



Cognitive Enhancement Therapy in Early Schizophrenia: A Qualitative and Quantitative Case Series of Patients' Experiences

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Abstract Evidence shows that cognitive remediation therapy improves cognition in individuals with schizophrenia. However, its broader impact on patients' lives remains unclear. Furthermore, little is known about the motivational factors influencing treatment engagement. This quantitative and qualitative case series study identified factors that influence patients' experiences while receiving cognitive enhancement therapy (CET). Nine individuals with schizophrenia who received CET completed two

questionnaires and participated in semi-structured focus groups or in an individual interview about their experience with CET. Four deductive themes were assessed when analyzing responses: (1) perceived impact, (2) motivational facilitators, (3) motivational barriers, and (4) suggestions to improve CET. All participants reported that CET was helpful, and the majority enjoyed participating in CET. Most participants reported high satisfaction with their work and school, but lower satisfaction with their social life. Results also indicated perceived improvements in negative symptoms, neurocognition, and confidence following CET. Participants identified extrinsic, intrinsic, and program-specific facilitators and barriers

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motivating their participation in the program. Suggestions to improve CET included changes to treatment design and content. Altogether, these results indicate that the perspective of CET end users can provide useful information on the factors influencing treatment engagement, satisfaction, and perceived impact.

Keywords Schizophrenia · Cognition · Cognitive remediation · Cognitive enhancement therapy · Motivation

Background

Schizophrenia is a chronic and severely disabling mental health disorder characterized by positive symptoms, negative symptoms, and cognitive deficits [4, 32, 40]. Since cognitive deficits are a strong predictor of poor functional capacity and quality of life, they represent a critical treatment target [7, 32]. Furthermore, although pharmacological treatments for schizophrenia are effective in treating positive and, to some extent, negative symptoms [58], cognitive deficits tend to persist [41]. This has led to the development of alternative interventions such as cognitive remediation, which aim to improve cognitive and daily functioning in individuals with schizophrenia [7]. Numerous studies have supported the efficacy of cognitive remediation programs for improving cognitive and functional outcomes in schizophrenia [9, 43, 62]. One approach to cognitive remediation is Cognitive Enhancement Therapy (CET) [35]. In addition to neurocognitive domains such as attention, memory, and problem-solving, CET specifically targets social cognition [21, 29, 36, 37]. During CET, individuals complete 18 months of neurocognitive training exercises in pairs with the aid of a CET therapist/coach, along with structured social-cognitive group sessions relevant to individual participant recovery goals [21, 29, 36, 37].

Several studies have shown that CET leads to improvements in neurocognitive, social-cognitive, and functional outcomes, which persist following treatment (e.g. [20–23, 25, 36]). However, there is limited research on participants' subjective experiences during CET and other cognitive remediation treatments, as well as their broader impact on participants' lives, beyond routinely measured

neurocognitive and social-cognitive outcomes. Traditionally, the acceptability of cognitive interventions is inferred by the number of missed sessions [50], in lieu of directly asking participants. Along with generally low adherence to homework across cognitive remediation studies [6], a meta-analysis of cognitive remediation therapies for schizophrenia indicated a pattern of difficulty with engagement similar to issues faced in other psychotherapies, with attrition rates that can be as high as 47.5% [62]. Where reported, the attrition rate for CET has been comparable to other cognitive remediation trials [23].

Beyond attrition rates as an indicator of subjective experience, the field has yet to examine personal factors that might influence engagement in cognitive remediation, as well as its effectiveness. Subjective awareness of neurocognitive improvement (i.e. perceived competence) has shown to increase engagement, task persistence, and learning among individuals with schizophrenia [16]. Moreover, factors such as task relevance, task interest and the amount of control or autonomy individuals have in learning situations contribute to motivation to engage in cognitive remediation [12, 31]. A prosocial treatment setting has also shown to foster intrinsic motivation for treatment, retention, and positive transfer effects in psychiatric samples, including individuals with schizophrenia [15, 42, 54]. Nevertheless, qualitative research on the factors that motivate participation and completion of cognitive remediation programs is limited [17, 62]. A better understanding of subjective factors contributing to cognitive remediation engagement could aid in the development of more engaging cognitive treatments and reduce attrition rates [28].

