A Comparison of the Effectiveness of Problem Solving Training and of Cognitive-Emotional Rehabilitation on Neurocognition, Social Cognition and Social Functioning in People with Schizophrenia

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Abstract: *Objective:* Social cognition and Problem Solving (PS) impairments are common characteristics in patients with schizophrenia. Experimental neuropsychological findings support the hypothesis that schizophrenia is characterized by a broad range of heterogeneous cognitive impairments. Since that time Problem Solving Training has been employed as a core strategy in a wide variety of therapeutic settings. Renewed interest in cognitive functioning, including social Problem Solving skills and social cognition in schizophrenia, has led us to reconsider the potential value of metacognitive strategy as a rehabilitation strategy.

Methods: The present study reports the results obtained by 24 persons with schizophrenia who were randomly assigned to one of two training session groups: Cognitive-Emotional Rehabilitation (REC) vs Problem Solving Training (PST). Both treatments were administered to small groups composed of subjects suffering from schizophrenic disorders over a 12 months period: primary measures of clinical, social outcomes and secondary measures of cognitive and Problem Solving functions were conducted at 0, and 12 months.

Results: Results showed that both training methods were found to be effective in psychopathological measures and in social functioning. On cognitive function improvements were specific to the rehabilitative approach. PST are mainly improved capacities for planning and memory, while the REC improved measures such as social cognition Theory of mind and emotion recognition.

Conclusion: The results confirmed that it is no necessary to divide the rehabilitation training in treatments directed to specific domains. The conceptualization and applicability of PST and REC its implications for persons with schizophrenia, and future studies in this research area have also been discussed.

Keywords: Rehabilitation, Schizophrenia, Social Cognition. Problem Solving training, Emotion Recognition.

BACKGROUND

Schizophrenia is a chronic and profoundly disabling psychiatric disorder. Diagnosis is predicated on a marked decline in social and occupational or educational functioning. Current estimates suggest that 85% of patients are unemployed and any one time, only 1% of patients with schizophrenia who receive Social Security Disability Insurance (SSI/SSDI) ever remove themselves from entitlements. The patients with schizophrenia show 1-2 standard deviation impairments on a variety of measures of neurocognitive function, including QI and overall cognitive structure [1, 2], episodic and working memory [3], attention [4], language [5], executive function and problem-solving [6, 7]. Our study wants to focus on the social cognition, a neurocognitive domain witch include all social and emo

tional competences to have a social behavior suitable for several situations.

Social cognition is an adaptive human function [8] whose impairment has been consistently observed in patients with schizophrenia and it was found to relate to their social functioning and behavior [9]. People affected by schizophrenia show major deficits in Theory of Mind (ToM) [10, 11]; it has been proposed that many symptoms in schizophrenic disorder may reflect a deficit in patients' ability to represent their own and other people's mental states [12]. According to Frith's model [12], the main aspect of metarepresentational processes is the ability to reason about how to represent the world, our thoughts and our actions. Such an aspect is termed "metarepresentation" and is the "data structure" underling self-awareness [13]. The deficit reported in schizophrenic disorder about such mental competence has thereby been termed "theory of mind deficit". The ToM represent a distinct module from the others neurocognitive competences; it is innate and related to the concept of "metacognition" introduced by Flavell [14], further divided by the other authors into several components: the metamemory, the meta-

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comprehension, autoregulation, acquisition of schemes, transfer, attribution of mental states. Particular significance has been attached to these deficits, as there are a growing number of studies showing that deficits in elementary neurocognitive function are linked to a variety of aspects of functional outcome cross-sectionally and in some cases longitudinally as well. Reviews suggest that neurocognitive deficits explain 20-60% of the variance in studies of the ability to solve interpersonal problems, community(social and occupational)function and measures of skill acquisition in rehabilitation programs [15, 16]. Many of these studies also suggest that neurocognitive deficits are more closely linked to functional outcome than are psychiatric symptoms [15]. Therefore the changes in fundamental neurocognitive skills, along with appropriate learning experiences, will improve life skills in patients with schizophrenia.

One crucial line of evidence for this assumption is that neurocognitive deficits are predictive of functional status. A meta-analysis of cognitive remediation in schizophrenia [17] evaluated the effect of cognitive remediation for improving cognitive performance, symptoms and psychosocial functioning in schizophrenia. The authors hypothesized that cognitive remediation would improve both cognitive functioning and psychosocial adjustment. They also hypothesized that programs that provide more hours of cognitive training would have stronger effects on cognitive functioning and the adjunctive psychiatric rehabilitation would be associated with greater improvements in functional outcomes. According to the other authors [18] the cognitive remediation, if ignore the social cognition and particularly the necessity to treat the social interaction and "the theory of mind", seems to be ineffective [19].

