Assessing the Usage and Usability of a Mental Health Advice Telephone Service in Uganda: A Mixed Methods Study

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Abstract

Background: Harnessing mobile health (mHealth) solutions could improve the delivery of mental health services and reduce their impact in Uganda and similar low-resource settings. However, successful adoption requires that mHealth solutions have good usability. We have previously implemented a telephone service to provide mental health information and advice in English and Luganda using an automated (interactive voice response) system and linkage to live agents that include mental healthcare workers and peer support workers.

Objective: To assess the usage and usability of this mental health telephone service.

Methods: We obtained usage data from the system call logs for 18 months to study the call volumes and trends. We then surveyed callers to obtain their characteristics and assess usability using the telehealth usability questionnaire. Additionally, call recordings were assessed for conversation quality using the telephone nursing dialogue process by three independent healthcare professionals, and correlations between quality and usability aspects were investigated.

Results: In 18 months, 2863 meaningful calls (i.e., went past the welcome message) from 1125 unique telephone numbers were made to the system. 1153 (40.3%) stopped at the pre-recorded interactive voice response information, and 1710 (59.7%) chose to speak to an agent; of which 1292 (75.6%) were answered, 393 (23.0%) went to voicemail and were returned in the following working days, and 25 (1.5%) were not answered. Usage was generally sustained over time, with spikes in calls corresponding to marketing events.
The survey (n=240) revealed that most callers were caregivers of mental health patients (60%) or the general public (19.2%), and few were mental health patients (18.3%). Additionally, majority were male (59.6%), spoke English (75.0%), had post-secondary education (68.3%), lived one hour or less from Butabika Hospital (77.9%), and were aged 25-44 (66.7%).
The overall usability score for the system was 4.12 on a 5-point scale, significantly higher than the recommended target usability score of 4 (p-value = 0.006). Mean scores for usability components ranged from 3.66 for Reliability, and 4.41 for Ease of use, and all components but Reliability were higher than 4 or within its confidence interval. Usability scores were higher for Luganda than English speakers, but there was no association with other participant characteristics such as sex, distance from the hospital,

age, marital status, duration of symptoms, or treatment status. The quality of call conversations (n=50) was 4.35 out of 5 and significantly correlated with usability (Pearson r = 0.34, p<0.05).

Conclusions: We found sustained usage of the mental health telephone service, with good user experience and high satisfaction across different user characteristics. Mobile health solutions like these should be embraced and replicated to improve the delivery of health services in Uganda and similar low-resource settings.

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The survey (n=240) revealed that most callers were caregivers of mental health patients (60%) or the general public (19.2%), and few were mental health patients (18.3%). Additionally, majority were male (59.6%), spoke English (75.0%), had post-secondary education (68.3%), lived one hour or less from Butabika Hospital (77.9%), and were aged 25-44 (66.7%).

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Conclusion: We found sustained usage of the mental health telephone service, with good user experience and high satisfaction across different user characteristics. Mobile health solutions like these should be embraced and replicated to improve the delivery of health services in Uganda and similar low-resource settings.

1. Introduction

Mobile health (mHealth) solutions have been widely implemented in Africa to support various clinical goals and processes, such as medication adherence, appointment attendance, communication with patients and health education, clinical data collection and reporting, and clinical decision support and adherence to guidelines [1–7]. Generally, positive results have been reported with regard to acceptability, usability, and clinical outcomes; however, most of the implementations have been in HIV/AIDS, maternal and child health, and to a limited extent in other non-communicable diseases such as cancer, hypertension, and diabetes [1–6]. Studies on the implementation of mHealth in mental health in Africa are limited. For example, in a meta-analysis of mobile phone-based interventions for mental health from across the globe by Goldberg et al. [8], none of the identified 145 randomized trials was from Africa. Another review by Ding et al. [9] that focused on mHealth for mental health among the youth, found only 3 out of the 151 studies were from Africa (Nigeria). Similarly, in the review of mHealth in Sub-Saharan Africa by Aboye and others [1], only 2 of the 59 studies were about mental health conditions, i.e., an app for dementia screening by lay health workers in Tanzania and a case study of telepsychiatry in Kenya following the outbreak of COVID-19. Other reviews by Ødegård et al. [4] (31 clinical trials of two-way SMS interventions) and Osei et al. [5] (12 studies of mHealth for disease diagnosis and treatment in Africa) did not report any studies on mental health.

A key issue in the implementation of mHealth solutions is usability. The International Standards Organization defines usability as the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use [10]. Usability influences users' intention and eventual use of technology [11], and good usability is essential for engagement with mental health mHealth solutions [12,13]. Moreover, persons with mental illnesses, particularly in Africa, often do not own mobile devices or share them with family members/caregivers (hence, no privacy and confidentiality), live in rural areas with poor telecommunication network coverage and limited access to electricity to charge devices, have low general and digital literacy, and face a lot of stigma, among other challenges [14–16], which can affect how easy it is for them to learn and use mHealth solutions or how satisfied they are with them [12,13]. Mental health mHealth solutions, particularly smartphone apps, have also been faulted for being unnecessarily complex [13] and carrying a high personal quantification cost [12] since they often require users to frequently enter data about their behavior and/or mood for the purposes of ecological momentary assessments.

Therefore, it is crucial to conduct research on the usability of mental health mHealth interventions [17] to inform improvements in their design, implementation strategies, and evidence base for these technologies in Africa. Moreover, since usability is subjective, studying the actual usage (e.g., the number of returning users or the kind of information sought) is essential, as it gives more insights into user satisfaction, perceived utility, and their unique challenges and needs.

We have previously implemented a mental health advice telephone service at the Butabika National Mental Referral Hospital (BNMRH) in Kampala, Uganda. It has an interactive voice response (IVR) system where people can call in and listen to pre-recorded mental health information or speak to a live agent to ask specific questions and advice about accessing mental health care services. A description of the co-creation process of this telephone service, including requirements elicitation, design considerations, features, and functionalities, have been reported previously [18]. This paper assesses the usage and usability of the system.

2. Methods

A quantitative study was conducted using the logs of the telephone system to assess usage, as well as a cross-sectional telephone survey of callers and rating of call conversation quality to assess usability.

2.1 Telephone system usage logs

Data collection: Data was obtained from the system call logs, which included the phone number, timestamp, duration, and IVR menu options chosen. Eighteen months were included, from August 2022, when system deployment and testing was completed, to February 2024.

Analysis: From the call logs, trends across calendar time, day of the week, and time of the day were extracted, as well as the language and destination of the call (IVR, live agent, or voicemail). The data was summarized using descriptive statistics (frequencies, percentages, medians, and ranges) and graphs made to visualize trends.

2.2 Usability survey

Participants: Participants included persons who had called into the telephone system. Survey calls were made once or twice a week, and the participants were recruited sequentially from the call logs of the preceding days. A survey log was kept in a spreadsheet to keep track of callers who had been successfully surveyed versus those for whom the survey was not completed, for example, because their phones were unreachable. If more than a month had passed since someone called the system without successfully surveying them, they were excluded from the eligible participants because it was considered too long for the caller to remember their call experience. The surveys were conducted in English or Luganda, depending on the participant's preference, and data was entered in real-time into a Google Form, which had been configured to shuffle the order of the questionnaire items to minimize the ordering effect [19].

The survey was administered by trained research assistants (nurses, peer support workers, and psychiatric clinical officers) who were part of the project team and served as call agents. For a month before data collection, the first author trained the research assistants on the questionnaire content, obtaining informed consent over the phone, and avoiding "leading" respondents to certain responses. The first author also listened to at least four randomly selected survey calls every month for quality control.

Sample size: The recommendation by Park et al. [20] was used to estimate the sample size as 241 participants for a Likert scale with five dimensions or usability attributes (or a maximum of four items per dimension if each dimension is analyzed separately), assuming a correlation coefficient of 0.5 and a tolerable error of 5%.

Data collection: The telehealth usability questionnaire (TUQ), developed and validated by Parmanto et al. [21], was used. The TUQ is based on older usability questionnaires and technology acceptance theories, but it is intended to assess a variety of telehealth set-ups, including those that use general-purpose computers and mobile phones, as opposed to traditional video-conferencing systems that are designed for a single purpose and often operated by a clinician or technical team. The TUQ thus can be used to assess usability from the patient's perspective. The original questionnaire has twenty-one items covering five usability attributes: usefulness, ease of use and learnability, interface quality, interaction quality, reliability, and satisfaction and future use. The language was adapted to context, replacing "telehealth system" with "Butabika call center service" and changing the item "the system is simple and easy to understand" to "the information is simple and easy to understand." The item "*I believe I could become productive quickly using this system,"* which was considered irrelevant to our

survey, was also removed. Items were scored on a 5-point Likert scale, with 1 as the lowest and 5 as the highest. In addition, questions about demographic characteristics and mental illness information were included, and a free text comment.