Mixed qualitative and quantitative methods have been suggested as a potential useful tool to identify critical information which could be used to improve engagement to cognitive interventions [5]. Hence, the current quantitative and qualitative case series study aimed to investigate patients' experience of CET using two questionnaires, two semi-structured focus groups, and one individual interview in a sample of nine individuals with schizophrenia who underwent CET treatment. Using a thematic content analysis, we analyzed responses related to four deductive themes: (1) perceived impact, (2) motivational facilitators, (3) motivational barriers, and (4) suggestions to improve CET. We hypothesized that participants would report positive levels of satisfaction with the CET program in

terms of helpfulness and enjoyment, as well as perceived improvements in life satisfaction and cognitive functioning following CET. Moreover, we expected to identify factors motivating or hindering participants' engagement and satisfaction with CET, as well as useful suggestions for CET improvement.

Methods

Study Design and Participants

This study was embedded within a large-scale multi-site randomized-controlled trial [61, in revision] (NCT #01561859). The participants included in the current study were 9 individuals referred to the Beth Israel Deaconess Medical Center (BIDMC) in Boston, Massachusetts by programs specialized in treating early-course schizophrenia. A total of 8 of these participants were randomized in the clinical trial, while one received CET after being initially randomized to the EST group. Therefore, this participant was excluded from the assessments and analyses of the larger trial, but was still invited to participate in the focus group session. The BIDMC Institutional Review Board approved all procedures, and all participants provided written informed consent. Participants were also asked to provide additional verbal consent before participating in the in-person interview or focus groups. Eligibility criteria for the study are outlined in the Supplementary Methods section of the Online supplement.

Procedure

Cognitive Enhancement Therapy

During CET, participants met with the trained coach in weekly individual sessions to create co-developed treatment plans complementary to personal recovery goals. Participants were assigned to pairs and completed approximately 60 h of a computer-assisted neurocognitive training (weekly 1-h sessions) in attention, memory, and problem solving. Further, participants were enrolled in forty-five weekly social-cognitive group sessions facilitated by the CET coaches involving 6–8 participants (one and a half hours per week). Participants were treated with CET

for up to 18 months. CET program content has been described in detail in previous reports [20, 35–37].

Participants' clinical symptoms severity, neurocognitive and socio-cognitive outcomes as well as life satisfaction was assessed at baseline, 9-month and 18-month follow-up. Treatment responses on those outcomes are reported in the full intent-to-treat sample ($n = 102$) in Wojtalik et al. [61, in revision]. Following their participation in CET, participants from BIDMC were then invited to complete two satisfaction questionnaires and to participate in either a focus group or an individual interview about their experience with CET.

Baseline Assessments

Neurocognitive and socio-cognitive functioning were assessed using composite scores corrected for age and sex from the Measurement and Treatment Research to Improve Cognition in Schizophrenia (MATRICS) [30]. Participants' level of life satisfaction was also assessed using overall composite scores of The World Health Organization Quality of Life (WHOQOL Group [60]) across domains of psychological health, social relationships and environment. Participants' negative and positive symptoms were assessed using the total scores of the Scale for the Assessment of Negative Symptoms (SANS) [2], and the Scale for the Assessment of Positive Symptoms (SAPS) [1], respectively.

Questionnaires

The CET satisfaction questionnaire addressed participants' level of satisfaction regarding perceived helpfulness and enjoyment of CET components (i.e. individual coaching, computer sessions, group lectures, group activities) as well as their perceived neurocognitive improvement. Participants were told that CET is designed to be helpful and enjoyable and that choosing “not at all” or a “a little” to describe the level of helpfulness and enjoyment of CET had negative implications. Moreover, they were told that choosing “neutral” implied that their experience was neither negative nor positive. This questionnaire also allowed them to provide open-ended feedback. The life satisfaction questionnaire addressed participants' level of satisfaction with their social life, occupation, and recovery. Questionnaires were filled in during the

focus group or interview sessions and are presented in the Supplementary Methods section of the Online supplement.

Focus Groups and Individual Interview

Two semi-structured focus groups ($n = 8$) and one individual interview ($n = 1$) were conducted to identify factors influencing participants' experience with CET. These qualitative assessments were conducted by a researcher who has experience working with individuals with schizophrenia (S.G.) and guided by a semi-structured interview (see Supplementary Methods section of the Online supplement). The questions in the semi-structured interview were selected to highlight factors suggested to be related to motivation and engagement in cognitive remediation in the literature and were divided in four predetermined themes: (1) perceived impact, (2) motivational facilitators, (3) motivational barriers, and (4) suggestions to improve CET. The focus groups and interview were video-recorded and transcribed into anonymized verbatim transcripts by L.O and S.T. Two other Authors (S.G., S.P) collected field observations and comments, and verified the accuracy of transcriptions.