Recent studies, showing that the relationship of social cognition abilities with functional outcome is more significant than other neurocognitive functions, have considered these abilities as a target of intervention research.

We hypothesise that by facilitating the subjects with schizophrenia in comprehension and utilization of thinking strategies necessary for social interactions, such as theory of mind comprehension [20, 21], strategic reasoning, and emotion recognition [22], it will be possible for them to improve in social tasks. Therefore we found necessary to compare the effectiveness of these two psychoeducational treatments: the Problem Solving Training (PST) and Cognitive-Emotional Rehabilitation (REC).

The Problem Solving Training (PST) and Cognitive-Emotional Rehabilitation (REC) are in some way similar because they are substantially based on psychoeducation and they also share many cognitive-behavioural techniques, particularly a goal oriented work, "home-work", feed-back with rewards, role-play, modelling, brainstorming and so on. The main difference is the focus on the "emotion-recognition" of the REC, while the PST is mainly focused on Problem Solving. For what concerns the techniques the REC is also characterized by a more intensive use of the "Socratic questioning".

The authors suggest that the two interventions may improve the social functioning, but we need to underline the peculiarity: the PST is hypothesized specifically to benefit neurocognition, particularly executive function and planning flexibility and attention, whilst REC should lead to improvements in social and emotional cognition, specifically in ToM.

For the PST, we followed the Falloon approach [23] better decribed in an unpublished manual that is quite similar of that edited by Barbieri *et al.* [24].

A structured method of resolving problems, such as PST, allows patients with schizophrenia to develop solutions to everyday problems, by assigning them a role of responsibility and allowing individuals to experience an active management of the problems themselves.

The rationale for PST include the vulnerability and stress hypoyhesis [25], evidence of interpersonal incompetence, deficits in emotional processing and hypersensibility, cognitive deficits and neural pathway dysfunction.

The structured problem solving model addresses most of these deficits and provides a prothesis that enables patients with a variety of different cognitive deficits to conduct effective problem solving of both practical and emotional problems. The PST has focused on specific areas of interpersonal or social functioning such as social or work skills, with increasing emphasis on remedying underlying perceptual deficits, such as recognition and expression of emotions.

Both interventions improve the social functioning, the management of the social and emotional tasks, but only the REC includes the remediation of the "theory of mind deficit".

It was hypothesized however that PST could not have a positive effect on general symptomatology in comparison with the REC; therefore the neurocognitive competences are less predictive of the functional outcome. We hyphotesized that the social cognition, especially the ToM, is more closely linked to functional outcome than cognitive deficits.

METHODS

Sample

Twenty-four people affected by schizophrenia, diagnosed according to DSM-IV-TR (APA, 2000) participated to the study. Subjects were outpatients of the department of Mental Health of Campobasso, Italy. All participants gave their informed consent.

The inclusion criteria were: (a) age more than 17 and less than 56 years, (b) DSM-IV diagnosis of schizophrenia confirmed following the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I) [26], (c) prevalence of symptoms confirmed by the Positive and Negative Syndrome Scale (PANSS) [27], and (d) presence of cognitive impairments confirmed by a battery of neuropsychological tests. Exclusion criteria were: (a) IQ below 85 points , (b) organic cerebral diseases or primary diagnosis of substance abuse, (c) psychiatric co-morbidity, (d) psychotic exacerbation in the previous six months, and (e) plans to change medication during the treatment phase. After a complete description of the study to the subjects involved, written informed-consent was obtained.

Patients were followed up for 12 months, with interviews at baseline (T0) , 6 months, 12 months (T1). Data were collected by clinical records, through clinical interview, psychological evaluation, rating scales and the specific interview for aimed at investigating social functioning. The researchers (psychologists) trained by specific training .Subjects were divided in two groups, REC and PST.

Randomization was independently conducted by Department of Mental Health of National Institute of Health of Rome. A random-number table was used to generate lots that were drawn in sealed envelopes, each assigning the respective patient to PST or REC group.

Patients were assessed before and after treatment by independent researchers (psychologist and neuropsychologist) of Institute of Psychiatry, University of l'Aquila. The evaluation being directed to key outcome variables including social, clinical, and neurocognitive tests.

OUTCOME MEASURES

Clinical Assessment

We used the Italian version of the Positive and Negative Syndrome Scale (PANSS) [28] which has similar psychometric properties to those obtained in the original version. Symptoms were assessed with regard to the month leading up to the evaluation.

