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Development of a Digital Program for Training Community Health Workers in the Detection and Referral of Schizophrenia in Rural India

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Abstract

This study aimed to develop and assess the acceptability of a digital program for training community health workers (CHWs) in the detection and referral of patients with schizophrenia in community settings in rural India. An iterative design process was employed. First, evidence-based content from existing community programs for schizophrenia care was incorporated into the curriculum, and reviewed by experts to ensure clinical utility and fidelity of the adapted content. Second, CHWs provided feedback on the appropriateness of language, content, and an initial prototype of the digital training program to ensure relevance for the local context. Focus group discussions were then used to understand the acceptability of the digital training prototype and to inform modifications to the design and layout. Qualitative data was analysed using a rapid thematic analysis approach based on predetermined topics pertaining to acceptability of the training content and digital platform. Development of the initial prototype involved content review by 13 subject matter experts with clinical expertise or experience accessing and receiving mental health services, and engagement of 23 CHWs, of which 11 provided feedback for contextualization of the training content and 12 participated in focus group discussions on the acceptability of the prototype. Additionally, 2 service-users with lived experience of schizophrenia contributed to initial testing of the digital training prototype and offered feedback in a focus group discussion. During contextualization of the training content, key feedback pertained to simplifying the language and presentation of the content by removing technical terms and including interactive content and images to enhance interest and engagement with the digital training. During prototype testing, CHWs shared their familiarity with similar symptoms but were unaware of schizophrenia as a treatable illness. They shared that training can help them identify symptoms of schizophrenia and connect patients with specialized care. They were also able to understand misconceptions and discrimination towards people with schizophrenia, and how to address these challenges by supporting others and spreading awareness in their communities. Participants also appreciated the digital training, as it could save them time and could be incorporated within their routine work. This study shows the acceptability of leveraging digital technology for building capacity of CHWs to support early detection and referral of schizophrenia in community settings in

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rural India. These findings can inform the subsequent evaluation of this digital training program to determine its impact on enhancing the knowledge and skills of CHWs.

Introduction

Schizophrenia is a severe mental illness that is among the leading causes of disability worldwide [1]. Schizophrenia has a tendency to have a chronic course, and is a potentially debilitating condition associated with impairment in one or more key functional domains, often impeding an individual's ability to live independently [2]. There is also significant societal stigma associated with schizophrenia, and severe mental illnesses more generally, given widespread misconceptions about these disorders, resulting in detrimental effects on self-esteem and quality of life among those living with schizophrenia [3]. Alarmingly, few individuals living with schizophrenia have access to adequate mental health care and in particular access to psychosocial interventions that are proven to support clinical and functional rehabilitation and recovery [4, 5], a gap in access that is especially pronounced in low-income and middle-income countries [6, 7].

In India, this gap in access to care for individuals living with schizophrenia is further exacerbated in rural areas due to a range of factors such as lower literacy levels, limited knowledge about mental health and opportunities for treatment and recovery, and altogether absent or inadequate mental health services with few trained mental health professionals [8–10]. Despite recent studies demonstrating the effectiveness of psychosocial interventions, focused on rehabilitation and skill-building, engaging in social activities, managing mental health symptoms, and promoting recovery and community reintegration, when delivered in LMICs [11, 12], there remains limited availability of these programs in most care settings, and even fewer efforts aimed at overcoming the detrimental effects of stigma and discrimination that deter help seeking and often result in long delays before initiating treatment [13, 14]. One of the key barriers to making effective care available for schizophrenia includes workforce shortages and inadequate training and support for health workers in routine primary care settings [15].

Task sharing mental health care through integration into primary health care has emerged as an effective approach for narrowing the treatment gap for mental disorders, particularly in lower income settings where there is limited workforce capacity [16, 17]. Task sharing involves the redistribution of mental health services from the limited number of available specialist mental health professionals, including psychiatrists, psychologists, or psychiatric nurses, to non-specialist health workers, such as community health workers or other frontline providers without prior training in the delivery of mental health care [17]. There is mounting evidence showing that task sharing is an effective approach for delivering a wide range community-based interventions for mental disorders in LMICs [12, 18], with successful efforts focused specifically on training and supporting community health workers in delivering psychosocial interventions to people living with schizophrenia [19–22]. Furthermore, digital technology holds promise to support these efforts by overcoming barriers to scaling up training and capacity building for community health workers [23, 24].

In India, face-to-face residential training at government training facilities is the typical approach for training community health workers; however, this approach to health worker training is costly, and requires substantial personnel and logistical resources, including transportation and access to a physical space for hosting the trainings. Use of digital platforms accessible from a smartphone app has emerged as a particularly promising approach for scaling up access to health worker training programs [23–28], especially in community settings in rural India [29, 30]. In prior work conducted by our team, we found that use of a digital program was not only feasible and acceptable among community health workers, but demonstrated success in improving the acquisition of knowledge pertaining to delivery of a brief psychosocial intervention for depression [31, 32]. Building on these prior successful efforts using digital technology in community-based settings, this project seeks to support the development of a brief digital program for training community health workers in the early detection, referral, and follow up for schizophrenia in rural India. Specifically, in this study, we describe: 1) the stepwise process for developing the training content and efforts to contextualize the program to the local setting; 2) the engagement of experts and community health workers to obtain feedback and recommendations about the digital training program; and 3) the integration of feedback into the program in preparation for a larger pilot study to evaluate the feasibility, acceptability, and preliminary effectiveness of the digital training program.