Data Analysis

Quantitative Analysis

Quantitative data were analyzed in R version 3.5.2. We used descriptive statistics including frequencies and measures of central tendencies to describe the sample in terms of sex, age, ethnicity, clinical diagnosis, education, number of CET sessions completed and treatment completion. We also reported the neurocognitive and socio-cognitive performance, level of life satisfaction, and level of symptoms severity at baseline for each participant in Table 1. Lastly, frequencies for the quantitative responses to the CET and life satisfaction questionnaires were tabulated to assess participants' experience of CET.

Qualitative Analysis

A thematic content analysis was performed with NVivo12 [10, 45]. A cross-sectional analysis was conducted to identify consensus and divergence through open-ended responses to the questionnaires

as well as transcripts of the focus groups and the individual interview [45].

A mixed analysis grid was used. More precisely, an initial coding framework was developed based on the themes initially identified in the interview guide (i.e. perceived impact, motivational facilitators, motivational barriers, and suggestions to improve CET) to perform the deductive analysis. As there is a lack of qualitative data regarding this type of intervention, the themes of the coding framework were minimal and broad in order to maximise the generation of categories and codes reflecting the participants' experiences [27]. Thus, an inductive analysis was also performed to identify emergent themes, categories, and codes. No new emergent themes were identified, but several categories (e.g. improved neurocognition) and sub-categories (e.g. focus/memory, thought organization and problem-solving) that emerged were included in the final categorization.

First, coders familiarized themselves with the data collected through questionnaires, focus groups, and the interview. Data were then summarized into smaller fragments of meaningful information that were first descriptive (paraphrases of participants' words) and then interpretative (words chosen by coders as most representative of underlying concepts, called codes). Codes reflecting similar meaning were grouped together under one category or sub-category, and categories were grouped in themes, within the themes of the coding framework [45, 46]. Co-coding and team meetings were used to agree on the coding scheme and final categorization.

Corresponding sample quotations for themes, categories, and sub-categories describing perceived impact, motivational facilitators, barriers, and suggestions to improve CET are identified in the Supplementary Results section of the Online supplement and frequencies (the number of participants who raised ideas related to certain themes, categories and sub-categories) are highlighted in Tables 2, 3, 4 and 5.

Results

Demographic Results

Participants were 9 individuals ($n = 1$ female, $n = 8$ male) who met diagnostic criteria for schizophrenia ($n = 6$) or schizoaffective disorder ($n = 3$) (mean age:

Table 1 Baseline clinical and demographic information

Participants									
Variable	1	2	3	4	5	6	7	8	9
Sex	M	M	M	M	M	F	M	M	M
Age	22	27	22	26	28	27	22	24	22
Ethnicity	Asian	African American	Other	Caucasian	Caucasian	Other	Caucasian	Asian	Caucasian
Diagnosis	SZ	SZ	SZ	SZ	SZ	SA	SA	SZ	SA
Education	Some college	Completed college	Some college	Completed post graduate education	Some college	Completed college	Some college	Some college	N/A
Completed treatment (Yes or no)	No	Yes	No	Yes	Yes	Yes	No	Yes	No
# of CET sessions completed	56	116	65	132	149	110	107	72	N/A
Neurocognition	48	47	38	49	41	45	48	47	N/A
Social cognition	41	35	26	60	25	32	57	55	N/A
Quality of life	84	79	54	N/A	61	86	94	69	N/A
Negative symptoms severity	21	28	28	32	43	20	36	28	N/A
Positive symptoms severity	3	0	7	1	39	18	15	0	N/A

M = Male; F = Female; Age = Age when consent to participate in CET was provided; SZ = Schizophrenia; SA = Schizoaffective disorder; Some college = Attended but did not complete college receiving a degree. Neurocognition = Measurement and Treatment Research to Improve Cognition in Schizophrenia (MATRICS) overall composite t scores corrected for age and gender. Social cognition = MATRICS social cognition composite t scores corrected for age and gender. Life Satisfaction = The World Health Organization Quality of Life (WHOQL) composite mean scores across life domains of psychological health, social relationships, and environment. Positive symptoms severity = total overall score of the Scale for the assessment of positive symptoms (SAPS). Negative symptoms severity = total overall score of the Scale for the assessment of negative symptoms (SANS). N/A = Information unavailable

Table 2 Perceived impact of CET

Theme	Category	Sub-category
Perceived impact	Decreased negative symptoms of schizophrenia (1)	
	Decreased self-blame/guilt (1)	
	Improved social cognition (5)	
	Improved neurocognition (4)	Focus/memory (3)
		Thought organization (1)
	Improved confidence and helped to attain recovery goals (8)	Problem-solving (1)

The number of participants who raised ideas related to each category and sub-category is shown in parentheses