We also calculated scores obtained in the 5-factor model developed by Lindenmayer *et al.* [29] which yields results for Negative, Positive, Cognitive, Excitement and Depression/Anxiety components.

Social Functioning: Personal and Social Performance Scale (PSP)

The PSP was developed on the basis of the social functioning component of the DSM-IV social and occupational functioning assessment scale (SOFAS) [30, 31]. The scale was interviewer-administered to informants, who provided information based on their knowledge of the patient's behavior.

Patient functioning was assessed in four main areas: socially useful activities; personal and social relationships; self-care; and disturbing and aggressive behaviors. Difficulty in each area was rated on a single item using a six-point scale: Absent; Mild; Manifest but not marked; Marked; Severe; or Very severe, where lower ratings indicated better functioning. A global item was rated by the interviewer, ranging from 0 to 100 in ten-point intervals, where lower scores indicated poorer functioning [30, 31].

The basic score ranges and corresponding functioning levels described by the developers were 1–30 (Poor functioning, requiring intensive support or supervision); 31–70 (Manifest disabilities of various degrees); 71–90 (Mild difficulties); and 91–100 (More than adequate functioning).

The inter-rater reliability for the global score, measured by the infraclass correlation coefficient (ICC), was 0.98 and the weighted Kappa was 0.94 . Further information about the measure can be obtained from the primary developer.

Neurocognitive Assessment

All participants completed a complete neuropsychological battery. The different raw scores were converted into T-scores (Mean: 50; SD: 10) and, in order to make all scores comparable, the norms adapted for age and educational level, as outlined in the manual covering each test, were applied. The neurocognitive assessment was carried out through the following instruments: *Estimated IQ*: Raven progressive matrices; *Working Memory*: forward and backward Digit Span; *Psychomotor Speed*: Trail Making Test-A (TMT-A); *Verbal Memory*: Rey Auditory Verbal Learning Test (RAVLT); *Executive Function*: Tower of London, Trail Making Test-B (TMT-B); Verbal Fluency; key search (Bads), Zoo map test (Bads) [32].

Social Cognition: Advanced Theory of Mind Scale

This task is an Italian adaptation of a cognitive task used by Blair & Cipolotti [33] proposed in literature by Happe [34].

This task consists in a short version of 24 short vignettes, each accompanied by a picture and two questions; the comprehension question "Was it true, what X said?", and the justification question "Why did X say that?". The 12 story-types included Lie, White Lie, Joke, Pretend, Misunderget, Double Bluff and Contrary Emotion. A set of control "physical stories" was also given to the subjects. These stories did not involve mental states but described instead an unforeseen outcome with a mechanical physical cause [34].

The explication given in response to the "Why" question was rated as either correct or incorrect. A justification could be incorrect because it involved errors about the facts given in the story, or because it involved an inference which was inappropriate as a reason for the story character's utterance. The justifications were also scored as either involving mental state or physical states. Many of the story characters' utterances could be justified correctly either in term of mental states or physical states. Mental states answers included those that referred to thoughts, feelings, desires, traits, and dispositions. It was given only one score per story, giving the subject credit for patient's "best" answer. That is, if a subject gave a correct answer and an inappropriate one, it would be selected the correct answer.

Each participant was tested alone in a room which was free from distractions. The experimenter introduced each story as follows: 'Here are some stories and some questions. I am going to read the stories, and I'd like you to listen carefully and answer the questions at the end of each story. If you want, you may read the stories yourself while I am listening. OK? Let's start'. The experimenter sat next to the individual and read out each story. The participants preferred sometimes reading the story out loud to the experimenter. The sheet remained in front of the participant throughout the reading and questioning tasks. This was done in order to minimize memory requirement.

First and Second Order Theory of Mind

First and Second Order Theory of Mind tasks [35,36] were used to measure players' ability to make inferences about mental states was investigated through the comprehen-

sion of false beliefs stories. Two stories were read to the participants individually in order to assess second- order ToM competence (the capacity to understand other people's false beliefs): The Washing Machine story [37, 38] and The Wallpaper Story [37, 38].

Each participant was tested alone in a room which was free from distractions. The experimenter introduced each story as follows: 'Here are some stories and some questions. I am going to read the stories, and I'd like you to listen carefully and answer the questions at the end of each story

These stories were presented to the subjects in a series of cartoons, in which the various actions of the characters were depicted in sequences. All the subjects were asked a ToM question and three control questions:

Emotion Attribution Task Colleagues [33, 37]

In this task, the participant was presented with 58 short stories describing emotional situations and was asked about what the main protagonists might feel in that situation. Fourteen stories were designed to elicit attributions of happiness, 14 of sadness, 10 of fear, 10 of anger and 10 of embarrassment. The task was scored according to the number of correct attributions made for each story category. Any positive affect (including relieved, overjoyed and ecstatic) was scored as correct for the happiness stories. Any sad affect (including sad, upset and devastated) was scored as correct for the sadness stories. Correct responses to the fearful stories included fearful, scared and petrified. Correct responses to the angry stories included angry, annoyed and irritated. Correct responses to the embarrassment stories included embarrassed, stupid and humiliated.