Methods

This study was conducted as a part of a project called SARATHA (Schizophrenia Assessment, Referral and Awareness Training for Health Auxiliaries) focused on the development of digital training for community health workers in the detection and referral of schizophrenia in primary care settings in rural India [33]. This study was conducted in Sehore district in the state of Madhya Pradesh, India, between November 2020 to November 2021. This study site was selected because Sangath, the research organization leading this project, has a close partnership and an established Memorandum of Understanding with the state government. Additionally, the goal was to develop a digital program for schizophrenia that could be successfully delivered by community health workers in Sehore district and then scaled up to other districts in the state, and also to other regions of India. Madhya Pradesh is a large, centrally located state with over 72 million people, of which nearly 73% reside in rural areas. Relative to many other Indian states, Madhya Pradesh ranks lower with respect to human development [34] and access to resources [35]. It is estimated that the care gap for mental disorders in the state exceeds 90% [36]. All study procedures were approved by the Institutional Review Boards at Sangath, India (Number: JN_2019_64) and Harvard Medical School, USA (Number: IRB20-1164).

Study Participants

The National Rural Health Mission established by the Government of India launched the Accredited Social Health Activist (ASHA) Programme in 2005 with the aim of community participation in the health system and improving the quality and reach of health care services for the poorest populations [37]. ASHAs are female community health workers and they

represent the single largest community health worker workforce on the globe [38]. Each ASHA caters to one thousand people and they serve as the link between government health care services and the community, mitigating the cultural and social barriers and enhancing community participation [39]. ASHAs receive service and performance-based incentives for performing their primary duties such as referral and escort services for institutional deliveries and facilitating immunization [40]. In recent years, the workload for ASHAs has gradually shifted to cover more non-communicable disease (NCD) care services, including screening for common mental health conditions, such as depression, driven largely by the nationally roll out of the Ayushman Bharat initiative [41]. This has included efforts to build capacity of ASHAs for delivery of mental health services in community settings [42, 43]. ASHAs represent the target group of community health workers in the SARATHA project, as they are ideally positioned to enable the scale up of brief interventions for mental disorders in primary care.

Furthermore, the District Mental Health Program was launched by the Government of India in 1996 with the objective of providing community mental health services and integration of mental health within general health services [44]. As part of the District Mental Health Program, community health workers such as ASHAs can be trained in the identification, referral, and delivery of simple psychosocial interventions. They also can play a role in overcoming barriers for the acceptability of mental health services in the community such as stigma, myths, and lack of awareness [45]. Given that ASHAs have a respected position in their local communities, they may be able to reach individuals who may be reluctant or unable to seek formal mental health services, and furthermore, many community members will likely respond better to ASHAs to engage them with regard to mental health help seeking and support [46]. The ASHA program provides an opportunity to improve mental health services by supporting communities in accessing treatments, reducing pressure on health systems, bringing in-depth knowledge about the villages, and facilitating community participation in health programs. In particular, the SARATHA project also expands on existing efforts to train and support ASHAs in delivery of care for schizophrenia, as reflected in District Mental Health Program efforts in a rural community in Karnataka, India [43, 47].

For the current study, we employed a purposive sampling approach to recruit available and interested ASHAs to contribute to the development of the digital training program. This involved having our team reach out to ASHA Supervisors and the Chief Medical Health Officer (CMHO) in Sehore district to determine the availability of ASHAs for their participation during the contextualization of the program content and development and testing of the digital training prototype. This was important to avoid any interference in their regular work. The study sample comprised ASHAs employed in the National Health Mission. ASHA Supervisors in Sehore district sent information about the study to ASHAs to determine their interest in participating. ASHAs work on an incentive-based scheme through the state level National Health Mission. They receive per diem incentives (called a dearness allowance) for participating in trainings, and a travel allowance per training. To remain consistent with current practices in the health system, participating ASHAs received a per diem incentive for participating in this study matched to the current rates provided in the district. This included a per diem daily allowance and travel allowance for completing the study activities.

Digital Training Program Content

The content of the digital training program was adapted from the COPSI (*COmmunity care for People with Schizophrenia in India)* program manual, a guide for working with patients with schizophrenia and their families in low-resource settings in India [48]. COPSI is a task-sharing model involving a collaborative community-based care intervention combined with standard facility care [20, 49], and the program was successfully delivered by trained community health workers, and emphasized collaboration between the individual with schizophrenia, their caregivers, and the treatment team [20]. In a randomized trial, the COPSI program achieved improvements in the positive and negative syndrome scale (PANSS) and the Indian disability evaluation and assessment scale (IDEAS), and the program was found to be comparable to a standard facility care control condition in terms of the proportion of participants who experienced a reduction of more than 20% in overall symptoms [20].

As part of the SARATHA project, we have combined the core content of the COPSI manual, and elaborated on specific sections relevant for the role of the target group of ASHAs. This content was also supplemented with content from the Department of Empowerment of Persons with Disability [50], PREMIUM Counselling Relationship Manual [51], and the National Institute of Mental Health and Neurosciences [52]. The development of the training program followed a step-wise approach, as described below. The program covers several key topics, beginning with a brief overview of schizophrenia and its symptoms, and the phases of illness, as well as common misconceptions about persons living with schizophrenia and issues pertaining to stigma and discrimination. The various types of available medical and psychosocial treatments are described, along with common physical comorbidities with schizophrenia, and consideration of rehabilitation programs and potential disability schemes and benefits. Given that community health workers have played a critical role in the COVID-19 response in India, there is also content describing the impact of COVID-19 on patients with schizophrenia as they represent a particularly vulnerable patient population. The program also emphasizes specific skills, such as screening and ways to identify potential schizophrenia cases in the community, managing suicide risk, and how to respond to family members and caregivers by delivering mental health first aid. Another key component of the training relates to how to make a referral, which involves coordinating with clinicians and caregivers, documentation and reporting, and post referral follow-ups.