Analysis: Usability survey data was analyzed by summarizing the participants' characteristics (frequencies and percentages), and for the TUQ items, sub-scales (usability attributes) and overall scale (mean and standard deviation). The scale's reliability was examined using Cronbach's alpha, and the differences in usability scores between participants' characteristics analyzed using the t-test (language, sex, distance from the hospital, duration of illness) and ANOVA (category of caller, level of education, marital status).

The free-text comments were analyzed using a deductive approach [22]. The first and fifth authors independently coded the comments into themes relating to participants' general opinions about the system, usability challenges, and recommendations for improvement.

2.3 Call conversation quality rating

Participants: The third, fourth, and fifth co-authors (JN, JRN, RN) did the quality assessment. They have all been involved in the development and operation of the call center system. JN is a social worker, and JRN is a psychologist, both at Butabika Hospital, while RN is a nurse at the Uganda Cancer Institute.

Data collection: Fifty recordings of telephone conversations involving the usability survey participants were randomly selected and were independently assessed using the telephone nursing dialogue process [23], i.e., on the aspects of *rapport*, actively *listening*, gathering and *analyzing* information, informing and *motivating* the caller, and *ending* with mutual agreement and safety-netting. The agent who answered the call (peer support work vs. professional healthcare provider) was also recorded, as well as the call issue, i.e. if it was solvable on the phone (defined as *"caller needed general information such as how to access mental health services, was providing information to us such as reporting a patient who "escaped" or just checking if system works"*) or not (defined as *"a thorough clinical assessment was need, prescription of medication, urgent intervention for suicidal patient, etc"*).

The recordings were accessed through a password-protected, time-limited cloud folder, and the assessment was recorded in Google Forms.

Analysis: The ratings of the call conversations were summarized into means and standard deviations. The reliability of the quality rating scale was assessed using Cronbach's alpha, and the correlation between the ratings by health professionals and the callers' usability scores was computed to evaluate whether any relationship exists. Chi-square tests were conducted to assess associations between agent and call issue.

Microsoft Excel (v.16) and SPSS (v.29) were used for all data cleaning and analysis of usage, usability, and conversation quality.

2.4 Ethics

Ethical approval for the research study was obtained from the Makerere University School of Public Health research ethics committee (#SPH-2021-153) and the Uganda National Council of Science and Technology (#HS1868ES). The research assistant obtained consent from the participants before administering the survey. He/she explained to the participant that this was research and participation was voluntary, with no bearing on the participant's medical care. As compensation for their time, participants were sent UGX 5000 (approx. US $1.3) as phone credit, as advised by the research ethics committee.

3. Results

3.1 Usage patterns

There were 5120 calls made to the system from August 2022 to February 2024. Of these, 2257 (44.1%) did not interact with the system, i.e., callers who were just checking to confirm that the system was on or failed to understand the IVR instructions and, therefore, did not press any IVR option. The remaining 2863 calls (55.9% of all calls, from 1125 unique telephone numbers) meaningfully interacted with the system, i.e., chose options from the IVR menu, with almost half (1153 calls, 40.3%, from 609 unique phone numbers) stopping at pre-recorded IVR information. The other 1710 calls (59.7%) chose to speak to a live agent, and of those, 1292 (75.6%, 593 unique phone numbers) were answered, 25 (1.5%, 25 unique numbers) were not answered, and 393 (23.0%, 254 unique phone numbers) were during out-of-office hours and went to voicemail which the agents returned within the following working days. Overall, the calls lasted 138.3 hours, each number making a median of two calls (min =1, max =77), lasting 3 minutes on average. There was approximately an equal number of calls in English as in Luganda, and there was no significant difference in the duration of calls (to the agents) in English vs. Luganda (mean=2.99 vs 3.06 minutes, p-value=0.31). Table 1 shows the details per call type.

Table 1

	IVR	Agent	Voicemail	Overall*
number of calls	1153	1292	393	2838
total duration of calls (hours)	49.5	65.0	23.7	138.3
average duration of each call (minutes)	2.6	3.0	3.6	2.9
calls in Luganda (%)	54.9	50.8	48.1	–
unique numbers	609	593	254	1456
median number of calls from a single number	1	2	1	2
maximum number of calls from a single number	34	25	24	77

**Note: There is an overlap in the callers to IVR and live agents (187 phone numbers) and live agents and voicemail (86 phone numbers); i.e., multiple calls from a single number choosing IVR, live agent, or voicemail on different calls. Therefore, the total in the table exceeds the figure (1125 unique telephone numbers) mentioned above. The numbers in the Overall column are calculated from the combined call dataset of IVR, live agent, and voicemail rather than the summation of the other column figures. Also, note that the 25 unanswered calls are not included.*

Figure 1 shows the mental health information topics listened to in the IVR and the frequency (number of calls). Information on what mental illnesses are, their signs and symptoms, and their causes was the most sought-after (73.1% of IVR subtopics). This involved several replays of the messages and was mostly in Luganda (71.8%).

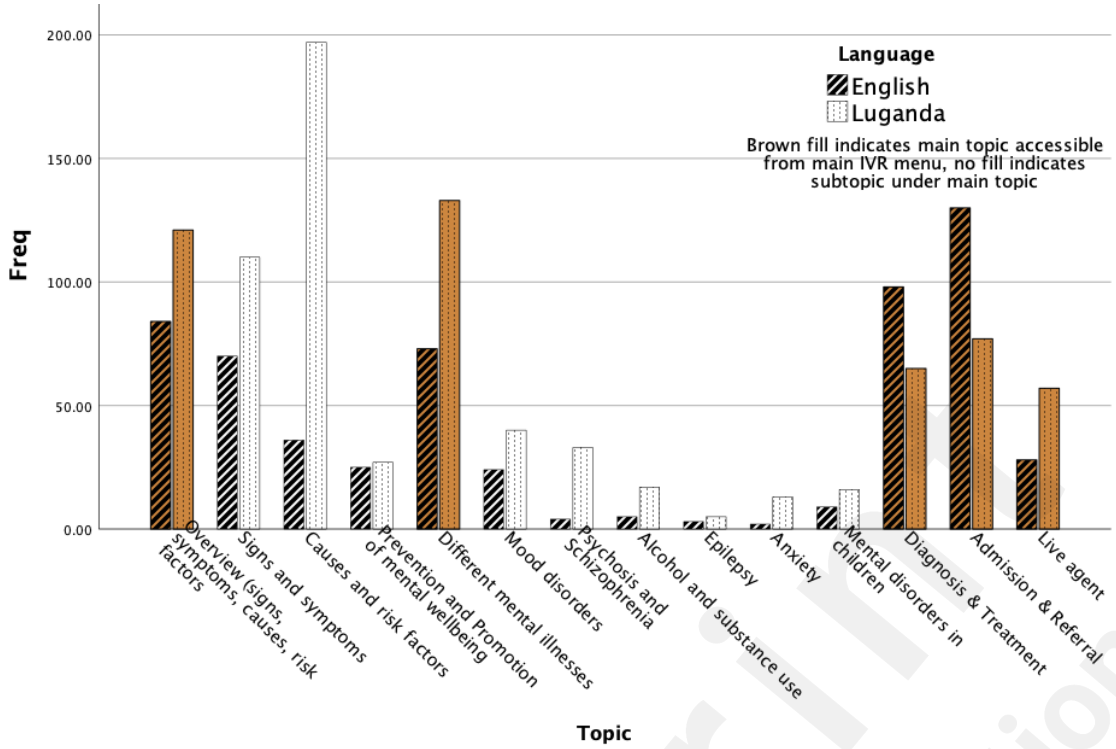

Fig. 1: Mental health messages listened to in the IVR

Figure 2 shows the call trends over the 18 months, Figure 3 shows call distribution over the time of the day, and Figure 4 shows call distribution across days of the week. Usage is generally sustained over time, with spikes in calls corresponding to marketing and sensitization events such as community outreaches when the call center number was shared with patients and the general public. Relatively more calls were made earlier in the week and during the day, compared to weekends and nights, respectively. Call agents (nurses, psychiatric clinical officers, psychologists, and peer support workers) were only available during office hours (8am to 6pm, Monday to Friday), and the system was configured not to route any calls to live agents outside of these hours. This explains why there are no calls to live agents and a high number of voicemails on Saturday and Sunday.

