Research Article

Service User Experiences of Integrating a Mobile Solution (IMPACHS) Into Clinical Treatment for Psychosis

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Abstract

Innovative technological solutions are increasingly being introduced into psychotherapy. Understanding service user perspectives is a key aspect in adapting this technology to treatment. This study investigated service users' personal experience of the utility, challenges, and rewards of using an mHealth solution in cognitive behavioral therapy for psychosis (CBTp). People participating in an early intervention program for psychosis ($n = 16$) utilized the mHealth solution for up to 6 months. Semi-structured qualitative interviews were conducted to capture participant experiences, and quantitative data were collected on psychopathology, usage, and quality of the solution. The solution was widely accepted and utilized in treatment. Four dominant themes were constructed from the interviews: (a) Accessibility and supporting recall, (b) Promotion of dialogue with the therapist, (c) Encouraging reflection, and (d) Factors that affected engagement with the solution. The mHealth solution was perceived as facilitating psychotherapeutic processes and supported underlying CBTp treatment principles.

Keywords

mHealth interventions; smartphone app; psychosis; blended interventions; mobile applications; cognitive behavior therapy; qualitative methods; thematic analysis; patient experiences; Western Europe

Introduction

Schizophrenia is considered a severe and debilitating mental illness, although a combination of pharmacological and psychosocial interventions have been shown to be effective in treating this disorder. Cognitive behavioral therapy for psychosis (CBTp) is an evidenced-based treatment that is often associated with a reduction in symptoms and distress within populations of people with schizophrenia (Rector & Beck, 2012; Turner et al., 2018).

Advancement and improved access to technology such as the internet and smartphone applications (apps) has led to the examination of how these technologies may supplement and potentially improve the effectiveness of psychotherapeutic interventions (Lindhiem et al., 2015).

The use of mobile-based interventions (mHealth) can have a number of advantages such as facilitating access to evidence-based treatment; enhancing the potency of psychotherapy; reducing stigmatization; enabling users to work at their own pace; and promoting autonomy and the flexible integration of mental health interventions into daily life (Cuijpers et al., 2008; Karyotaki et al., 2015; Linardon et al., 2019; Torous et al., 2017). A key component of the success of a mobile application is user engagement (Torous et al., 2018).

Despite a number of potential benefits, there are also a number of concerns about the use of mHealth applications in clinical treatment. These issues include the illegal hacking and use of personal data; the quality of therapeutic interventions provided via technology platforms; the impact of technology on the therapeutic alliance, and ethical dilemmas in clinical management (Firth & Torous, 2015; Martínez-Pérez et al., 2015). Other concerns about

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the adoption of technology-driven psychotherapy include the skill level required by users to adequately utilize smartphones; challenges maintaining user engagement; the personalization of mHealth interventions, and whether these technological interventions will replace face-to-face treatment as a means of cost cutting in mental health services (Berry et al., 2019; Bucci et al., 2018).

Several studies have begun to investigate how psychosocial treatment for schizophrenia and mobile applications can be combined. A recent systematic review found five feasibility studies conducted on smartphone apps for schizophrenia. Short-term results indicated that users displayed high engagement and satisfaction, although little information was provided on the integration of these interventions into clinical treatment or user experiences (Firth & Torous, 2015).

The few qualitative studies examining the use of this form of technology within populations with psychosis have found a general acceptance of mobile applications. Service users have both described potential benefits such as facilitating access to treatment and destigmatization and potential concerns about data privacy/protection, technology literacy, and potential threat to person-centered care (Berry et al., 2016; Bucci et al., 2018; Palmier-Claus et al., 2013).

Given that the integration of technology into clinical treatment for mental health problems is a relatively new and rapidly developing field, there is a need for further research studies to understand how service users engage, experience, and meaningfully integrate this technology into their treatment. Qualitative research has a critical role in the research process and can be used in determining the feasibility of a particular intervention (Duggleby et al., 2020). Service user perspectives are considered important factors in understanding issues related to engagement, utilization, and ultimately treatment outcomes associated with mHealth interventions (Bucci, Schwannauer, & Berry, 2019; Firth & Torous, 2015b).

The study aimed to identify service user's personal experiences when using a mHealth solution in treatment based on a cognitive behavioral approach to psychosis (CBTp). These experiences were contextualized with quantitative information of how the solution was utilized during treatment and completion of a questionnaire to rate the perceived quality of the solution.

Method

Design

This study involved semi-structured interviews where qualitative information about the users' experiences integrating the mHealth solution into treatment was supplemented with quantitative information on the quality of the mHealth solution. By combining quantitative and qualitative data, it was hoped to provide a more holistic understanding of the participants' experiences (Bartholomew & Lockard, 2018).

