Computer-assisted cognitive remediation therapy: Cognition, self-esteem and quality of life in schizophrenia

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ABSTRACT

Background: Quality of life (QoL) is an important outcome in the treatment of schizophrenia. Cognitive deficits have an impact on functional outcomes. Cognitive remediation therapy is emerging as a psychological intervention that targets cognitive impairment, but the effect of computer-assisted cognitive remediation on neuropsychology and social functioning and wellbeing remains unclear. The aim of the current study is to investigate the neurocognitive outcomes of computer-assisted cognitive remediation (CACR) therapy in a sample of schizophrenia patients, and to measure the quality of life and self-esteem as secondary outcomes.
Methods: Sixty-seven people with schizophrenia were randomly assigned to computer-assisted cognitive remediation or an active control condition. The main outcomes were neuropsychological measures and secondary outcomes (self-esteem and quality of life). Measurements were recorded at baseline and post-treatment.
Results: The CACR therapy group improved in speed of processing, working memory and reasoning and problem-solving cognitive domains. QoL and self-esteem measures also showed significant improvements over time in this group.
Conclusions: Computer-assisted cognitive remediation therapy for people with schizophrenia achieved improvements in neuropsychological performance and in QoL and self-esteem measurements.

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1. Introduction

Schizophrenia can be considered a chronic illness that affects all aspects of daily life, ranging from social functioning to subjective wellbeing. Quality of life (QoL) is an important outcome in the treatment of people with schizophrenia. As this concept provides a global idea of the capacity of patients to interact satisfactorily with their environment, it seems reasonable to believe that patients' symptoms may have a major influence on QoL. Meta-analytical studies have found a relationship between severity of psychiatric symptoms and QoL measurements (Eack and Newhill, 2007) and suggest that neurocognition plays a key role in QoL in schizophrenia (Tolman and Kurtz, 2010). Specifically, positive relationships have been found between measurements of crystallized verbal ability, working memory, verbal list learning, processing speed and objective measurements of QoL.

In recent decades, several disciplines have devoted great efforts to planning treatments able to improve QoL and self-esteem in schizophrenia patients. Additionally, neurocognitive impairment has been proposed as a putative target to indirectly improve QoL. Addington and Addington (2008) have suggested that neurocognitive measurements are able to predict QoL levels not only in first-episode patients, but also in chronic patients and even in a healthy control group. For this reason, it is currently assumed that cognitive impairment plays an important role in self-perceived QoL. Nonetheless, this association has still not been conclusively established; while some studies have found a positive relation between neurocognitive measures and different domains of QoL (Dickinson and Coursey, 2002; Narvaez et al., 2008), others did not establish significant associations (Heslegrave et al., 1997). Besides, executive function and QoL may even be negatively associated (Fiszdon et al., 2008).

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Meta-analyses have suggested the validity of cognitive remediation therapy (CRT) as a psychological intervention targeting cognitive impairments (McGurk et al., 2007; Wykes et al., 2011). But not all studies include QoL or psychological well-being measurements after CRT. In fact, in a review of studies over the last forty years or so only about 25% used QoL or self-esteem measurements, and those that did, presented contradictory results. Moreover, QoL is a multi-dimensional construct that includes both objective components of community function and subjective assessments of well-being (Test et al., 2005).

Computerized procedures that were originally developed in the field of brain injury or neurological disorders are currently being used for remediation of cognitive impairment in psychiatric disorders. In fact, recent meta-analytic studies have shown computer-assisted cognitive remediation (CACR) to be efficacious in patients with schizophrenia (Grynszpan et al., 2011).

A significant effect size has been found for CACR in cognitive measurements, although no greater than for paper and pencil programs. In addition, effect sizes for social functioning improvements vary widely according to study (McGurk et al., 2007). When comparing the effectiveness of two different cognitive remediation modalities (cognitive subprograms of Integrated Psychological Therapy (IPT-cog) and CACR) with a standard, non-cognitive-targeted rehabilitation intervention, only the CACR group showed a larger effect size on psychosocial functioning (Vita et al., 2011). However, other authors did not find any evidence of a benefit in the CACR group compared to the active control condition in performance on neuropsychological and functional outcome measures (Dickinson et al., 2010).

Nonetheless, computer tasks offer a number of advantages over those using paper and pencil. The most noteworthy are the enhancement of motivation due to the sensory variety that these exercises present (Medalia et al., 2001), and the possibility of providing immediate feedback (Bellucci et al., 2003). Another important feature of CACR is its presentation of custom-tailored and adaptive tasks that can take into account the patient's deficits and their evolution over the course of therapy (Sartory et al., 2005).