Table 3 Motivational facilitators for CET

Theme	Category	Sub-category
Motivational facilitators (extrinsic)	Family support (2)	
	Cost (1)	
	Incentives (5)	Monetary compensation (4) Food (i.e. Pizza) (1)
Motivational facilitators (intrinsic)	Desire to overcome cognitive symptoms (2)	
Motivational facilitators (program-level)	Quality of program delivery (8)	Positive relationship with coach (5)
		Coach feedback reinforced learning (4)
		Peer feedback reinforced learning (4)
	Overall program content (7)	Positively challenging (1) Prompted a perception of improvement in cognition (6)
Group session content (8)	Relevant to recovery goals (5)	
	Socially engaging (4) Fun and engaging (4)	
Computerized session content (5)	Fun and engaging (5)	

The number of participants who raised ideas related to each category and sub-category is shown in parentheses

Table 4 Motivational barriers for CET

Theme	Category	Sub-category
Motivational barriers (intrinsic)	Lack of intrinsic motivation (1)	
	No perceived instant payoff (1)	
Motivational barriers (program-level)	Issues with group content (5)	Content heavy (binder) (2)
		Disorganized binder (3)
		Mundane or tiresome (3)
	Issues with computerized session content (5)	Content is too difficult to understand (4) Purpose of training is unclear (3) Mundane or tiresome (1)

The number of participants who raised ideas related to each category and sub-category is shown in parentheses

24.39, $SD = 2.74$) (see Table 1). Participants identified as Caucasian ($n = 4$), Asian ($n = 2$), African American ($n = 1$) or other ($n = 2$) with an average duration of illness of 4.13 years ($SD = 2.08$). Participants completed between 56 and 149 CET sessions and 4 out of nine participants were considered non-completers of CET. Participants were considered completers if they completed the entire 18-month protocol of CET, based on data from the release termination report and clinician report.

Quantitative Results

Baseline Assessments

Baseline scores for neurocognitive functioning, social-cognitive functioning, satisfaction across all domains of life, negative and positive symptom severity are reported in Table 1 for each participant.

Table 5 Suggestions to improve CET

Theme	Category	Sub-category
Suggestions for improvement	Coaching (1)	Increased guidance with recovery plan (1)
	Group sessions (4)	Breakdown/streamline binder content (4)
	Computer sessions (3)	Modernize exercises (2)
		Lengthen training (1)
	CET environment (2)	Increase lighting/Increase room size (2)
	CET purpose and design (6)	Change binder content format (4)
		Include more interactive activities and content (1)
		Explain benefits and purpose of CET (3)
		Explain structure of CET (3)
		Involve participants in CET design (3)

The number of participants who raised ideas related to each category and sub-category is shown in parentheses

Perceived Neurocognitive Improvement

Figure 1 shows that most participants reported perceived neurocognitive improvements post CET, especially in the domains of attention (a good amount: 6 out of 9), problem-solving (a good amount: 6 out of 9), as well as in the ability to act wisely in social situations (a good amount: 6 out of 9) and self-understanding of skills and setbacks (a good amount: 5 out of 9). Most (6 out of 9) also indicated that CET improved their ability to think clearly. In comparison, fewer participants reported feeling that CET improved their memory (neutral: 4 out of 9) and organization (neutral: 4 out of 9).

Perceived Life Satisfaction

Most participants reported high satisfaction with their current work or school situation (5 out of 9 very satisfied) as well as with their recovery (5 out of very satisfied; see Fig. 2) following CET. However, most (6 out of 9) reported having only being “a bit” satisfied with their current social life (see Fig. 2).

Self-Reported Experience of CET

As shown in Fig. 3, participants reported positive participatory experiences with individual coaching (5 out of 9 helped a lot; 6 out of 9 enjoyed a lot), computer sessions (4 out of 9 helped a lot; 4 out of 9