Participants and Context

Participants had a diagnosis within the schizophrenia spectrum (International Statistical Classification of Diseases, 10th Revision [ICD10] F20–29) and were able to provide informed consent. A convenience sample of patients were recruited from an early intervention service for psychosis called OPUS. This treatment consisted of assertive outreach, psychoeducation and specific interventions to promote understanding of mental illness, coping with symptoms, and facilitating functioning and recovery. The foundation of therapeutic sessions was CBTp. Several studies have demonstrated that this approach is more effective and cost efficient than the standard treatment (Bertelsen et al., 2009; Correll et al., 2018; Petersen et al., 2005).

The mHealth Solution

The mHealth solution Improving Availability and Cost-effectiveness of mental Healthcare for Schizophrenia through mHealth (IMPACHS) involved a collaboration between researchers/clinicians from Region Zealand Psychiatry in Denmark, the University of Hamburg in Germany as well as technology companies Monsenso and Time4you. Monsenso was the technical lead in the project, and this organization had extensive experience in the development and implementation of mHealth solutions within psychiatry (Faurholt-Jepsen et al., 2019).

The mHealth solution comprised two integrated platforms based on CBTp. The first solution (Monsenso) consisted of self-monitoring function for inputting information on mood, symptoms, and reflections, while the second solution, the internet-based training (IBT) learning management system (Time 4U), contained a range of e-learning modules covering relevant topics for psychosis. Permission from the service user meant clinicians were able to monitor participants' interaction via a computer dashboard. This dashboard gave access to both solutions.

The first solution contained a number of functions, accessible through the patients' smartphone via an app and the clinicians' dashboard accessed through a web portal: The self-assessment function allowed the user to rate the quality of their day as well as a number of individualized parameters, such as mood, frequency of psychotic experiences, sleep patterns, or any other parameter deemed relevant in clinical treatment. It was possible to write notes accompanying together a rating in this part of

solution. The visualization function summarized data and created graphs based on inputted data over time. The thoughts function provided strategies to help people deal with unpleasant or anxious thoughts. The library function had a range of psychoeducational information on psychosis, the action plans function contained customizable plans based on useful strategies to cope with symptoms (e.g., hearing voices), and finally, the warning signs and triggers functions helped people identify and describe factors that lead to symptom exacerbation. Action plans, triggers, and warning signs could be edited through either the app or the clinician dashboard.

The second solution, IBT, consisted of web-based e-learning courses. The e-learning courses comprised eight CBTp modules developed from evidence-based interventions for psychosis (Mehl et al., 2015; National Institute for Health and Care Excellence, 2014; Turner et al., 2018) selected and adapted by a team of clinical psychologists with extensive experience in CBTp. The CBTp modules were hallucinations, delusions, self-esteem, behavioral activation, emotion regulation, sleep, physical health, and medication management. Each module consisted of brief chapters containing psychoeducation (text, videos) and short, easy-to-understand exercises. Texts and exercises were supplemented with audio descriptions to cater for people's preferred learning styles (e.g., audio vs. visual styles). Participants could transfer relevant information from the e-learning modules into the self-monitoring platform, so this information and strategies could be easily accessed whenever the participant needed it. Finally, a series of follow-up questions were accessible to service users and clinicians that allowed closer monitoring of relevant symptoms. The format of the content was adapted to the solution in close dialogue with the respective IT experts.

Participants had access to the mHealth solution for a period up to 6 months, and they were free to decide which parts of the solution they accessed during treatment. The freedom of access to material on the solution was seen as empowering for the individual as they could decide the role and timing of accessing the mobile solution would play in their recovery (De Jager et al., 2016). Treatment providers also provided guidance on the modules selected based on individual treatment goals and current difficulties experienced by service users.

Interview Guide

The interview guide was developed by reviewing qualitative studies that had examined interactions between people with mental health problems and mobile applications. Based on this review, a range of questions were constructed to capture the experience of participants using the mobile solution. The interview was structured as to start with broad questions about everyday life and how participants experienced their mental health problems, followed by questions on participants' experiences of treatment and their relationship with the treatment provider. The final phase of the interview involved questions about participants' interactions with the mobile solution during treatment and specific questions about what aspects of the solution were useful or difficult to use. Inquiry into how or whether interacting with the solution affected the relationship with the treatment provider was also undertaken along with any suggestions for improvements to the solution.