Iterative Design Process

An iterative design process was employed for developing and contextualizing the digital training program for use in rural India. This process involved writing scripts for the content, obtaining expert feedback, and working with ASHAs to further refine the content and ensure acceptability for the target setting and context. We also collected feedback from service users living with schizophrenia as a means to further ensure relevance of the program for the target patient group. As illustrated in Fig. 1, our use of a systematic approach for designing the digital training content helped to ensure that the program was both culturally and contextually relevant, taking into account the views and experiences of ASHAs and individuals with lived experience of schizophrenia, making sure the language is clear and approachable, while closely following the curriculum informed by experts with clinical experience and specific knowledge of psychosocial interventions and treatments for schizophrenia.
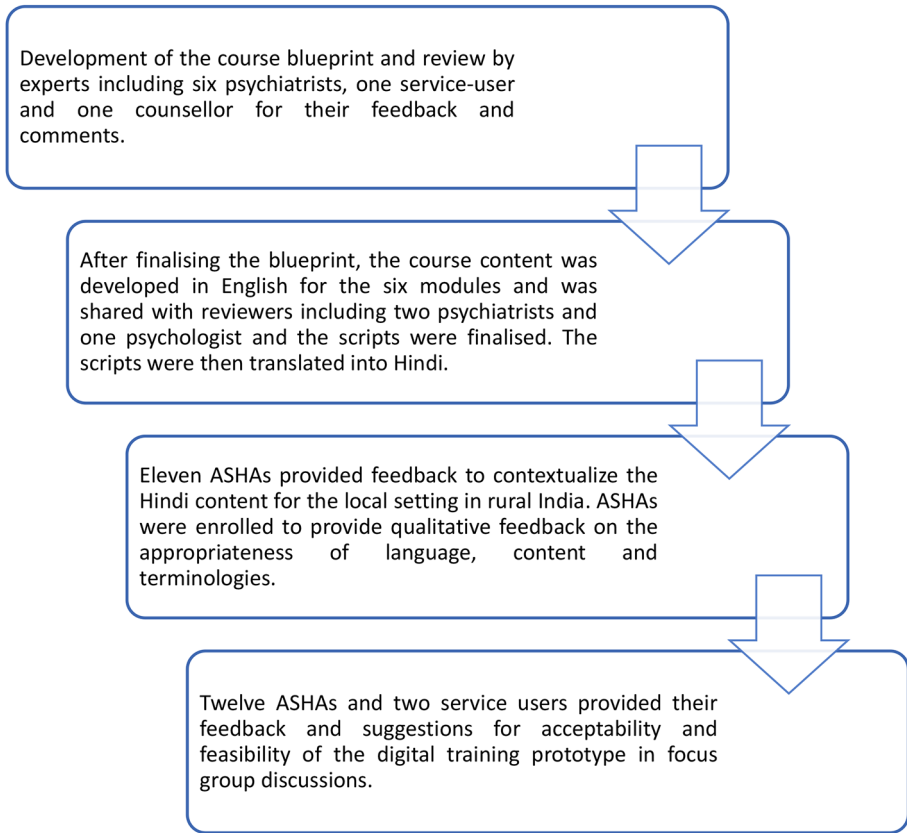
Development of the course blueprint and review by experts including six psychiatrists, one service-user and one counsellor for their feedback and comments.

After finalising the blueprint, the course content was developed in English for the six modules and was shared with reviewers including two psychiatrists and one psychologist and the scripts were finalised. The scripts were then translated into Hindi.

Eleven ASHAs provided feedback to contextualize the Hindi content for the local setting in rural India. ASHAs were enrolled to provide qualitative feedback on the appropriateness of language, content and terminologies.

Twelve ASHAs and two service users provided their feedback and suggestions for acceptability and feasibility of the digital training prototype in focus group discussions.

Fig. 1 Overview of the stepwise process for developing and contextualizing the training content

First, we developed the blueprint for the digital training curriculum, which involved mapping out the specific knowledge and skills that would be covered in the training [53], and required to detect, refer, and provide follow up services for schizophrenia in community settings [33]. In this case, the blueprint consisted of primarily of drawing from the COPSI manual, an evidence-based psychosocial intervention for schizophrenia delivered by community health workers in India [20, 48], with attention to the steps required for identifying schizophrenia in the community, and ensuring adequate referral and follow up in community settings. To support this process, we engaged content experts to provide guidance on the design of the curriculum, and allowed multiple rounds of feedback to incorporate revisions and to finalize the curriculum. In total, 6 psychiatrists, one service user with lived experience of schizophrenia, and one counselor reviewed and commented on the curriculum and offered recommendations for additional topics to include in the training program. The final blueprint for the training program, outlining the specific content described above within 6 modules, is listed in Table 1.

Second, after finalising the blueprint, the course content was scripted in English, following a similar process employed by our team in the development of a digital program for training the same target group of ASHAs in the delivery of a brief evidence-based psycho-

Table 1 Blueprint for the digital program for training community health workers on the detection and referral of schizophrenia in primary care settings in rural India