Interventions

Both intervention were conducted by professional qualified as psychologist or social worker for each treatment. Each weekly session last 90 minutes, followed by two exercices (weekly frequency) plained among sessions (six-monthly).

Problem Solving Training, PST

We followed Fallon unpublished manual [23] very similar to that of Barbieri, *et al.* [24]. A structured method of resolving problems, such as PST, allows patients with schizophrenia to develop solutions to everyday problems, by assigning them a role of responsibility and allowing individuals to experience an active management of the problems themselves. The PST includes stimulation of perceptive , processing and attentive processes, along with skills in specific social situations. In addition, PST does not suggest the participants any predetermined solution, but aims to teach strategies of thought that allow the choice of a solution based on a careful evaluation of their and others' actions. The PST is divided into four stages of increasing complexity, involving identification and definition of practical problems to solve interpersonal issues, and finally intrapersonal management of crisis situations and suffering.

This intervention conducted by psychologist and social worker of Day Center of Campobasso.

Two groups participated in this study: each group were composed by 6 patients.

The users had the manual to read during the session .

Phase 1: patients clarify their current personal life goals and the problems they must overcome to achieve those goals. They are instructed about the 6-step structured Problem Solving method, and use this to deal with practical problems related to one or more of their goals, such as shopping, nutrition, exercise, use of transport, budgeting and scheduling daily activities.

Phase 2: patients deal with interpersonal problems such as making friends, expressing positive feelings, giving and receiving criticisms etc

Phase 3: problems of residual psychotic and non-psychotic symptoms are addressed in this part of the course. In addition to the 6-step Problem Solving structure, patients learn to perform a Problem Analysis that helps to formulate the precise nature of the problem, triggers and reinforces and modifying factors, including current effective and ineffective coping strategies.

Phase 4: in the final phase, issues of coping with distressing feelings associated with major life crises (including major stressful life events, persisting intolerable stressors, and recurrent major episodes of illness) are addressed. These may include coping with a full range of emotions, fear, sadness, jealousy, anger, frustration, disappointment and their associated behaviors, such as aggression, self-harm, withdrawal, and substance use.

The techniques used are brainstorming, role-play, cognitive restructuring, homework and information and social reinforcement. The task group has to provide modeling, immediate feedback and opportunities for application of skills in "here and now." In addition, work has focused on issues related to the concrete life of the participants. The usual steps of PST are to define problems in specific terms, to think creatively trying to find an alternative solution, to bring the positive or negative side to every situation, to choose the best solution, splitting the solution chosen in a series of achievable steps in order to evaluate the effectiveness of the choice. The main targets of this method are to help each patient to achieve the objectives he/she considers most important for his/her life. The program does not, in fact, propose only the solution of major problems, but also the way to cope with the smaller stresses of daily life, eating, sleeping, working and having fun, in order to have a more satisfactory life.

Cognitive-Emotional Rehabilitation (REC)

The treatment provides a six-months weekly meeting lasting about 75-90 minutes, held with a group composed of 8 to 12 patients. The intervention is structured and manualized, and is substantially based on the psychoeducational approach integrated with behavioural and cognitive techniques. The manual it has not been published yet, but the technique to manage the group and the theoretical principal of the approach it is similar to the approach developed by Vendittelli *et al.* [39] for psychiatric ward [40].

Sessions are provided to teach patients to recognize events and situations they are usually exposed to in everyday life. In order to improve effective interpersonal communication and structured Problem Solving skills, practical training is provided. To carry out goal-oriented tasks, patients after

the sessions must do homework with the help of nursing staff.

These are reviewed at the beginning of the next group's activity, the following day.

The intervention consists of three phases: sharing the objectives of work (motivation and consent); learning to be aware of faces emotions and understanding other's behaviors.

The emotions that are treated are as follows: a) fear; b) joy; c) anger; d) Fault; e) sadness; f) shame; g) jealousy; h) envy; i) interest; l) embarrassment; m) disgust.

