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A new computerized cognitive and social cognition training specifically designed for patients with schizophrenia/schizoaffective disorder in early stages of illness: A pilot study



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ABSTRACT

People with schizophrenia/schizoaffective disorders at early stages of the illness present cognitive and social cognition deficits that have a great impact in functional outcomes. Cognitive Remediation Therapy (CRT) has demonstrated consistent effect in cognitive performance, symptoms and psychosocial functioning. However, any CRT intervention or social cognition training have been specifically designed for patients in the early stages of psychosis. The aim of this pilot study is to assess the efficacy of a new computerized cognitive and social cognition program for patients with schizophrenia/schizoaffective disorder with recent diagnosis. A comprehensive assessment of clinical, social and non-social cognitive and functional measures was carried out in 53 randomized participants before and after the 4-months treatment. Significant results were observed in Spatial Span Forwards, Immediate Logical Memory and Pictures of Facial Affect (POFA) total score. None of these results were explained by medication, premorbid social functioning or psychopathological symptoms. No impact of the intervention was observed in other cognitive and social cognition outcome neither in clinical and functional outcomes. This new computerized intervention may result effective ameliorating visual attention, logical memory and emotional processing in patients in the early stages of schizophrenia/schizoaffective disorder.

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1. Introduction

Cognitive impairments are considered a core feature in schizophrenia, being presented all over the course of the illness (Jahshan et al., 2010). Patients in the early phases of schizophrenia present a medium-to-large effect deficit across all neurocognitive functions, showing the greatest deficits in immediate verbal memory and speed processing (Mesholam-Gately et al., 2009). Impairments in different cognitive functions, such as attention, verbal memory, processing speed and executive functions (EEFF), seem to be associated to clinical and functional outcomes at early stages of

the illness (Bodnar et al., 2008; Milev et al., 2005; Torgalsboen et al., 2014).

Social Cognition has been the last aspect included in the wide range of altered neurocognitive domains in schizophrenia. Social cognition refers to the mental operations underlying social behavior and it is understood as a multidimensional construct that comprises emotional processing, social perspective and knowledge, attributional bias and theory of mind (ToM) (Green et al., 2008; Penn et al., 2008)

As well as in chronic people with schizophrenia, impairments in emotional recognition (Amminger et al., 2012; Horan et al., 2012) and ToM (Bora and Pantelis 2012) have been described in patients with a recent diagnosis. Furthermore, although attributional biases have been less studied at early stages of the illness, they have been observed in early-stages psychosis subjects (Thompson et al., 2013).

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Evidence suggests that both cognitive and social cognition impairments influence the social functioning and daily life of patients at early phases of the illness (Allot et al., 2011; Vesterager et al., 2012) as well as in chronic patients (Hoerth and Hofer, 2014). These findings highlight the importance of considering neurocognitive deficits as targets for remediation with the final objective of enhancing the improvement of functional outcomes in these patients. Due to the limited effect pharmacological treatments have shown ameliorating cognitive and social cognition deficits, (Hill et al., 2010; Kucharska-Pietura and Mortimer, 2013) different non-pharmacological therapies have been long considered. Cognitive remediation therapy (CRT) is an evidence-based treatment that seems to positively impact on neurocognitive impairments. Functional improvement has been also related to CRT, although such gains are much more pronounced when CRT is offered along with other rehabilitative interventions (Wykes et al., 2011). CRT has resulted to be effective beyond gender, previous cognitive impairment of participants, type of CRT intervention, and duration of the therapy. However, baseline symptoms and strategic approach seem to modulate the effect of CRT in neurocognitive gains (Wykes et al., 2011). Different authors have shown patients with an early onset of the illness may also benefit from CRT at a cognitive (Ueland and Rund, 2005; Wykes et al., 2007; Eack et al., 2009) and functional level (Wykes et al., 2007; Eack et al., 2010a; Lee et al., 2013). These benefits have been observed applying classical (Ueland and Rund, 2005; Wykes et al., 2007) or new technologies solutions CRT paradigms. In a recent study, Fisher et al. (2015) demonstrated that a Neuroplasticity-Based Auditory Training via laptop computer improved verbal memory in schizophrenia patients with recent onset. The effect of CRT on social cognition is also observed in patients in the early phases of schizophrenia. Applying the Cognitive Enhancement Therapy (CET), a CRT approach that includes computerized exercises of CRT and social-cognitive group sessions, Eack et al. (2007) found larger improvements in the ability to understand and manage emotions as well as in the ability to use emotions to facilitate thinking and decision-making in the CET group. Thus, after two years of treatment, the CET group showed improvements in neurocognition and social cognition (Eack et al., 2009), which were related with the improvement and maintenance of functional outcomes 1 year after the treatment (Eack et al., 2010a, 2011). Additionally, cognitive improvement was associated with preserved gray matter volume in different brain regions in CET group (Eack et al., 2010b). Although authors did not comprehensively explore the effect of CET in different social cognition abilities, they proved the impact of a CRT program that includes cognitive and social cognition abilities training in patients in the early stages of schizophrenia. Taking into account these finding, the administration of CRT at early stages has been suggested to play a “protective” role in neurocognitive and functional impairments of schizophrenia patients (Barlatti et al., 2012).

