

Research

A Cognitive Rehabilitation Program for Psychoses: Origins, Development and Perspectives

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Abstract

Background: Cognitive Remediation or Rehabilitation Treatment (CRT) is a psychosocial treatment method against cognitive deficits and their functional consequences. CRT is implemented in various disorders ranging from brain injury to neurological and mental disorders and is associated with positive results in terms of cognitive and social functioning. Similarly, the investigation of the effects of CRT in schizophrenia has shown that it could improve cognition and everyday functioning and that it might also be beneficial for the other clusters of symptoms of the disorder (positive and negative symptoms).

Objective: To present the origins, process of development and characteristics of a CRT program for individuals with psychoses (schizophrenia and other psychotic disorders, bipolar disorder with psychotic features and bipolar depression, etc.), along with the experience of its pilot implementation and its perspectives under limited financial and human resources.

Methods: The article will discuss the theoretical basis of a CRT program for patients with psychosis. It will also present the consecutive steps of its development, its structure and its pilot implementation. Finally, it will discuss its future perspectives.

Results: The program is based on the experience from animal and human studies and on principles including interdisciplinary therapeutic team work, individualization of therapy, frequent practice of cognitive tasks, use of strategies and psychological support. It aims at the improvement of everyday functioning of individuals with psychoses through the enhancement of their cognition. It is preceded and followed by sessions assessing cognitive performance, symptoms and functioning and comprises 40 individual training sessions with a frequency of at least two sessions per week. The training sessions are divided into two parts including a) a cognitive exercises module and b) a social cognition module. Cognitive exercises include a program designed for elderly suffering from mild cognitive impairment and additional cognitive tasks involving the main cognitive domains of impaired performance in schizophrenia. The social cognition module has been arisen from a program administered to patients hospitalized in an acute psychiatric ward with the aim to facilitate and accelerate their discharge. The perspectives of the CRT program include the development of group training sessions and public awareness activities and the creation of similar CRT Units in Mental Health Centres and other Health Settings. Given that both the cognitive impairments and the methods used for their treatment have common features across different mental or neurological disorders (e.g. non-psychotic depression, dementia, brain injury, substance use disorders), they also include the implementation of the program on individuals presenting with cognitive impairments beyond psychoses.

Conclusions: The development of CRT programs in the context of a National Health Service and under conditions of limited funding is feasible and could satisfy the unmet needs of patients having cognitive difficulties regardless of their aetiology.

Key words: *Cognitive remediation, cognitive rehabilitation, CRT, cognitive training, psychosis, schizophrenia*

Introduction

Rehabilitation has been defined as “the planned attempt under skilled direction by the use of all available measures to restore or improve the health, usefulness and happiness of those who have suffered an injury, or are recovering from a disease”. It has an additional aim to “return those individuals to the service of the community in the shortest time”¹. Rehabilitation can be implemented in every disease, either mental or non-mental, which is associated with treatment-resistant symptoms impeding everyday functioning.

Cognitive deficits accompany several disorders which, directly or indirectly, impact on brain functioning, including mental, neurological or general medical disorders²⁻¹². Cognitive deficits refer to, albeit not being limited to, deficits in general cognition and specific cognitive impairments in the areas of speed of processing, memory, attention, reasoning and social cognition. The management of these cognitive deficits involves, whenever feasible, the treatment or the prevention of the progression of the underlying disorder and the use of supplementary psychosocial therapeutic methods which are generally referred to as “cognitive remediation” or “cognitive rehabilitation” treatments (CRTs).

CRTs have been clinically employed and have been found to improve both cognition and everyday functioning of individuals suffering from cognitive deficits across different disorders. In a recent review of CRT programs, Cicerone and colleagues suggested that they are the best available forms of treatment for people who exhibit neurocognitive impairment and functional limitations after traumatic brain injury or stroke. Interestingly, Cicerone and colleagues also suggested that different cognitive domains could respond differentially to treatments¹³.