The activity consists in learning/education through the "Socratic approach", that is, through mediated learning techniques the conductor teaches the subjects to observe other patients' faces in order to recognize their emotions and to observe others' behaviors in order to understand their mental state. The conductor is helped by a co-tenant who writes on a blackboard a summary of the work. This phase of education also called " Emotional Navigator " engages provides for 20-25 seats.

In the third phase, conductor and co-tenant, using two boards far from each other, collect each the summary of the "emotional work" of his own mind on his own blackboard. The blackboard is divided into five areas: 1) context/situation; 2) Mood/Emotions felt; 3) Thoughts/Pictures mental disabilities, 4) Body Sensations; 5) Actions / Behaviour / Attitudes / Expressions.

The group program (Day-Center of Campobasso) is conducted by a professional (called the "conductor") with the assistance of another (the "co-conductor"). Conductors come from various professional backgrounds, but in this study the main trainer was a psychiatrist while the co-conductor was a psychologist. Two black-boards were used to make notes during the sessions. Groups was held one day a week from 09.15 am to 11.00 am. Each weekly session was clearly structured, and followed the steps outlined in the REC manual unpublished which content is described in Vendittelli & Veltro [41]. The techniques, instead, were very similar to those illustrated in the manual of cognitive behavioral therapy for inpatients [39]. The treatment was based on psycho-educational strategies and on the main behavioral cognitive therapy.

Data Analytic Plan

Data analytic plan was as follows: a series of independent *t* tests to examine baseline differences between the REC and PST group on the clinical and demographic variables was performed. Second, we compared the two groups on baseline clinical and demographic variables. If baseline differences were present, these variables were entered as covariates in the analyses.

To examine the efficacy of REC vs PST group, we conducted a series of 2 X 2 repeated measures Anova Treatment (between subjects Pst Vs REC) X Time (pre-test vs. post-test; within subjects). Non parametric tests we used for qualitative variables.

The primary analyses focused on the change on neuro-cognition (cognitive and social cognition) as a result of the

treatment. Thus, if REC is effective in improving social cognition and PST is effective in problem solving, we should see an interaction effect Data were analysed with SPSS 16.0.

RESULTS

Pre-Treatment

The mean age of total sample was 38.38 years ($\pm$ 8.81), mean years of education 11.29 ($\pm$. 3.29).

All subjects were taking neuroleptics whose Chlorpromazine mean daily dosage equivalents were 180.51 ($\pm$ 148.92) mg/eq [42] (Kessler & Waletzky, 1981); the mean duration of illness was 13.03 ($\pm$. 8.08).

The mean I.Q., assessed through Mini Mental State Examination, was 27.46 points (s.d. 4.35).

Mean age PST users was 37.7 ($\pm$11.16s), mean age REC users was 38.8 ($\pm$ 6.3) (t = 0.29; df = 22; p = 0.77; IC 95% = -6,6 + 8,7). Mean age of education in the PST group was 11.17 ($\pm$ 4.0), in the REC group was 11.42 ($\pm$ 2.5) (t= 0.18; df = 22; p = 0.86; IC 95% = - 2.62 + 3.11). mean age of illness inthe first group was 11.91 ($\pm$ 7.9), in the second group was 14.17 ($\pm$ 8.3) (t = 0.68; df = 22, p = 50, IC 95% - 4.6 + 9.1). There was no statistical significant difference in QI level, in the ratio of previews admissions in the hospital, in symptomatology and neurocognitive functions between the groups examined by t-test. The Social functioning (PSP 0-100) in PST group was 47.5 ($\pm$ 17.9), in REC group was 47.6 ($\pm$ 17.9) (t = 0.23; df = 22; p = 0.98; IC 95% $\pm$ 15).

Post-Treatment

Clinical Measures

During treatment-course there were no drop-out and proposal to admit patients in psychiatric ward. Non clinical measures analysis revealed that in general three scales of the PANSS showed an improvement in both treatment groups (time effect), in Positive ($F (1,22) = 20.0$, $p < .001$), Negative Scales ($F (1,22) = 20$, $p<.001$) and Psychopathology Scale scale ($F (1,22) = 20$; $p <.001$).

Only the General Psychopathology Scale showed a group effect which favored PST group ($F (1,22) =7.73$; $p < .001$) (Table **1**).

In both groups we observed a improvement trough total PSP score, with mean level in the PST group PST 49 ($\pm$ 14) (increasing 1,5 respect to baseline), while in the REC group appeared 56 ($\pm$ 14) (increasing 8.4 respect to baseline) ($F (1,22) = 7.06, p < .05$)

With regard to social functioning, we found significant Group X Time interaction in Social engagement ($F (1, 22) = 19.6, p <.001$) and Interpersonal Communication ($F (1, 22) = 14.9, p <.001$) subscales. Probing of the interactions revealed a significant improvement in willingness to engage others in conversation, the quality of their social support network, and ability to have conversations with others for those individuals who underwent REC treatment (Table **1**).