Interviews were conducted with participants after they had interacted with the mobile solution for up to a period of 6 months. A single researcher was responsible for conducting interviews and received regular supervision to ensure consistency in the structure of the interview to minimize the use of closed or leading questions. This semi-structured and open-ended interview structure was adopted to facilitate the collection of participants' experiences, while minimizing the impact of the researchers own beliefs and perceptions.

All interviews were confidential where the participant could freely express their opinions without concerns that the information would be accessed by others. The interviews were conducted throughout 2018 and recorded on an iPad after obtaining written consent and stored on a secure server.

Measures

Sociodemographic data were collected for each participant. Psychopathology was assessed using the Scale of Assessment of Positive Symptoms (SAPS; Andreasen et al., 2005) and the Brief Negative Symptom Scale (BNSS; Kirkpatrick et al., 2011). Functioning was assessed using the Personal and Social Performance Scale (PSP; Morosini & Morosini, 2008), and the World Health Organization 5 (WHO-5) questionnaire was used to measure well-being (Topp et al., 2015).

The quality of the mHealth solution was assessed with Mobile Application Rating Scale, user edition (uMARS; Stoyanov et al., 2016) which examined the quality and usability of the mHealth solution. The Negative Effects Questionnaire (NEQ; Rozental et al., 2019) was used to identify any negative events attributable to the mHealth solution.

Data Analysis

Data from the clinical questionnaires and quality rating scales were analyzed using descriptive statistics. The qualitative interviews were analyzed according to thematic analysis (Braun & Clarke, 2006) Thematic analysis

is a widely used "method for identifying, analyzing and reporting patterns (themes) within qualitative data" (Braun & Clarke, 2006). The specific approach taken for this study was reflexive thematic analysis, where the orientation was both inductive and essentialist in nature and themes were grounded in the content of the data (Braun & Clarke, 2006; Braun et al., 2015). The themes were constructed as result of coproduction of the participants' verbal descriptions, the primary researchers' viewpoint, and context.

All interviews were recorded on an iPad, (lasting 15–30 minutes), transcribed verbatim, and analyzed according to the principles of thematic analysis. The six phases of analysis included familiarization with the data, coding and labeling of data, searching for themes, reviewing themes, defining and naming themes, and writing up the results.

A single researcher was involved in the primary data analysis. First, this researcher read through all the transcripts to familiarize themselves with the content. Then, each interview was reread, and potential codes and themes were noted. The next phase involved a reflexive process to review codes and themes and return to the raw transcripts to further clarify codes and refine themes. The final phase involved descriptions of common themes and selection of quotes from the interview transcripts that captured the essence of each common theme. The researcher had experience in qualitative analysis at a psychology graduate level and received regular supervision from an experienced academic who had both taught and supervised qualitative projects at a doctoral level and had widely published research in international journals.

Several steps were taken throughout the analysis to promote the trustworthiness of the qualitative findings (Guba & Lincoln, 1989; Nowell et al., 2017). To improve the credibility of analysis, prolonged engagement with the material and the collection of information from different sources such as interviews and questionnaires (data triangulation) was undertaken. To promote transferability of the analysis, detailed demographic data of participants were provided along with thick descriptions of how different participants experienced their mental health problems. To address confirmability, a clear process (audit trail) for conducting the reflexive thematic analysis was outlined and followed by the authors. Finally, researchers not directly involved in the analysis were asked to provide feedback on the process and results of the study (e.g., external audit) to increase the dependability of the analysis and findings.

Data Management and Storage

Data were stored and handled as confidential material in accordance with current regulations by national authority. Data from the mobile solution were stored anonymously on an external secure server that was approved by Psychiatry Region Zealand (REG-191-2017:IMPACHS, Datatilsynet j.nr. 2012-58-0003).

Funding

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Ethics

The study followed the ethical guidelines for Psychiatry Region Zealand regarding the recruitment, participation, and storage of information for participants in the study. The study protocol and participant information was approved by the regional scientific ethics committee (VEK). Previous research studies have indicated that the use of mHealth solutions is not usually associated with negative consequences and given that the solution was a supplement to standard clinical treatment, the risk of adverse events was considered low.

Participants received comprehensive information about the study and its aims from the interviewer as well as written detailed information about their rights as a participant in research project and how data would be collected and stored. Written consent was obtained from the participant. Participants had the choice to use or not use the solution as much as they wanted without consequences for their ongoing psychiatric treatment. The study was conducted in close collaboration with the treating psychiatrist.

