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A randomized controlled trial examining a cognitive behavioral therapy intervention enhanced with cognitive remediation to improve work and neurocognition outcomes among persons with schizophrenia spectrum disorders

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ABSTRACT

This single blind, three-armed randomized controlled trial compared cognitive behavioral therapy (CBT) enhanced with cognitive remediation (CBT + CR) to CBT alone and an active control condition on work and neurocognition outcomes for persons with schizophrenia spectrum disorders. Seventy-five adult outpatients with schizophrenia or schizoaffective disorder were randomized to three study conditions ($N = 25$ per group). The CBT intervention was the Indianapolis Vocational Intervention program (IVIP), consisting of weekly group and individual sessions focused on work-related content. Participants in the CBT + CR group received IVIP and Posit Science computer-based cognitive training. The active control group consisted of weekly vocational support groups and individual vocational support sessions. All participants were placed into a noncompetitive work assignment and were followed for 26 weeks. Data collection included hours worked, weekly work performance ratings, and neurocognition assessed at baseline and 6 months. Neurocognition was also assessed at 12 months. Data were analyzed using multilevel linear models to account for nested, repeated measures data. Results indicate that participants in the CBT + CR condition worked significantly more hours and had a more positive trajectory of improving global work performance and work quality across the study compared with the CBT alone and vocational support condition. Compared to the other conditions, CBT + CR also had a significant increase in overall neurocognition that continued to the 12 month follow-up, particularly in the domains of verbal learning and social cognition. In conclusion, CBT + CR may be an effective intervention to improve work functioning and neurocognition in persons with schizophrenia.

1. Introduction

Although most people with schizophrenia desire to work, vocational difficulties are common (Luciano and Meara, 2014), leading to economic hardship (Danziger et al., 2009) and poor psychosocial outcomes (Kukla et al., 2012; Twamley et al., 2008). Previous studies examining this vocational dysfunction have highlighted two notable contributors: neurocognitive deficits and negative self-expectations. Neurocognitive deficits including difficulties in learning and memory, executive functioning, attention, and social cognition predict poor work outcomes (Bryson and Bell, 2003; McGurk et al., 2003); these findings suggest that persons with schizophrenia may struggle at work when they have difficulty attending to, recalling, and flexibly thinking about work tasks. In parallel, defeatist beliefs and self-expectations of failure at work, low self-esteem, and underestimates of work-related skills have been linked to difficulties obtaining work and poor job performance (Campellone et al., 2016; Davis et al., 2004; Kukla et al., 2014).

Several studies have addressed the treatment of cognitive impairments in people with schizophrenia using cognitive remediation (CR) strategies. Prior studies demonstrate that CR improves core cognitive deficits in schizophrenia (McGurk et al., 2007), particularly when paired with psychiatric rehabilitation programs that allow persons to practice acquired skills in real world settings (Medalia and Saperstein, 2013). Going a step further, recent research has also found that CR

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augmentation of vocational rehabilitation is associated with a 20% higher employment rate and increases in hours worked and money earned among persons with schizophrenia (Chan et al., 2015).

Cognitive Behavior Therapy (CBT) approaches are well established as effective treatments addressing self-defeating beliefs and behaviors that occur in many disorders, including schizophrenia. Burgeoning evidence also indicates that CBT is a promising approach to ameliorate maladaptive work-related beliefs and behaviors, leading to significantly enhanced employment outcomes across domains (Kukla et al., 2016; Kukla et al., 2017; Lysaker et al., 2009; Mervis et al., 2016). However, most people with schizophrenia achieve only modest to moderate improvement in work functioning in response to CBT and a minority do not benefit at all from CBT. One possibility is that persisting cognitive deficits hinder the acquisition of cognitive and behavioral skills and application of these elements on the job.

This notion suggests that CR may be needed to amplify the effects of CBT leading to better work outcomes. For instance, it is possible that with improved memory acquired through CR, persons may be able to make more use of CBT in their lives, such as the use of cognitive restructuring on the job to promote positive self-expectations of work success. Another possibility is that with increased capacity for learning and problem solving, people with schizophrenia may be able to more effectively identify, practice, and apply useful behavioral coping strategies on the job. Third, increasing capacity in other neurocognitive areas may allow people to better relate to and have positive workplace interactions with co-workers and supervisors. Hence, to study the effects of CBT enhanced with CR, we compared a combined CBT and CR intervention (CBT + CR) to unenhanced CBT (CBT alone) and a vocational support condition on work and neurocognitive outcomes in adults with schizophrenia spectrum disorders engaged in vocational rehabilitation. First, we hypothesized that the CBT + CR group would experience greater gains in work outcomes compared with CBT alone and vocational support groups across the active study period. Second, we hypothesized that the CBT alone group would have better work outcomes compared to the control group across the active study period. Third, we hypothesized that the CBT + CR group would experience greater gains in neurocognition compared with CBT alone and vocational support groups at the 6 and 12 month follow up periods.