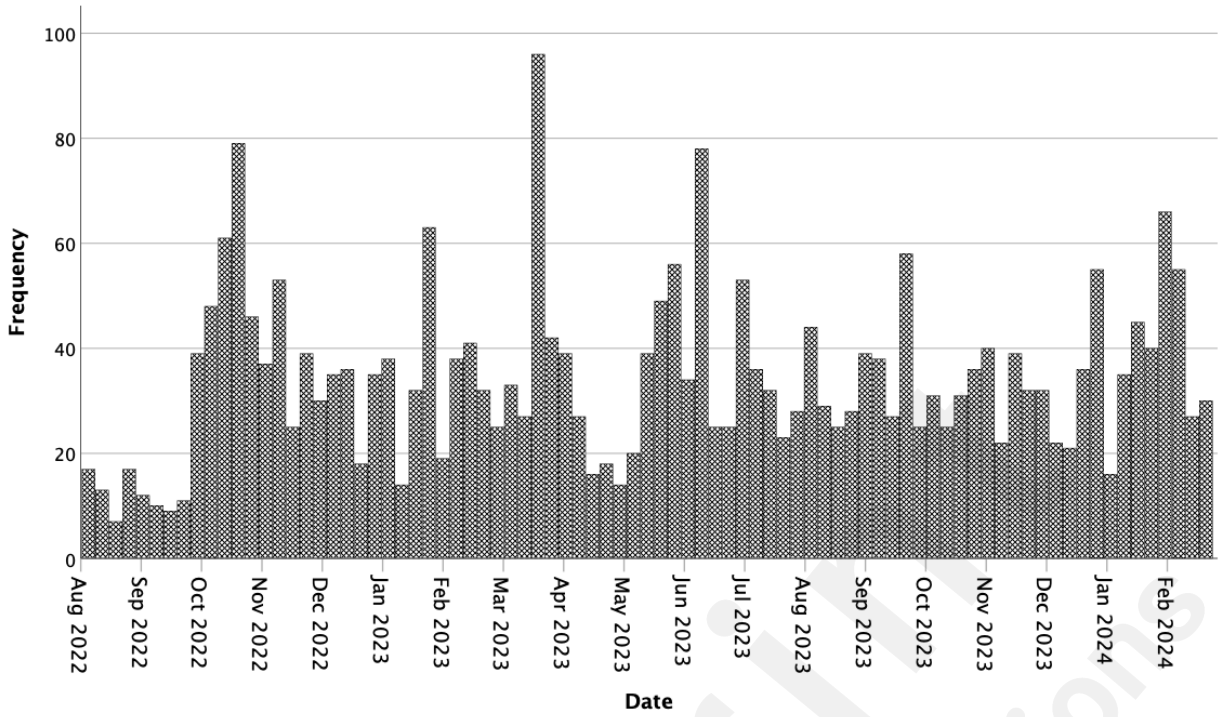

Fig 2: Call trends over time

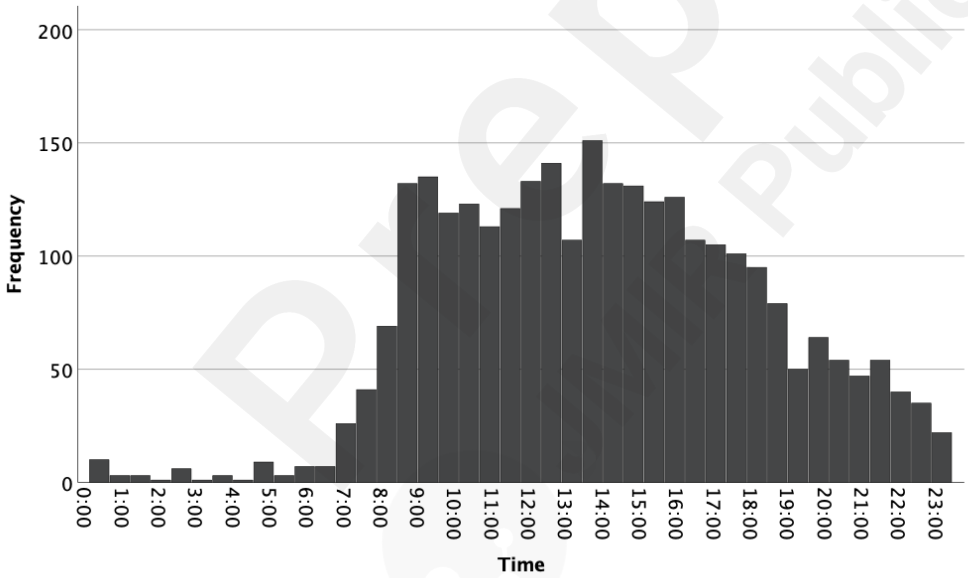

Fig. 3: Calls trends across time of the day

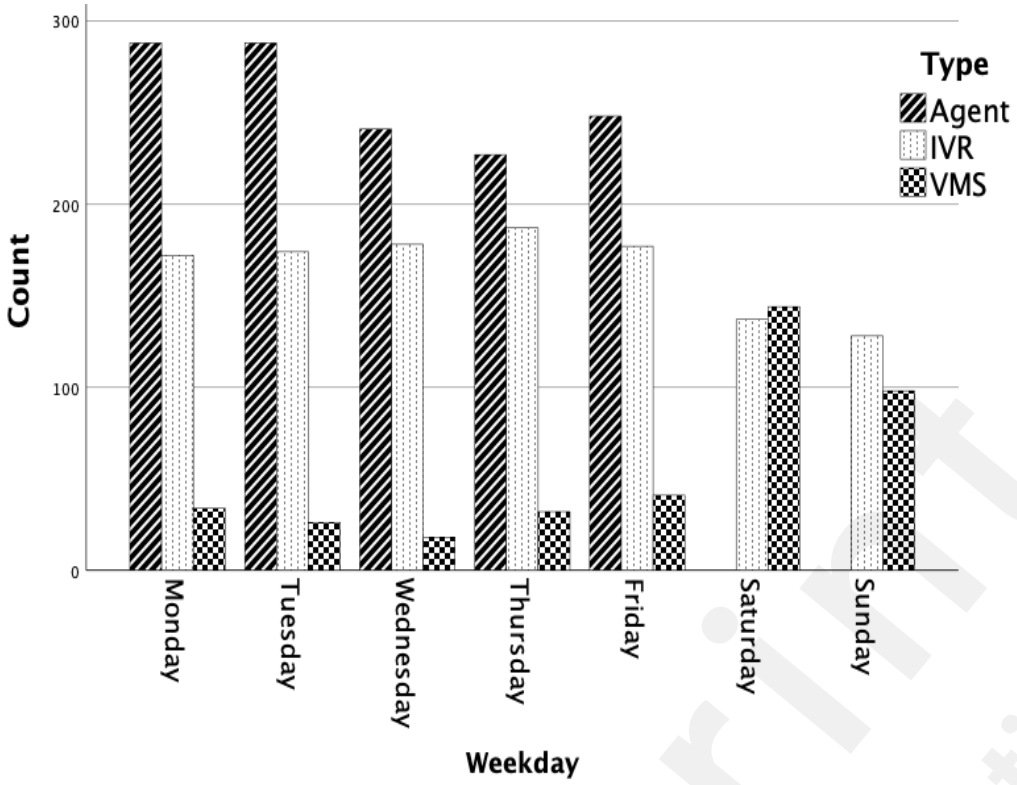

Fig. 4: Distribution of call types per day of the week. Note: There were no live agents on Saturdays and Sundays.

3.2 Usability

3.2.1 Characteristics of Usability Survey Participants

Two hundred and fifty-two callers were surveyed, 12 of whom were excluded from the analysis because the usability questions were incomplete (e.g., due to poor phone network or if the participant did not have time) or if the participant mentioned that they could not recall their experience when they used the call center service. The remaining 240 surveys that were analyzed were from caregivers of mental health patients (n=144, 60%), members of the general public (n=46, 19.2%), mental health patients themselves (n=44, 18.3%), healthcare providers (n=5, 2.1%), and peer support workers (n=1, 0.4%).

The majority of the participants were male (n=143, 59.6%), spoke English (n=180, 75.0%), had post-secondary school level education (n=164, 68.3%), lived 30km or less (approximately one hour or less) from Butabika Hospital (n=187, 77.9%), and were aged 25-34 (n=97, 40.4%) or 35-44 (n=63, 26.3%). Of the patients (i.e., caller category patient or caregiver), the majority had had the illness for over a year (n=147, 78.4%) and were already receiving treatment (n=134, 71.3%), and most of the mental health issues were alcohol and substance-related disorders (n=48, 25.5%) and mood disorders (n=43, 22.9%). Other participant characteristics are shown in Table 2.