For PSP total score we obtained a significant time effect ($F (1,22) = 7.06, p <.05$). These results evidence that in both groups there is an improvement in social function global score (Table **2**).

Table 1. Symptomatology and Social Functioning Measures by Treatment Condition at the Baseline and Post Rehabilitation Treatment

	Group	Baseline Mean (SD)	Follow-up Mean (SD)	Time Effect	Time *Group
PANSS (3factor)					
Positive	REC	5.9 (2.1)	5.7 (1.7)	0.376	0.837
	PST	6.4 (2.2)	6.2 (2.4)		
Negative	REC	14.0 (5.3)	12.6 (4.7)	0.001	0.523
	PST	15.2 (5.3)	13.1 (4.2)		
General psychopathology	REC	10.1 (3.3)	7.6 (2.5)	.001	.001
	PST	9.8 (2.9)	10.0 (2.4)		
PSP					
Communication	REC	16.4 (4.2)	24.7 (9.6)	.001	.001
	PST	14.1 (4.1)	14.6 (8.8)		
Interpersonal social behavior	REC	33.4 (3.9)	34.3 (4.2)	0.074	0.197
	PST	30.1 (4.6)	30.2 (4.3)		
Nonpersonal social behavior	REC	20.5 (2.8)	20.9 (3.3)	.006	0.371
	PST	19.4 (3.5)	19.6 (3.2)		
Personal Autonomy	REC	14.2 (4.5)	18.5 (3.9)	.001	.007
	PST	16.6 (5.3)	18.6 (4.7)		
Self-care	REC	33.9 (5.8)	34.8 (5.5)	.269	.213
	PST	33.8 (4.8)	33.8 (4.4)		
Total score	REC	118.4 (16.6)	133. 3 (21.8)	.001	.001
	PST	114.1 (15.3)	117.0 (13.3)		

The primary analyses focused on the change in social cognition as a result of the treatment. A series of 2 X 2 repeated measures ANOVAs conducted on the social cognition measure revealed significant interactions in first-level Theory of Mind task ($F (1,22) = 7,3$, $p <.05$) (Table **3**). Analysis revealed also a significant interaction in emotion recognition total score ($F (1,22) = 13.69$, $p <.05$); emotion recognition sadness ($F (1,22) = 7,88$, $p <.001$) fear ($F (1,22) = 7,14$, $p <.001$) and anger ($F (1,22) = 11,3$, $p < .001$) (Table **3**).

There were no evidence of significant improvement in both groups of second-order Theory of Mind.

Probing of interactions revealed a significant improvement in social cognition and emotion perception only in individuals who received REC treatment (Table **3**).

With regard to the general neuro-cognitive function, we found a significant Group X Time interaction for Tower of London total score ($F (1,22) = 4.39$, $p < .05$), key search ($F (1,22) = 4,34$, $p <.05$) and working memory ($F (1,22) = 4,34$, $p < .001$). Again, probing of interactions revealed a significant improvement in inferring others' intentions/desires only in individuals who received PST treatment (Table **2**).

In both groups we obtained a significant time effect in social cognition measures in happiness score ($F (1,22) = 5.24$, $p < .05$) and embarrassment ($F (1,22) =7,93$, $p <.001$). These results probe that there is an improvement in recognizing Happiness and Embarrassment in both groups (Table **3**)

For neuropsychological measures we obtained a time effect on selective attention measure ($F (1,22) = 7.06$, $p <.001$); verbal memory –Rey A ($F (1,22) = 8$, $p <.001$); and verbal memory-Rey-B ($F (1,22) = 19.13$, $p <.001$). These results evidence that in both groups there is an improvement of selective attention and verbal memory (Table **2**).

DISCUSSION

As it is well known from literature, it is not always easy to conduct studies about the efficacy of different types of rehabilitative interventions in psychiatric populations. Some of the reasons concern the long duration of these experiments, the difficulty of comparing treatments in clinical populations, and the methodology of the assessment concerning the social functioning. This last issue is often not well overlooked [43] even if "the functioning" became in the last years the most important and necessary outcome crite-

Table 2. Neurocognitive Measures by Treatment Condition at the Baseline and Post Rehabilitation Treatment