Module No.	Module	Learning Objectives	Learning Outcomes
1	What is Schizophrenia?	Learning about schizophrenia and its symptoms To dispel misconceptions associated with schizophrenia To know the issue of stigma and discrimination To know the potential risk with schizophrenia cases To know the available treatments for schizophrenia To know the physical comorbidities in schizophrenia To know the phases of illness	Understand schizophrenia and its symptoms Have a clear understanding of facts, stigma and discrimination related to schizophrenia Clarity on available treatments for schizophrenia Able to recognise different phases of the illness
2	Disability and Rehabilitation	To understand rehabilitation and its need To know about disability To know about various disability schemes and benefits	Understand the importance of rehabilitation to improve the quality of life of the individual living with schizophrenia Understand the concept of disability and various schemes by the government. Skilled in the process of obtaining Disability Certificates and able to support patients and their families in obtaining the disability card
3	Understanding of COVID-19	To develop a basic understanding of COVID-19 To learn about vaccines To know how COVID-19 may impact a person living with schizophrenia and their family	Understanding COVID-19 and its impact on a person living with schizophrenia and their family and regarding vaccination for COVID-19
4	How to Identify Schizophrenia in the Community	To know the screening tool To learn how to identify a schizophrenia case in the community	Skilled in recognizing schizophrenia cases in the community Skilled in detecting patients with the help of the screening tool
5	Mental Health First Aid	How to respond to and involve a family member or caregivers Managing suicide risk in schizophrenia To learn about Mental Health First Aid (MHFA) and how to deliver MHFA	Skilled in communicating with family members and providing mental health first aid. Able to assess suicide risk and its management
6	How to Make a Referral	Understand the referral process How and whom to refer How to coordinate with clinicians and caregivers or family members How to do documentation and reporting Post referral follow-up	Skilled in referring cases from the community and communicating with clinicians and caregivers Able to educate family members/caregivers about the importance of referral Able to maintain a record of community processes and reporting

Note: The core program content in SARATHA was adapted primarily from the COPSI manual [20, 48], which has been simplified into a 6-module program. Additional content for the program was adapted from the Department of Empowerment of Persons with Disability [50], The PREMIUM Counselling Relationship Manual [51], as well as the "*Nuts and Bolts of Starting and Running Psychiatric Rehabilitation Services*" manual developed by National Institute of Mental Health and Neurosciences [52].

social intervention for depression [29]. The scripts for the six modules were drafted and then shared with subject matter experts, including two psychiatrists and one psychologist (same individuals who reviewed the blueprint in the previous step), in order to finalize the scripts. Next, our team translated the scripts into Hindi. To contextualize the content for the local setting in rural India, ASHAs were enrolled to provide qualitative feedback on the appropriateness of language, content, and terminologies used in the training program content and to inform modifications to the training content. In total, eleven ASHAs participated in design workshops where they commented on the training program content. Their recommendations were integrated into the program content before our team proceeded with the development of the digital content for creating the initial prototype of the program for formative testing with the target group of ASHAs in the next step.

Following this, our team developed the initial prototype of the digital training program. This involved working with a local video production company to develop the scripts into short videos, ensuring that filming took place in local settings to reflect the types of locations familiar to ASHAs in their typical work. The video-based content was supplemented with the development of graphics and images depicting the various steps in delivering the intervention content, as reflected in the examples provided in Fig. 2. The video and graphical content was then uploaded to the Sangath Learning Management System (built using the Moodle platform, an open-source online learning management system software), where the training content can be accessed from a wide range of devices, including smartphones, tablets, or any devices with Internet connectivity. The final content of the prototype was presented through a series of short videos, PowerPoint slides with narration, images, and graphics, as well as links to relevant resources and materials available to download for participants. Through the Moodle learning management system, various learning activities were included to promote learner engagement, consisting of multiple-choice questions, drag

Fig. 2 Sample content from the SARATHA training program manual

and drop word selection tasks, matching words and phrases, and case vignettes. The feasibility and acceptability of this prototype of the digital training program was then evaluated in design workshops with 12 ASHAs, followed by focus group discussions to gather their insights and recommendations to inform further modifications to the training ahead of pilot testing.

Additionally, we invited two service users with lived experience of schizophrenia to also review the digital training program prototype as way to gather their unique perspectives and to further ensure that no important topics were omitted from the final training content. They were presented the digital training content over Zoom videoconferencing platform, and engaged in a discussion with our research team, providing feedback and recommendations about the layout and topics covered in the content. The time gap between the development and digital prototype testing was necessary to allow time for our team to incorporate the recommendations from ASHAs and service users and to further allow modifications to the digital training content and layout of the program in preparation for subsequent pilot testing. The design workshops and focus group discussions were facilitated under strict COVID-19 protocol guidelines followed by our team and aligned with national and health system recommendations [54].

Data Collection and Analysis

During the design workshops, two members of our research team recorded detailed notes summarizing the feedback and recommendations provided by the ASHAs and service-users. Next, the focus group discussions were conducted in Hindi, audio-recorded and subsequently transcribed verbatim and translated into English in preparation for thematic analysis. The focus group discussions were about 60 min in duration. We used a semi-structured interview guide covering key topics related to the feasibility and acceptability of the training content as well as use of the digital training platform. Development of the interview guide was informed by our prior efforts working with ASHAs to test the feasibility and acceptability of a digital platform for training in depression care [30], as well as our team's efforts collecting insights from multiple stakeholder groups on the use of digital interventions for the management of schizophrenia in routine care settings in Madhya Pradesh, India [55]. Specifically, the interview guide covered five broad domains: 1) knowledge and attitudes about schizophrenia; 2) knowledge gained from the training program; 3) satisfaction with the training program; 4) usability of the digital training platform; and 5) usefulness/utility of the training program. We refined the questions in our interview guide over multiple iterations, and allowed flexibility for the interviewers to explore and probe any potentially new or unexpected topics that emerged over the course of the focus group discussions.

Two experienced researchers from our team facilitated the design workshops and focus group discussions. Given that our overarching goal with the focus group discussions was to collect participant feedback and recommendations for improving the training content and addressing concerns about usability with the digital platform, we employed a rapid qualitative thematic analysis approach [56–58]. This involved having our team collaboratively review the interview transcripts, field notes, and additional observations, employing a process of triangulation in order to identify key insights from participants, and specific recommendations for improving the content, layout, and clarity of the digital training program in preparation for the larger pilot study. First, our team reviewed the transcripts and

field notes independently, documenting any key observations and notable points reflected in participants' feedback. Next, our team met to review these initial observations, and one researcher then proceeded to code the qualitative transcripts. Lastly, our team met again to review and group the codes into overarching categories that offer actionable steps for guiding our subsequent revisions and improvements to the training content and digital platform.