Table 2: Characteristics of usability survey participants

Characteristic	Categories	N	%
Category of participant (caller)	Care giver	144	60.0
	Other*	46	19.2
	Mental health patient	44	18.3
	Healthcare provider	5	2.1
	Peer support worker	1	0.4

Language	English	180	75.0
	Luganda	60	25.0
Sex of participant (caller)	Male	143	59.6
	Female	97	40.4
Age group of participant (caller)	18 - 24	39	16.3
	25 - 34	97	40.4
	35 - 44	63	26.3
	45 and above	41	17.1
Does the phone belong to you?	Yes	237	98.8
	No	3	1.3
Highest level of education completed	University degree or higher	114	47.5
	Tertiary but not degree	50	20.8
	“A” Level	19	7.9
	“O” Level	33	13.8
	Primary school	22	9.2
	None	2	0.8
Marital status	Married/cohabiting	117	48.8
	Never Married	107	44.6
	Separated/Widowed	16	6.7
Distance to Butabika (30km is approx. one hour travel time)	30km of less	187	77.9
	More than 30km	53	22.1
Sex of patient†	Male	108	57.4
	Female	80	42.6
Age group of patient†	Under 18	33	17.6
	18 to 24	33	17.6
	25 to 34	68	36.2
	35 to 44	33	17.6
	45 and above	21	11.2
Complaints‡	Alcohol and Substance related disorders	48	25.5
	Mood disorder (Depression, bipolar, etc)	43	22.9
	Psychotic disorders	26	13.8
	Epilepsy	21	11.2
	General enquiry or problem not clear	20	10.6
	Physical symptoms/illness	11	5.9
	Cognitive problems	9	4.8
	Anxiety disorders	5	2.7
	Developmental disorders	3	1.6
	Sexual and gender identity disorders	2	1.1
When did the illness start?	A year or more ago	147	78.4
	Less than a year ago	41	21.6
Is the patient on treatment?	Yes	134	71.3
	Alternative medicine	3	1.6
	No	51	27.1

**Other, for example, included community members reporting a person in the community who seems to have a mental illness and requesting guidance on how to deal with them, news agencies, and students looking for internships.*

†Callers who said they were caregivers of a mental health patient were asked for details about their patient. Together with callers who were patients themselves, these formed the total number of patients.

‡Diagnoses reported by participant; otherwise, the research team derived the most likely diagnosis

from the reported symptoms

3.2.2 Usability scores

The Cronbach's alpha for the scale was 0.89, and for the subscales, it ranged from 0.60 (Ease of use) to 0.76 (Interaction quality). Deleting any item reduced the alpha.

The overall usability score for the system was 4.12 (SD = 0.69) on a 5-point scale, significantly higher than the mid-point 3 (p-value <0.001) and also significantly higher than the recommended target usability score of 4 on a 5-point scale (p-value = 0.006). [24,25].

The mean scores for the individual TUQ items ranged from 3.50 (SD = 1.28) for the item "*The system is able to do everything I would want it to be able to do"* to 4.61 (SD = 0.80) for "*I would use the mental health call center again.*"). All items were higher than the midpoint of 3 (all p-values <0.001), and 14 of the 20 items were above the recommended score of 4 on a 5-point scale (p-value <0.05) [24,25]. The six items scoring <4 included all three items in the Reliability component and one from each of the Usefulness, Interface quality, and Satisfaction components; see Table 3.

The mean scores for the usability components (subscales) ranged from 3.66 (SD = 1.03) for Reliability to 4.41 (SD = 0.80) for Ease of use. They were also all significantly higher than the mid-point of 3 (p-value <0.001), and all but the Reliability component were higher than 4 or within its confidence interval.

Table 3: Usability components, questionnaire items and their means, standard deviations, and Cronbach's alpha for the sub-scales (usability attributes).

Usability Component	Items	Item mean ($\bar{x}$)	SD	p-value*	Mean difference ($\bar{x}$ -4)	Component mean	SD	($\bar{x}$ -4)	p-value	Component alpha
Usefulness	U1 The mental health call centre service improves my access to healthcare services	4.09	1.11	0.106	0.09			-0.02	0.35	0.61
	U2 The mental health call centre service saves me time travelling to a hospital or specialist clinic	4.04	1.28	0.322	0.04					
	U3 The mental health call centre service provides for my healthcare needs	*3.83*	*1.22*	*0.018*	*-0.17*	3.98	0.91			
Ease of use	E1 It was simple to use the call centre system	4.43	0.89	<0.001	0.44			0.41	<0.001	0.60
	E2 It was easy to learn to use call centre system	4.42	0.94	<0.001	0.42	4.41	0.80			
Interface	UI1 The way I	4.54	0.9	<0.00	0.54	4.18	0.7	0.1	<0.00	0.66

quality	interact with the providers over the call centre system is pleasant		1	1				8	1	
	UI2 I like using the call centre service	4.26	1.06	<0.001	0.26					
	UI3 The information is simple and easy to understand	4.47	0.86	<0.001	0.47					
	UI4 This system is able to do everything I would want it to be able to do	*3.50*	*1.28*	*<0.001*	*-0.50*		5			
Interaction quality	UX1 I could easily talk to the mental health provider using the call centre service	4.19	1.18	0.008	0.19			0.30	<0.001	0.76
	UX2 I could hear the health provider clearly using the call centre system	4.54	0.91	<0.001	0.54					
	UX3I felt I was able to express myself effectively	4.43	0.96	<0.001	0.43					
	UX4 Using the call centre service, I could interact with the healthcare provider or peer support worker as well as if we met in person	4.07	1.20	0.186	0.07	4.30	0.81			
Reliability	*R1 I think the care provided over the call centre service are the same as in-person visits*	*3.54*	*1.32*	*<0.001*	*-0.46*			-0.34	<0.001	0.60
	R2 Whenever I made a mistake using the system, I could recover easily and quickly	*3.83*	*1.24*	*0.032*	*-0.17*					
	R3 The system gave error messages that clearly told me how to fix problems	*3.68*	*1.40*	*0.001*	*-0.32*	3.66	1.03			
Satisfaction and future use	S1 I feel comfortable communicating with the mental health care provider using the call centre service	4.24	1.15	<0.001	0.24	4.17	0.80	0.17	<0.001	0.66

	S2 The call centre service is an acceptable way to receive healthcare services (compared for example to face-to-face)	*3.68*	*1.31*	*<0.001*	*-0.32*					
	S3 I would use mental health call centre service again	4.61	0.80	<0.001	0.61					
	S4 Overall, I am satisfied with this mental health call centre service	4.18	1.11	0.007	0.18					
Overall	Overall					4.12	0.69	0.12	0.006	0.89

P-value: One-tailed t-test (whether the mean is significantly less or higher than 4). Items in italics are less than 4, while the rest are higher than 4 or equivalent (within its confidence interval). Component mean and alpha were calculated for items in the individual subscale.

Overall usability was slightly higher for Luganda (4.24/5) compared to English (4.07/5) speakers (p-value = 0.055). However, the scores were significantly higher for Luganda speakers for the usability components interface quality (4.36/5 vs. 4.12/5, p-value = 0.011), interaction quality (4.47/5 vs. 4.25/5, p-value = 0.043), reliability (3.99/5 vs. 3.55/5, p-value = 0.002), and satisfaction and future use (4.39/5 vs. 4.10/5, p-value = 0.008).

There was no statistically significant difference in usability scores between males and females, for participants living within 30km (one hour) from Butabika Hospital and those living farther, for patients who have had the mental illness for a year or less versus longer, and for those on treatment versus those who are not. Similarly, there was no difference in usability scores among different participant categories (p-value = 0.67), age groups (p-value = 0.46), levels of education (p-value = 0.51), and marital status (p-value = 0.51).

3.2.3 Qualitative comments

There were 155 comments, which were coded into six themes; see Table 4. The majority (60 comments) were ***appreciation*** of the call center initiative and compliments for a good service and user experience, with one participant stating that she was *"very pleasantly surprised that [the hospital has] a toll-free line and it actually worked"*. Conversely, 26 comments were about ***usability challenges*** such as poor network, long telephone queues and callback delays, and difficulty in navigating the IVR instructions for non-tech-savvy callers.

There were also several comments with recommendations for improvement. The majority (48 comments) were on ***improving the call center service***, for example, through marketing and sensitization to improve reach, adding more staff to ensure reduced call waiting time and 24/7

availability, training of agents, addition of clinical specialists to provide therapy over the phone, and addition of video calling options. Other recommendations concerned ***improvements in mental healthcare services in general***, such as improving medicine availability, improving patient care and security at Butabika Hospital, improving access to mental health services in rural areas, and establishing community outreach and ambulance services to assist in pick-up of patients with unstable mental health states. A few comments were related to the usability survey (2 comments) or were questions about mental illness (6 comments).

