



CASE REPORT

The Ecological Cognitive training program (ECo) for bipolar disorders: a case report. Case Report

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Abstract

Objective: Cognitive deficits remain underdiagnosed and difficult to treat in bipolar disorders. Cognitive remediation programs should take more into account the specificities of these illnesses, such as potential mood variations during cognitive training. We report on the design of a new ecological cognitive remediation program for mood disorders (called “ECo”) that we administered to a patient suffering from a type II bipolar disorder. **Methods:** Before and after administering this 28-session program, we assessed the patient’s cognitive and functional abilities, using standardized neuropsychological tests and clinical scales and questionnaires. **Results:** After the therapy, we observed major improvements in executive functions, moderate improvements in attentional processes, and mixed results for verbal memory. Improvements occurred despite a worsening of the patient’s symptomatology during the last month of therapy. The conventional assumption that cognitive remediation should only apply to patients with minimal residual symptoms raises ethical concerns regarding the exclusion of patients with more serious symptoms. Furthermore, this assumption may not be applicable to patients with bipolar disorders, as these patients frequently experience mood variations, even during periods of remission. **Conclusions and Implications for Practice:** The flexibility of the ECo program may represent an asset in multiple clinical contexts, or places where treatment is provided, or when treating patients at different stages of the recovery process.

Clinical trial registration number: 10477M

Keywords

Bipolar Disorder; Cognitive Impairments; Cognitive Remediation; Rehabilitation

1. Introduction

Cognitive impairments in bipolar disorders.

Nearly sixty percent of stabilized patients suffer from cognitive deficits that lead to functional disabilities (Pattanayak et al., 2011). The most significant deficits are observed in executive functions (inhibition, planning, and spatial reasoning), sustained and selective attention, psychomotor speed, verbal learning and memory, visual memory, and cognitive flexibility (Bora et al., 2009; Cullen et al., 2016; Martínez-Arán et al., 2004; Sparding et al., 2015). Inhibition deficits could constitute an endophenotype of bipolar disorders (Bora et al., 2009), and spatial reasoning deficits may be a major risk factor predicting their pathologies (Tiihonen et al., 2005). Furthermore, bipolar patients suffer from impairments in social cognition and metacognition (Samamé et al., 2012). These impairments exacerbate the patient’s disability and impede the efficiency of pharmaceutical and psychotherapeutic treatments (Latalova et al., 2011).

Challenges of cognitive remediation for bipolar disorders.

Recently, several therapeutic methods have shown their relevance regarding cognitive impairments in severe psychiatric disorders

(Ives-Deliperi et al., 2013; Voráčková et al., 2016). Many authors suggest that bipolar patients could benefit from a specific treatment for their cognitive deficits, such as cognitive remediation (CR), a therapeutic intervention that has proved its efficacy in schizophrenia (Fitapelli & Lindenmayer, 2022; Isaac & Januel, 2016). CR consists of an intensive training of cognitive functions during which the patient develops problem-solving strategies. CR’s objective is to improve quality of life and psychosocial rehabilitation through a reduction in cognitive impairments (Medalia & Choi, 2009).

Regarding bipolar disorders, initial studies have suggested that the Functional Remediation group program has an effect on psychosocial functioning and residual depressive symptoms (Solé et al., 2015). Computerized methods such as CIRCuiTS, COGMED, HAPPYneuron or SCIT, have also been implemented with promising results on neurocognition and social cognition improvements, but mixed results on daily functioning (Lahera et al., 2013; Lengvenyte et al., 2020; Lewandowski et al., 2017; Ott et al., 2020; Strawbridge et al., 2020; Veeh et al., 2017). A recent review suggests that computerized programs improve neurocognition as much as paper and pen methods (Fitapelli &



Lindenmayer, 2022). The development of CR for bipolar disorders should take into account several issues. In particular, due to the specificity of cognitive impairments and the cognitive diversity of the population (Bora et al., 2009; Wykes & Spaulding, 2011), individualized programs seem to be preferable. Furthermore, programs need to integrate elements of metacognitive (Martínez-Arán et al., 2011; Vianin, 2007) and social skills (Medalia & Choi, 2009; Wykes & Spaulding, 2011) training. Although computerized methods may address these challenges, paper and pen cognitive remediation programs provide a complementary therapeutic tool for patients that are not familiar with computers due to their age or precarious living conditions. Furthermore, paper and pen remediation could be an alternative solution taking into account the limited budget available for many healthcare facilities and therapists. Finally, paper exercises are easier to use and simplify if needed. This is particularly relevant when the therapist needs to adapt the therapeutic framework to mood changes in bipolar disorders.

The ECo program.