Results

Sample Characteristics

In this study, development of the digital training program involved content review by 13 subject matter experts with clinical expertise or experience accessing and receiving mental health services. This included 8 psychiatrists/physicians, 2 psychologists, 2 counsellors and 1 service user. After designing the training content, a total of 23 ASHAs participated in the review of the content and testing of the initial prototype of the digital training program. The demographic characteristics of the ASHAs are summarized in Table 2. Briefly, these ASHAs, who are all women and from Sehore district in Madhya Pradesh, were between the ages of 25–56 years, had a minimum of 8th standard education, and had on average between 6 and 8 years of work experience. First, a total of 11 ASHAs provided feedback for contextualization of the training content, ensuring use of relevant language and terms for the target setting. Next, a total of 12 ASHAs tested the initial prototype of the digital training program and then participated in focus group discussions. In addition, 2 service users, one male and one female, ages 48 and 45, respectively, and who self-reported having a lived experience of schizophrenia, were engaged in testing the prototype and participated in a focus group discussion.

Qualitative Findings

The focus group discussions revealed three overarching themes as summarized in the sections below.

Theme #1: Recognizing Schizophrenia in the Community and Importance of Treatment

The first key theme to emerge pertained to ASHAs' views about the importance of the training in helping them to better understand schizophrenia as a disorder, and the importance of treatment for supporting recovery among affected individuals. Most ASHAs in this study

Table 2 Demographic characteristics of the participating community health workers

Characteristic		Sample (n=23)	
		N (%)	Mean (SD)
Age	26–38	12	33.4
	39–54	11	44.6
Education (in years)	10–12	8	11.1
	13 and above	15	15.3
Work Experience (in years)	1–6	7	2.4
	7–8	9	7.6
	9–10	7	9.2

indicated that they were not aware of schizophrenia prior to being introduced to the training content. For instance, one ASHA expressed the novelty of learning about schizophrenia when she stated:

"*This is the first time we heard the name of this illness*."

While other ASHAs indicated that they knew about mental illness, but not specifically about schizophrenia or the types of symptoms of schizophrenia and how to treat this disorder within their communities. For instance, one ASHA explained:

"*We knew that mental illness happens but today we got to know about this illness and its symptoms*."

Several ASHAs mentioned that they had seen similar symptoms, as suggested by one ASHA who stated: "*Have seen people with similar symptoms in the community*". Another ASHA elaborated how these symptoms were addressed among an individual in her community:

"*One of my friends daughter showed similar symptoms she was around 25–26-year-old, she was being given sleeping medicine and she used to sleep the entire day*".

Importantly, several ASHAs described how in addition to identifying the symptoms of schizophrenia, that this training helped them recognize that treatment for schizophrenia is possible:
"*We came to know that this illness can be treated*".
Further, participants reinforced the importance of the training, with ASHAs remarking that *"this illness needs to be treated"*, that "*regular treatment can be quite helpful"* and that:

"*We learned new that with treatment patient can live better life and can work as well*."

Overall, ASHAs offered positive feedback about the training content, describing it as being very helpful in supporting them in identifying individuals living with schizophrenia and creating awareness about this illness, with one ASHA commenting: *"Training will be helpful for patient identification, treatment and creating awareness"* and another stating: *"Every ASHA should do this training"*.

Theme #2: Understanding Symptoms and Impact of Stigma on Individuals Living with Schizophrenia

The second key theme based on ASHAs' comments during the focus group discussions related to increasing their understanding about the various symptoms, while also appreciating the extent to which misconceptions about schizophrenia as well as discrimination towards individuals living with schizophrenia persist in many community settings. For example, participants shared what they learned from the training, including being able to recall specific symptoms such as hallucinations or delusions. One ASHA commented that "*We learned about hallucinations and delusions"*, while another ASHA elaborated further about various symptoms, and emphasized the importance of initiating treatment:

"In this we learned details of illness such as various symptoms which we didn't know earlier such as crying, getting angry, irritability can also be symptoms of mental illness."

Further, some ASHAs expressed some of their existing notions and beliefs about mental health in their communities, such as use of traditional treatments like visiting faith healers for prevention or seeking religious shamans. One ASHA mentioned use of traditional approaches for prevention, where *"people wear threads etc. for prevention against the illness"*, and another ASHA explained that the mental health symptoms related to schizophrenia are often incorrectly attributed to an individual's beliefs and misfortune:

"People also feel that if someone's wish didn't come true then they show symptoms of the illness after their wish comes true, they get better".

Importantly, participants described how the training can make them more aware, in particular about the need to see a doctor and seek medical treatment for schizophrenia, which can help them address misconceptions about the illness in their communities. ASHAs commented on how gaining this new understanding about schizophrenia and its treatment can be beneficial to their patients especially if they can share this information with others: *"The more we spread awareness the better it'll be".*

Lastly, participants found that the training helped them to better understand the detrimental impacts of societal discrimination towards people with mental illness, and specifically for those living with schizophrenia, and how to address these challenges by supporting others and spreading awareness about schizophrenia in their communities.:

"Discrimination happens towards people with mental illness but with this training, we learned that one should not do this and stigmatize them."