Table 4: Qualitative comments from the usability survey

Theme	**Description**	**Frequence (n(%))***	**Illustrative quote**
Appreciation	Comments where participant expressed appreciation, approval, compliments or other positive opinions; for example, because it is convenient, free, and/or improves access to mental health services.	60 (38.7)	“interactive and caring people”
			“the customer care is good”
			“happy [to get] the right information about the prices of the private services before coming to the hospital”
			“very pleasantly surprised that [the hospital has] a toll-free line and it actually worked”
			“Just thanking you for the service, because otherwise as a person in a rural area far away [I]was stuck with [my] grand daughter and had no other means of getting help. [I] was attend to well.”
			“Having access to this information free of charge is wonderful using the toll free number.”
			“It’s a good innovation, it’s good to get the information you need before coming to the hospital”
Usability challenges	Comments where participants reported difficulty using the system, for example due to poor network, long telephone queues before connecting to agent, difficult following the IVR instructions, and mismatch in expectations (such as expecting an agent 24/7 instead of voicemail over the weekend, or to book an appointment which were not possible)	26 (16.8)	“For a village person [someone who is not tech-savvy]the system is difficult”
			“There should be clear network and quite environment.”
			“The length of time it takes to get to talk to a responder is too long, it should be the first option and not the last”
			“Get more call responders so that a caller does not wait for long on line”
			“The call center responder[s] take long to return voicemail call.”
Recommendations for improving the call center	Suggestions for improving the reach and impact of the call center service, for example, more marketing and sensitization of the public about it, adding video call option, more training for the agents, adding more agents to ensure faster response and 24/7 availability, including specialists to give therapy on phone, adding more	48 (31.0)	“If the system could be operating 24/7 with a respondent and not just voice mail on weekend and after 8pm.”
			“They should keep updating the call center responders to the current information in different departments in the hospital.”
			“The call center should have all information or file data concerning the patients so that if one calls in to find out about their patient, there is an answer for them”
			“Do more of the sensitization of the number to the public.”
			“There should be professional personnel

	languages and agents who understand cultural and religious perspectives of calls, and improve continuity by integrating with other information systems.		like doctors to answer some technical questions."
			"It would be good if there is a person who can give information depending on the cultural, religious and other affiliation"
			"The stuff responding to the callers should have phone etiquette"
Recommendations for improving mental health care services in general	Comments or suggestions on improving mental healthcare services beyond the call center, for example, reducing medicine stock-outs, availing ambulances and pick-up services for patients who might be difficult to handle due to their mental illness, improving patient security and care while they are in Butabika Hospital, having more mental healthcare providers in rural areas, and other digital services that supplement the call center	26 (16.8)	"We are not getting enough drugs when we come for review yet the drugs are very expensive and patients keep relapsing whenever they miss."
			"…need to put a psychologist in different centers for easy access to services"
			"There should be proper directions when someone is in the hospital"
			"Security [should] be tightened so that patients do not escape easily"
			"An emergency team should be put in place to pick-up people that have lost their sanity from the community"
			"On the Butabika website prices of all services offered at the hospital should be shown to the public clearly for one to know what they need off hand"
			"Avail download of prescriptions"
Questions about mental illnesses	Participants asked questions related to mental illnesses	6 (3.9)	"Is depression curable?"
			"What [is the] time span for someone to heal from mental illness?"
Issues related to the survey	Comments related to the telephone survey or the items in the questionnaire	4 (2.6)	"Send the questionnaire via email"
			"Instead of asking someone: "I like using the call center" use: "I prefer using the call center [compared to…""

**Note: There were a total of 155 comments, but some comments were coded into more than one theme. Hence, the sum of the frequencies is 170.*

3.3 Assessment of call conversations by health workers.

Call conversation ratings are shown in Table 5. Overall, the mean call conversation quality, as assessed by health workers, was 4.35 (SD=0.69) out of 5, with Rater 3 giving the lowest rating of 3.84 (SD=1.08) and Rater 2 giving the highest score of 4.66 (SD=0.75). The individual quality aspects ranged from 4.27 (SD=0.82) for Ending to 4.49 (SD=0.57) for Listening.

The quality aspects were highly correlated, ranging from 0.72 (Rapport and Ending) to 0.92 (Analyzing and Motivating), and had a Cronbach's alpha of 0.97.

Table 5: Call conversation assessment by health workers.

Quality aspect	Rater	Mean	SD
All (average)	Rater 1	4.55	0.75
	Rater 2	4.66	0.69
	Rater 3	3.84	1.08
	All raters	4.35	0.69

Rapport	Rater 1	4.69	0.68
	Rater 2	4.64	0.74
	Rater 3	3.55	1.39
	All raters	4.29	0.72
Listening	Rater 1	4.70	0.65
	Rater 2	4.73	0.67
	Rater 3	4.04	1.16
	All raters	4.49	0.57
Analyzing	Rater 1	4.40	0.99
	Rater 2	4.64	0.74
	Rater 3	3.98	1.20
	All raters	4.34	0.77
Motivating	Rater 1	4.45	0.97
	Rater 2	4.66	0.76
	Rater 3	3.94	1.27
	All raters	4.35	0.80
Ending	Rater 1	4.51	0.90
	Rater 2	4.61	0.83
	Rater 3	3.69	1.29
	All raters	4.27	0.82

Overall call quality significantly correlated with overall usability (Pearson r = 0.34, $p<0.05$). Correlations between the individual quality aspects and usability components are shown in Table 6, the strongest being between Ending and Satisfaction (Pearson r = 0.55, $p<0.01$).
There was no association between agent (peer support work vs professional health worker) or call issue (whether solvable on the phone or not) and usability scores given by the callers.

Table 6: Correlations between call conversation aspects and usability components.

	Rapport	Listening	Analyzing	Motivating	Ending	Conversation quality (overall)	Usability (overall)	Usefulness	Satisfaction	Ease of use	Interface quality	Interaction quality	Reliability
Rapport	1.00	0.851**	0.848**	0.835**	0.723**	0.904**	00.23	0.306*	0.287*	-0.03	0.17	0.402**	0.18
Listening	0.851**	1.00	0.885**	0.891**	0.823**	0.943**	0.26	0.312*	0.343*	-0.11	0.23	0.325*	0.24
Analyzing	0.848**	0.885**	1.00	0.917**	0.825**	0.956**	0.315*	0.354*	0.361*	0.01	0.27	0.341*	0.28
Motivating	0.835**	0.891**	0.917**	1.00	0.876**	0.967**	0.27	0.369*	0.345*	-0.10	0.27	0.294*	0.23
Ending	0.723*	0.823**	0.825**	0.876**	1.00	0.913**	0.479**	0.382**	0.550**	0.11	0.479*	0.359*	0.403**

	*										*		
Conversation quality (overall)	0.904**	0.943**	0.956**	0.967**	0.913**	1.00	0.337*	0.368*	0.407**	-0.02	0.311*	0.364*	0.289*
Usability (overall)	8.00	0.26	0.315*	0.27	0.479**	0.337*	1.00	0.858**	0.920**	0.787**	0.929**	0.881**	0.733**
Usefulness	0.306*	0.312*	0.354*	0.369*	0.382**	0.368*	0.858**	1.00	0.717**	0.534**	0.759**	0.669**	0.404**
Satisfaction	0.287*	0.343*	0.361*	0.345*	0.550**	0.407**	0.920**	0.717**	1.00	0.596**	0.867**	0.737**	0.614**
Ease of use	-0.03	-0.11	0.01	-0.10	0.11	-0.02	0.787**	0.534**	0.596**	1.00	0.740**	0.601**	0.523**
Interface quality	0.17	0.23	0.27	0.27	0.479**	0.311*	0.929**	0.759**	0.867**	0.740**	1.00	0.677**	0.609**
Interaction quality	0.402**	0.325*	0.341*	0.294*	0.359*	0.364*	0.881**	0.669**	0.737**	0.601**	0.677**	1.00	0.544**
Reliability	0.18	0.24	0.28	0.23	0.403**	0.289*	0.733**	0.404**	0.614**	0.523**	0.609**	0.544**	1.00

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

4. Discussion

This study evaluated the usage and usability of a mental health telephone advice service in Uganda. The findings show that all three access channels of the mental health telephone service (IVR, live calls, and voicemail) are used, and usage was sustained throughout the evaluation period. The large number of callers (40.3%) that stopped at the IVR, despite the availability of the option to speak to a live agent, is encouraging because it indicates the acceptability of IVR or even preference for IVR over speaking to an agent. Using IVR reduces the pressure on the limited human resources and allows access to information during out-of-office hours. As can be seen from the call distribution

across time of the day (Figure 3) and day of the week (Figure 4), a significant proportion of calls were made on weekends and in the evening and night when staff were unavailable to answer the calls, underscoring the utility of the IVR. Moreover, all those who chose to speak to an agent also went through the IVR, thus accessing some information in an automated way. In the formative research for this service [18], some participants indicated the need for anonymity to avoid stigma and felt that the call center service affords them this anonymity. In another study of a similar service for cancer awareness in Uganda [26], callers indicated that an advantage of IVR was the possibility to listen to the information an unlimited number of times, something that is impossible or awkward with a live agent (asking for the same information several times). These views might explain why many callers chose not to speak to an agent. On the other hand, some survey participants expressed the need to have the option to speak to an agent as the first option, suggesting that the higher percentage of IVR users could also be explained by our design of the system (the IVR options were intentionally offered first) rather than user preference.

It is notable that only a small proportion of the callers (18.3%) were patients themselves, and the majority were caregivers (60.0%) or other members of the general public (19.2%). Butabika Hospital is a national referral hospital that handles patients with severe mental health disorders, and previous studies in Uganda have shown that people seek care when mental disorders are severe [27,28]. Such patients might be unable to arrange their own care or comprehend information from the telephone services. Moreover, patients with mental disorders are often isolated and might not possess phones [18,29]. The significant role played by caregivers (family members) should be considered when designing interventions for mental health, and for telephone services such as ours, the information needs of the caregivers, which could be different from those of the patients, should be fully explored and addressed [30].