Besides brain injury or neurological disorders, CRT programs have also been used in the management of psychiatric disorders. The earliest programs have been historically developed for patients with schizophrenia and have been associated with positive effects. Meta-analyses have confirmed that CRT is an effective treatment against cognitive deficits in schizophrenia^{14,15} and have generated calls asking for its adoption as a best practice in the treatment of the disorder¹⁶. Recent evidence suggests that CRT in schizophrenia appears limited in older patients, but that it could be beneficial even for individuals at ultra-high risk for psychosis^{17,18}. Although there is not yet convincing evidence supporting the use of CRT in the prodromal psychotic state, psychological interventions incorporating CRT tasks are found promising with respect to the delay of the first psychotic episode¹⁹. Preliminary evidence also indicates that CRT is associated with an increase in time to relapse in schizophrenia

²⁰. Similar CRT programs have been administered to mental health disorders other than schizophrenia and had a comparable efficacy on cognitive symptoms^{21,22}. Interestingly, CRT programs not only enhance cognition, but they also appear to improve the primary symptoms of the underlying disorders^{23,24} and they could modify the use of psychiatric services^{14,21,25-29}.

CRT programs in schizophrenia share certain key practice methods such as the use of strategies to optimize performance, the repetition of the same exercises over many sessions until performance is improved and the linking of exercises to real world behaviours^{30,31}. The current CRT programs in schizophrenia can be classified into three groups: a) cognition enhancement programs, b) compensatory rehabilitation programs and c) computer-based programs³². The programs aiming at cognitive enhancement focus on the correction of the underlying deficit. The compensatory rehabilitation programs are designed to overcome or circumvent cognitive deficits in order to improve broader aspects of functioning. These programs take advantage of the unimpaired cognitive processes and of the context of the behaviours through environmental supports such as signs, checklists, or alarmed drug packaging. Similarly to their applications in non-mental disorders, the use of computers in CRT in schizophrenia has been employed to increase its efficacy. Computerized CRT programs could have both advantages (improved control of the level of difficulty, immediate feedback, better monitoring, familiarization of patients with advances in technology) and disadvantages (limited social interaction, difficulties of older patients with using computers). It should be noted here that current evidence in schizophrenia suggests that computer and non-computer-based CRT programs have similar efficacy¹⁴.

CRT has been mainly used in research rather than clinical practice in patients with schizophrenia. Its pilot implementation beyond research and in the context of mental health services in several countries shows that it is a feasible treatment strategy against cognitive deficits associated with mental and neurological disorders³³⁻³⁸.

Stimulated by the literature on the close association between cognition and everyday functioning in patients suffering from mental disorders³⁹⁻⁴¹, we founded a specialized Unit (named as Cognitive Rehabilitation Unit) in the Psychiatric Hospital of Attica (PHA)⁴². PHA is the largest provider of mental health services in Greece. Our aim was to improve the social functioning of individuals with mental disorders through the enhancement of their cognition. In this paper we present the historical and theoretical background, the development, the implementation and the perspectives of a CRT program for individuals with psychotic disorders.

Methods

The article will discuss the history and the theoretical basis of a CRT program for patients suffering from psychotic disorders. It will also present the consecutive steps of its development, its structure and its implementation. Finally, it will discuss its future perspectives.

Results

A brief history of CRT

The history of CRT is closely linked to the history of neuropsychology. Publications, dated as early as the 17th century, describe methods of rehabilitation in patients with aphasia. Broca, after having proposed his theory on the lateralization of language in 1861⁴³, he also investigated methods for the rehabilitation of language functions following brain injury. Interestingly, similar rehabilitation tools as those used during these early efforts (such as wooden geometric forms) were also employed in the creation of intelligence tests, supporting the strong and mutual relationship between cognitive assessment and cognitive training⁴⁴. The American psychologist Shepherd Franz who was a prominent figure in the neuropsychological rehabilitation⁴⁵. He identified rehabilitation with re-education and favoured the re-education of specialized capacities or the re-education of the personality as a whole for individuals presenting with cognitive impairments and psychotic disorders⁴⁶.

The First World War which led to severe brain injuries to thousands of soldiers fuelled the efforts to create brain injury rehabilitation centres in several countries including Germany and Austria. Kurt Goldstein, Max Isserlin and Walther Poppelreuter were neuropsychiatrists who have left written documents of their work in Germany⁴⁷⁻⁴⁹ and used techniques involving the strengthening of preserved skills rather than the

recovery of lost skills. After the end of the First World War the interest in neuropsychological rehabilitation was diminished, but it was eventually restored after the Second World War by the Russian psychologist Alexander Luria^{50, 51}.

