, R., Anjur, K., Deng, D., & Naslund, J. A. (2021). The emergence of digital mental health in low-income and middle-income countries : A review of recent advances and implications for the treatment and prevention of mental disorders. *Journal of Psychiatric Research*, 133(2021), 223–246. <https://doi.org/10.1016/j.jpsychires.2020.12.016>

Chen, G., Lin, C., Chen, Y., Li, L., Luo, S., Liu, X., Huan, X., Cao, X., McGoogan, J. M., & Wu, Z. (2020). Job Satisfaction among Methadone Maintenance Treatment Clinic Service Providers in Jiangsu, China: A Cross-sectional Survey. *Journal of Addiction Medicine*, 14(1), 12–17. <https://doi.org/10.1097/ADM.0000000000000530>

Davis, F. (1989). Perceived Usefulness , Perceived Ease of Use , and User Acceptance of Information Technology. *MIS Quarterly*, 13(3), 319–340. <https://doi.org/10.2307/249008>

- Do, V. Van, Spears, C. A., Van Minh, H., Huang, J., Redmon, P. B., Xuan Long, N., & Eriksen, M. P. (2020). Perceptions About Mindfulness and Text Messaging for Smoking Cessation in Vietnam: Results From a Qualitative Study. *JMIR MHealth and UHealth*, 8(6), e17337. <https://doi.org/10.2196/17337>
- Dugosh, K., Abraham, A., Seymour, B., Mcloyd, K., Chalk, M., & Festinger, D. (2016). A Systematic Review on the Use of Psychosocial Interventions in Conjunction With Medications for the Treatment of Opioid Addiction. *J Addict Med*, 10(2), 91–101. <https://doi.org/10.1097/ADM.0000000000000193>
- Garett, R., & Young, S. D. (2021). Potential Effects of Digital Inequality on Treatment Seeking for Opioid Use Disorder. *International Journal of Mental Health and Addiction*, 0123456789. <https://doi.org/10.1007/s11469-021-00629-5>
- Gonzales, R., Anglin, M. D., & Glik, D. C. (2014). Exploring the feasibility of text messaging to support substance abuse recovery among youth in treatment. *Health Education Research*, 29(1), 13–22. <https://doi.org/10.1093/her/cyt094>
- Green, C., McCarty, D., Mertens, J., Lynch, F., Hilde, A., Firemark, A., Weisner, C., Pating, D., & BM, A. (2014). “The chief of the services is very enthusiastic about it”: A qualitative study of the adoption of buprenorphine for opioid addiction treatment. *J Subst Abuse Treat*, 46(3), 390–401. <https://doi.org/10.1016/j.jsat.2013.09.002>.
- Hamideh, D., & Nebeker, C. (2020). The Digital Health Landscape in Addiction and Substance Use Research : Will Digital Health Exacerbate or Mitigate Health Inequities in Vulnerable Populations ? *Current Addiction Reports*, 7, 317–332. <https://doi.org/10.1007/s40429-020-00325-9>
- Harst, L., Lantsch, H., & Scheibe, M. (2019). Theories Predicting End-User Acceptance of Telemedicine Use : Systematic Review. *J Med Internet Res*, 21(5), e13117. <https://doi.org/10.2196/13117>
- Jaguga, F., Kiburi, S. K., Temet, E., Barasa, J., Karanja, S., Kinyua, L., & Kwobah, E. K. (2022). A systematic review of substance use and substance use disorder research in Kenya. *PloS One*, 17(6), e0269340. <https://doi.org/10.1371/journal.pone.0269340>
- Keoleian, V., Polcin, D., Galloway, G. P., & Francisco, S. (2016). Text messaging for addiction: A review. *J Psychoactive Drugs*, 47(2), 158–176. <https://doi.org/10.1080/02791072.2015.1009200>.Text
- Ketikidis, P., Dimitrovski, T., Bath, P., & Lazuras, L. (2012). Acceptance of Health Information Technology in Health Professionals : An Application of the Revised Technology Acceptance Model. *Health Informatics Journal*, 1–11. <https://doi.org/10.1177/1460458211435425>

Kiburi, S. K., Kwobah, E. K., Paruk, S., & Chiliza, B. (2023). Feasibility , acceptability and preliminary efficacy of a cognitive behavior therapy text - message intervention among individuals with opioid use disorder in Kenya : a randomized feasibility trial. *BMC Digital Health*, 1(14), 1–19. <https://doi.org/10.1186/s44247-023-00014-3>

Kiburi, S. K., Paruk, S., & Chiliza, B. (2022). Mobile phone ownership, digital technology use and acceptability of digital interventions among individuals on opioid use disorder treatment in Kenya. *Frontiers in Digital Health*, 4, 975168. <https://doi.org/10.3389/fgth.2022.975168>