2. Methods

Study procedures were approved by the institutional review boards of Indiana University-Purdue University Indianapolis and the Richard L. Roudebush VA Medical Center. After providing informed consent, 75 participants were randomized to one of three conditions using a random number generator in blocks of five to promote balance across the conditions: Vocational support (control group; N = 25), work-focused CBT (N = 25), or work-focused CBT enhanced with CR; CBT + CR (N = 25). The active intervention was 26 weeks during which participants were placed in noncompetitive work positions and attended weekly individual therapy, group therapy, and CR training sessions according to condition assignment. Hours worked (assessed weekly across the 6-month work period), work performance (assessed bi-weekly across 6 months), neurocognition (assessed at baseline, 6 and 12 months) were measured. Assessments were completed by trained research staff blinded to study condition. Participants were paid $20 for all assessments and $3.50 per individual, group, and CR training sessions attended.

2.1. Participants

Seventy-five adult participants with a Statistical Manual of Mental Disorders, Fourth Edition (SCID-I First et al., 1994) confirmed diagnoses of schizophrenia ($n = 53$; 71%) or schizoaffective disorder ($n = 22$; 29%) were recruited from an urban VA outpatient psychiatry clinic serving 1500 veterans from August 2009 to September 2013. Demographics are presented in Table 1. Additional inclusion criteria were unemployment, desire to work, and a post-acute phase of illness. Exclusion criteria were presence of a medical condition preventing study participation. Participants with substance use disorders were not excluded. During the study period, participants received medication management and standard outpatient psychiatric treatment.

2.2. Interventions

Cognitive Remediation (CR) Intervention: Participants randomly assigned to the CBT + CR group performed exercises using Posit Science Brain Fitness and Insight software. Developed using neuroplasticity models, Brain Fitness (auditory) and Insight (visual) hierarchically train cognitive domains by focusing on sensory discrimination and advancing to higher level cognitive abilities including working memory, sequencing, set shifting, and problem-solving. Sustained attention and processing speed are trained throughout. Difficulty is adjusted within training trails to minimize errors and sustain challenge. Scoring points and visual rewards are used to reinforce good performance (Fisher et al., 2009).

The Posit Science training occurred in the “Cog Lab”, an office with computer work stations. Participants progressed through their training plan, which consisted of 4 different exercises performed for 15 min each and involving many trials of the same task. The lab was supervised by trained research assistants who provided one-to-one software orientation and monitoring as needed. Research assistants did not provide “coaching” or suggest strategies to improve performance; rather, they ensured that participants were actively training.

Cognitive Behavioral Therapy (CBT) Intervention: The Indianapolis Vocational Intervention Program (IVIP) is a work-focused CBT intervention designed for persons with schizophrenia spectrum disorders engaged in noncompetitive work (Davis et al., 2005). The overall goal of the IVIP is to assist persons to learn to identify cognitive processes and correct work-related dysfunctional beliefs and behaviors. The IVIP includes 26 weekly group sessions and individual sessions. The hour long weekly group sessions center on a rotating manualized curriculum of 4 two-week modules (total of eight sessions): “Thinking About Work”; “Barriers to Work”, “Workplace Relationships”, and “Realistic Self-Appraisal.” Groups sessions include a structured agenda, instruction on the basic CBT principles applied to work, job-related feedback, and peer support. Weekly hour long IVIP individual sessions provide further opportunities for examination of work-related thoughts and behaviors using the CBT principles.

2.3. CBT therapist training and fidelity

IVIP therapists were experienced masters level clinicians. After initial training facilitated by the senior author, a clinical psychologist, weekly supervision involved the review of random IVIP individual and group session tapes, assessment of adherence to the CBT model, and feedback on individual fidelity items. Level of adherence to the principles of CBT for individual sessions was assessed using the Revised Cognitive Therapy Scale (CTS-R; Milne et al., 2001) conducted by a trained clinical psychologist. Adequate fidelity was defined as a CTS-R score of 36 on the individual version and a score of 21 on the group version, with no individual items falling below a rating of 2. This score reflects an average rating above “competent” as compared with an “average” skilled therapist. All IVIP therapists maintained at least adequate fidelity during the study period.

2.4. Vocational support condition

Vocational support services in the control group were modeled on usual services provided in VA Compensated Work Therapy programs and included 26 hour-long weekly group sessions offering general support of work endeavors and discussion of work-related matters. Support