MAIN

Evaluating the acceptability of remote cognitive remediation from the perspective of psychosis service users

Lois Ann Parri[1] , Katherine Barret[1], Rosie Hill[1], Arif Hoque[1], Iris Isok[1], Alex Kenny[1], Sarah Markham[1], Nike Oyeleye[1], Roisin Quinn[1], Angela Sweeney[1], Til Wykes[1,2] and Matteo Cella[1,2]

[1]Institute of Psychiatry, Psychology and Neuroscience, King's College London, London, UK and [2]South London & Maudsley NHS Foundation Trust, Maudsley Hospital, London, UK

Corresponding author: Lois Ann Parri; Email: lois.parri@kcl.ac.uk

Abstract

Objectives: Cognitive remediation (CR) can reduce the cognitive difficulties experienced by people with psychosis. Adapting CR to be delivered remotely provides new opportunities for extending its use. However, doing so requires further evaluation of its acceptability from service users' views. We evaluate the acceptability of therapist-supported remote CR from the perspectives of service users using participatory service user-centred methods.

Method: After receiving 12 weeks of therapist-supported remote CR, service users were interviewed by a service user researcher following a semi-structured 18-question interview guide. Transcripts were analysed using reflexive thematic analysis with themes and codes further validated by a Lived Experience Advisory Panel and member checking.

Results: The study recruited 26 participants, almost all of whom reported high acceptability of remote CR, and some suggested improvements. Four themes emerged: (1) perceived treatment benefits, (2) remote versus in-person therapy, (3) the therapist's role, and (4) how it could be better.

Conclusions: This study used comprehensive service user involvement methods. For some participants, technology use remained a challenge and addressing these difficulties detracted from the therapy experience. These outcomes align with existing research on remote therapy, suggesting that remote CR can expand choice and improve access to treatment for psychosis service users once barriers are addressed. Future use of remote CR should consider technology training and equipment provision to facilitate therapy for service users and therapists.

Keywords: Cognition; Cognitive therapy; Digital psychological therapy; Metacognitive therapy; Psychosis; Remote therapy

Introduction

People who experience psychosis will often encounter cognitive difficulties such as forgetfulness, a struggle to focus, disorganised thinking and difficulties in planning, even in early psychosis (Wright *et al.*, 2019). These can significantly affect functioning, contribute to disability, and negatively affect quality of life (Sheffield *et al.*, 2018). A study led by a service user identified patients' priorities for recovery linked directly to cognition, including rebuilding skills for everyday life (Pitt *et al.*, 2007). Reducing cognitive difficulties can also benefit treatment uptake, engagement and retention, contributing to long-term recovery (Oathamshaw and Haddock, 2006).

Cognitive remediation (CR) is a psychological intervention targeting cognitive and functioning difficulties with evidence supporting its effectiveness with small to medium effect sizes (Vita *et al.*, 2021). Metacognition in the context of CR is usually defined as the capacity to regulate cognitive processes; for example, by planning, monitoring, and evaluating cognitive skills use, and knowledge, what individuals know about their cognition and other factors affecting cognitive skills and use in daily situations (Cella *et al.*, 2015). Best practice CR uses cognitive task practice to improve cognitive performance, teach strategy use, and support the implementation of strategies in daily life. CR sessions are supported by a therapist who supports the transfer of therapy learning to relevant clients' goals and scaffolds and adapts therapy demands to make these accessible and tailored to the client's needs and skills. Despite ample efficacy evidence, there are limited accounts of the experience of those who have used this therapy, with this information being important for acceptability and improving treatment procedures. A recent meta-analysis (Vita *et al.*, 2022) found high levels of engagement with treatment, but this was measured as drop-out from a trial and thus an indirect measure of satisfaction. When asked directly, service users are generally satisfied (Rose *et al.*, 2008). CR experts in a White Paper suggested four key ingredients in CR therapy that benefited recovery: (1) facilitation by a therapist, (2) cognitive exercise, (3) developing problem-solving strategies, and (4) procedures to facilitate transfer to real-world functioning (Bowie *et al.*, 2020). This was confirmed in the Vita *et al.* (2021) meta-analysis that showed greater benefit if treatments included all four ingredients. CIRCuiTS^{TM} (Computerised Interactive Remediation for Cognitive and Thinking Skills) is a therapist-supported CR software developed using a service user-centred experience procedure, utilising all four key elements from the White Paper, and has resulted in high acceptability (Reeder *et al.*, 2016) – a recent large-scale study demonstrated high levels of satisfaction with this treatment (Evans *et al.*, 2023). CIRCuiTS^{TM} contains the four ingredients highlighted in the White Paper.