A group of brain injury treatment centres was created in the UK which focused mainly on aphasia and provided both medical and rehabilitation services. The prominent centres were those of Oxford and Edinburgh. At the Oxford centre, the neurologist W. R. Russell confirmed the role of post-traumatic amnesia duration in predicting functional outcome from traumatic brain injury⁵², a role which had been identified long before⁵³. At the Edinburgh centre, in 1946, Edna Butfield and the psychologist Oliver Zangwill published the results of a case series of aphasia therapy⁵⁴. Zangwill divided the strategies used in neuropsychological rehabilitation into three categories, compensation, substitution and direct retraining⁵⁵ (table 1).

Figure 1

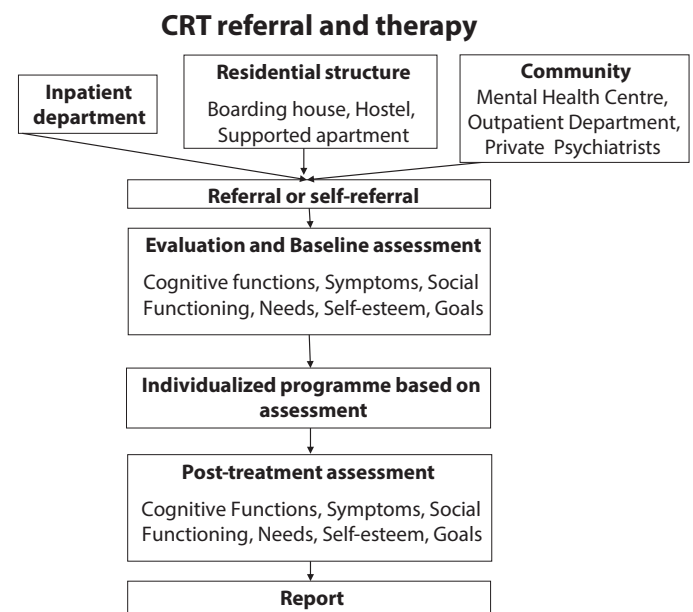


Table 1: Cognitive rehabilitation strategies proposed by Zangwill (Zangwill 1947)

Strategy	Description	Example
Compensation	Reorganization of psychological function so as to minimize or circumvent a particular disability. During compensation training, the patient is being helped to get round his disability along ways that he has already found.	In serious disabilities of the right hand, an individual could be trained in the use of the left hand.
Substitution	The building-up of a new method of response to replace one damaged irreparably by a cerebral lesion.	Lip reading in the deaf.
Direct Retraining	Re-learning during which the patient regains lost functions. It is opposed to substitute learning, since it does not refer to replacement of a lost function by a new one, but to the reappearance of this same function.	Correction of errors in simple multiplication by revising and re-learning the multiplication tables.

Similar initiatives to create rehabilitation centres for brain injuries have been undertaken in the US in order to treat injured war veterans. Interestingly, the cognitive assessments used in these centres, such as the Wechsler intelligence scales have been incorporated in neuropsychological batteries which are currently being used worldwide⁵⁶.

After the Second World War, the brain rehabilitation efforts continued in many countries. The target population of these centres eventually moved from war veterans to road accident victims with brain injuries and stroke patients⁵⁷. During the 1960s and early 1970 there was a new surge of interest in the systematic rehabilitation of patients with traumatic brain injury. The interest in CRT was also triggered by advances in cognitive psychology and has been continuing until today worldwide⁵⁸⁻⁶². The CRT programs differed with respect to their structure and the rehabilitation settings in which they were administered. Day treatment programs or residential rehabilitation programs were developed to address the multiple and complex needs of patients. These latter programs aimed to directly improve the individual's functioning in a particular residence, community or occupation and therefore provided the rehabilitation services at these sites⁶³. More recent CRT programs were influenced by the revolution in information technology and begun to take advantage of computer technology⁶⁴⁻⁶⁷.

CRT in Psychiatry

CRT in Psychiatry has a shorter history in which schizophrenia plays a pivotal role. Schizophrenia has long been recognized as a cognitive disorder⁶⁸. In the early 1900s Emil Kraepelin differentiated "dementia praecox" from manic depressive illness on the basis of cognitive symptoms⁶⁹. He also described the frequent attentional disturbances which accompanied dementia praecox such as distractibility, disturbances of vigilance and inability to shift attention⁶⁹. Eugen Bleuler was the first to use the term "schizophrenia" instead of "dementia praecox", since he had noticed that the syndrome does not always progress into dementia and that it does not always appear during puberty or shortly after. He also noticed that patients with schizophrenia demonstrate variable attentional deficits. In contrast to the attentional deficits, Bleuler believed that memory impairments in schizophrenia are secondary to distractibility or delusions⁷⁰.