Drawing from the feedback provided by participating ASHAs, this training appears to offer potential to address misconceptions about mental illness by promoting greater understanding about schizophrenia among ASHAs and the need to raise awareness within their communities. Some participants also recommended ways to improve the content related to stigma and discrimination, such as showing contrasting examples of people experiencing discrimination and the difference between people who do not face such discrimination, with one participant suggesting it would be good to: *"Show with examples patient who face discrimination and its effect on their lives".*

Theme #3: Acceptability of Digital Training Program for Building Skills and Knowledge About Schizophrenia and Recommendations for Improving the Training Program

The third important theme captured ASHAs' comments surrounding the use of the digital platform, and ways that the usability and various functions of the technology could be improved. Overall, ASHAs reported that participating in this training delivered over a digital platform accessible from a smartphone app, and learning about the schizophrenia was a good experience for them. For instance, they talked about being able to concentrate more while accessing through a mobile phone: *"concentration remains in one place; we don't*

have to write anything and there is no need for any discussion". Another ASHA commented that when *"We use our headphones and do our own work, no one disturbs".*

They also emphasized the value of digital training as other ASHAs who were not present in the workshop could also learn the content, indicating that they would "*recommend this training to others*", while also suggesting that the videos and training content could be shown to other people in the community so that they can understand better and learn about schizophrenia. The ASHAs described the convenience of the digital training program, because they would no longer need to spend time away from their family and children to participate in the training activities, while also being able to do the training at their own leisure: *"Course can be done from home, saves time and the videos can be shown to others and teach them and create awareness".*

The ASHAs also commented on other benefits of the digital training program such as *"this training saves our time and can be done along with our routine work"*, and reflecting on the use of the digital platform for expanding the reach of the training, *"Platform is ok, many people can get trained".* They also appreciated some of the features of the program, such as the use of engagement questions presented after every video, as well as commenting on the audio quality: *"Audio and video content was clear and useful".*

Despite highlighting several positive aspects of the training, many ASHAs also commented on areas that need improvement or technical features of the digital platform that did not work well for them. Some of the technical issues that the ASHAs mentioned during the prototype testing included interrupted and slow internet, difficulty moving forward and backward in the mobile app (i.e., navigating the training content) as one ASHA expressed that *"it was difficult to access the previous content and moving to the next video"*, and challenges with submitting their final assessments after completing the training as illustrated by ASHAs stating that they experienced "*difficulty in submission of assessment questionnaire*". For some ASHAs, they requested assistance from research staff, but mentioned experiencing frustration if such help was not readily available. This was described by one ASHA:

> *"When we got stuck, they checked with us (team members) so the experience was smoother but if similar help is not available then other ASHAs may find it difficult".*

Several participants also provided recommendations for improving the digital training program. For instance, ASHAs indicated that learning the content through pictures was especially helpful because the pictures were interesting, but recommended adding more images: *"It was useful especially the visuals and more can be added".* Other ASHAs commented on the need for case vignettes and more role plays to illustrate the core concepts and to *"Show stories of patients in story form, role-play"*, recommended that the *"length of the videos can be shortened"*, and suggested making the content dramatic to help better understand the core content and to make the program more engaging:

> *"If the training content can be made more dramatic using role-play, ppts and videos it will help in understanding".*

Some ASHAs also indicated that *"the language can be made simpler"*, highlighting the need to include a glossary of terms related to schizophrenia treatment because they found that several words were highly technical and difficult to understand:

"There are a few words used which are difficult to understand for instance "bhram" (delusions), "matibhram" (hallucinations), "skizophrenia" (schizophrenia). These are very technical and difficult words to understand, it could be difficult to make people understand so if some other words can be used instead".

In summarizing a few final recommendations from the ASHAs for adding to the training content, there were suggestions to include more details about the treatment course for schizophrenia, provide a list of hospitals where treatment is available, and the possibility of accessing financial support for poor patients.

Qualitative Feedback from Service-Users

The two service-users also commented on the digital training program, and the link between the content covered and their own personal lived experiences of schizophrenia, *"I had the problem, the same problem that's being talked about"*. Generally, they found the content clear to follow, but also described some of the ways in which the program could be useful for helping community health workers learn more about schizophrenia and helping someone living with this condition in the community. They mentioned that *"The module would help ASHA workers for detection"* and that *"ASHA workers would benefit from understanding the symptoms"*. Regarding specific aspects of the content, they mentioned that the *"case studies are a useful tool… It shows people and articulates what they've gone through… that they're normal, that they are not mad"* and that the value with this training is that *"we can clearly see that people are living normal lives."*

They also mentioned the negative impact of stigma and the way illness is portrayed in society, and the importance of sensitizing others about the illness, and how this training program for ASHAs could help with overcoming these challenges:

"Movies and books have created a lot of stigma around schizophrenia. Thus, it becomes important to shift the paradigm from "they are violent" to "they are operating out of fear". This is important for those who provide them care, like the ASHAs. Giving examples of people living with schizophrenia and contributing to society. Important to also not portray them as a burden and to value them as "normal people". So that the ASHA workers don't feel like that they are "stuck with these people", so that they see them as regular people."

And expanding on this point about stigma with reference to the specific content in the training:

"The module can focus on awareness and stigma. Those are key. There is a lot of it at home and open stigma outside. It's an everyday living experience."

They offered recommendations for including content to show how some people living with the illness also lead life like any other person, as reflected by the following: *"It would be useful to include examples of people with living with schizophrenia in a positive way."* This was further emphasized when one service user mentioned:

> *"Positive depictions of people living with schizophrenia are important because "we seem to be stuck in the medication paradigm" and it is important to emphasize that a normal and good life is possible".*

The service users also offered suggestions for expanding the description of symptoms, and being sure to use local terms that would be familiar to the ASHAs. For instance, one service user explained: *"Some symptoms of schizophrenia were missing, such as: social aloofness, over sexuality, poor coping skills in response to stress, breaking of communication"*, while other suggestions included mentioning *"symptoms like excessive lethargy could be added"*.