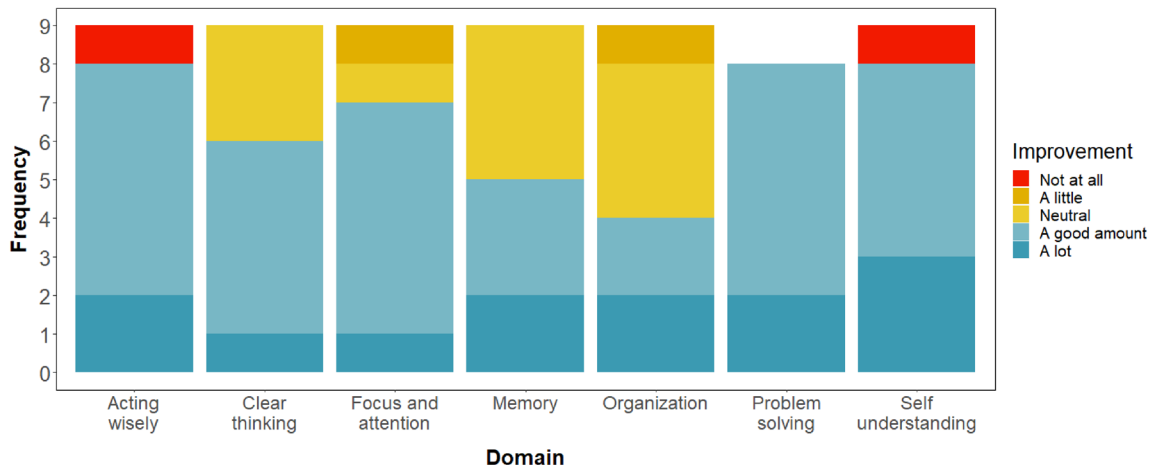


Fig. 1 Participants’ perceived neurocognitive improvements following CET. Note: One response was missing for problem solving

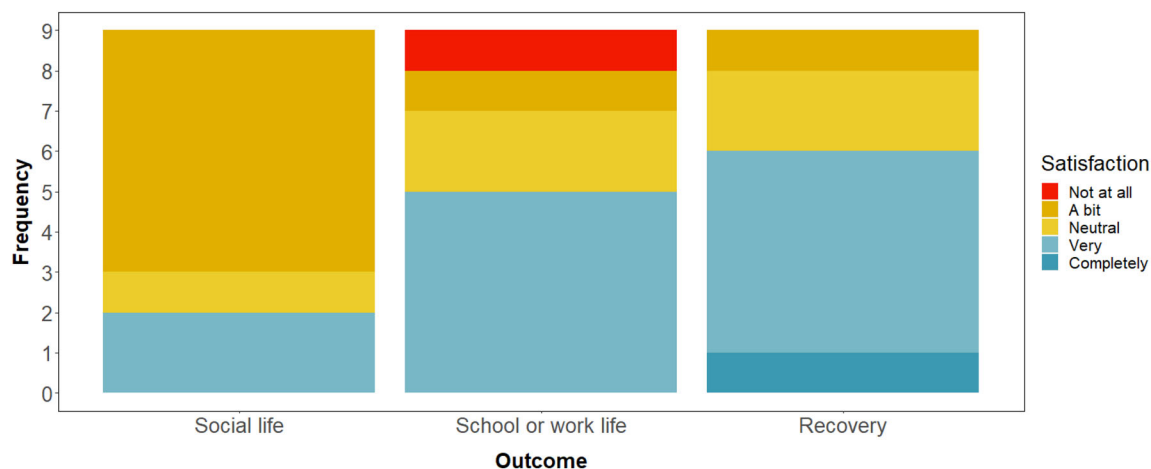


Fig. 2 Participants' self-reported level of satisfaction with their life following CET

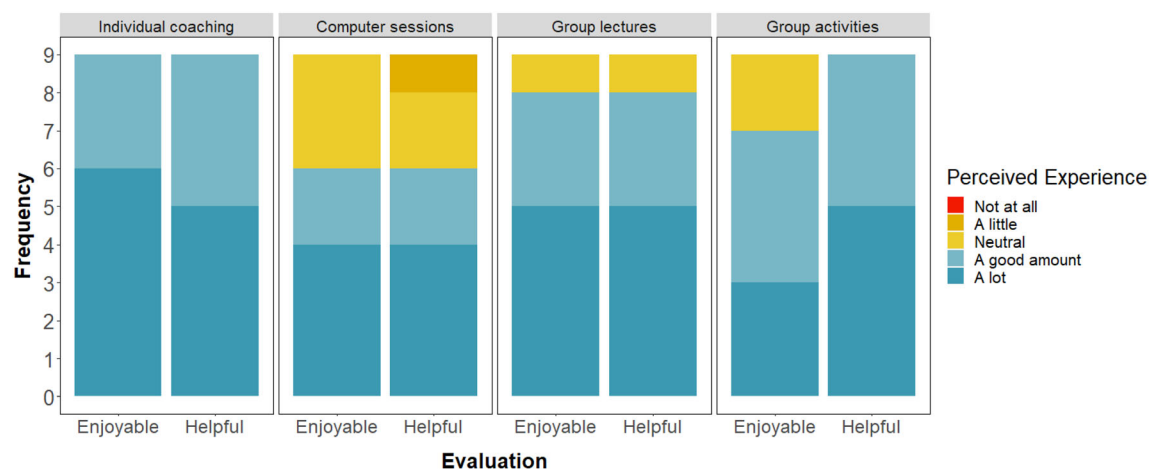


Fig. 3 Participants' self-reported level of helpfulness and enjoyment of CET

enjoyed a lot), group lectures (5 out of 9 helped a lot; 5 out of 9 enjoyed a lot) and group activities (5 out of 9 helped a lot; 4 out of 9 enjoyed a good amount).