However, the discovery of antipsychotics has led psychiatrists and other mental health professionals to ignore cognitive deficits. The focus was set primarily on the positive and secondarily on the negative symptoms of the disorder.

During the 1970s and 1980s, it was found that in contrast to

patients with other psychiatric diagnoses, patients with schizophrenia cannot be distinguished from brain injured patients on the basis of cognitive impairments revealed by neuropsychological tests⁷¹. Despite this early finding, the relationship of schizophrenia with cognitive impairments was not systematically investigated until the 1990s. More recent studies started to shed light onto the link between cognition and social functioning^{39,40} and to examine whether cognitive impairments could be improved with the administration of antipsychotics^{72,73}. It was found that antipsychotics could indeed improve but, unfortunately, they could not reverse these cognitive impairments and, therefore, psychological treatments such as CRT were tried with the aim to further improve residual deficits in cognition and functioning.

CRT studies in the field of schizophrenia, conducted during the 1980s and 1990s, investigated the effect of programs with either focused (specific task training) or broader rehabilitation objectives including social cognition⁷⁴⁻⁷⁸. The results of the earlier programs focusing on attentional training and set-shifting were promising, but contradictory⁷⁹⁻⁸³. They used paper-and-pencil, computerized, or a combination of both types of exercises and employed two main methodologies, namely drill and practice (systematic repetition of concepts, examples, and practice exercises) and strategy coaching (education and use of cognitive strategies to compensate for difficulties).

What could be the aim of CRT?

Based on the literature presented above, the aim of CRT could be summed into combining compensation and substitution of cognitive impairments with direct cognitive retraining and efforts to improve community functioning.

The origins of CRT at the PHA

As mentioned above, the unmet needs of individuals suffering from severe mental disorders and the evidence revealing the relationship of cognitive deficits with everyday functioning stimulated the development of a specialized service inside the PHA. The study of the relevant literature, along with the experience of conducting human and animal research work in the interface of cognition and mental disorders both fuelled this development⁸⁴⁻⁸⁹ which followed three steps. The first step was the establishment of a Cognitive Rehabilitation Unit (Unit) and the recruitment of a research and therapeutic team comprising mental health professionals from different disciplines. Unfortunately, the establishment of the Unit coincided with the emergence of a severe financial crisis in Greece.

Due to resulting financial and human resources constraints, the PHA approved the establishment of the Unit provided that it would not be associated with high economic costs. The second step was the investigation of the correlates of cognition in patients with schizophrenia receiving care from the same hospital through several cross sectional studies⁹⁰⁻⁹². Having had a better understanding of the role of cognition in schizophrenia and of its relationship with functioning, the third step focused on methods to remediate cognitive deficits. Following a sabbatical at the Institute of Psychiatry, King's College, London, the staff of the Unit was familiarized with CRT methodology and participated in research on the predictors and efficacy of CRT in schizophrenia^{17, 93, 94}. The above experience resulted in the development of a CRT program for individuals with schizophrenia which was named "Meleti", after the Greek word "study", and was elaborated over certain key principles.

Principles of the "Meleti" program

The "Meleti" program is based on certain principles. The first principle is that there are similarities in terms of cognitive deficits and their rehabilitation among mental and non-mental disorders. Interestingly, neuropsychological tests cannot distinguish cognitive deficits in schizophrenia from those observed after head injury^{71, 95}. The appearance of similar cognitive deficits in the context of different diagnoses⁹⁶⁻⁹⁸ suggests that cognition could actually be a common treatment target in different neuropsychiatric disorders. Consequently, it should come as no surprise that CRT programs implemented against the cognitive deficits of seemingly diverse disorders share common characteristics^{3, 13, 26, 32, 99, 100}. A second principle arising from randomized trials is that CRT could improve both cognition and social functioning in schizophrenia^{14, 101}. As mentioned above, these trials also showed that the addition of CRT programs on other rehabilitation programs could boost functioning^{14, 15}. A third principle is that CRT is more effective in clinically stable patients¹⁴. A fourth principle is that cognitive strategies should be incorporated in CRT, since they facilitate the "bridging" of cognitive outcomes with everyday functioning¹⁴. Two other principles are that CRT in schizophrenia should be individualized based on the cognitive and functional profiles of patients¹⁰² and that it should recruit an interdisciplinary therapeutic team. Notably, the interdisciplinary approach is recommended for CRT programs in other brain disorders, such as acquired brain injury¹⁰³. Finally, a last principle is that higher education of trainers is associated with better results in terms of both attendance and cognitive improvements following CRT in schizophrenia¹⁰⁴.