In terms of use of the digital platform, and the layout of the training, the service users commented on some of the technical challenges that represented a hindrance to navigating the training smoothly, as well as the need to break the content into smaller segments to increase usability and sustain attention:

> *"There was also too much text that could make it difficult to read. Bullet points, more colour, illustrations, using voice over could help. People's attention spans are shrinking – important to capture it."*

Overall, both service-users agreed that the use of a digital training program could help with reaching and training more people, *"The online medium has a much bigger reach, can be accessed by thousands of people. Is more convenient as the ASHAs can do it in their free time… It's a huge advantage"*. They also recognized some of the benefits of face-to-face trainings, but ultimately that the digital platform is a valuable approach to expand the reach of training: *"Face to face learning is better but it can be complemented with digital/ virtual meet ups. The online medium is cost effective and convenient."*

Digital Training Program

Following completion of the prototype testing and then the focus group discussions with ASHAs and service-users, the various recommendations and suggestions for improving the training program were incorporated into the final training content. This resulted in the development of a final digital training prototype for further larger scale evaluation. Specifically, as illustrated in Fig. 3, the final training program consisted of a series of short videos for each module covering both lecture-based content and role-plays demonstrating the application of the knowledge and skills in practice. Furthermore, the final digital training program was supplemented with a detailed manual that could be available digitally or in print summarizing the core content covered in each module. Sample content from the manual is presented in Fig. 2, and this offered participants a way to follow the content outside of the digital app in the event that there were difficulties with connecting to the online training and to offer multiple approaches for interacting with and learning the core concepts in the program.
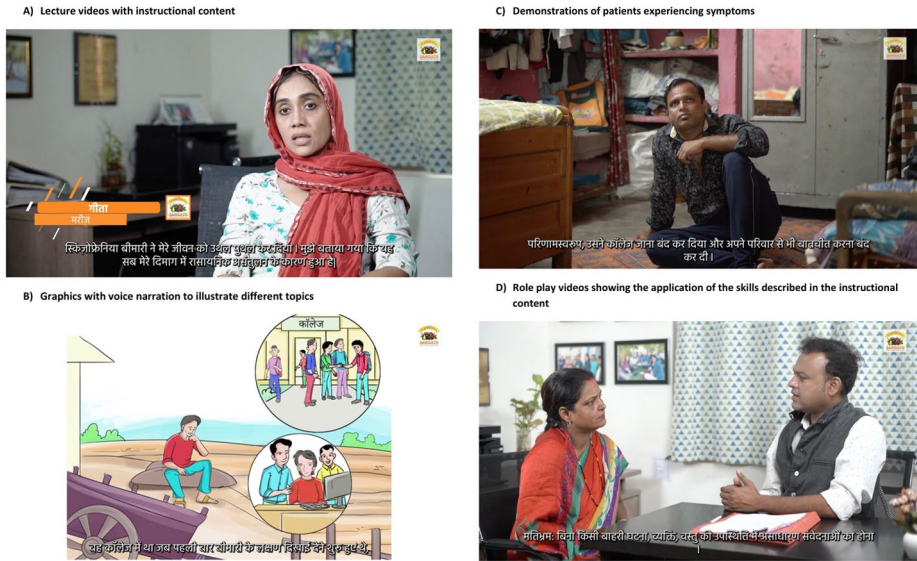
Fig. 3 Sample content from the video-based instructional materials for the SARATHA digital training program

Discussion

This study describes the systematic development and testing of an initial prototype of a digital program delivered on a smartphone app for training community health workers, referred to as ASHAs, in the early detection and referral of schizophrenia in their communities. This study forms part of the larger SARATHA project aimed at leveraging widely available digital technology to facilitate the training of ASHAs [33], an essential frontline provider workforce within India's National Health Mission primarily serving rural and poor communities in much of the country [38, 59], to act as the primary touch point for persons living with schizophrenia within the community. Importantly, this study represents the initial steps towards building workforce capacity in the community to support the early identification of schizophrenia, which represents an urgent public health priority given the significant delays in detecting and treating schizophrenia in lower income settings such as rural India, resulting in detrimental outcomes for individuals, and their families, communities, and society at large [60]. We highlight the steps employed to adapt and digitize existing evidence-based psychosocial intervention content, previously evaluated in a large-scale trial in India [20], for serving as the foundation of this brief digital training program curriculum and initial prototype, and illustrate the early feedback and perceptions captured from our target group of ASHAs. Through thematic analysis of our focus groups with participating ASHAs, three key themes emerged highlighting the new recognition of schizophrenia both as an illness and the availability of treatment, understanding the impacts of stigma, and commenting on how to improve the training content and overall experience interacting with the digital training platform. Importantly, the feedback and recommendations collected from ASHAs in this study have directly informed improvements to the training program content and layout in preparation for a subsequent pilot study [33].

There has been mounting interest in task sharing efforts in LMICs aimed at training and building capacity of community health workers in supporting delivery of mental health services, and in particular, expanding access to psychosocial interventions for treatment and rehabilitation for schizophrenia in routine care settings [12]. Specifically, in India, prior efforts have demonstrated success in training and supporting ASHAs in screening for common mental disorders and increasing help seeking for mental health problems in rural areas [61, 62], with more recent programs engaging ASHAs to facilitate delivery of community-based rehabilitation for persons with severe mental disorders as a complement to usual care, as demonstrated in an ongoing study in Karnataka focused on promoting functioning and reducing disabilities caused by severe mental disorders [43]. During the COVID-19 pandemic, ASHAs also played a key role in supporting continuity of community care for severe mental disorders by acting as a bridge between patients with mental illness and the District Mental Health Program of Ramanagara district of Karnataka, and delivering services directly at patients' doorstep [63]. Therefore, our study complements these existing programs and further contributes to realizing the promise of training and supporting ASHAs as a means to scale up mental health services in rural India. Furthermore, the insights collected from ASHAs in our study reinforce these opportunities by pointing to their keen interests in learning additional content about schizophrenia, as well as recognition of the potential to support care in the community and respond to the needs of the families of affected individuals.