Most studies have provided therapy in person, but remote therapy delivery has become increasingly popular due to its convenience and potential capacity to reach more service users (Godine and Barnett, 2013; Kocsis and Yellowlees, 2018). However, information on the acceptability of any intervention delivered remotely, especially from the service user's perspective, is limited. Despite recent reviews suggesting that remote CR provides clinical value with high retention rates (Gire *et al.*, 2017; Jagtap *et al.*, 2022), barriers remain. One which is prevalent in people with psychosis is a lack of digital literacy, skill and ownership (Robotham *et al.*, 2016; Spanakis *et al.*, 2022). A review of digital health interventions found that insufficient technology skills among service users was a recurring issue preventing engagement (Aref-Adib *et al.*, 2019).

This study aimed to evaluate service users' views on remote therapist-led CR, to progress implementation by filling the gaps in research on the remote format from service user perspectives whilst using participatory service user-centred research methods. The participatory methods used reduces the power imbalance that can affect participants' feedback and prioritise the views and experiences of those using services when interpreting the findings (Barber *et al.*, 2011).

Method

Design

A case series of individuals with psychosis completed 12 weeks of therapist-supported remote CR. After therapy ended, a service user researcher invited participants to take part in a feedback interview about their therapy experience. The research therapists were also interviewed to gain a deeper understanding of the context of issues raised by participants.

Participants and research therapists

Participants were individuals with psychosis using early intervention and community recovery services in the South London and Maudsley NHS Foundation Trust, referred by their healthcare professionals. Inclusion criteria were: (i) clinically stable (as judged by the referring clinician), (ii) using psychosis services, (iii) aged over 18, (iv) had a documented episode of non-affective psychosis according to DSM-5/ICD-10 criteria (assessed by case note review) and (v) able to provide informed consent. The exclusion criteria were: (i) inability to communicate sufficiently in English to access therapy, (ii) an underlying organic or neurological condition affecting cognition, (iii) co-morbid diagnosis of a learning disability, and (iv) recent change in anti-psychotic medication (in the last two weeks). Interview participation was compensated at £12 per hour.

Three research therapists provided the remote therapy using CIRCuiTS™, a remote CR software. They completed an online interactive CIRCuiTS™ training, which covered foundational and specialised CR therapy skills, including how to facilitate cognitive tasks practice, software usage, and the therapy model and formulation (Taylor *et al.*, 2023). The 25–hour flexible training involved clinical vignettes, mini-lectures, readings, and interactive learning, and culminated in a mandatory competence test to qualify as a CIRCuiTS™ therapist. Weekly supervision by an experienced clinical psychologist ensured adherence to the therapy model, manual and procedures. All therapists were interviewed at the end of their involvement to gain further context for participants' accounts of therapy. These therapist interviews were not included in the participants' analysis but are reported in the results below as they provide additional context for the therapy experience.

Intervention

The CIRCuiTS™ CR software included cognitive tasks targeting metacognition and taught cognitive strategies focusing on transference to everyday life. Therapists facilitated sessions remotely using video call software (Microsoft Teams and Zoom), focusing on engagement, strategy use, monitoring goal progress and promoting learning transfer. Participants were set up to receive remote CR during an initial onboarding session where their therapist showed them how to access and navigate the software. If participants did not own or had an incompatible computer or tablet, they were able to borrow a laptop for the duration of the study. CIRCuiTS™ was provided individually following a manualised protocol, with sessions lasting up to an hour approximately two to three times a week for a total of 40 hours over 12 weeks. Participants were also encouraged to complete an independent unfacilitated practice session each week. Participant contact time with therapists was confined to therapy sessions only, other than to address any session scheduling issues in between sessions or a brief call for technical support before joining the video session.

Measures

Feedback interviews

Interviews were semi-structured and adapted from schedules for evaluating technology-based intervention acceptability in people with psychosis (Cella *et al.*, 2022). There were 18 questions for participants, and 25 questions for research therapists (see appendices A and B in the Supplementary material for interview schedules). The questions covered: helpful aspects of therapy, potential improvements, remote treatment format, therapists, treatment barriers, feelings during therapy and session details. Interviews were recorded using video conferencing software and subsequently transcribed. Participants completed the interviews online, except for two who preferred an in-person format.
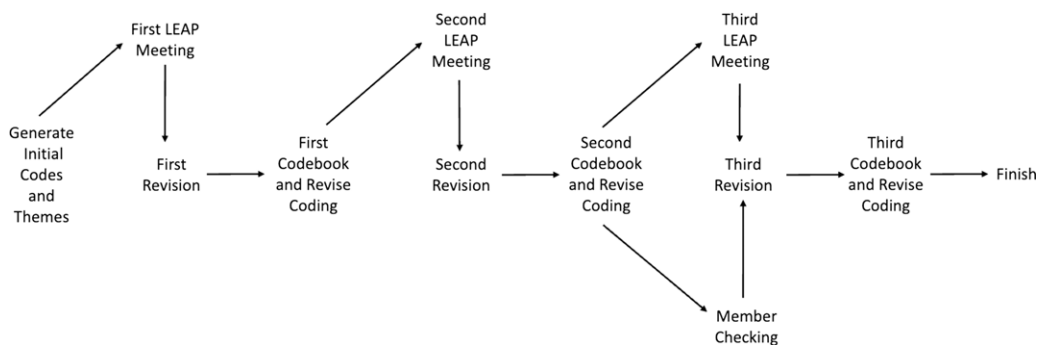
Figure 1. The data analysis process.