The characteristics of the "Meleti" CRT Program

Population

The population of the CRT program was determined using several inclusion and exclusion criteria shown in table 2.

Table 2: Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
Psychosis	Other organic brain disorder or history of serious brain injury affecting brain functioning
Age 18-65 years	Dementia
Good knowledge of Greek	History of mental retardation
Stable psychopathology	Dyslexia or other learning difficulties
Stable pharmacological treatment	Current alcohol or substance use
Cognitive dysfunction and patient's request	Serious vision problems

Assessments

The neuropsychological assessment battery was mainly based on the domains of cognitive dysfunction which the Measurement and Treatment Research to Improve Cognition in Schizophrenia (MATRICS) identified in schizophrenia¹⁰⁵. In addition to these cognitive domains we also included judgement, vocabulary, spatial visualization ability and motor skill, visual learning and memory and cognitive flexibility and calculated an equivalent of full-scale IQ using the Block Design and Vocabulary subtests¹⁰⁶. The cognitive assessment battery of the "Meleti" comprised subtests from the Wechsler Adult Intelligence Scale (WAIS)-IV¹⁰⁷, the Montreal Cognitive Assessment (MOCA)¹⁰⁸, the Hopkins Verbal Learning Test-Revised¹⁰⁹, the Benton Visual Retention Test-Revised¹¹⁰, the Intra- and Extra-Dimensional Set Shifting and the Stockings of Cambridge Task from the Cambridge Neuropsychological Test Automated Battery (CANTAB)¹¹¹ and the Point-Light movies from Harvard University assessing social cognition through movies of whole-body emotional cues¹¹².

In addition to the neuropsychological assessment, the assessments of the "Meleti" program also included clinical symptom scales (Positive and Negative Syndrome Scale-PANSS for schizophrenia¹¹³ and the Clinical Global Impression Scale¹¹⁴), a self-esteem scale (Rosenberg Self-Esteem Scale¹¹⁵), a Subjective Scale to Investigate Cognition in Schizophrenia¹¹⁶ and functioning rating scales, such as the DSM-IV-TR¹¹⁷ GAF Scale, the Strauss-Carpenter Scale¹¹⁸ and the Camberwell Assessment of Need Scale¹¹⁹.

The assessment battery is shown in table 3.

Table 3: Assessment battery

A. Objective Cognitive Assessment	Cognitive or Clinical Domain
1. Animal naming	Psychomotor speed
2. Digit symbol WAIS-IV	Psychomotor speed
3. Comprehension WAIS-IV	Judgment
4. Vocabulary WAIS-IV	Vocabulary
5. Block design WAIS-IV	Spatial visualization ability and Motor Skill
6. Montreal Cognitive Assessment (MOCA), Attention subscale	Attention
7. Digit span subscale WAIS-IV	Immediate and working memory
8. Hopkins Verbal Learning Test (HVLT) – Revised	Verbal learning and memory
9. Benton Visual Retention Test-Revised	Visual learning and memory
10. Intra and Extra- Dimensional Set Shifting (IEDS) from Cambridge Neuropsychological Test Automated Battery (CANTAB)	Cognitive flexibility
11. Stockings of Cambridge (SOC) CANTAB	Cognitive planning
12. Montreal Cognitive Assessment (MOCA)	Brief cognitive screening tool
13. Point-light movies	Social cognition
B. Subjective cognitive function	Description
1. Subjective Scale to Investigate Cognition in Schizophrenia (SSTICS)	A scale to measure cognitive complaints of patients with schizophrenia
C. Clinical Assessment	
1. Clinical Global Impression (CGI) Scale	Brief assessment of the patient's global symptoms by the clinician
2. Positive and Negative Syndrome Scale (PANSS)	A rating scale used for measuring symptom severity of patients with schizophrenia
D. Self-esteem	Description
1. Rosenberg self-esteem scale	A 10-item scale that measures self-worth
E. Functioning	Description
1. Global Assessment of Functioning (GAF) Scale	A rating scale used for measuring the social, occupational, and psychological functioning of an individual.
2. Strauss-Carpenter Scale	A four-item scale based on four areas of functional outcome in schizophrenia.
3. Camberwell Assessment of Need Scale	A scale assessing the needs of people with severe mental illness

Development procedure

The “Meleti” CRT program was developed in four phases.