Our study also adds to an increasing number of programs focused on leveraging widely available digital technology for enabling task sharing through training community health workers in LMICs [23, 64], and expanding services for severe mental disorders [65]. Recent studies have demonstrated the potential for use of digital technology for training ASHAs about mental disorders in India [66], and studies from other countries have found that a hybrid approach where technology is used as an adjunct to in-person instruction and supervision can support training of community health workers in lower resource settings [67]. Overall, there have been fewer studies focused solely on determining whether an entirely remotely delivered training over a smartphone app can support the training of community health workers in the delivery of comprehensive psychosocial interventions [31]. Additionally, there have been few studies that have specifically examined the role of technology for building capacity of frontline community health workers in India for early detection and referral of schizophrenia, highlighting a novel aspect of this study which holds potential to meaningfully scale up schizophrenia care in rural India. This is a particularly timely effort, because the work described in this study aligns with increasing recognition from the health system in India on the important role for leveraging technology to support health worker training and rapid digitization in response to the COVID-19 pandemic [68–70], as well as emerging studies demonstrated the feasibility and acceptability of using digital technology for supporting clinical care and capturing clinical metrics among patients with schizophrenia in different settings in India [55, 70–73].

Drawing from the comments from ASHAs in this study, we found that they had relatively little prior knowledge about schizophrenia, and were not aware that treatment for such a condition was possible, which is consistent with many prior studies showing limited understanding about mental illness among community health workers in India [74, 75]. Several ASHAs also commented on local beliefs pertaining to schizophrenia, partially informed by traditional healing practices as well as misconceptions about the causes and treatments that

are commonly shared in community settings. Despite mentioning these existing beliefs, it is noteworthy that the ASHAs expressed an overwhelming interest in furthering their understanding about these conditions and spreading awareness among their patients and within their communities. This could partly be due to the fact that the ASHAs who enrolled in this study were already interested in this topic (a major reason why they consented to enrol); however, this is also promising because it highlights that for ASHAs, who are respected and trusted members of rural communities [39], that there is high potential for such a training program to offer education and support these frontline health workers towards addressing the detrimental consequences of stigma [76] and promoting greater understanding about the different symptoms, treatment options, and possibility to achieve recovery for severe mental illnesses such as schizophrenia. This is also consistent with prior studies showing that training community health workers in India can result in improvement in mental health literacy, greater recognition of mental disorders, reduction in stigmatizing attitudes, and increased self-perceived competence in being able to care for patients living with mental illness [77, 78].

Limitations

There are several limitations with this initial formative study. Importantly, while this study describes the process for developing the digital training program and evaluating its initial acceptability for community health workers in rural India, we do not report any findings on whether the training program is effective and can achieve its desired goal of building knowledge and skills of the target group of ASHAs, and ultimately improving care for persons living with schizophrenia. With regards to the steps in the intervention development process, it is possible that additional perspectives related to the feasibility and acceptability of the training content were not sufficiently captured given the small sample size. This highlights the importance of further pilot testing, and specifically testing the training in the field in order to represent the real-world settings where ASHAs would complete the training at their own leisure in combination with their other work and family responsibilities. It is also noteworthy that the ASHAs enrolled in this study came from one rural district in a large state in Central India, and therefore, will likely not reflect the scenario of other settings across India. To address this challenge, our team specifically engaged a range of content experts from different parts of India to review the content, though ultimately, the program will need to be tested in different settings allowing the possibility for some further region-specific modifications if necessary to respond to diverse languages, cultures, and contexts. Lastly, it is important to recognize that because participation in this study was voluntary and required collecting informed consent from ASHAs, it is possible that they may have already been interested in learning about different mental disorders such as schizophrenia, which may limit generalizability to the larger population of ASHAs, or to other frontline health workers who may not show similar interests in learning about or treating mental health problems in the community.

Conclusion

An important strength in this study is that the development of the digital training program involved primarily integrating content from the evidence-based COPSI program and accompanying manual and instructional content [20], as this program has previously demonstrated effectiveness for clinical management and addressing disability among individuals living with schizophrenia when delivered by community health workers in India. This content was further supplemented with instruction on effective counseling skills and empowering individuals living with disabilities [50–52]. By starting with this robust foundation of evidence to design and develop the training program, we are ideally positioned with the SARATHA project to expand our focus on overcoming challenges to implementation and integrating services for schizophrenia into the delivery of primary care in rural and under-resourced settings in India largely served by the target cohort of ASHAs. For instance, in addition to demonstrating the preliminary effectiveness of the digital training program for building skills and equipping community health workers with essential knowledge about schizophrenia, subsequent emphasis will be required to determine whether these frontline health workers can apply the skills gained through this training program within their regular clinical work. This likely will require ongoing supervision and the health system infrastructure necessary to enable successful task sharing, as reflected by prior research where continued supervision helped to strengthen community health workers' skills and build their competencies for delivering a psychosocial rehabilitation intervention for schizophrenia [79]. Lastly, there will be a clear need to assess outcomes among patients and their families, importantly whether there are reductions in the identification and initiation of treatment for individuals living with schizophrenia and improvements in functioning. The current study represents an important initial step focused on program development that fits into the larger vision of the SARATHA program, with the immediate next step to pilot test the digital training content with a larger cohort of ASHAs.

Declarations

Ethics Approval All study procedures were approved by the Institutional Review Boards at Sangath, India (Number: JN_2019_64) and Harvard Medical School, USA (Number: IRB20-1164).

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