Kissi, J., Dai, B., Dogbe, C. S., Banahene, J., & Ernest, O. (2020). Predictive factors of physicians ' satisfaction with telemedicine services acceptance. *Health Informatics Journal*, 26(3), 1866–1880. <https://doi.org/10.1177/1460458219892162>

Luk, T. T., Wong, S. W., Lee, J. J., Chan, S. S.-C., Lam, T. H., & Wang, M. P. (2019). Exploring Community Smokers' Perspectives for Developing a Chat-Based Smoking Cessation Intervention Delivered Through Mobile Instant Messaging: Qualitative Study. *JMIR MHealth and UHealth*, 7(1), e11954. <https://doi.org/10.2196/11954>

Mark, T. L., Treiman, K., Padwa, H., & Henretty, K. (2020). Addiction Treatment and Telehealth : Review of Efficacy and Provider Insights During the COVID-19 Pandemic. *Psychiatric Services*, 00(00), 1–8. <https://doi.org/10.1176/appi.ps.202100088>

Martin, R., Kang, A. W., Debritz, A. A., Walton, M. R., Hoadley, A., Delacuesta, C., & Hurley, L. (2021). Medication for Opioid Use Disorder Service Provision and Telephone Counseling : A Concurrent Mixed-Methods Approach. *International Journal of Environmental Research and Public Health*, 18(6163). <https://doi.org/10.3390/ijerph18116163>

Ministry of Health, & National AIDS and STI Control Programme. (2021). National implementation guidelines for Medically assisted treatment , for people with opioid use disorder. NASCOP. <https://www.un.org/en/sc/1540/national-implementation/guidelines-for-reporting.shtml>

Molfenter, T., Brown, R., Neill, A. O., Kopetsky, E., & Toy, A. (2018). Use of Telemedicine in Addiction Treatment : Current Practices and Organizational Implementation Characteristics. *International Journal of Telemedicine and Applications*, 3932643, 1–7. <https://doi.org/10.1155/2018/3932643>

Molfenter, T., Roget, N., Chaple, M., Behlman, S., Cody, O., Hartzler, B., Johnson, E., Nichols, M., Stilen, P., & Becker, S. (2021). Use of Telehealth in Substance Use Disorder Services During and After COVID-19 : Online Survey Study. *JMIR MENTAL HEALTH*, 8(2), e25835. <https://doi.org/10.2196/25835>

Muench, F., Weiss, R. A., & Morgenstern, J. (2013). Developing a theory driven text messaging intervention for addiction care with user driven content. *Psychol Addict Behaviour*, 27(1), 315–321. <https://doi.org/10.1037/a0029963>.

National Authority for the Campaign Against Alcohol and Drug Abuse. (2022). National Survey on the Status of Drugs and Substance use in Kenya.

Nesvag, S., & McKay, J. R. (2018). Feasibility and Effects of Digital Interventions to Support People in Recovery From Substance Use Disorders: Systematic Review. *Journal of Medical Internet Research*, 20(8), e255. <https://doi.org/10.2196/jmir.9873>

Nguyen, B. D., Li, L., Lin, C., Nguyen, T. T., Shoptaw, S., & Le, M. G. (2024). Confidence in providing methadone maintenance treatment of primary care providers in Vietnam. *Addiction Science and Clinical Practice*, 19(1), 1–10. <https://doi.org/10.1186/s13722-023-00419-5>

Njenga, F., Ongeru, L., Nguithi, A., Anundo, J., Mugane, M., Kimari, Z., Mbugua, G., Kaigwa, C., & Atwoli, L. (2022). Integrating telepsychiatry services in a care setting in Kenya: a case report. *BJPsych International*, 19(2), 2021–2023. <https://doi.org/10.1192/bji.2021.38>

Ojeahere, I., Kiburi, S., Agbo, P., Kumar, R., & Jaguga, F. (2022). Telehealth interventions for substance use disorders in low- and- middle income countries : A scoping review. *PLOS Digital Health*, 1(11), e0000125. <https://doi.org/10.1371/journal.pdig.0000125>

Ojeahere, M. I., Kiburi, S. K., Agbo, P., Kumar, R., & Jaguga, F. (2022). Telehealth interventions for substance use disorders in low- and- middle income countries: A scoping review. *PLOS Digital Health*, 1(11), e0000125. <https://doi.org/10.1371/journal.pdig.0000125>