CR programs for bipolar disorders are scarce, especially in France. Taking into account the clinical and theoretical issues of adapting CR to bipolar disorders, we designed an individual program specific to bipolar patients. Its development was the subject of a PhD in psychology (Isaac, 2018) conducted with the ethical approval of the Comité de Protection des Personnes (the French Committee for the Protection of Individuals), with the reference number 10477M. The ECo program, which was registered and copyright protected by the French company Société des Gens de Lettres, uses paper and pen exercises, as well as exercises with tools that the patient can handle. This program is used as a medium to help the patient develop problem-solving strategies throughout the course of their therapy. ECo includes 28 one-hour therapy sessions (over 14 weeks, with 2 sessions per week), and 14 “at home” sessions that involve exercises from the ECo program. Thanks to the program flexibility, ECo is adapted for the majority of bipolar patients who are willing to train their cognitive abilities. Provided that the clinical state of the patient is compatible with the conduct of psychotherapy, there is no contraindication to the program. This relies on the qualitative appreciation of both therapist and patient. A summary of ECo’s features is presented in Table 1.

The ECo program is divided into five modules:

1. Psychoeducation (two sessions), where the patient and the therapist discuss several topics related to cognition, such as cognitive functions, cognitive impairments and the risk factors that may influence them, or functional difficulties and their origins. This module also aims to help the patient better understand the goal of CR therapy and its complementarity with the pharmaceutical treatment and other ongoing therapies.
2. Cognitive training for attentional processes (eight sessions);
3. Cognitive training for memory (eight sessions);
4. Cognitive training for executive functions (eight sessions); and
5. Functioning for daily life (two sessions), where the patient identifies a difficult situation in their life, its consequences and the impact on their emotions and mood. Then, they are guided to identify the cognitive functions involved in this situation, and the possible strategies they can use to help solve the issue. Finally, the patient applies these strategies at home, and discusses them with

their therapist at the next session. The patient is encouraged to continue using this method after the end of the therapy.

The three cognitive training modules are used in an order defined by the therapist according to each patient’s impairments. However, inhibition and visuo-spatial reasoning are emphasized throughout the program. In each module, four cognitive functions are trained (see Table 2). For each function, there are five different exercises, with around ten levels of increasing difficulty for each exercise. The exercises use paper and pen, verbal stimuli, or tools (tokens, cards, chessboard or city maps). The therapist and the patient jointly choose the exercises they want to work on, in order to increase the patient’s motivation and self-efficacy (Wykes & Spaulding, 2011). Each exercise is introduced by the therapist, the patient verbalizes a strategy to complete it, and discusses this strategy with the therapist. Then, through frequent feedback and questions from the therapist, the patient is guided through to the achievement of the level. When the patient passes the first levels, more difficult levels are presented. In the last levels of each exercise, the patient learns to apply cognitive skills in a more practical, ecological setting (see Figure 1).

The ECo program is currently used in adult psychiatry units by clinicians (e.g., psychologists, nurses, psychiatrists, occupational therapists, and special educators). ECo is freely distributed to any healthcare worker that has previously enrolled in the Psychosocial Rehabilitation diploma at Sorbonne Paris Nord University.

2. Clinical vignette

Mr F., a 62-year-old patient suffering from a type II bipolar disorder, received the ECo program. Mr F. is a retired engineer who lives alone, and who is involved in several not-for-profit organizations. During his spare time, he likes reading and writing, as well as attending scientific lectures.

Before therapy, Mr F.’s main cognitive complaints were:

1. reasoning (specifically, putting ideas together and understanding what people were saying);
 2. selective attention (specifically, focusing on an activity or thought, and reading when there is background noise);
 3. visuo-spatial and verbal memory (specifically, finding personal effects, and remembering names);
 4. planning (specifically, organizing different activities during the same day).
- These difficulties hindered him from actively participating in association activities and lectures, and led to a significant reduction in his daily activities and social interactions.

Before and after therapy, the patient received a thorough clinical and cognitive assessment, and completed self-assessment scales. All assessments were conducted and scored by trained psychologists and psychiatrists (see Table 3), and the therapist did not participate in any assessment. Mr F. gave written informed consent for the anonymous publication of his data.

Results are presented in Tables 4 and 5. At baseline, cognitive assessments and the Assessment of Functional Repercussions questionnaire suggested that his executive functions were more altered than other cognitive functions. There were: major impairments in visual and verbal abstraction, spatial reasoning, inhibition, and planning; moderate impairments in verbal memory, processing speed, and attentional processes; and preserved abilities in working memory, verbal comprehension, and emotion recognition. Clinical assessments revealed a euthymic mood at baseline, good insight, and average social desirability.