However, these conclusions do not refer specifically to QoL measurements after CACR. Cavallaro et al. (2009) showed a significant improvement in cognitive flexibility and attention performances and QoL levels, but did not assess indicators of self-esteem in their study. Other studies did not show improvements in QoL (Fisher et al., 2009), or in either QoL or self-esteem immediately after CACR therapy (Hodge et al., 2010).

The aim of the current study is to investigate the neurocognitive outcomes of CACR in a sample of schizophrenia patients and to measure the quality of life and self-esteem as a secondary outcome. We hypothesize that patients who benefit from CACR will experience significant improvements in objective QoL and self-esteem.

2. Method

2.1. Design

This study used a randomized controlled trial with two groups (CACR and active control condition). Participants received 48 sessions of therapy or active control over a period of six months.

The main outcomes were performance on the cognitive test assessed at baseline and post-treatment. Secondary outcomes were quality of life and self-esteem, also assessed at baseline and post-treatment.

The study procedures were approved by the Institutional Ethics Committee of the Consorci Sanitari de Terrassa. Detailed information about the procedures of the study was provided to all participants and their families. Written informed consent was obtained from all participants prior to inclusion in the trial. The trial registration number is NCT01598220.

2.2. Participants

The sample was recruited by experienced psychologists or psychiatrists from among schizophrenia outpatients of the Department of Mental Health of Consorci Sanitari de Terrassa.

The inclusion criteria were: DSM-IV criteria for schizophrenia disorder confirmed by Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I; First et al., 1997); age between 18 and 55 years; estimated IQ of 85 or above according to the Vocabulary subtest on the Wechsler Adult Intelligence Scale-III (WAIS-III); patients were considered sufficiently stable if they had a Global Assessment of Functioning score (GAF; Endicott et al., 1976) of 40 or higher and they maintained a stable dose and type of psychiatric medication for at least one month prior to inclusion. Exclusion criteria were: a score of 6 or higher (severe or extremely severe) on any item of PANSS-P Positive Syndrome Scale, Spanish version (Peralta and Cuesta, 1994); absence of cognitive impairment confirmed by neurocognitive assessment (when raw scores were less than 1 standard deviations of the mean score obtained from the respective normative data in their corresponding manual, they were considered non-impaired); current substance abuse or drug dependence in the last year, defined by the Structured Clinical Interview for DSM-IV (SCID-I; First et al., 1997); traumatic brain injury or history of neurological illness; electroconvulsive therapy in the previous 12 months; psychiatric comorbidity and plan to change medication during the trial.

2.3. Outcome measures

2.3.1. Primary outcomes

All participants completed a comprehensive battery of neuropsychological tests reflecting some of the domains proposed by the National Institute of Mental Health Measurement and Treatment Research to Improve Cognition in Schizophrenia (NIMH MATRICS) committee as critical targets for cognitive enhancing treatments in schizophrenia (Kern et al., 2008). Estimated Verbal IQ was assessed with the Vocabulary subtest of the Spanish version of the Wechsler Adult Intelligence Scale-III (WAIS-III; Wechsler, 2001). Attention was assessed with Conners' Continuous Performance Test II (CPT II; Conners, 2000). Psychomotor Speed was assessed with the Symbol Digit Modalities Test (SDMT; Smith, 2002). Phonemic fluency was assessed with the FAS test (Benton and Hamsher, 1976). Working Memory was assessed with Letter–Number Sequencing (WAIS-III). Verbal learning was assessed with California Verbal Learning Test (CVLT; Delis et al., 2000), taking into account the number of words recalled in short-term and long-term free recall. Executive function was assessed with the Wisconsin Card Sorting Test (WCST-CV3; Heaton, 1999), taking into account the measures of completed categories and number of perseverations, and with the Stroop Test (Golden, 1994) and Matrix reasoning (WAIS-III).

2.3.2. Secondary outcomes

The Heinrichs–Carpenter Quality of Life Scale (QLS; Heinrichs et al., 1984) and the Rosenberg Self-esteem Scale (RSES; Rosenberg, 1965) were administered to assess the two secondary outcomes. The QLS assesses overall quality of life and functioning on 21 items rated from 0 to 6 (higher scores reflecting better quality of life). It is divided in four subscales: interpersonal relationships (QLS-1), instrumental role functioning (QLS-2), intrapsychic foundations (QLS-3), and use of objects and participation (QLS-4).

The RSES is a 4-point Likert-type Scale comprising ten items to assess self-esteem. Five of the scale items are positively worded and five negatively worded.

2.3.3. Clinical assessment

The Spanish version (Peralta and Cuesta, 1994) of Positive and Negative Syndrome Scale (PANSS) was administered to all participants. The Global Assessment of Functioning (GAF) was used to evaluate the overall severity of psychiatric disturbance.