Results

Qualitative Analysis From Interviews

The majority of the 10 participants who were interviewed stated that their mental health problems took up a considerable part of their lives, highlighting issues such as medication, the impact of symptoms, and engagement with treatment. Few participants had full- or part-time work or studies. Many participants were socially isolated (due to negative symptoms or paranoia) and more than half were living with their parents. Participants generally reported having a limited range of activities compared with most 18- to 36-year-olds. Many participants described how they had to deal with a lack of energy and memory problems. All participants in the study owned smartphones, and all stated that they were accustomed to using apps.

The majority of participants were positive about the integration of the mHealth solution into psychotherapy, and they described a range of ways the mobile solution affected treatment. Four common and interrelated themes were constructed from the analysis. These themes were accessibility and support of recall (Theme 1), promotion of dialogue (Theme 2); facilitation of reflection (Theme 3), and factors that affected engagement with the solution (Theme 4).

Theme 1: Easily Accessible and Supporting Memory

All participants described the advantage of having the mobile solution installed on their phone, which meant it was accessible at all times, given the majority of participants had access to their mobile in most situations. One participant, a women, in her early 20s, commented the following:

> It is good idea having the app on my phone as it is easy to access because I always have my mobile with me

Participants described that easy accessibility had implications for their memory in a variety of situations. Interaction with the solution could help with remembering to complete therapy tasks such as self-monitoring (e.g., after receiving a push message), and accessing stored data could help with the recalling events and experiences in a range in relevant settings.

A male in his late 20s who reported considerable cognitive problems in remembering and structuring his day noted how the solution supported recall in therapy sessions:

> It's definitely made it easier to tell her (my therapist) how the day has been, right? Then (my therapist) can just look it up and see (on self monitoring scores) if it's been a good or a bad day, right? Then one doesn't have to sit there and make an effort to remember what to say . . .

A young female participant who described herself as relatively independent in daily life but experiencing cognitive difficulties noted how she used the solution:

> It's a bit difficult with memory sometimes, right, or if there are some things one would rather just forget, but then to write it down, in terms of reflecting on oneself too, um . . . I do think it was a pretty good thing, because I can't always remember, well, so how was it I was feeling yesterday and then, if somebody asks, its just "um, I'm fine," right? (laughs) But if you've written down in different points, like a little more in-depth, then perhaps you say to yourself, "actually I wasn't feeling very well yesterday".

Theme 2: Promoting Dialogue

Nearly all users indicated that interaction with the solution facilitated conversations with their therapist. This promotion of dialogue usually occurred by accessing data from daily self-assessment in weekly therapy sessions, where the participant and therapist examined visual summaries (graphs) via the clinician dashboard.

A male participant, who described himself as leading a very passive life due to debilitating negative symptoms and near-constant voices, explained that his therapists' access to his self-assessment ratings via the clinician dashboard made conversations easier:

> Well she (the therapist) opens it on the computer and then we go through it (. . .) 'cause then [my therapist] can access it and see that "okay," I've been down and . . . then we talk about it, right?.

For this participant, reviewing the self-evaluation output in his therapy session helped his therapist to identify and raise issues to discuss, often difficult for the participant to do due to memory problems. Many participants highlighted how the information generated from the regular inputting of data into the mHealth solution provided a foundation for discussions in therapy sessions.

Another participant, a female in her early 20s who experienced a lack of motivation and difficulty preparing for individual sessions noted the visual feedback from the self-evaluation made it easier for her to identify her own needs and to address them by either asking for help or bringing them up with her therapist in the next session:

> I really like the thing where one can visually see how, how one's days have been and that sort of thing (. . .) I think it's very much the visual aspect of it, being able to see that . . . if one's really down (. . .) then one should probably, you know, give it some attention and at least talk it over with [my therapist] next time I see him (. . .) and it really matters to me regarding when it, that is, about seeking extra help, right? (. . .) I think it makes it easier when I can tell that I'm down.

The use of graphs in the mHealth solution helped her to identify what was important to discuss with her therapist. The majority of participants described how the visual graphs were very helpful in providing a summary of their symptoms and activities for both themselves and their therapists.

Many participants stated that the sharing of information from the mobile application led to an experience that the therapist had a better understanding of what they were going through. This sharing of information strengthened the perceived bond or alliance between them. None of the

participants stated that the use of the mobile application affected negatively their therapeutic relationship. Most participants were positive about the therapist being able to track how they were doing (through the self-assessment and visualization functions). Many participants stated this tracking created a sense of being understood and created a safe environment where discussions could take place.