However, he presented low average social functioning, and role limitations in daily functioning.

Mr F. completed all 28 cognitive remediation sessions. No therapy session was cancelled, and the patient carried out all at-home sessions. However, three weeks before the end of therapy, Mr F. exhibited acute depressive symptoms that had occurred with seasonal regularity for several years. This depressive episode was treated by the patient's psychiatrist, and the decision was made with the patient to maintain the CR sessions.

During post-therapy assessment, the patient was still suffering from severe depressive symptoms. However, despite the worsening of these symptoms, several cognitive improvements were observed. The patient demonstrated a score normalization above the median of the general population for several executive functions (visuospatial reasoning, inhibition, and verbal and visual abstraction), as well as an improvement in planning, processing speed, and attention. Furthermore, we observed improvements in emotion recognition, even though this wasn't impaired before therapy. As expected, we observed no improvement in the patient's highest performing cognitive functions, such as working memory or verbal comprehension, due to a ceiling effect in the tests. Finally, we observed mixed results on verbal memory, with only small changes in the retrieval of semantic information, and decreased recall despite learning potential being maintained.

Clinical assessment revealed subjective improvements in daily activities that require attentional abilities, verbal memory, and reasoning. Accordingly, Mr F. expressed no more difficulties with reading when there is background noise, remembering names, or planning activities. He was able to remember and discuss with relatives the content of the lectures he had attended. Furthermore, he developed compensatory strategies, such as focusing his attention on the location of his personal effects and checking for them regularly. However, some difficulties remained, including focusing on a specific thought. Finally, after therapy, despite lower general and mental health probably due to his acute depressive episode, the patient maintained good insight and average social desirability, and showed less role limitations due to physical and emotional problems.

3. Discussion

Despite severe depressive symptoms, after therapy, the patient showed a general improvement in psychosocial functioning, previously impaired executive functions, as well as attentional abilities and processing speed. These results are consistent with previous studies on the effect of CR (Deckersbach et al., 2010; Demant et al., 2015). The improvement in selective attention was observed both in cognitive and functional assessments, possibly showing a generalization of learned strategies in real life.

ECo focusses on both knowledge and confidence in cognitive abilities, as a support for cognitive improvement. We assume that such a gain in self-efficiency is a major factor for countering facets of depression such as self-devaluation, feeling of inadequacy, perceived lack of control or hopelessness (Maddux & Meier, 1995). The overall positive effect of ECo is reinforced by it being both integrative and individualized.

There are some ethical questions around the conventional concept of CR programs, as they are only offered to stabilized patients with minimal or no residual symptoms. This concept also sometimes significantly differs from what therapists experience with patients suffering from mood disorders. ECo takes into account the clinical state of patients as well as their life plans;

we assume that this conjunction drives them toward recovery. Moreover, maintaining ECo despite the reactivation of mood symptoms provides continuity of care, a core principle of psychosocial rehabilitation. Maintaining ECo of course depends on patients' motivation and their therapists' decision.

The flexibility of ECo supports its application in multiple clinical contexts (inpatients or outpatients), different places where treatment is provided (e.g., hospitals, social structures, or private practices), and at any time in the patients' process of recovery. We implemented ECo in various clinical fields in order to assess its feasibility. We collected the feedback of both healthcare staff and users, which led to some adaptations to the program, such as the current design of a new training module focused on social cognition and metacognition. In future extension of the work, it would be useful to assess the effectiveness of the ECo program with cohort studies (Lengvenyte et al., 2020; Škobrtal et al., 2019) or randomized controlled studies (Strawbridge et al., 2020). Qualitative studies also appear relevant in order to specify if the ECo program met the expectations of the patients regarding their subjective cognitive complaints. A validation study is also underway in order to compare ECo to a control recovery-oriented therapy for people living with a mood disorder (protocol number: 2019/76).

ECo is a new individual cognitive remediation program for bipolar patients that aims to improve patients' cognitive functioning through intensive training, and development of problem-solving skills. The philosophy of the program relies on the patients' recovery processes and on their therapists' adjustments to the patients' expectations and courses of illness. ECo adapts to the healthcare user, rather than the other way around. This flexibility is a major asset for ensuring patients' continuity of care.

4. Conclusions

ECo is a new individual cognitive remediation program for bipolar patients that aims to improve patients' cognitive functioning through intensive training, and development of problem-solving skills. The philosophy of the program relies on the patients' recovery processes and on their therapists' adjustments to the patients' expectations and courses of illness. ECo adapts to the healthcare user, rather than the other way around. This flexibility is a major asset for ensuring patients' continuity of care.

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