Assessments

In addition, quantitative information was collected at baseline and post-therapy, including socio-demographic information, cognitive assessments (CANTAB tests assessing executive functioning, memory and learning memory, attention and working memory; Estrada *et al.*, 2020), familiarity with technology (Sedgwick *et al.*, 2021), symptoms using the PANSS (Kay *et al.*, 1987) and functioning using the time use survey (Cella *et al.*, 2016). The results of these assessments are reported elsewhere (Cella *et al.*, n.d.).

Procedure

After all therapy and post-therapy assessments were completed, participants were invited to participate in an online study evaluating their opinions of receiving remote therapy. All interviews lasted between 30 and 60 minutes and were conducted, recorded, transcribed and checked.

Service user involvement

The study design and interview schedule were informed by consultations with the service user FAST-R group (NIHR Maudsley BRC, 2017), a service where people with relevant lived experience advise on study design, procedure and materials. A Lived Experience Advisory Panel (LEAP) of six individuals with relevant lived experience supported study management and research procedures. The LEAP met five times throughout the project and supported the analysis by refining and validating the codes and themes. To support contributions to the analysis, the service user researcher trained the LEAP to code using the produced codebook for added inter-rater validity. All are co-authors of this paper. Two study participants were involved in member checking to ensure accuracy in the interpretation of their interview by showing them their analysed transcripts.

Data analysis

A reflexive thematic analysis following an inductive experiential approach (Braun and Clarke, 2019), with LEAP participation and member checking enabling direct inquiry into the perspectives of participants. Reflexivity was achieved throughout the analysis by: (1) considering the positionality of the service user researcher (L.P.) through regular reflective discussions with senior researchers (M.C., A.S.), (2) the service user researcher engaging in independent reflection by introspection, and (3) facilitating the LEAP to reflect on the feedback they gave by prompting them to engage in introspection. The analysis, shown in Fig. 1, was conducted using NVivo (version: Release 1.7).

Table 1. Baseline clinical and demographic characteristics

Characteristic	Mean (*SD*) or *n* (%)
Age	40.23 (12.21)
Gender, *n* (%)	
Men	16 (61.53%)
Women	10 (38.46%)
Ethnicity, *n* (%)	
White	12 (46.15%)
Black	13 (50.00%)
Asian	1 (3.85%)
Employment, *n* (%)	
Unemployed	18 (69.23%)
Full-time	4 (15.38%)
Part-time	2 (7.69%)
Full-time education	2 (7.69%)
PANSS Positive[1]	12.43 (.91)
PANSS Negative[2]	13.52 (1.36)
PANSS General[3]	27.19 (1.36)
Structured Economic Activity[4]	69.27 (13.80)
One Touch Stockings of Cambridge[5]	9.38 (.68)
Pair Associative Learning[6]	25.62 (3.82)
Rapid Visual Information Processing[7]	448.52 (32.79)
Spatial Working Memory[8]	14.57 (1.97)
Emotion Recognition[9]	2438.83 (227.85)

[1]PANSS Negative, negative psychosis symptoms (ranging 7–49, higher scores indicate more symptoms). [2]PANSS Positive, positive psychosis symptoms (ranging 7–49, higher scores indicate more symptoms). [3]PANSS General, general psychosis symptoms (ranging 16–112, higher scores indicate more symptoms). [4]Structured Economic Activity, how many hours a month spent engaged in structured economic activities. [5]One Touch Stockings of Cambridge, executive function (ranging 0–15, lower scores indicate poorer performance). [6]Paired Associative Learning, visual memory and new learning (ranging 0–70, higher scores indicate poorer performance). [7]Rapid Visual Information Processing, sustained attention (ranging 100–1900, higher scores indicate poorer performance). [8]Spatial Working Memory, executive function and memory (ranging 0–90, higher scores indicate poorer performance). [9]Emotion recognition, affect recognition (higher scores indicate poorer performance).

Interviews were transcribed orthographically and included hesitations, pauses, repetition and overlapping speech. After familiarisation, the service user researcher coded the transcripts, noting anything significant to the research aims and objectives. Relevant or sufficiently frequent codes (mentioned by two or more participants) were grouped to form provisional themes and subthemes. Themes were presented to the LEAP by the service user researcher, who, as a group, reviewed at least one excerpt from each subtheme and provided feedback on their structure and accuracy. Following LEAP feedback, the research team (service user researcher with regular input and checking from both senior researchers) revised the themes and codes, collapsing, combining, and re-defining them to create a codebook – which included the code/theme name, definition, and examples. The cycle of coding, presenting and revising was repeated twice. During the last cycle, LEAP members each independently coded one participant interview as a further validation check, and two study participants reviewed their analysed interviews as a member check by meeting with the service user researcher to validate the interpretation of the views they had expressed during their interview. The analysis finished with a final round of revisions to the themes by the research team and the subsequent write-up.