Phase I: Data collection phase: Reviewing the existing CRT programs for severe mental disorders

DK and ET reviewed the existing CRT programs for severe mental disorders, starting from the first publications on CRT in schizophrenia¹²⁰ and continuing with the existing meta-analyses and the relevant individual papers^{15, 121-124}. They also reviewed the literature involving the CRTs in patients suffering from non-psychiatric disorders^{125, 126}.

Phase II: Practical CRT training phase

Before the development of the “Meleti” program, DK was trained at the Department of Psychology, Institute of Psychiatry, King's College London (2010-2011). This training in-

involved theoretical and practical experience with one CRT paper-and-pencil program which had been previously developed in Australia. The program was based on executive processing, and consisted of three modules: cognitive flexibility, working memory, and planning. DK participated in the development and was also trained in the administration of a similar electronic CRT program (CIRCUITS) which was developed at the Institute of Psychiatry^{127, 128}. Upon his return from London he trained the members of the therapeutic team of the Unit.

Phase III: Sessions design

Several meetings of the therapeutic team of the Unit were dedicated to determining the sessions of the CRT program. During these meetings the therapeutic team decided to integrate CRT sessions initially designed for individuals with mild cognitive impairment into the rehabilitation program for individuals with psychoses and to develop additional sessions

targeting cognitive and social cognition impairments.

Phase IV: Pilot implementation phase

During this phase, the sessions were first administered to individuals suffering from schizophrenia at the Unit which was initially housed inside the PHA. The program was finalized following this initial administration. The Unit's therapeutic team conducted educational seminars to mental health professionals of the PHA working at hostels and boarding house who implemented the program to patients accommodated in these residential structures.

Frequency and duration of therapy

The frequency of CRT sessions is 2-5 sessions per week. The duration of treatment including the assessment sessions is approximately 6 months.

Referral and therapy

Individuals can be accepted by the Unit following a referral by their therapist or therapeutic team or by themselves. An initial evaluation of the individual is conducted by a Consultant Psychiatrist during a diagnostic interview. The Psychiatrist takes a history of the disorder, makes the diagnosis, evaluates the patient according to the inclusion and exclusion criteria and conducts the clinical assessments (see table 3). Clinical, neuropsychological, and social functioning evaluations are conducted before and after CRT sessions and the program ends with a report given to the participant and his/her therapeutic team. Figure 1 shows a summary of the "Meleti" program from the referral of a participant to the completion of the program.

Initial psychoeducation session

Before the start of the assessments and the therapeutic sessions of the program, the participant attends one psychoeducational session lasting 45 minutes. During this session, he/she has the chance to learn basic facts about the symptoms of psychotic disorders, about the role of cognition on these symptoms and, lastly, about the importance of cognitive symptoms for everyday functioning.

Assessment sessions

The assessments shown in table 3 are conducted during two groups of three separate sessions before and after the therapeutic sessions, respectively. They are conducted by the psychologists, the occupational therapist and the psychiatrists of the Unit. These assessments produce quantitative data which

are useful for the individualization and evaluation of treatment.

Therapeutic sessions

Table 4 shows the 40 sessions of the CRT program and the cognitive domains targeted by each session. They comprise two modules, the Cognitive Exercises Module (first 35 sessions) and the Social Cognition Module, (last 5 sessions), respectively.

Goals

The whole program develops around specific goals jointly set by the participant and his/her therapeutic team. These goals have to be specific, measurable, realistic and achievable within a time-frame. Notably, the goals could change during the course of training, when the participant and his/her therapeutic team gain a better understanding of his/her strengths and weaknesses. At the end of the program, the participant rates the degree of achievement of his/her goals using a Likert scale. Finally, the participant and his therapeutic team are given a report from the Unit summarizing the treatment course, his/her strengths and capabilities and proposing practical interventions for the accomplishment of his/her goals in his/her everyday life.