A female in her mid-30s with moderate negative symptoms and difficulties concentrating highlighted that knowing how her therapist could access a visual overview of her mood states made her feel more safe:

> P: I know [my therapist] has been keeping an eye on me (. . .) and it did sort of make me feel safe that I knew he was keeping an eye on those graphs (. . .) that was really nice. (p. 8)
>
> I: Did it affect your conversations?
>
> P: Yes, I actually think they became more in depth (. . .) because he sort of knew how I was
>
> feeling, too, when I turned up, I didn't have to spend so much time explaining a lot, that is,
>
> because he could tell from the graphs that I'd become worse (. . .) um, and then he knew
>
> that that was where we had to start.

Many participants highlighted how the mHealth solution could be accessed by both service users and therapists and this information provided a common source in discussions. These inputted data (and graphs) were perceived by service users to facilitate conversations and could lead to strengthening of therapeutic relationship between themselves and their therapist.

Theme 3: Encouraging Reflection

A significant proportion of users described how the interaction with the mHealth solution often provided both a stimulus and opportunity to reflect. This reflection could occur when completing self-monitoring tasks, while accessing data in session with the therapist or alone. Participants explained the solution created a space for them to think about different aspects of their mental health difficulties. For some participants, this reflection facilitated their understanding of links between thoughts, feelings, and situations.

One participant, a female who experienced significant psychotic symptoms but stated she was still able to function reasonably well, reflected on her interaction with the mHealth solution:

> To take a moment to think about what had been going on that day, right? (. . .) also in order to gain greater self-awareness I'm thinking, in being able to recognise one's own behavioural patterns, which can a bit difficult sometimes . . .

The task of completing the self-monitoring each day gave her the opportunity to pause, reflect, and gain greater awareness into her reactions. In addition, many participants highlighted that the daily prompt (push messages) to complete the self-monitoring also created a space for them to reflect.

Another participant, a female relatively stable in her symptoms, noted how the self-monitoring prompts affected her:

> It (the app) has made me more conscious of myself and of what has caused me to feel down and what causes me to feel better . . .

Some participants reported by retrieving information stored in the solution helped them to discriminate between reality and a more distorted or biased version of reality that was associated with their psychosis. A female in her early 20s, who had a tendency to minimize her mental health problems and underestimate the support she needed, noted the following:

> It can be a good thing to just keep an eye on how things are going because it can be a bit like . . . inside one's head it's going splendidly, and then in reality one's been . . . (. . .) or vice versa, if you're feeling really low but then you realize that . . . okay, this past week has actually been good . . . yes, so that's pretty great I think.

Thus, information contained in the solution appeared to promote a more balanced recall of events. Many people with mental health problems can be significantly influenced by their current mood state (e.g., feeling down or anxious) which in turn can influence or bias memory recall. This biased recall can result in a distorted view of how they have been feeling or coping with things. Access to the information contained in the mobile solution could facilitate reflection and the integration of all relevant information.

Theme 4: Factors That Affect Engagement

All users indicated that a variety of factors could affect their engagement with the solution. The most common issues included negative internal states, such as symptoms, or external issues relating to difficulties in navigating in the mHealth solution or technical problems. Participants' responses to these issues ranged from slight irritation to totally disengaging with the solution.

Several participants described how low mood, negative symptoms, and poor motivation could at times lead them to avoid interacting with the mHealth solution. One participant, a woman in her 30s with stable psychotic symptoms but considerable affective symptoms, noted the following:

> You could say that, when I was at my lowest, I didn't use the app (. . .) I was afraid it would become worse (. . .) it's like my mind is playing games with me, when I'm feeling bad (. . .) Then it's as if my mind is bullying me and saying "I'll see if I can make you feel even worse," so, sometimes I get afraid of my own mind (. . .) Then if I start focussing on things, I'm afraid something will happen.

For this participant, there was a concern that engaging with the solution would lead to more negative thoughts and rumination and worsen her mental state.

Technical challenges, while infrequent, could affect negatively participants' engagement. These technical problems could range from difficulties logging on to the system to challenges with navigation or the solution freezing/not updating correctly preventing access. One common problem mentioned by several participants was difficulties with the Bluetooth (e.g., switching the phone on automatically and draining battery). Participants' response to this problem ranged from been mildly annoyed to totally disengaging with the solution. A female in her mid-30s reflected on her interaction with the solution:

> I was a little out of patience with [the app] in the beginning, actually, because it runs on Bluetooth and switches it on all the time (. . .) it can still annoy me to this day, when I see the Bluetooth symbol on my phone.

It is noteworthy that one participant linked the Bluetooth problem directly to his paranoid ideation, where he believed an external entity was controlling his phone and trying to monitor his behavior. This appraisal resulted in him uninstalling the solution, even though he had found many functions beneficial.