Results

Twenty-six people (96.66% of potential participants) participated in the feedback interviews. The clinical and demographic characteristics are presented in Table 1. Our participants had cognitive scores aligned with a recent study employing CR in early intervention services with psychosis service users (Wykes *et al*., 2023). The baseline and post-therapy scores of the one participant who declined to be interviewed did not significantly vary from those of the 26 participants, having

completed the entire course of therapy (thus unlikely to have given a vastly different perspective of acceptability).

Interviews lasted approximately 30 minutes, and all except one were completed in a single session. Four themes emerged: (1) perceived treatment benefits, (2) remote versus in-person therapy, (3) the therapist's role, and (4) how it could be better. There appeared no pattern of age, gender or ethnicity with any of the themes. In the supporting excerpts, **IN** denotes the interviewer and **P** the participant. All supporting excerpts are presented in Appendix C of the Supplementary material.

Perceived treatment benefits

Participants discussed the different benefits gained from and during their treatment process, explicitly or implicitly. Almost all mentioned the enjoyment they derived from therapy as a primary benefit. Some used the words 'fun' and 'game' when describing the CIRCuiTS^{TM} tasks. Many participants found therapy to be a respite and a good investment of their time, providing structure to their week. Many reported no dislike for the therapy, and some even expressed a desire for more sessions:

> P06: *I felt enjoyment. Yeah, 'cause it was fun.*

> P11: *It just felt like a good, good, you know, good use of my time.*

Many participants reflected implicitly and explicitly on treatment benefits aligning with cognitive improvements and metacognition. Almost all said that by becoming more aware of their strengths and difficulties, they better understood how they approach everyday problems, which improved their lives. A few participants expressed that they now had a more accurate understanding of their abilities and a more compassionate attitude towards themselves and areas where they struggle.

> P28: *Help me the most was um, looking through the task that I did. And thinking about what I can improve on.*

One of the most mentioned beneficial outcomes was learning cognitive strategies that participants applied to their day-to-day lives, aligning with CR's underlying aim to improve functioning. However, one participant sometimes found choosing a strategy too constraining:

> P06: *We'd talk about the strategy that it could apply to in life and it was really nice drawing those parallels.*

Most found that therapy helped with cognitive and practical goals such as getting a job interview, exercising more or improving organisational skills. P10 mentioned that therapy did not help with their current life goals, but the skills they learnt were valuable, and they could see how the therapy would benefit their future goals:

> P08: *I think the CRT has given me building blocks and tools to be able to deliver my deliverables at work, basically, yeah.*

> P10: *I feel like I have other issues that can't really be dealt with through doing the CRT, although it was useful and I found it helpful.*

Many participants said that engaging with therapy via the remote format had improved their technology skills, with some citing improved digital literacy as one of their most important

learning points. This is also supported by the outcomes of the familiarity with technology assessment, which suggested increased confidence in using technology from baseline to post-therapy:

P06: ... *I expanded my horizons with with technology a little bit.*

Remote versus in-person therapy

The participants shared a wide range of advantages and disadvantages of both in-person and remote therapy. The most mentioned advantage was flexibility in time and location. Participants liked not having to travel and found it easier to slot sessions into their day-to-day life. Some also found it less socially pressuring than in-person therapy, enabling them to concentrate better and feel less insecure about making mistakes:

P08: *I think it's just the greater flexibility of being able to fit it across school schedule, timetable, and your commitments really.*

P10: *I feel like having um ... somebody there in the room with me would have made me feel a little bit of pressure.*

Although participants were generally happy with the remote format, some identified downsides or benefits exclusive to in-person therapy. The main disadvantages were the lack of human connection and in-person communication when using technology. Some participants also highlighted that off-screen physical cues and body language might go unnoticed:

P12: *Um ... You can read body language and, eye contact ... and ... stuff like that.*

Almost all participants were happy with the remote format, and most favoured it ($n = 17$), but a few would still have preferred in-person ($n = 5$) or a mix of both ($n = 4$). Some noted that format preference depends on the individual, while others believed treatment format would not make a difference:

P08: *I feel like it depends on your circumstances, and what your preferences are. That's my honest answer.*

A few participants were ambivalent when asked which treatment format worked best, with some clear discrepancies when reporting which format they preferred and which they believed was superior:

P21: *I think it would be better if it were face to face.*

[— Later in the interview —] P21: ... *I'd probably prefer to have it remotely.*

The therapist's role

Therapist support emerged throughout all interviews as a crucial therapy component, either explicitly or implicitly. Support can be one of two types: therapeutic (emotional or metacognitive support) and practical (guide CIRCuiTS™ tasks or session scheduling):

P10: *She was supportive, and she validated me and stuff and encouraged me. That was helpful.*

Participants valued the therapist's facilitation of metacognition through encouraging introspection, reflection, and helpful insights. Participants valued these insights as something that they could not have gained independently:

> P02: *Umm. She made me think about ... Why and how I've made decisions.*

Often participants referred to the safety and self-assuredness facilitated by the therapist using these terms directly, such as 'confident' and 'non-judgemental', or indirectly by saying how they felt safe in the therapeutic space. A few said they were unafraid of making a mistake or being judged:

> P06: *Um,* [Therapist] *was really strong and very good at what she did and made me feel, you know, feel sort of safe and secure ...*

A few highlighted how important it was for the facilitator to be trained and highlighted their expertise, emphasising that they were qualified professionals with the necessary knowledge, skills and expertise. The therapists' technology skills were important for many to overcome technical issues and teach technology skills:

> P13: *I think a therapist that's there knows what they're doing, they know what to say, they know how to answer someone's question. So yeah, it's important.*

Almost all believed that the therapist was essential and said that the experience would be dehumanised without a therapist, and they would not have engaged or benefited as much. A few suggested that therapy without the therapist may be possible, but success would vary from person to person:

> P13: *A therapist needs to be there.*

> P34: *Can be, but I'd still like the therapist, like someone to show you you're doing it right.*

How it could be better

Most participants found the CIRCuiTS™ tasks appropriately challenging and engaging. However, some reported that they were occasionally too complex or not challenging enough:

> P22: *Yeah there was a point which it got too difficult.*

> P10: *Uhm, I sometimes get a bit bored. I don't know if I did it enough to increase the difficulty of it though, a lot of it was quite easy. And it, it wasn't challenging.*

Barriers to attendance included mood, forgetfulness, technology problems, and scheduling difficulties. But they reported that they overcame barriers, and therapy proceeded successfully:

> P10: *I suppose my own mood and emotions and stuff and uh my circumstances sometimes make me forget ...*

> P13: *... I wouldn't be able to potentially do it to the best I can because of the, the function of the laptop ...*

Participants generally believed this treatment was suitable for individuals with psychosis but not those with active psychosis. The potential barriers they identified included experiencing technology-related or demotivating delusions, medication side-effects and the lack of in-person presence. However, one participant (P32) had increasingly more active psychosis and welcomed CIRCuiTS™ as a respite from their hallucinations:

P06: *For me, technology is a real sort of part of my psychosis* ...

P32: *... at least that two days I'll get ... Like a break from the voices* ...

Few participants reported any dislikes, although some suggested improvements, including (1) making the software compatible with mobile phones, (2) a post-therapy strategy list to refer to, (3) a taster session to get acquainted with the technology, (4) providing more autonomy to change CIRCuiTS™ task difficulty and focus, and (5) tailoring the number of sessions to meet individual needs better:

P10: *Maybe if you were able to make it available on smartphones.*

P08: *I think just having a list of your overall strategy.*

P06: *I think maybe having a taster and sort of realising that it's fine online* ...

P10: *be able to ... pick ... you know, an area and do tasks related to that* ...

P12: *I would have liked to have been able to continue on my own without a therapist.*

Therapist insights

All three therapist interviews focused on technology. As did participants, the therapists identified that participants gained valuable technology skills to use beyond the therapy setting, enabling them to connect digitally with the wider world. They all observed that clients relied heavily on them to navigate hardware and software, especially at the start of therapy but often throughout. The therapists reported that the therapeutic alliance was successful online but missed the closeness of the in-person format. One therapist specified that, as with any treatment, the success of remote versus in-person will vary depending on the client's individual circumstances. They identified digital illiteracy as the primary challenge that participants lacked knowledge and familiarity with technical terminology and use. All therapists highlight that digital inclusion needs further attention for the remote delivery of CR to fulfil its potential. However, therapists explained that the main cause for missing sessions was participants forgetting or not feeling up to it, rather than a technology issue – which, although more frequent, did not prevent attendance.

Discussion

Using participatory service-user-centred methods, this study demonstrates that remote therapist-led CR was well-received, easy to access and acceptable to service users. Participants reported various treatment benefits, including enjoyment, added structure, achieving goals, and benefits lasting beyond therapy, including using cognitive strategies, metacognition, and cognitive skills more efficiently. These findings align with the emerging literature suggesting that remote CR is acceptable and beneficial (Gire *et al.*, 2017; Jagtap *et al.*, 2022). It was clear from the participants' accounts that having the therapist facilitate the sessions was a key component of success, as

previously identified (Vita *et al.*, 2021). The advantages included normalising experiences and difficulties, helping with technology issues, facilitating metacognition, and providing safety and self-assuredness.

The analysis also identified many of the well-known advantages (flexibility and convenience) and disadvantages (technology problems and lack of human element) of remote therapy, aligning with existing research (Godine and Barnett, 2013). Even though most participants said they preferred remote therapy, some still reported that in-person treatment would generally work best. Rosenberg (2020) argued that this misalignment might be influenced by participants' and therapists' inexperience with remote treatments and apprehensions about developing a successful therapeutic alliance. However, evidence suggests that good therapeutic bonds and alliances can develop in remote therapies, with research suggesting that this can even be stronger (Tremain *et al.*, 2020).