	Group	Baseline Mean (SD)	Post-Treatment Mean (SD)	Time Effect	Time * Group
Executive Functions					
Tower of London	REC	21.(14.1)	29.9 (5.3)	-	0.05
	PST	25.2 (3.7)	28.7 (3.8)		
Verbal Fluency	REC	29.9 (9.9)	26.3 (7.4)	.05	-
	PST	27.7 (9.4)	23.1 (9.7)		
Zoo Map Test	REC	91.4 (16.3)	93.5 (7.2)	.010	-
	PST	94.4 (20.9)	91.3 (13.3)		
Key Search	REC	90.1 (17.9)	97.1 (15.4)	-	.010
	PST	86.9 (16.4)	95.4 (15.8)		
Memory					
Verbal memory -Rey A)	REC	18.1 (5.9)	26.1 (7.2)	.010	-
	PST	17.2 (7.2)	29 (5.04)		
Verbal memory-Rey B	REC	2.8 (1.5)	5.6 (1.5)	.000	-
	PST	1.6 (1.3)	5.6 (3.02)		
Working Memory	REC	4.3 (1.1)	5 (0.7)	-	.037
	PST	5.1 (1.2)	4.8 (0.6)		
Speed of Processing					
Trail Making Test -A (sustained attention)	REC	79.9 (38.3)	55.7 (14.02)	-	-
	PST	87.5(42.3)	75.2 (37.2)		
Trail making test-B (selective attention)	REC	178.4 (68.4)	140.4 (81.9)	.017	-
	PST	187.3 (95.7)	132.3 (76.06)		

rion for the therapy of schizophrenia. In fact, in many studies the Social Functioning is showed as a "total score", but it is quite difficult to understand which component it has been more sensitive to the effect of the intervention (i.e., to have a job? friends? hobbies? to be engaged? the absence of disturbing behavior?). Aware of these difficulties we conducted the study that provides evidence of the effectiveness on neuropsychological measures and on social functioning of a rehabilitation strategies by comparing two different cognitive behavioral intervention techniques both cognitive behavioural, but aimed at dealing with different skills: the ability to solve problems and the competence in emotional perception particularly focused to ameliorate the Theory of Mind. For both of them the results on social functioning, or better on the component of inter-personal relationships of the social functioning, it was assumed to have been the same. In fact, it is reasonable that individual learning by using Problem Solving should be able to obtain a better social functioning through the improvement of cognitive abilities to manage inter-personal as well as intra-personal problems. On the other hand REC treatment aims explicitly at the management and the recognition of emotions particularly in the social relationships. As a consequence from the application of these

two techniques, we expected that subjects treated with PST would generally improve the strategic capacity, while, on the contrary, subjects treated with the REC would show an improvement on social cognition ability, in particular in the emotion recognition.

With regard to the results on cognitive abilities, in general REC-treated subjects showed a much greater improvement in emotion recognition ability and in understanding others' mental states than did PST-treated subjects. However, also PST group showed an improvement in the emotion recognition ability. This result has to be stressed because of its lack of empirical evidence which could demonstrate the effectiveness of different cognitive interventions on social cognition. At the same time the data found out were interesting and could be the goal of other investigations. In fact the emotion perception (improved in both treatments but less in PST than REC) appears also in this study as a distinct domain from that of the ToM, the last improved only in the REC group. By comparing the two treatments, it is also possible to see that they act specifically on different cognitive deficits, in fact the results show that Problem Solving Training seems to be more effective in improving executive func-

Table 3. Social Cognition Measures by Treatment Condition at the Baseline and Post Rehabilitation Treatment

	Group	Baseline	Post-Treatment	Time Effect	Time * Group
		Mean (SD)	Mean (SD)		
Theory of Mind					
First order Theory of Mind	REC	3.6 (3.5)	9.8 (3.7)	-	.009
	PST	5 (4.1)	6 (5.2)		
Emotion Recognition					
Emotion recognition total score	REC	13.6 (6.1)	30.5 (15.9)	-	.000
	PST	12.3 (4.2)	23.7 (15.5)		
Fear	REC	4.4 (3.2)	7.4 (4.2)	.000	.014
	PST	4.5 (1.8)	5.2 (3.3)		
Sadness	REC	2.08 (1.7)	5.1 (3.2)	-	.013
	PST	3.1 (3.09)	3 (2.2)		
Anger	REC	1.2 (1.8)	5.7 (2.5)	-	.042
	PST	0.75 (1.1)	1.3 (1.3)		
Happiness	REC	2.8 (2.5)	4.6 (0.9)	.032	-
	PST	3.9 (2.3)	4.6 (2.6)		