Portz, J. D., Bayliss, E. A., Bull, S., Boxer, R. S., Bekelman, D. B., Gleason, K., & Czaja, S. (2019). Using the Technology Acceptance Model to Explore User Experience , Intent to Use , and Use Behavior of a Patient Portal Among Older Adults With Multiple Chronic Conditions : Descriptive Qualitative Study Corresponding Author : *Journal of Medical Internet Research*, 21(4), e11604. <https://doi.org/10.2196/11604>

Proctor, E., Silmere, H., Raghavan, R., Hovmand, P., Aarons, G., Bunger, A., Griffey, R., & Hensley, M. (2011). Outcomes for Implementation Research: Conceptual Distinctions, Measurement Challenges, and Research Agenda. *Administration and Policy in Mental Health and Mental Health Services Research*, 38(2), 65–76. <https://doi.org/10.1007/s10488-010-0319-7>

Rahimi, B., Nadri, H., Afshar, H., & Timpka, T. (2018). A Systematic Review of the

Technology Acceptance Model in Health Informatics. *Applied Clinical Informatics*, 9(3), 604–634. <https://doi.org/10.1055/s-0038-1668091>

Ramirez-Correa, P., Ramirez-Rivas, C., Alfaro-Perez, J., & Melo-Mariano, A. (2020). Telemedicine Acceptance during the COVID-19 Pandemic : An Empirical Example of Robust Consistent Partial Least Squares Path Modeling. *Symmetry*, 12(10), 1593. <https://doi.org/10.3390/sym12101593>

Rice, D., Corace, K., Wolfe, D., Esmaelisaraji, L., Michaud, A., Grima, A., Austin, B., Douma, R., Barbeau, P., Butler, C., Willows, M., Poulin, P., Sproule, B., Porath, A., Garber, G., Taha, S., Garner, G., Skidmore, B., Moher, D., ... Hutton, B. (2020). Evaluating comparative effectiveness of psychosocial interventions adjunctive to opioid agonist therapy for opioid use disorder : A systematic review with network. *PloS One*, 15(12), e0244401. <https://doi.org/10.1371/journal.pone.0244401>

Riedel, L., Uscher-pines, L., Mehrotra, A., Busch, A. B., Barnett, M. L., Raja, P., & Huskamp, H. A. (2021). Use of telemedicine for opioid use disorder treatment – Perceptions and experiences of opioid use disorder clinicians. *Drug and Alcohol Dependence*, 228, 108999. <https://doi.org/10.1016/j.drugalcdep.2021.108999>

Sahu, P., Mathur, A., Ganesh, A., Nair, S., Chand, P., & Murthy, P. (2020). Acceptance of e-consult for Substance Use Disorders during the COVID 19 pandemic : A study from India. *Asian Journal of Psychiatry*, 54, 102451. <https://doi.org/10.1016/j.ajp.2020.102451>

Sekhon, M., Cartwright, M., & Francis, J. J. (2017). Acceptability of healthcare interventions : an overview of reviews and development of a theoretical framework. *BMC Health Services Research*, 1–13. <https://doi.org/10.1186/s12913-017-2031-8>

Suffoletto, B. (2016). Text Message Behavioral Interventions : From Here to Where ? *Curr Opin Psychol*, 1(9), 16–21. <https://doi.org/10.1016/j.copsy.2015.09.012>

United Nations office on drug and crime (UNODC). (2023.). *World drug report, 2023*. United Nations publication,.

United Nations Office on Drugs and Crime, and W. H. O. (2020). *International standards for the treatment of drug use disorders: revised edition incorporating results of field testing*.

Uscher-pines, L., Sousa, J., Raja, P., Mehrotra, A., Barnett, M., & Huskamp, H. A. (2020). Treatment of opioid use disorder during COVID-19 : Experiences of clinicians transitioning to telemedicine. *Journal of Substance Abuse Treatment*, 118, 108124. <https://doi.org/10.1016/j.jsat.2020.108124>

Venkatesh, V., & Bala, H. (2008). *Technology Acceptance Model 3 and a Research Agenda*

on Interventions. *Decision Sciences*, 39(2), 273–315.

Weng, F., Yang, R., Ho, H., & Su, H. (2018). A TAM-Based Study of the Attitude towards Use Intention of Multimedia among School Teachers. *Applied System Innovation*, 1(36), 1–9. <https://doi.org/10.3390/asi1030036>

Wu, L., Zhu, H., Swartz, M. S., Sciences, B., & Policy, F. (2017). Treatment utilization among persons with opioid use disorder in the United States. *Drug Alcohol Depend.*, 117–127. <https://doi.org/10.1016/j.drugalcdep.2016.10.015.Treatment>

Zhang, P., Aikman, S. N., & Sun, H. (2008). Two types of attitudes in ICT acceptance and use. *International Journal of Human-Computer Interaction*, 24(7), 628–648. <https://doi.org/10.1080/10447310802335482>