These results support the widely discussed view that digital literacy and technology ownership are significant barriers to service users' access to therapy. While the 'digital divide' is thought to be reducing for people who experience psychosis, ownership of technology necessary to support the remote therapy software may still be below general population levels (Naslund and Aschbrenner, 2021; Townsend *et al.*, 2016). A further issue highlighted by participants, which resonates with the literature, is digital literacy (Merchant *et al.*, 2020). Participants often commented on how digital therapies can and did provide learning, experience and confidence in using technologies. Their statements are supported by the familiarity with technology outcomes (data reported in Cella *et al.*, n.d.), which demonstrated a significant improvement in familiarity with remote calling platforms. With technology use and skills increasingly essential for everyday activities, this may be a further benefit associated with remote therapy modality.

Strengths, limitations and future research

The main strength of this study was the level of service user involvement from the project design to dissemination. There is evidence that studies conducted with high levels of service user involvement provide more open feedback and are more feasible (Ennis and Wykes, 2013). The analytic process had input from the LEAP, which helped to align the findings with the participants' actual perceptions. Member checking with two of the service users provided an additional type of validation, although this is too few participants to be considered a substantial aspect of the analysis. The participatory method is novel, as the research team supported service user involvement and provided the LEAP with skills to code transcripts and independently conduct portions of the analyses. When reflecting on their involvement, LEAP members highlighted their contribution to the analysis as valuable in learning transferable skills. This method ensured that the LEAP and the research team relationship was of reciprocal value.

One limitation may be hesitancy to critique due to the perceived inclusion of the service user researcher with the therapists. However, participants did provide a large amount of feedback with a breadth of detail, both positive and not so positive, so this may not have had a significant impact. Additionally, now realising the extent of the influence of digital literacy and skill, more data on these areas would have provided further valuable context and detail.

Future studies should consider minimising technology-related difficulties to save time and effort and ease frustrations for both practitioners and service users (Camacho and Torous, 2022). In this study, steps were taken to anticipate, prevent, and solve technology-related issues. Technology ownership was assessed at baseline, and participants without a compatible device could borrow a laptop from the research team. Other common issues of remote therapy were managed during the participants' onboarding session (e.g. the need for a private space and reliable internet connection).

Despite some technology-based issues, poor digital literacy was the main barrier, not hardware or software. A limitation of our current approach was that therapists did not receive training to support technology use amongst people with poor digital literacy. The research therapists also identified the lack of training or dedicated IT support as a barrier during therapy. While this would benefit future implementation of remote CR, the issues experienced by participants were often related to a unique set of circumstances and, therefore, are difficult to include in standard training. With now a better understanding of the significant impact of poor digital literacy, it is clear that asking participants about specific issues around digital literacy would have been valuable and that further research on this issue is warranted. Although participants did not mention anything beyond the therapist support they received that may have supported their technology use, it is likely that trained technical support and resources such as video tutorials on how to log in or troubleshoot issues would have been beneficial. Creating digital inclusion resources and teaching therapists support skills tailored to people with psychosis could overcome the barrier of digital illiteracy.

Conclusion

Services offer limited access to psychological therapies, and the poor availability of trained clinicians and lack of access to digital technology may restrict their reach. This study showed that the remote provision of CR is acceptable and often preferred, and with therapist support, this method can expand service user choice and improve access to CR.

References

Aref-Adib, G., McCloud, T., Ross, J., O'Hanlon, P., Appleton, V., Rowe, S., Murray, E., Johnson, S., & Lobban, F. (2019). Factors affecting implementation of digital health interventions for people with psychosis or bipolar disorder, and their family and friends: a systematic review. *The Lancet Psychiatry*, 6, 257–266. https://doi.org/10.1016/S2215-0366(18)30302-X

Barber, R., Beresford, P., Boote, J., Cooper, C., & Faulkner, A. (2011). Evaluating the impact of service user involvement on research: a prospective case study. *International Journal of Consumer Studies*, 35, 609–615. https://doi.org/10.1111/j.1470-6431.2011.01017.x

Bowie, C. R., Bell, M. D., Fiszdon, J. M., Johannesen, J. K., Lindenmayer, J. P., McGurk, S. R., Medalia, A. A., Penadés, R., Saperstein, A. M., Twamley, E. W. and Ueland, T., & Wykes, T. (2020). Cognitive remediation for schizophrenia: an expert working group white paper on core techniques. *Schizophrenia Research*, 215, 49–53. https://doi.org/10.1016/j.schres.2019.10.047

Braun, V., & Clarke, V. (2019). Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health*, 11, 589–597. https://doi.org/10.1080/2159676X.2019.1628806

Camacho, E., & Torous, J. (2022). Impact of digital literacy training on outcomes for people with serious mental illness in community and inpatient settings. *Psychiatric Services*. https://doi.org/10.1176/appi.ps.20220205

Cella, M., Edwards, C., & Wykes, T. (2016). A question of time: a study of time use in people with schizophrenia. *Schizophrenia Research*, 176, 480–484. https://doi.org/10.1016/j.schres.2016.06.033

Cella, M., Parri, L., Wang, K., Quinn, R., Oyeleye, O., Jin, H., Wykes, T. (n.d.). Evaluating remote delivery of cognitive remediation in people with psychosis [manuscript under review].