Other technical challenges, highlighted by participants, included setting up the customized elements of the solution (particularly at the start of the study). While customizability of various functions was generally regarded as a positive feature of the solution, it was also perceived as initially challenging by a number of participants.

One participant, who felt herself to be quite proficient at using her smartphone, reported the following:

> I found it difficult to get started because . . . it seemed very simple when you showed me how to set it up and how to enter the responses and make those questions (. . .) but then when I was at home and tried to do it, I just couldn't figure it out (. . .) um, so it wasn't until I had a conversation with [my therapist] and he helped me go in and choose . . . but then, once I'd chosen the questions I wanted things were actually pretty easy.

Feedback from personnel revealed that while the instructions and setup of the solution appeared straightforward, many participants needed to receive instructions repeatedly to be able to independently use the solution. It is possible that cognitive deficits often associated with psychosis influenced the ability of the participants to learn and use the mHealth solution.

Finally, while most participants found the push messages (reminders sent by app to mobile phone) to complete the self-monitoring task as helpful, one participant commented these messages could also be annoying if he was using his phone or otherwise occupied.

Quantitative Results

A total of 16 patients were included in the study and completed the baseline assessment and introduction to the mobile solution. Four people dropped out of OPUS treatment during the study period and therefore did not complete the postassessments. The reason for stopping treatment was not associated with the mHealth solution. There were no significant differences between completers and people who dropped out on baseline characteristics apart from noncompleters displaying slightly higher levels of psychotic symptoms than completers. Of the 12 patients who completed the trial with mobile solution, 10 of these people agreed to participate in interviews. Baseline characteristics of the sample are shown in Table 1.

Participants displayed low to moderate severity of symptoms, poor functioning, and low well-being, scores although there was considerable heterogeneity between participants. Two thirds had a schizophrenia diagnosis (F20).

Results for the evaluation of the quality of the mHealth solution are contained in Table 2. Participants rated the mHealth solution as good across a range of uMARS parameters (e.g., functionality, aesthetics, and information) and as adequate on subjective quality, perceived impact, and engagement. Quantitative data about the usage of the mHealth solution revealed it was used for an average period of 140 days (range: 40–180 days), where the self-monitoring was the function, most regularly used. Daily self-monitoring was completed for at least 3 months by three quarters of the participants.

Results from the NEQ identified few negative events during treatment. A quarter of participants experienced moderate or higher levels of negative feelings, stress, or sleep disturbances at some time during OPUS treatment,

Table 1. Baseline Characteristics of Participants ($n = 16$).

Characteristic	OPUS Participants
Age	$M = 24.06$ years
Gender	Male = 4 (25%), female = 12 (75%)
Diagnosis (ICD-10)	
Paranoid schizophrenia (F20.0)	8 (50%)
Undifferentiated schizophrenia(F20.3)	3 (18%)
Simple schizophrenia (F20.6)	1 (6%)
Schizoaffective disorder (F25)	2 (13%)
Nonorganic psychosis (F29)	2 (13%)
Psychotic symptoms (SAPS)	2.56 (moderate; $SD = 1.26$)
Negative symptoms (BNSS)	21.94 (low; $SD = 14.67$)
Function (PSP)	46.13 (low; $SD = 15.78$)
Well-being (WHO-5)	40.00 (low; $SD = 20.24$)

Note. ICD-10 = International Statistical Classification of Diseases, 10th Revision; SAPS = Scale of Assessment of Positive Symptoms; BNSS = Brief Negative Symptom Scale; PSP = Personal and Social Performance Scale; WHO = World Health Organization.

Table 2. Quality Ratings of the mHealth Solution (uMARS) by Participants ($n = 12$).

Domain	Ratings
Engagement (interactive, interesting, customisable)	3.35
Functionality (functioning, easy to learn/navigate)	3.84
Aesthetics (graphic design, visual appeal, style)	3.95
Information (high-quality information, credibility)	4.28
Subjective quality (recommend, usage, economic value)	3.43
Perceived impact (change due to solution)	3.48

Note. Range: below 3 = poor; 3.0–3.5 = adequate; 3.5–4.0 = good; 4+ = very good. uMARS = Mobile Application Rating Scale, user edition.

but participants did not indicate that these negative events were directly associated with using the mHealth solution.