Qualitative Results

Perceived Impact

A summary of perceived impacts is identified in Table 2. Participants reported that CET had positive impacts including (1) decreased negative symptoms, (2) improved neurocognitive skills like focus, memory, and problem solving, (3) improved social cognition, (4) increased self-confidence, and (5) enhanced ability to attain recovery goals.

Motivational Facilitators and Barriers to Cognitive Enhancement Therapy

Motivational facilitators are specified in Table 3. Participants reported that successful attendance of CET was motivated by external factors such as family support. Some participants also appreciated that CET was provided at no cost, whereas others were motivated by compensation. Some participants were intrinsically motivated to receive CET by their desire to relieve neurocognitive symptoms associated with their condition, while others reported a lack of intrinsic motivation and instant payoff as a barrier to pursuing CET.

Feedback from peers and coaches emerged as an important program-level motivator, and a positive relationship with coaches reinforced motivation to learn. Overall, participants indicated that CET was positively challenging and that this motivated them to participate, alongside perceived neurocognitive improvement. Relevant content motivated them to actively engage in the group sessions. Similarly, some participants highlighted that computerized sessions were “fun and engaging”.

Motivational barriers are shown in Table 4. Regarding program-level motivational barriers, some participants noted that the group session curriculum was dense, and that binder content was disorganized. Others noted that binders were difficult and cumbersome to transport to group sessions which affected their motivation to come to the sessions. Some mentioned that activities and lectures during group sessions were mundane and tiresome. Computerized content was also described as too difficult to understand and some participants noted that the purpose of computerized neurocognitive training was unclear.

Suggestions for Improvement

A summary of suggestions for improvement from CET end users is presented in Table 5. Participants indicated that having more help with their recovery plan via one-on-one coaching would be beneficial to delineate and accomplish their recovery goals. All participants suggested that the CET binder covered in group sessions could be broken down and streamlined to improve the CET program content. They also recommended summarizing the binder content, adding a table of contents, and providing access to it online. Moreover, participants suggested that having more interactive activities during the group sessions would increase their motivation to participate in CET.

Modernization and lengthening of computerized training were also raised as suggestions to improve CET. Specifically, participants noted that computer graphics were outdated and that they would have liked more time to complete the exercises. Participants also suggested that having a larger, well-lit room would improve the CET environment. Finally, many participants suggested that discussing the structure, content, and benefits of CET would motivate them to be more engaged with the program. They particularly highlighted that being involved in the design of the

program could be beneficial to increasing motivation and improving participants’ experience in future trials.

Discussion

Overall, findings from this quantitative and qualitative case series study indicate some improvements in neurocognition, negative symptom severity, and life satisfaction after CET. Participants also reported overall positive levels of satisfaction with CET. Moreover, participants identified interrelated extrinsic, intrinsic, and program-specific facilitators and barriers to participating in CET, and they provided valuable insight to improve future trials.

Impact of CET

Our quantitative and qualitative analyses revealed perceived improvements in neurocognitive functioning following CET in most participants. During the focus groups and individual interview, 4 out of 9 participants identified improved neurocognition in domains of focus and memory, thought organization and problem-solving. Furthermore, most (6 out of 9) reported perceived neurocognitive improvements in domains of attention, problem-solving, their ability to act wisely in social situations, and their ability to think clearly through the CET satisfaction questionnaire. Fewer reported improvements in memory and organization (4 out of 9 through the CET satisfaction questionnaire) and most but fewer (5 out of 9) reported improvements in self-understanding of skills and setbacks). While, in most cognitive remediation studies, cognitive outcomes are investigated with standardized assessment batteries only [52], additionally recording participants’ accounts of their experience with CET provided us with an important piece of evidence in support of its efficacy from the end user point of view.

Our qualitative results also highlighted a subjective relationship between treatment outcomes and feeling of self-efficacy. Specifically, most participants reported that CET-induced improvements increased their confidence and ability to attain personal recovery goals. For example, participants noted that CET’s “positively challenging” environment helped them overcome defeatist beliefs and negative symptoms. In turn, this fostered a greater sense of self-efficacy

regarding their neurocognitive capacity and functional improvement. Thus, consistent with prior schizophrenia research on cognitive remediation [17, 50] and CET specifically [20, 36], treatment effects extended beyond specific cognitive treatment targets to secondary recovery factors. These findings are in line with previous reports of the efficacy of CET in schizophrenia for promoting self-esteem [33, 34], self-competency, self-efficacy [20, 36], and negative symptoms [24]. Future research should examine the persistence of these secondary recovery factors after treatment and clarify whether they concur with improved neurocognitive and functional outcomes [26].