Cella, M., Reeder, C., & Wykes, T. (2015). Lessons learnt? The importance of metacognition and its implications for cognitive remediation in schizophrenia. *Frontiers in Psychology*, 6, 1259. https://doi.org/10.3389/fpsyg.2015.01259

Cella, M., Tomlin, P., Robotham, D., Green, P., Griffiths, H., Stahl, D., & Valmaggia, L. (2022). Virtual Reality Therapy for the Negative Symptoms of Schizophrenia (V-NeST): a pilot randomised feasibility trial. *Schizophrenia Research*, 248, 50–57. https://doi.org/10.1016/j.schres.2022.07.013

Ennis, L., & Wykes, T. (2013). Impact of patient involvement in mental health research: longitudinal study. *British Journal of Psychiatry*, 203, 381–386. https://doi.org/10.1192/bjp.bp.112.119818

Estrada, F., Crosas, J. M., Ahuir, M., Pérez-Muñoz, S., Zabala, W., Aguayo, R., Barbero, J. D., Montalvo, I., Tost, M., Llauradó, L., Guardia, A., Palao, D., Monreal, J. A., & Labad, J. (2020). Free thyroxine concentrations moderate the response to a cognitive remediation therapy in people with early psychosis: a pilot randomized clinical trial. *Frontiers in Psychiatry*, 11, 636. https://doi.org/10.3389/fpsyt.2020.00636

Evans, J., Tinch-Taylor, R., Csipke, E., Cella, M., Pickles, A., McCrone, P., Stringer, D., Oliver, A., Reeder, C., Birchwood, M., & Fowler, D. (2023). Satisfaction with cognitive remediation therapy: its effects on implementation and outcomes using the cognitive remediation satisfaction scale. *Schizophrenia*, 9, 67. https://doi.org/10.1038/s41537-023-00390-9

Gire, N., Farooq, S., Naeem, F., Duxbury, J., McKeown, M., Kundi, P. S., Chaudhry, I. B., & Husain, N. (2017). mHealth based interventions for the assessment and treatment of psychotic disorders: a systematic review. *MHealth*, 3, 33. https://doi.org/10.21037/mhealth.2017.07.03

Godine, N., & Barnett, J. E. (2013). The use of telepsychology in clinical practice: benefits, effectiveness, and issues to consider. *International Journal of Cyber Behavior, Psychology and Learning*, 3, 70–83. https://doi.org/10.4018/ijcbpl.2013100105

Jagtap, S., Romanowska, S., Leibovitz, T., Onno, K. A., Burhan, A. M., & Best, M. W. (2022). Can cognitive remediation therapy be delivered remotely? A review examining feasibility and acceptability of remote interventions. *Schizophrenia Research*. Cognition, 28, 100–238. https://doi.org/10.1016/j.scog.2022.100238

Kay, S. R., Fiszbein, A., & Opler, L. A. (1987). The Positive and Negative Syndrome Scale (PANSS) for schizophrenia. *Schizophrenia Bulletin*, 13, 261–276. https://doi.org/10.1093/schbul/13.2.261

Kocsis, B. J., & Yellowlees, P. (2018). Telepsychotherapy and the therapeutic relationship: principles, advantages, and case examples. *Telemedicine Journal and E-Health*, 24, 329–334. https://doi.org/10.1089/tmj.2017.0088

Merchant, R., Torous, J., Rodriguez-Villa, E., & Naslund, J. A. (2020). Digital technology for management of severe mental disorders in low-and middle-income countries. *Current Opinion in Psychiatry*, 33, 501. https://doi.org/10.1097/YCO.0000000000000626

Naslund, J. A., & Aschbrenner, K. A. (2021). Technology use and interest in digital apps for mental health promotion and lifestyle intervention among young adults with serious mental illness. *Journal of Affective Disorders Reports*, 6, 100227. https://doi.org/10.1016/j.jadr.2021.100227

NIHR Maudsley BRC (2017). *Getting a FAST-R assessment of your research*. https://www.maudsleybrc.nihr.ac.uk/posts/2017/february/getting-a-fast-r-assessment-of-your-research/

Oathamshaw, S. C., & Haddock, G. (2006). Do people with intellectual disabilities and psychosis have the cognitive skills required to undertake cognitive behavioural therapy? *Journal of Applied Research in Intellectual Disabilities*, 19, 35–46. https://doi.org/10.1111/j.1468-3148.2005.00284.x