Cognitive strategies

An important component of the CRT program is the teaching of cognitive strategies. Before each cognitive exercise the participant is shown a list of strategies and selects the most appropriate. Examples of strategies include visualization, verbalization, dividing larger tasks into smaller ones, checking, making comparisons etc. Strategies correspond to all three types suggested by Zangwil (see table 1)⁵⁵.

Meta-cognition

Cognitive strategies are closely linked to meta-cognition but they are not identical¹²⁹. Meta-cognition is the awareness of one's own cognition and meta-cognitive activities which could occur either before cognitive activities, or during activities or after their completion. It involves planning, monitoring and evaluation¹³⁰. The participant not only chooses between a set of suggested cognitive strategies, but he/she is also asked to follow any other helpful strategy. In addition, after having completed a task, he/she is asked to specify which strategy he/she chose, whether and why he/she followed an alternative strategy and to rate the usefulness of these strategies. These meta-cognitive tasks along with the rating of the achievement of the initial functional goals aim at facilitating the generalization of the cognitive benefits to real world tasks.

Table 4: Rehabilitation Sessions and Cognitive Functions

Sessions Number	Educational material	Cognitive domain involved
Cognitive Exercises Module		
First 22 sessions	Cognitive exercises from leaflets for patients with Mild Cognitive Impairment or similar exercises by other books. Exercises involve specific cognitive domains and are individualized (graded for difficulty) according to the cognitive performance of participants. *	Verbal Learning, Verbal Comprehension, Working Memory, Selective Attention, Vigilance, Reasoning and Problem Solving, Planning
Intercalated in 5 sessions (sessions 3,4,7,8,12)	Name maximum number of words in one minute that belong to a certain category (e.g. animals)	Verbal fluency Processing speed
23 rd Session	Dual task and image symmetry exercises	Cognitive Flexibility, Selective Divided Attention, Vigilance
24 th session	Letter and form symmetry, completion of sentences and stories, synonyms	Selective Attention, Reasoning and Problem Solving, Verbal Comprehension
25 th session	Number and Letter coding exercises	Selective Attention, Speed of Processing, Working Memory
26 th session	Text comprehension and memory	Verbal memory, Verbal comprehension
27 th session	Wordsearches	Verbal fluency
28 th session	Image ordering	Reasoning and Problem Solving, Verbal Fluency
29 th session	Guess Who game and Tangram	Working Memory, Visual Memory
30 th session	Arithmetic calculations and games	Working Memory, Arithmetic Operations, Attention
31 st session	Images differences, left-right discrimination, metaphors	Working memory, Selective Attention, Visual Memory, Verbal Comprehension
32 nd session	Geography game	Verbal Memory and Learning, Visual Memory and Learning
33 rd session	Executive functioning game (BeeBot)	Reasoning and Problem Solving, Working Memory, Planning
34 th sessions	Auditory memory exercises	Auditory Memory, Working Memory, Verbal Comprehension, Reasoning and Problem Solving
35 th session	Memorizing and Copying forms	Visual Memory and Learning
Social Cognition Module		
36 th session	Self-Knowledge exercises	Meta-cognition
37 th session	Emotion Recognition tasks	Emotion Perception, Meta-Cognition
38 th session	Emotion and Social Stimuli Recognition tasks	Emotion and Social Perception, Empathy, Meta-Cognition
39 th session	Emotion Recognition tasks	Emotion and Social Perception, Understanding Intentions, Meta-Cognition
1-40 th session	Storytelling	Meta-Cognition

*The main leaflets are given with the permission of the Athens Association of Alzheimer's Disease and Related Disorders.

Zangwill, O. L. (1947). «Psychological aspects of rehabilitation in cases of brain injury.» *Br J Psychol Gen Sect* 37(2): 60-69.

Additional evaluations

The evaluation of participant is not limited to the assessment battery administered by the Unit's team. It also includes evaluations conducted by their therapeutic team outside the Unit (outpatient clinics, hostels, mental health centres e.t.c.) assessing their needs, cognitive capabilities and goals and similar self-evaluations by the participant before following therapeutic sessions. Ratings of the needs of participant by family members and caregivers are also encouraged when

feasible. Discrepancies in evaluations could reveal deficits in the participant's meta-cognition and insight, or systemic dysfunctions in the participant's environment.