The results showed significantly high scores for the different usability aspects and for the system overall (compared to recommended target usability scores [24,25]). Similar findings of high usability, especially satisfaction, intention for future use, ease of use, and usefulness, have been reported by other studies on tele-mental healthcare in the US [31], South Korea [32], the UK [33], and Italy [34], although these were within the context of COVID-19 lockdowns. We could not find any studies in Uganda that have assessed aspects of the usability of digital health solutions from the perspective of clients. As can be triangulated from the qualitative comments and call quality ratings by the healthcare providers in our study, participants appreciated the convenience of, and the possibility to, access information via the telephone service free of charge. It was also clear that some participants have had bad experiences with other call center services or did not expect this hospital to set up one that “actually worked” and had “pleasant and caring” agents. These contributed to the high scores.

There was no difference in usage (number of calls) and efficiency (duration of calls) for English and Luganda overall, but a slight majority of calls that stopped at IVR were in Luganda. Moreover, the IVR options (i.e., mental health information topics) sought after differed for the two languages, with Luganda-speaking callers seeking information for understanding mental illnesses (what mental illnesses are and what causes them) while English-speaking callers were interested in the management of the mental illnesses (information on diagnosis, treatment and referral process). English proficiency is a proxy for formal literacy in Uganda since English is learned in school, and it is the language used in healthcare and other official communications unless the client has low literacy. The finding that callers with less literacy needed more information for a basic understanding of mental illnesses is not surprising. Literate members of the community can access other sources of mental health information, including online resources and print media; therefore, they may have less unmet mental health information needs. This is also supported by the finding that usability scores

were slightly higher for Luganda speakers than English speakers, suggesting that they appreciate the service more or consider it more useful, as it is one of the few sources of mental health information they have. As Park et al. [32] point out, when users have no alternatives, e.g., due to COVID-19 lockdowns or, in the case of Uganda, limited access to mental healthcare services in general, they might rate the telephone service optimistically.

Similar to ours, other studies have found that the *reliability* component of usability is ranked the lowest, and users want physical encounters with mental healthcare providers [31,33] despite their appreciation of the telephone service. Non-verbal communication is important in mental health for comprehensive assessment and therapeutic alliance. Therefore, telephone services should supplement rather than replace physical clinic visits. Video conferencing options have also been proposed in our study and in others [31,33], although this could be limited in Uganda by limited access to the internet and smart devices in rural areas.

Connolly and colleagues [13] state that the evidence base for the usability of mental health apps is still uncertain and argue that simple telephone features can be used to deliver mental health services instead of expensive smart apps with poor usability. Our study contributes to the literature on usability and demonstrates how basic phone features (IVR and voice calls) can be used to deliver value and good user experience. We also demonstrated efficient use of human resources since we did not hire new staff but gained over 130 hours from the existing staff and volunteer peer support workers. With very few unanswered calls (0.9%) and no reports from the callers of congested telephone lines or long telephone queues, we could gain more hours from the staff if market the service more and increase demand. Usage trends can help identify the busy days of the week or hours of the day, thus informing staff scheduling, further improving efficiency, and reducing the number of unanswered calls even when demand increases.

There are a few limitations to this study. First, the usability survey was not conducted in real-time but rather a few days or even weeks after the participant called the mental health telephone service. This could have led to recall bias. Indeed, a few participants reported that they could not recall their experience, and their surveys were terminated. However, some participants could have continued with the survey even when their recall was not good. Future studies should collect user feedback immediately after the call. Another limitation is the cross-sectional nature of the survey. Users of the mental health telephone services called the system a median of two times, and their experience could have been different at each of these encounters. Collecting feedback immediately after each call and tracking the responses for each caller at different encounters could help uncover more details on what influences usability, such as the agent that answered the call. In the qualitative responses, participants indicated that the communication skills of some agents were lacking, but we could not identify the agent and sub-analyze the usability scores for each agent. Lastly, this study was on a single system at a single site. Without a comparative system, individual usability scores might be difficult to interpret. Often, usability evaluations are conducted in an A/B setup to compare different systems (or versions of the same system). However, we have used the recommended cutoffs that have been derived from hundreds of usability studies as the reference means for our t-tests instead of assuming the mid-point of the Likert scale [24,25].

5. Conclusion

This study found sustained usage of a mental health telephone service in Uganda, with good user experience and high satisfaction and intention for future use across different user characteristics. Mobile health solutions like ours should be embraced and replicated to improve the delivery of

health services in mental health and other disease domains in Uganda and similar low-resource settings. However, attention should be paid to user experience, and the design and implementation of the system (e.g. content and access channels) should be aligned with the preferences and characteristics of different users to ensure good usability and sustained use.

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Conflict of interests:
None.

References

1. Aboye GT, Vande Walle M, Simegn GL, Aerts JM. Current evidence on the use of mHealth approaches in Sub-Saharan Africa: A scoping review. Health Policy Technol Elsevier; 2023 Dec 1;12(4):100806. doi: 10.1016/J.HLPT.2023.100806
2. Karamagi HC, Muneene D, Droti B, Jepchumba V, Okeibunor JC, Nabyonga J, Asamani JA, Traore M, Kipruto H. eHealth or e-Chaos: The use of Digital Health Interventions for Health Systems Strengthening in sub-Saharan Africa over the last 10 years: A scoping review. J Glob Health International Society for Global Health; 2022 Dec 3;12:04090. PMID:36462201
3. Aboye GT, Vande Walle M, Simegn GL, Aerts JM. mHealth in sub-Saharan Africa and Europe: A systematic review comparing the use and availability of mHealth approaches in sub-Saharan Africa and Europe. Digit Health SAGE Publications; 2023 Jan 1;9. PMID:37377558
4. Ødegård ES, Langbråten LS, Lundh A, Linde DS. Two-way text message interventions and healthcare outcomes in Africa: Systematic review of randomized trials with meta-analyses on appointment attendance and medicine adherence. PLoS One Public Library of Science; 2022 Apr 1;17(4):e0266717. PMID:35421134
5. Osei E, Kuupiel D, Vezi PN, Mashamba-Thompson TP. Mapping evidence of mobile health technologies for disease diagnosis and treatment support by health workers in sub-Saharan Africa: a scoping review. BMC Med Inform Decis Mak BioMed Central Ltd; 2021 Dec 1;21(1):1–18. PMID:33407438
6. Manby L, Aicken C, Delgrange M, Bailey J V. Effectiveness of eHealth Interventions for HIV Prevention and Management in Sub-Saharan Africa: Systematic Review and Meta-analyses. AIDS Behav Springer; 2022 Feb 1;26(2):457–469. PMID:34427813
7. Hampshire K, Mwase-Vuma T, Alemu K, Abane A, Munthali A, Awoke T, Mariwah S, Chamdimba E, Owusu SA, Robson E, Castelli M, Shkedy Z, Shawa N, Abel J, Kasim A. Informal mhealth at scale in Africa: Opportunities and challenges. World Dev Pergamon; 2021 Apr 1;140:105257. doi: 10.1016/J.WORLDDEV.2020.105257
8. Goldberg SB, Lam SU, Simonsson O, Torous J, Sun S. Mobile phone-based interventions for mental health: A systematic meta-review of 14 meta-analyses of randomized controlled trials. PLOS digital health PLOS Digit Health; 2022 Jan 18;1(1):e0000002. PMID:35224559
9. Ding X, Wuerth K, Sakakibara B, Schmidt J, Parde N, Holsti L, Barbic S. Understanding Mobile Health and Youth Mental Health: Scoping Review. JMIR Mhealth Uhealth JMIR Mhealth Uhealth; 2023;11. PMID:37220197
10. ISO/TS 20282-2:2013(en), Usability of consumer products and products for public use — Part 2: Summative test method. Available from: https://www.iso.org/obp/ui/#iso:std:iso:ts:20282:-2:ed-2:v1:en [accessed Apr 28, 2024]
11. Lah U, Lewis JR, Šumak B. Perceived Usability and the Modified Technology Acceptance Model. Int J Hum Comput Interact Taylor & Francis; 2020 Aug 8;36(13):1216–1230. doi: 10.1080/10447318.2020.1727262
12. Torous J, Nicholas J, Larsen ME, Firth J, Christensen H. Clinical review of user engagement with mental health smartphone apps: evidence, theory and improvements. Evid Based Ment Health Evid Based Ment Health; 2018 Aug 1;21(3):116–119. PMID:29871870
13. Connolly SL, Hogan TP, Shimada SL, Miller CJ. Leveraging Implementation Science to Understand Factors Influencing Sustained Use of Mental Health Apps: a Narrative Review. J Technol Behav Sci Nature Publishing Group; 2021 Jun 1;6(2):184. PMID:32923580
14. Madonsela S, Ware LJ, Scott M, Watermeyer J. The development and use of adolescent mobile mental health (m-mhealth) interventions in low- and middle-income countries: a scoping review. South African Journal of Psychology SAGE Publications Inc.; 2023 Dec 1;53(4):471–483. doi:

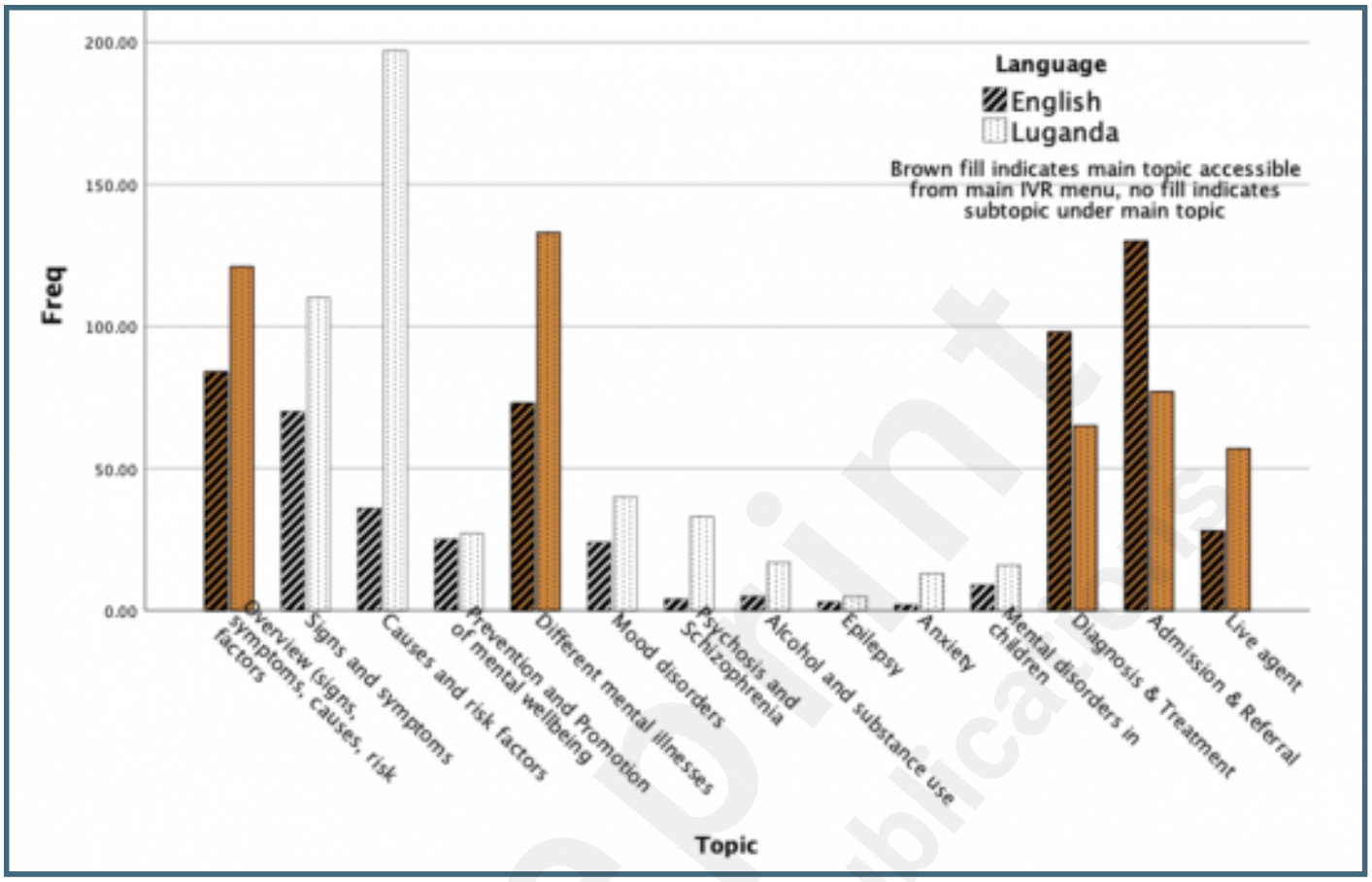
10.1177/00812463231186260/ASSET/IMAGES/LARGE/10.1177_00812463231186260-FIG1.JPEG
15. Nicholas A, Joshua O, Elizabeth O. Accessing Mental Health Services in Africa: Current state, efforts, challenges and recommendation. Annals of Medicine and Surgery Wolters Kluwer Health; 2022 Sep 1;81:104421. PMID:35996570
16. Alloh FT, Regmi P, Onche I, Teijlingen E Van, Trenoweth S. Mental Health in low-and middle income countries (LMICs): Going beyond the need for funding. Health Prospect 2018;17(1):12–17. doi: 10.3126/hprospect.v17i1.20351
17. Inal Y, Wake JD, Guribye F, Nordgreen T. Usability Evaluations of Mobile Mental Health Technologies: Systematic Review. J Med Internet Res JMIR Publications Inc.; 2020;22(1). PMID:31904579
18. Kabukye JK, Namagembe R, Nakku J, Kiberu V, Sjölinder M, Nilsson S, Wamala-Larsson C. Implementing a Hospital Call Center Service for Mental Health in Uganda: User-Centered Design Approach. JMIR Hum Factors JMIR Hum Factors; 2024 Jun 6;11:e53976. PMID:38843515
19. Strack F. “Order Effects” in Survey Research: Activation and Information Functions of Preceding Questions. Context Effects in Social and Psychological Research Springer, New York, NY; 1992;23–34. doi: 10.1007/978-1-4612-2848-6_3
20. Park JW, Jung MS. A Note on Determination of Sample Size for a Likert Scale. Commun Stat Appl Methods 2009/07/31. The Korean Statistical Society, and Korean International Statistical Society; 2009 Jul;16(4):669–673. Available from: http://http://www.csam.or.kr/journal/view.html?doi=
21. Parmanto B, Lewis, Jr. AN, Graham KM, Bertolet MH. Development of the Telehealth Usability Questionnaire (TUQ). Int J Telerehabil University Library Systems, University of Pittsburgh; 2016 Jul 1;8(1):3–10. PMID:27563386
22. Hsieh HF, Shannon SE. Three approaches to qualitative content analysis. Qual Health Res Qual Health Res; 2005 Nov;15(9):1277–1288. PMID:16204405
23. Gustafsson SR, Wahlberg AC. The telephone nursing dialogue process: an integrative review. BMC Nurs BioMed Central Ltd; 2023 Dec 1;22(1):1–18. doi: 10.1186/S12912-023-01509-0/FIGURES/3
24. Brooke J. SUS: A Retrospective. J Usability Studies Bloomingdale, IL: Usability Professionals’ Association; 2013 Feb;8(2):29–40.
25. Nielsen J, Levy J. Measuring usability: Preference vs. Performance. Commun ACM ACMPUB27New York, NY, USA; 1994 Jan 4;37(4):66–75. doi: 10.1145/175276.175282/ASSET/C9B59D25-8EAB-44A9-95B6-DC85DA6634A6/ASSETS/175276.175282.FP.PNG
26. Kabukye JK, Ilozumba O, Broerse JEW, de Keizer N, Cornet R. Implementation of an interactive voice response system for cancer awareness in Uganda: Mixed methods study. JMIR Mhealth Uhealth JMIR mHealth and uHealth; 2021 Jan 26;9(1):e22061. PMID:33496672
27. Abbo C, Ekblad S, Waako P, Okello E, Musisi S. The prevalence and severity of mental illnesses handled by traditional healers in two districts in Uganda. Afr Health Sci Makerere University Medical School; 2009 Aug 8;9(Suppl 1):S16. PMID:20589155
28. Mwesiga EK, Nakasujja N, Nakku J, Nanyonga A, Gumikiriza JL, Bangirana P, Akena D, Musisi S. One year prevalence of psychotic disorders among first treatment contact patients at the National Psychiatric Referral and Teaching Hospital in Uganda. PLoS One PLOS; 2020 Jan 1;15(1). PMID:31995567
29. Verity F, Turiho A, Mutamba BB, Cappo D. Family care for persons with severe mental illness: experiences and perspectives of caregivers in Uganda. Int J Ment Health Syst Int J Ment Health Syst; 2021 Dec 1;15(1). PMID:34016125