In the last decade different specific social cognitive trainings (SCT) have been developed for patients with psychosis and positive results have been observed (Kurtz and Richardson, 2012; Henderson, 2013), although further research is needed. SCT seem to impact in ToM alterations (Wolwer and Frommann, 2011; Bechi et al., 2012), emotional processing deficits, attributional biases (Penn et al., 2007) as well as functional outcomes (Wolwer and Frommann, 2011; Tas et al., 2012). There are several studies using SCT in the early phases of schizophrenia, but no SCT programs specifically designed for patients at early stages of psychosis currently exist. Patients in the early phases of schizophrenia/schizoaffective disorder present specific characteristics such as younger age, lower level of cognitive dysfunction or emotional status related to the recent diagnosis. In fact, a recent study suggests that working memory and social cognition deficits could be more preserved at early stages of the illness (McCleery et al.,

2014). Attending to the promising results of Eack et al. (2007, 2009, 2010a), developing a specific cognitive and social cognition training for psychosis patients of recent diagnosis may improve and even prevent cognitive, social cognition and functional alterations in schizophrenia patients.

The NeuroPersonalTrainer[®] is a neurocognitive rehabilitation platform, initially developed for acquired brain injury patients by the Guttmann Institute (Barcelona, Spain). This platform has been modified and adapted to treat neurocognitive needs of early-stages psychosis patients. New cognitive exercises and levels of complexity as well as a new Social Cognition Module based on multimedia content have been specifically created by experienced psychologists and neuropsychologists for this population. Thus, a new platform, the NeuroPersonalTrainer-Mental Health (NPT-MH), has been developed. All exercises present different levels of complexity, allowing the design of individualized and personalized cognitive rehabilitation sessions adapted to the patient's cognitive profile, making the NPT-MH a suitable cognitive rehabilitation tool to implement at the early stages of psychosis.

The main objective of this study was to explore the preliminary efficacy of this new computerized cognitive and social cognition program, i.e. NPT-MH, in terms of cognitive, social cognition, clinical and functional improvement in patients with schizophrenia/schizoaffective disorder in the early stages of the illness.

2. Method

2.1. Participants and procedure

Fifty-three participants were recruited from the outpatient service of the Mental Health Department of the Parc Tauli Hospital (Sabadell, Spain). Patients were included if they met the following inclusion criteria: (1) lifetime history of a single episode of schizophrenia/schizoaffective disorder according to the DSM-IV criteria, with less than 5 years of evolution; (2) No changes in antipsychotic medication during the month prior to the study recruitment; (3) Clinical stability defined as being an outpatient for at least the previous 4 weeks to the study, score less than 4 in the P1, P2 and P3 items of the Positive and Negative Syndrome Scale (PANSS) (Andreasen et al., 2005) and score less than 4 in the Calgary Depression Scale (Addington et al., 1990). Participants were excluded if they (1) had IQ < than 70, (2) had history of brain damage or (3) were abusing substances (except nicotine or caffeine) for at least 12 months prior to study enrollment. All participants were informed about the characteristics of the study and all of them signed an informed consent prior to participation. The study was approved by the Ethical Committee of the Tauli hospital.

An expert psychiatrist interviewed each patient using the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I) (APA, 1994) for diagnosis, reviewed the medical records, confirmed the inclusion and exclusion criteria, administered clinical scales and controlled pharmacological treatment. Two expert neuropsychologists administered and corrected the neurocognitive assessment (neuropsychological tests and social cognition tasks). Mood, social functioning and quality of life scales were administered by a clinical psychologist.

Upon recruitment, participants were randomized into the NPT-MH group or the non-specific computer training group (control group), using a computer-generated permuted-block randomization scheme by an independent statistician. Clinical, cognitive, social cognition and functional measures were assessed at baseline (along the 4 weeks prior to treatment) and post-treatment (along the 4 weeks after treatment). The neurocognitive assessment was carried out by the same neuropsychologists that administered the interventions in both groups. Clinical and functional assessments were carried out by the same evaluators that assessed clinical and functional outcomes at baseline (a psychiatric and a clinical psychologist), both blinded to the treatment condition of participants.

2.2. Assessments

2.2.1. Neuropsychological measures

An extensive neuropsychological exploration was carried out in every patient. Attention was assessed by the Digits forward subtest from the WAIS-III (Wechsler, 1999), Spatial span forward of the Wechsler Memory Scale (WMS-III) (Wechsler, 2004) and the index of maintained attention from the Conners Continuous Performance Test-II (CPT-II) (Conners, 2000); the Rey Auditory Verbal Learning Test (RAVLT) (Rey, 1964), Logical Memory and Visual Reproduction subtests (VR) of the WMS-III were used respectively for the assessment of verbal learning and

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