tions such as planning (Tower of London score and key search) and working memory. These results suggest that a treatment based on Problem Solving has indeed improved the subject's ability in problem solving strategies something which is not present in REC group. In particular, subjects had become more skilled in defining the problem/goal, in identifying possible solutions, in choosing an appropriate solution and evaluating the plan of action chosen. On the contrary, subjects treated with REC improve the ability to recognize negative emotions such as sadness, fear, embarrassment and anger. Moreover, they improve first-order Theory of Mind ability; a particularly important result both because of the difficulties that are often observed in other rehabilitative interventions, and because it is now generally accepted that an individual's social functioning is related not only to the ability to solve every day life problems, but also to the capacity to adequately create social relationships, that is, to understand others' mind [21, 44, 45]. Furthemore, the results we observed get on with the Penn's statement [46]: "*one can imagine tailoring treatment (cognitive remediation, social cognitive training, cognitive behavioural therapy, etc.) to the needs of the client with schizophrenia, rather than hoping that a "one-size intervention" will fit all, an unrealistic expectation given the heterogeneity of the disorder (and its changes over time)*". Under this perspective the REC should be considered as an addition to the armamentarium of the treatments for schizophrenia, to provide in a multimodal evidence-based approach [47]. That statement is based on the results of this study that showed in both groups a significant improvement in social functioning and clinical symptoms. This is a very important result, because it shows that both treatment techniques are effective on an individual's social functioning (and symptomatology) particularly in the component of the interpersonal relationships as hypothesized by

authors. We would also like to pinpoint the accuracy of the researchers in choosing the PSP as a reliable and pertinent tool to discriminate the interpersonal relationships from other component (personal as well as disturbing behavior) of social functioning.

Indeed, both interventions were conducted in an appropriate manner, because both groups obtained interesting improvements on important cognitive skills like memory, selective attention and cognitive functions, that are considered very important for a suitable social functioning. The results may well explain the improvement achieved in both groups on social functioning and clinical symptoms.

Our results demonstrate that, through REC, it is possible to improve skills related to social cognition, such as false belief comprehension, recognition of emotions, and the understanding of others' intentions.

The most important limit of this study is related to sample size, that do not permit the generalizability of the current state. It should also be taken into account that this is a study of efficacy led in a routine mental health service where all patients during the study received a standard treatment care that include in the department of Campobasso optimal drug therapies, individual psychological support if necessary, psychosocial individual program based on individual need assessment, education about the nature of illness and about pharmacotherapy. In addition to this, we have to consider that this is a pilot study, but nevertheless to demonstrate the efficacy in this Real World we use the methodology of Randomized Clinical Trial with a vary vast and accurate clinical, social and cognitive assessment for two interventions designed and manualized under conditions of routine care at a mental health service. All patients then secured the benefits provided by a Department of Mental Health. If the statistical

power of the results can be regarded as diminished by the lack of sampling, it is however also true that the small sample size did observe statistically significant differences with very high probability (p <. 01) for some variables.

Another limitation might be the relatively short period of observation. This is the first intervention that aims to assess the effectiveness of two highly structured interventions and deficit-oriented, cognitive variables on which the impairment is stable over time and considered by some authors trait-marker [48]. Therefore, the possibility to improve these deficits in one year is encouraging and represents an incentive for authors to evaluate, in years to come, the natural evolution in the absence of Booster sessions.

As regards the first two limitations, it should be highlighted that this study was conducted with minimal funding which has allowed only to sign a contract of independent detectors. This study may therefore be regarded as a pragmatic clinical trial, with the advantages provided from this design study and two methodological issues to be highlighted:

1. Temporary control;

2. Characteristics randomization.

A thorough evaluation has been carried out simultaneously for all predictor variables, like years of illness, years of treatment, age of onset; by using an ANOVA and covariate analysis it was also performed a thorough independent assessment of all clinical variables of psychopathological type. We have detected an overall improvement in all patients, confirming that integrated psychosocial interventions are most effective in patients with schizophrenia with improvement mainly in psychosocial variables. In particular, patients seem to be benefited mainly by the two manualized interventions, both being oriented to the improvement of social cognition deficits variables. In literature, psychosocial manualized and structured interventions aimed at the improvement of others' emotional perception and Theory of Mind are absent, except for few very interesting cases of treatment [49]. The fact that for years we have been working in order to structure an intervention aimed at improving the emotional perception, and thus the ability to infer others' emotions and intentions , is shown accurately in this work. That is why the improvement is specific in the group treated with REC specific method.

Finally, the two interventions showed an effect on two different skills which are both essential for a long-term positive outcome of subjects with schizophrenia. Therefore, for future research, it is desirable to study the effectiveness of such treatments also in combination, in order to broadly treat cognitive disorders representing the core symptoms of the disease.

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