Discussion

The purpose of this study was to examine the experiences of service users integrating an mHealth solution into treatment for psychosis. First, the qualitative and quantitative results indicated that the mobile solution was widely accepted and used in treatment by participants. This finding is consistent with a number of qualitative studies that indicate a general acceptability and openness about integrating technology into clinical treatment (Austin et al., 2020; Berry et al., 2016; Bucci, Schwannauer, & Berry, 2019; Ng et al., 2019; Torous et al., 2019). Second, participants described that interactions with the mHealth solution could affect treatment in range of ways, most of which were perceived as helpful during treatment for psychosis. These perceived benefits included the promotion of dialogue, encouragement of reflection, and assisting in recall to both complete therapy tasks and retrieve important experiences. Participants also described several factors that could negatively influence their engagement with the solution.

Easily Accessible and Supporting Memory

Nearly all participants commented the solution as readily accessible, as they had their mobile phone with them at all times. Coupled to this theme of accessibility was the common perception that interaction with the solution could facilitate memory functions in a range of situations. Specifically, participants described how having easy access to the mobile solution outside therapy in combination with regular reminders (e.g., push messages) helped them be better to remember therapy tasks. Within the session, information stored in the mobile solution could be accessed and used to facilitate recall of significant experiences. Many people with psychosis often experience cognitive difficulties (Green et al., 2012; Michel et al., 2013) and the common perception that the solution could assist with self-monitoring and retrieval can be a significant benefit in the clinical management of their illness. This common perception that interaction with the mobile solution helped with memory processes highlighted the potential role that technology can play in addressing difficulties experienced by a people with psychosis (e.g., cognitive deficits) and reduce potential barriers to relevant therapy activities.

The Therapeutic Dialogue, Reflection, and Alliance

Qualitative feedback identified that the mHealth solution was perceived to promote dialogue and reflection during psychotherapy. The self-monitoring and visualization functions were highlighted as central in these processes. First, when participants inputted information (e.g., rating symptoms and mood), it was perceived to promote greater awareness of current emotional and behavioral patterns. Numerous studies have found that people completing self-monitoring can enhance their understanding of mental health difficulties (Berry et al., 2019; Bucci, Schwannauer, & Berry, 2019; Eisner et al., 2019). Second, participants described an experience of enhanced reflection when therapists' accessed data inputted into the solution during therapy sessions. These data were converted to graphical representations which formed the basis of conversations. Discussion about these graphs could help inform treatment goals and the selection of relevant e-learning modules in the mHealth solution. The direct and active integration of information from the solution by the therapist could be seen as increasing the relevance of mobile solution in clinical treatment and thereby promoting engagement with the solution (Alfonsson et al., 2016).

Many participants noted that the mHealth solution led to greater reflection on a number of levels, whether it be simply recalling the days' events when completing self-monitoring or examining a specific situation to develop a better understanding of how this situation affected mood and behavior. Some participants were able to use different elements of the solution to reappraise their understanding of a situation or integrate new information contained in the solution (e.g., ratings, notes, or useful strategies) in discussions with their therapist. Importantly, the concepts of self-reflection and improved insight are the foundation of CBTp and these processes can often lead to behavior change.

Therapeutic alliance is considered a key factor in the effectiveness of psychotherapeutic interventions (Flückiger et al., 2018). Importantly, none of the participants felt the mHealth solution negatively affected the relationship with the therapist. On the contrary, several participants described the process of sharing information contained in the solution led to a greater perceived understanding between the therapist and participant. The combination of self-monitoring and the meaningful sharing of this information between service users and treatment providers was seen to enhance the therapeutic relationship. Good therapeutic alliance and appropriate therapist support can improve engagement in treatment (Stewart, 2013; Torous et al., 2018) and improve applicability of mHealth solutions in real-world settings (Torous & Hsin, 2018).

Engagement With the mHealth Solution

Low service user engagement is often a common problem with mobile solutions within the field of mental health (Palmier-Claus et al., 2013). Potential reasons for low engagement include unfriendly user interfaces, noncentric user design, concerns with data privacy, untrustworthiness of information, and perceived unhelpfulness of solution in crisis situations (Torous et al., 2018).

Quantitative data collected about the usage of the mHealth solution indicated that most participants regularly engaged with the solution and this engagement was maintained several months. This sustained engagement with the solution is a significant finding, given that user engagement with mHealth interventions for people with psychosis is poorly researched and engagement is considered a key issue for the potential implementation and efficacy of digital interventions (Torous et al., 2018).

The patterns of good engagement are supported by results from the uMARS questionnaire where participants rated functionality, information, and aesthetics of the mobile solution as good. These factors are directly associated with higher engagement. Service users indicated the ability to customize self-monitoring parameters or the freedom to access content (or not) was also perceived as a benefit. The flexibility of the solution could be seen as improving the user-centric design, often considered an important factor in promoting user engagement.