In line with previous studies [22, 26], most participants reported high satisfaction with their work and school situation, as well as with their recovery following CET. Nonetheless, most of them were only “a bit” satisfied with their social life. Accordingly, in other samples of individuals with schizophrenia, objective cognitive assessments have been found to correlate poorly with self-reported functional recovery [3, 13, 38, 44]. Therefore, perceived social functioning in everyday life is a treatment target that requires further investigation [17, 52, 56]. The perceived limited transfer of social-cognitive improvements into real-life settings may reflect the limited ecological validity of current cognitive remediation interventions [8, 49]. More naturalistic approaches might improve transfer of social-cognitive gains into daily life [29, 49].

Participatory Experience and Satisfaction with CET

Quantitative analyses of questionnaire data revealed positive participatory experiences in terms of perceived helpfulness and enjoyment. Clinical measures also revealed that life satisfaction improved following CET. This is in line with previous studies where individuals with schizophrenia also reported that cognitive remediation was helpful [48] and enjoyable [12, 17]. Believing that cognitive remediation can help in achieving recovery goals has been shown to predict active engagement in treatment [11], a vital factor for its success [18]. Similarly, satisfaction with cognitive remediation therapy has been shown to predict its efficacy [52].

Motivational Facilitators to CET

Among extrinsic motivational facilitators, participants highlighted external incentives such as monetary compensation. Importantly, they also emphasized the importance of receiving social support and feedback from family, peers, and coaches. They reported that having a supportive family encouraged them to attend and actively participate in treatment sessions. This is in line with extensive research on the benefits of family support in mental health care [19]. For example, families can provide support in setting treatment and recovery goals, which can result in more tailored interventions and better outcomes [19]. Social support has been shown to be critical for treatment outcomes among individuals with schizophrenia [51] and our study underlines that this also applies to CET. Thus, an interesting possibility for future research would be to combine CET with family interventions and measure their joint impact on functional recovery.

Participants also indicated peer feedback and peer support as key motivational facilitators. Peer supporters in therapy can draw upon their lived experiences to empathize, share insights, serve as role models, impart hope, and engage others in treatment activities [14]. Beyond typical psychiatric rehabilitation groups, CET includes partnered activities and small-group discussions [20], potentially creating an ideal environment for peer support. In addition to being a motivator for treatment, performing neurocognitive training with a peer has been associated with better neurocognitive outcomes than when those exercises were performed alone [53], thus contributing to the overall efficacy of CET.

Furthermore, participants emphasized the importance of receiving supportive, adaptive, and instructive coaching, as noted in previous studies [17, 26, 50]. CET coaching involves collaborative completion of homework, goal-setting, encouragement, and support with decision-making [26]. This type of therapeutic relationship has been associated with greater neurocognitive improvements relative to cognitive remediation without human guidance [39] and has been shown to facilitate empowerment and recovery [47]. One possible factor underlying the importance of coaching is ongoing feedback on performance, which may facilitate participants' ability to detect improvements [57]. Therefore, our results contribute to

converging evidence that coaching is a valuable component for CET's acceptability.

Lastly, participants indicated that they were motivated to participate in CET because it was positively challenging, the group session content was relevant, and the computerized sessions prompted a perception of improvement in neurocognition. This is consistent with other cognitive remediation studies indicating that mastering cognitively challenging exercises can be intrinsically rewarding [50]. Thus, our results support previous evidence suggesting that intrinsic motivation increases when learning tasks are salient and success is experienced [55].

Motivational Barriers and Suggestions to Improve CET

Participants reported both intrinsic and extrinsic motivational barriers to CET. As intrinsic motivational barriers, they mentioned a lack of perceived improvement or “instant payoff” and confusion surrounding the goal of CET. To improve their experience, they suggested providing them with the opportunity to learn about the scope of CET, as well as to contribute to its design and implementation. Thus, to promote intrinsic motivation and engagement, future CET studies should involve people with schizophrenia in the development of the program. This would facilitate personalization of the CET learning material in line with recovery goals [59], as well as contextualize the cognitive exercises in real-world situations relevant to the individual [55]. Then, peer support and coaching could be planned more often throughout the intervention to allow participants to continuously monitor their improvements, as well as the adherence to their pre-established recovery goals. This finding also highlights the need for coaches to follow the CET training manual and ensure that participants are aware of CET benefits and goals.