Follow-up

The follow-up of participants includes 10 anamnestic sessions and group CRT sessions with cognitive and social cognition tasks. These sessions are offered as a continuation of core sessions.

Perspectives

The future perspectives of the Unit include the development of novel educational, clinical and organizational activities. Educational initiatives for mental health professionals and carers could contribute to early detection of cognitive impairments and could lead to the administration of the CRT program before the first psychotic episode. As mentioned above, there is promising evidence associating such an administration with a delay in the appearance of the first psychotic episode¹⁹. Dissemination activities including public awareness initiatives could also result in combating stigma. There is a need to inform the public, employers and those responsible for designing health policies about the importance of work opportunities for individuals with psychoses. These opportunities should take into account their cognitive difficulties and could result in their full integration into society. In addition, dissemination activities could have a preventive potential given that cognitive impairments manifested as a drop in school performance usually precede psychotic symptoms¹³¹. The creation of a network for CRT by following the paradigm of France³⁶ could facilitate the dissemination and success of cognitive rehabilitation efforts. Finally, the integration of CRT programs in the treatment of cognitive difficulties associated with other mental health disorders, medical disorders or with aging is another perspective. Interestingly, the administration of arithmetic and reading exercises in older people has been shown to have beneficial effects in non-targeted cognitive functions, suggesting a transfer of benefits¹³². In addition to individuals with psychosis, the Unit has already administered the “Meleti” program to patients with substance use disorders and brain injury with promising results.

Discussion

We described the stages of development, the aims and the structure of a CRT program which comprises cognitive exercises, training in social cognition and meta-cognition, includes strategy coaching and addresses the needs of individuals presenting with psychotic disorders and cognitive difficulties.

Similar programs are implemented in a clinical or research basis. The “Meleti” program shares common characteristics with the existing programs in schizophrenia, but it also has notable differences. The similarities between the “Meleti” program and the existing relevant programs include the population involved, the intensity of sessions (e.g. ^{76, 79, 133}), the use of strategies (e.g. ^{76, 134-136}) or the use of paper and pencil tasks. Similarly, to several ex-

isting programs, the “Meleti” program also recognizes the importance of interdisciplinary work. However, “Meleti” differs with the current CRT programs in a number of issues. First, “Meleti” does not include computerized exercises. It should be noted here that, in general, although the use of computerized tasks could facilitate the control of the level of difficulty of exercises and the individualization of treatment, there is a dearth of data comparing the efficacy of computerized versus no computerized CRT programmes¹⁰⁴. As mentioned above, a recent meta-analysis in schizophrenia found that paper-and-pencil and computerized CRT programmes have similar efficacy¹⁴. In addition, “Meleti” is clinically oriented and it is implemented in clinical settings, whereas many programs are being used for research purposes in university settings. Another difference is that “Meleti” combines training in both cognition and social cognition, whereas several programs for individuals with schizophrenia do not address social cognitive impairments. In addition, as opposed to other programs, the core component of “Meleti” comprises personal (one-to-one) sessions, rather than group sessions. However, group sessions are now being used in a pilot continuation of the main program. Finally, the trainers of the Unit are experienced psychologists, as opposed to the faculty of other CRT programs which employ non-specialized staff.

There are a number of limitations of the “Meleti” program which need to be mentioned. We acknowledge that the absence of data from a randomized study investigating its efficacy is the most important of them. However, the safe implementation of the program to more than 150 participants supports the feasibility of the program. In addition, naturalistic pilot data published in conferences and unpublished data from a non-randomized comparative study with a control group receiving occupational therapy of the same duration found that “Meleti” group showed improvements in cognition and symptomatology which did not appear in the occupational therapy group. Undoubtedly there is a need for a randomized study examining the short- and long-term effects of the program for participants and their caregivers and its effects on variables beyond cognition, such as symptomatology, functioning and psychiatric services issues (relapses, hospitalizations, costs).

In conclusion, we briefly presented the history of CRT with a particular focus on schizophrenia and we also described the development of one CRT program for individuals with psychoses in the context of the Greek National Health Service. Our experience has shown that the implementation of CRT in psychosis is feasible and could satisfy several unmet needs of patients having cognitive difficulties. Preliminary evidence

suggests that this program could be implemented in individuals presenting with cognitive difficulties which are suffering from other disorders beyond psychosis.

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