While overall engagement with the solution during treatment could be considered satisfactory, it still showed variability and participants described a range of factors that could influence engagement. Technical challenges such as configuring the functions, navigating within/between different platforms, and problems with the Bluetooth function resulted in participants experiencing frustration, asking/requiring extra support, or disengaging with the solution albeit in the short term. A clear message from participants was that even relatively minor technical problems could negatively influence engagement. Ensuring that service users and treatment providers have sufficient time to learn and understand how to use the mobile solution is necessary to improve IT health literacy and promote engagement (Cárdenas et al., 2020; Mackert et al., 2016).

Low mood, paranoia, reduced energy levels, and poor motivation were described by participants as factors often linked with lower engagement with the mHealth solution. Psychiatric symptoms have been identified as an additional barrier for engagement with mHealth interventions (Torous et al., 2018). Several participants were, at times, concerned that engagement with the solution could lead to worsening of their mental health. The impact of mental health and use of technology in clinical treatment is a complex issue, and it has been suggested that involving

users in the design and implementation of these solutions into treatment can help increase the relevance and engagement with these technologies in times of distress (Tighe et al., 2017). A better understanding of how distress is experienced by people with psychosis and what is helpful can also be used to inform the development of interventions, so they are perceived as beneficial (Griffiths et al., 2019). Qualitative information from this study can also be used to inform the future design and content of mobile solutions for populations with psychosis.

Negative events associated with the mobile solution were very rare based on questionnaire data, although qualitative data from interviews did reveal a small number of participants who felt interaction with solution increased paranoid ideas or worsened mood. Importantly, participants were able to freely disengage with the solution if they experienced these negative events. Further research is needed to understand the positive and negative effects on engaging with different technological interventions in psychotherapy (Bucci, Schwannauer, & Berry, 2019). Based on the information collected in this study, the benefits of integrating an mHealth solution into clinical treatment for psychosis were clearly perceived to outweigh the disadvantages.

Interestingly, data security was not described as a common concern by participants, despite a number of previous qualitative studies having identified this as a significant issue for service users when using technology in mental health treatment (Berry et al., 2019; Bucci et al., 2018; Nicholas et al., 2017). Possible explanations why it was not an important issue for this group could be twofold. First, a considerable amount of information was provided to explain how data would be stored and who had access to it, and second, this study was conducted in a mental health service that had an established track record of integrating technology into clinical treatment (e.g., electronic patient journals). Both these factors may have allayed any concerns about data security.

Limitations

There were a range of limitations to the study. First, as the sample was self-selected, there is possibility that these people were already open and positive about the use of technology which may have influenced experiences and feedback. Second, while the design of this study provided a greater insight into the experiences of service users integrating the mobile solution in psychotherapy, it cannot provide quantitative information of how the integration of the mHealth solution into CBTp may affect treatment outcomes such as changes in symptoms, functioning, or treatment alliance. Future studies need to be designed to answer these important questions and determine the efficacy of the mHealth solution (Bucci, Ainsworth, et al., 2019). Finally, this study was carried out from an atheoretical perspective, and it does not offer any explanations about why or how the mHealth solution affected treatment and participant experiences. Bucci and colleagues (2019) have acknowledged a lack of theory in the majority of studies examining the integration of technology into clinical treatment. They recommend that future studies test different theoretical models to generate ideas about potential mechanisms and underlying processes that influence interactions between the person and technology within psychotherapeutic context (Bucci, Ainsworth et al., 2019).

Conclusion

The following study collected service user perspectives of using an mHealth solution in cognitive behavioral treatment (CBTp) for psychosis. Qualitative feedback and quantitative results from participants largely supported the acceptance and utility of this mobile solution as a helpful adjunct to psychotherapy. The common themes constructed from qualitative material from interviews described a range of ways this technology affected therapy. These themes included facilitation of dialogue, reflection, and recall of experiences. Each of these themes is congruent with underlying principles of CBTp and treatment of psychosis. Participants also described a range of factors that could affect their engagement with the solution. There were few negative events directly associated with the use of the mobile solution into clinical treatment, and it was perceived that interaction with the solution along with the sharing of data in the solution supported treatment goals and therapeutic alliance.

Further research into factors that affect engagement and how different components of the mHealth solution contribute to treatment outcomes still needs to be addressed. The increasing integration of technology into clinical treatment for mental health problems has the potential to significantly change the structure and outcomes for mental health services. This innovation needs to be undertaken with close collaboration between service users, treatment providers, and IT experts to ensure meaningful outcomes for all stakeholders.

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