With respect to extrinsic motivational barriers, some participants noted that content was too difficult for them. Difficult content might represent a motivational barrier because it limits the opportunities to demonstrate competency [16], potentially increasing frustration [52]. As noted above, individuals with schizophrenia benefit especially from interventions that promote self-efficacy [16]. Thus, one approach to mitigate perceived difficulty could be to titrate the complexity of CET exercises in a personalized fashion

so that 80% or greater success rates are achieved, while maintaining challenge in support of cognitive growth. In prior cognitive remediation studies, this approach has been shown to promote self-efficacy and motivation to initiate and complete learning tasks [16]. Finally, some participants noted that the content of the group sessions was disorganized, lengthy, mundane, and heavy, which undermined their motivation. As a countermeasure, they suggested breaking down and streamlining binder content (e.g. converting it to online format) and including more interactive and engaging group activities. A summary of relevant suggestions to build in motivators and to attenuate motivational barriers to CET is highlighted in Table 6.

Limitations

This study involved a small sample of individuals with early course schizophrenia. Hence, while our findings highlight important factors influencing perceived CET experience of these participants, they are limited in their generalizability. Furthermore, our small sample does not allow us to conduct comparative statistics, nor draw inferences about causality or efficacy of CET. Hence, qualitative research involving larger samples and individuals with enduring symptoms of schizophrenia is needed to perform more comprehensive analyses of participants' experiences with CET, and to be able to generalize our study findings. Our recruitment may also have suffered from selection bias and this should be considered while interpreting the current findings, given that only a portion of a larger sample of participants receiving CET agreed to answer questionnaires and participate in focus groups or an interview. Our results might also be biased by these differing methods of data collection. For instance, participants may have been more willing to share their thoughts during an interview than a focus group due to social pressure presented by their peers. In order to minimize the risk of social desirability, besides informing participants that their response would be completely confidential, interviews were conducted by a neutral interviewer (S.G.) who had not provided any intervention or assessment in the original clinical trial. Further, while participants were told that describing CET as “not at all” or a “a little” helpful or enjoyable implied having a negative experience with CET, the CET satisfaction questionnaire could

Table 6 Synthesis of recommendations for future CET studies and clinical services

Recommendations for future CET studies and similar clinical services	Intended outcome
Implement ecological approaches focusing on participants' community goals	Improved transfer of social-cognitive gains into daily life
Involve people with lived experience in the development of the program	Personalization of the learning material in line with recovery goals
Plan peer support and coaching more often throughout the intervention	Adherence to pre-established recovery goals and enhanced self-monitoring
Titrate the complexity of computerized exercises in a personalized fashion so that 80% or greater success rates are achieved, while maintaining challenge in support of cognitive growth	Promotion of self-efficacy and motivation to initiate and complete learning tasks
Ensure coaches are following the training manual and that participants are aware of the purpose and possible benefits of the intervention	Increased clarity regarding the goal of the intervention and perception of improvement
Break down and streamline content related to the intervention (e.g. converting the CET binder to online format) and include more interactive and engaging group activities	Promoted motivation to engage with and attend the intervention

have positively biased their ratings. Future studies regarding CET may benefit from scales that permit participants to provide clearer negative ratings for its components and allow for the triangulation of qualitative findings and descriptive survey results. Importantly, despite this limitation, focus group interviews and the individual interview provided us with a nuanced understanding of participants' perceived experience of CET.

Conclusion

Overall, our quantitative and qualitative case series study provides additional evidence that CET is an acceptable intervention that can lead to self-reported improvements in cognition and functional recovery. We also identified several motivational facilitators that could be leveraged in future studies and factors that can improve CET efficacy from the point of view of its end users.

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Authors' Contribution SG and MSK designed the study, and SG oversaw every step of the study. LS helped with the development of the focus group and the interview guide. SG, SP, and LO collected the data. LO and ST transcribed all verbatim. CN, FG and SG performed the analyses. CN wrote the first draft

of the manuscript, helped by AT and PP. LS, JW, and MSK also provided valuable expertise on cognitive enhancement therapy throughout the study. All authors contributed to the writing and approval of the final manuscript. **Funding** This work was funded by an operating Grant from NIMH MH 92440; MSK, PI, Clinicialtrials.gov #NCT01561859). SG was supported by a postdoctoral training fellowship from the Fonds de recherche du Québec – Santé and by an Emerging Research Innovators in Mental Health award.

Availability of Data and Material The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

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