30. Verity F, Turiho A, Mutamba BB, Cappo D. Family care for persons with severe mental illness: experiences and perspectives of caregivers in Uganda. Int J Ment Health Syst BioMed Central Ltd; 2021 Dec 1;15(1):1–9. doi: 10.1186/S13033-021-00470-2/METRICS
31. Lee H, Palmer J, Mullick P, Kiely C. Patient experience with telehealth service in a mental health setting. Arch Psychiatr Nurs Elsevier; 2023 Apr 1;43:150. PMID:37032009
32. Park HY, Kwon YM, Jun HR, Jung SE, Kwon SY. Satisfaction Survey of Patients and Medical Staff for Telephone-Based Telemedicine During Hospital Closing Due to COVID-19 Transmission. Telemedicine Journal and e-Health Mary Ann Liebert, Inc.; 2021 Jul 1;27(7):724. PMID:33216710
33. Naik KV, Allen L, Gnanavel M. Patient satisfaction with telephone consultations at a community mental health service: a descriptive survey. https://doi.org/1012968/bjhc20210115 MA Healthcare London ; 2022 Nov 4;28(11):284–291. doi: 10.12968/BJHC.2021.0115
34. Maresca G, Anchesi S, Bonanno L, Bramanti A, Carnazza L, Cimino V, Corallo F, Lo Buono V, Giambò FM, Latella D, Parasporo N, De Cola MC. Feasibility, Usability, and Customer Satisfaction of the Tele-COVID19 Project, Sicilian Model. Medicina (B Aires) Multidisciplinary Digital Publishing Institute (MDPI); 2022 Aug 1;58(8). PMID:36013577

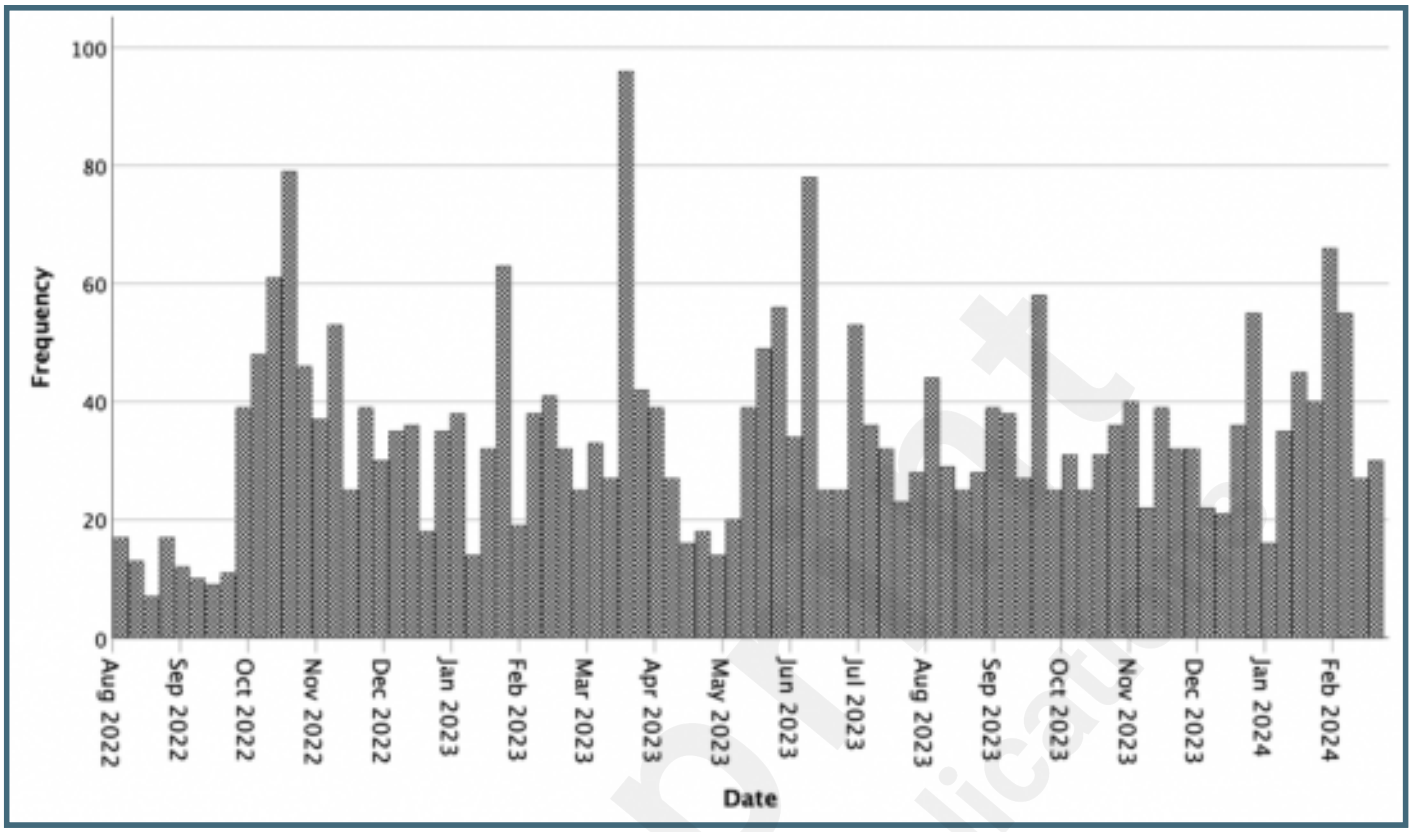
Supplementary Files

Figures

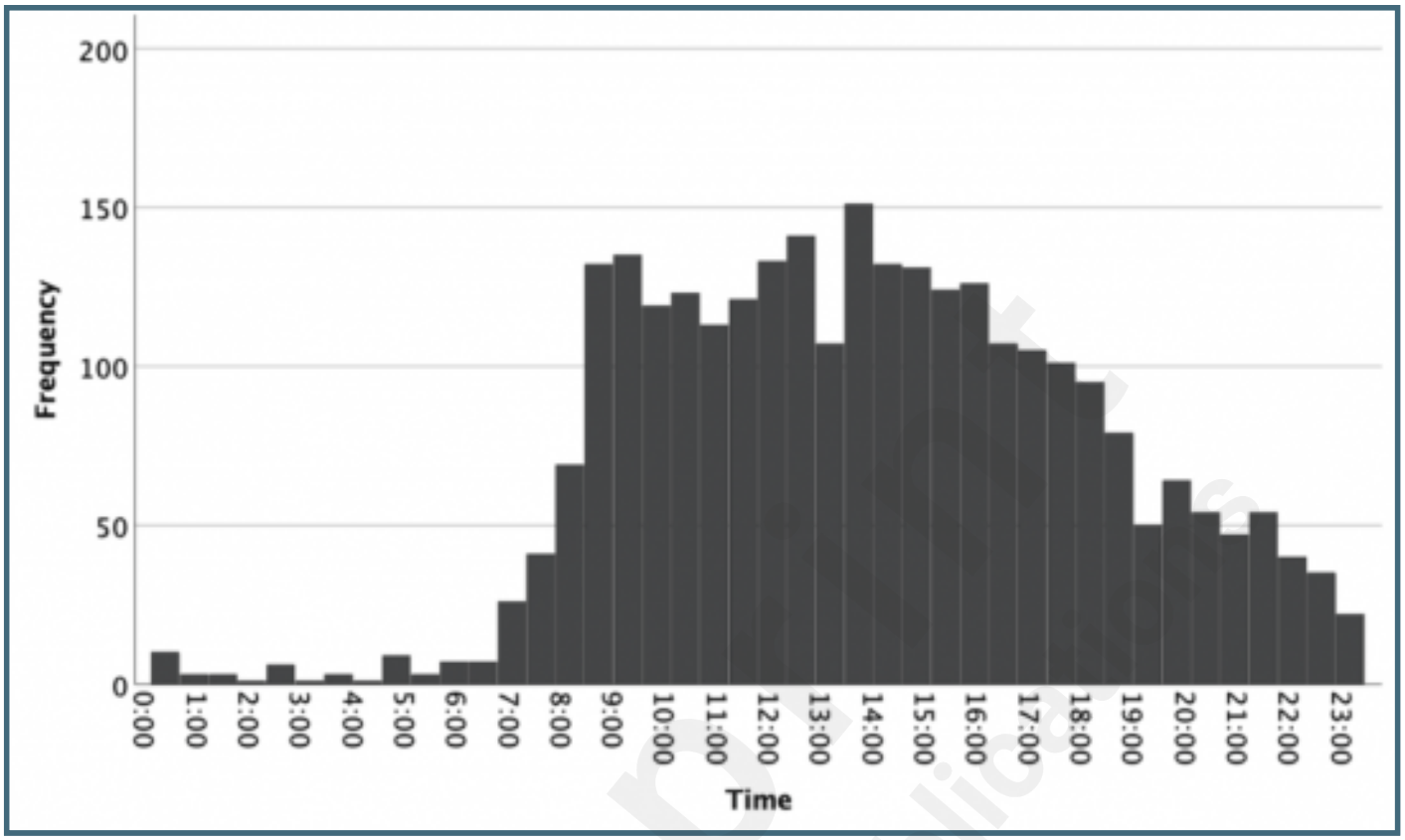
Mental health messages listened to in the IVR.



Call trends over time.



Calls trends across time of the day.



Distribution of call types per day of the week. Note: There were no live agents on Saturdays and Sundays.