Pitt, L., Kilbride, M., Nothard, S., Welford, M., & Morrison, A. P. (2007). Researching recovery from psychosis: a user-led project. *Psychiatric Bulletin*, 31, 55–60. https://doi.org/10.1192/pb.bp.105.008532

Reeder, C., Pile, V., Crawford, P., Cella, M., Rose, D., Wykes, T., Watson, A., Huddy, V., & Callard, F. (2016). The feasibility and acceptability to service users of CIRCuiTS, a computerised cognitive remediation therapy programme for schizophrenia. *Behavioural and Cognitive Psychotherapy*, 44, 288–305. https://doi.org/10.1017/S1352465815000168

Robotham, D., Satkunanathan, S., Doughty, L., & Wykes, T. (2016). Do we still have a digital divide in mental health? A five-year survey follow-up. *Journal of Medical Internet Research*, 18, e309. https://doi.org/10.2196/jmir.6511

Rose, D., Wykes, T., Farrier, D., Doran, A.-M., Sporle, T., & Bogner, D. (2008). What do clients think of cognitive remediation therapy?: A consumer-led investigation of satisfaction and side effect. *American Journal of Psychiatric Rehabilitation*, 11, 181–204. https://doi.org/10.1080/15487760801963694

Rosenberg, D. D. (2020). *Psychotherapy By Telehealth: Tele-Therapy is Effective and Develops a Positive Therapeutic Alliance*. Shorehaven Behavioral Health, Inc. 4. https://www.shorehavenbhi.com/2023pdfs/Psychotherapy-by-telehealth.pdf

Sedgwick, O., Hardy, A., Greer, B., Newbery, K., & Cella, M. (2021). "I wanted to do more of the homework!"-Feasibility and acceptability of blending app-based homework with group therapy for social cognition in psychosis. *Journal of Clinical Psychology*, 77, 2701–2724. https://doi.org/10.1002/jclp.23193

Sheffield, J. M., Karcher, N. R., & Barch, D. M. (2018). cognitive deficits in psychotic disorders: a lifespan perspective. *Neuropsychology Review*, 28, 509–533. https://doi.org/10.1007/s11065-018-9388-2

Spanakis, P., Wadman, R., Walker, L., Heron, P., Mathers, A., Baker, J., Johnston, G., Gilbody, S., & Peckham, E. (2022). Measuring the digital divide among people with severe mental ill health using the essential digital skills framework. *Perspectives in Public Health*, https://doi.org/10.1177/17579139221106399

Taylor, R., Crowther, A., Tinch-Taylor, R., da Cunha Lewin, C., Cali, C., Reeder, C., Cella, M., Wykes, T. (2023). Evaluation of a new online cognitive remediation therapy (CIRCuiTS™) training for mental health professionals. *Psychology and Psychotherapy: Theory, Research and Practice*. https://doi.org/10.1111/papt.12510

Townsend, L., Zippay, A., Caler, K., & Forenza, B. (2016). Technology and opportunity: people with serious mental illness and social connection. *Journal of the Society for Social Work and Research*, 7, 371–393. https://doi.org/10.1086/686882

Tremain, H., McEnery, C., Fletcher, K., & Murray, G. (2020). The therapeutic alliance in digital mental health interventions for serious mental illnesses: narrative review. *JMIR Mental Health*, 7, e17204. https://doi.org/10.2196/17204

Vita, A., Barlati, S., Ceraso, A., Deste, G., Nibbio, G., & Wykes, T. (2022). Acceptability of cognitive remediation for schizophrenia: a systematic review and meta-analysis of randomized controlled trials. *Psychological Medicine*, 1–11. https://doi.org/10.1017/S0033291722000319

Vita, A., Barlati, S., Ceraso, A., Nibbio, G., Ariu, C., Deste, G., & Wykes, T. (2021). Effectiveness, core elements, and moderators of response of cognitive remediation for schizophrenia: a systematic review and meta-analysis of randomised clinical trials. *JAMA Psychiatry*, 78, 848–858. https://doi.org/10.1001/jamapsychiatry.2021.0620

Wright, A. L., Phillips, L. J., Bryce, S., Morey-Nase, C., & Allott, K. (2019). Subjective experiences of cognitive functioning in early psychosis: a qualitative study. *Psychosis: Psychological, Social and Integrative Approaches*, 11, 63–74. https://doi.org/10.1080/17522439.2019.1571623

Wykes, T., Stringer, D., Boadu, J., Tinch-Taylor, R., Csipke, E., Cella, M., Pickles, A., McCrone, P., Reeder, C., Birchwood, M., Fowler, D., Greenwood, K., Johnson, S., Perez, J., Ritunnano, R., Thompson, A., Upthegrove, R., Wilson, J., Kenny, A., . . . & Joyce, E. M. (2023). Cognitive remediation works but how should we provide it? An adaptive randomized controlled trial of delivery methods using a patient nominated recovery outcome in first-episode participants. *Schizophrenia Bulletin*, sbac214. https://doi.org/10.1093/schbul/sbac214