



## The relative contribution of neurocognition and social cognition to 6-month vocational outcomes following Individual Placement and Support in first-episode psychosis



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### ABSTRACT

**Aims:** To examine whether baseline neurocognition and social cognition predict vocational outcomes over 6 months in patients with first-episode psychosis (FEP) enrolled in a randomised controlled trial of Individual Placement and Support (IPS) versus treatment as usual (TAU).

**Methods:** 135 FEP participants (IPS  $n = 69$ ; TAU  $n = 66$ ) completed a comprehensive neurocognitive and social cognitive battery. Principal axis factor analysis using PROMAX rotation was used to determine the underlying cognitive structure of the battery. Setwise (hierarchical) logistic and multivariate linear regressions were used to examine predictors of: (a) enrolment in education and employment; and (b) hours of employment over 6 months. Neurocognition and social cognition factors were entered into the models after accounting for premorbid IQ, baseline functioning and treatment group.

**Results:** Six cognitive factors were extracted: (i) social cognition; (ii) information processing speed; (iii) verbal learning and memory; (iv) attention and working memory; (v) visual organisation and memory; and (vi) verbal comprehension. Enrolment in education over 6 months was predicted by enrolment in education at baseline ( $p = .002$ ) and poorer visual organisation and memory ( $p = .024$ ). Employment over 6 months was predicted by employment at baseline ( $p = .041$ ) and receiving IPS ( $p = .020$ ). Better visual organisation and memory predicted total hours of paid work over 6 months ( $p < .001$ ).

**Conclusions:** Visual organisation and memory predicted the enrolment in education and duration of employment, after accounting for premorbid IQ, baseline functioning and treatment. Social cognition did not contribute to the prediction of vocational outcomes. Neurocognitive interventions may enhance employment duration in FEP.

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### 1. Introduction

Vocational recovery is a considerable treatment challenge following psychotic illness, with an estimated unemployment rate of 40% among young people with first-episode psychosis (FEP) (Killackey et al., 2006), which rises to over 70% in those with chronic illness (Lehman et al., 2002; Marwaha and Johnson, 2004; Waghorn et al., 2012). The Individual Placement and Support (IPS) model of supported employment is the leading evidence-based approach to vocational rehabilitation in severe chronic mental illness, achieving an average employment rate across randomised controlled trials (RCTs) of 61% relative to 23% in comparison treatments (Bond et al., 2008; Rinaldi et al., 2010). Trials of IPS

with recent-onset psychosis samples have achieved employment or education rates as high as 85% (Killackey et al., 2008; Nuechterlein et al., 2008). Our recent RCT involving 146 FEP participants broadly replicated these outcomes, with 6 months of IPS resulting in a significantly higher combined employment and education rate compared with usual treatment (88.1% vs. 72.1%;  $p = .023$ ). However, the groups did not differ significantly in the average hours worked over the 6-month period (247.2 vs. 241.5;  $p = .927$ ), indicating that maintaining vocational roles may be challenging for this population (unpublished data).

Vocational rehabilitation studies in chronic schizophrenia have also identified employment duration as a challenge, with many participants experiencing unsatisfactory job terminations (e.g., quitting without another job or being fired) (Becker et al., 1998; McGurk and Mueser, 2004; Mak et al., 2006; Bond et al., 2008). There is a cohort who does not experience sustained positive vocational outcomes following supported employment, suggesting a need for a greater understanding

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of factors that limit vocational recovery. Neurocognition and social cognition are two person-related factors that may be associated with vocational recovery and are amenable to intervention, yet have received limited investigation within supported employment in FEP.

Relative to healthy peers, people with FEP experience significant stable deficits in multiple neurocognitive domains (Mesholam-Gately et al., 2009; Bozikas and Andreou, 2011), including attention, working memory, processing speed, verbal fluency, learning and memory, and executive functions. These deficits are consistently associated with poorer real-world functional outcomes in chronic schizophrenia (Green et al., 2004; Fett et al., 2011). In FEP, the relationship between baseline neurocognition and broad functional outcomes shows variability, but appears stronger over the longer-term (Allott et al., 2011).

Several studies have shown that neurocognitive deficits are predictive of poorer employment outcomes in both chronic (McGurk and Meltzer, 2000; Gold et al., 2002; McGurk and Mueser, 2004; Rosenheck et al., 2006) and early (Bilder et al., 2000; Dickerson et al., 2008; Nuechterlein et al., 2011; Tandberg et al., 2011) phases of psychosis. Nuechterlein et al. (2011) found in recent-onset schizophrenia that working memory, attention/early perceptual processing, and verbal memory/processing speed accounted for 52% of the variance in return to work or school over 9 months. Similarly, Tandberg et al. (2011) reported that sustained attention significantly predicted remaining employed over a 2-year period in FEP participants. A relationship between neurocognition and vocational outcomes has also been demonstrated in vocational intervention trials in chronic schizophrenia. Following a 6-month work rehabilitation programme, Bell and Bryson (2001) showed that up to 44% of the variance in improved occupational functioning was explained by baseline neurocognition. Gold et al. (2002) found that baseline neurocognition did not predict attainment of competitive employment, but did predict the hours engaged in work over 2 years. Likewise, McGurk et al. (2003) reported that baseline executive functioning and verbal learning and memory predicted the wages earned and hours worked over 2 years following IPS.

Social cognition is also impaired early in the course of psychosis and remains relatively stable (Mesholam-Gately et al., 2009; Green et al., 2012; Horan et al., 2012; Thompson et al., 2012). Deficits are observed in emotion recognition, theory of mind (ToM), social perception/knowledge, and adaptive attributional styles. Social cognition is predictive of social functioning in psychotic disorders, independently of neurocognition (Pollice et al., 2002; Brune, 2005; Brune et al., 2007; Fett et al., 2011). Furthermore, social cognition has been shown to mediate the relationship between neurocognition and social and occupational functioning (Addington et al., 2010; Schmidt et al., 2011), highlighting the importance of considering both constructs in relation to functioning. Despite interpersonal encounters being inherent to most vocational roles, few studies have examined how social cognition impacts vocational functioning in psychotic disorders. A study of schizophrenia in patients found that 25% of work-related social skills were explained by social cognition and neurocognition, with the independent impact of social cognition being larger than neurocognition (Vauth et al., 2004). In a large FEP sample, Horan et al. (2012) found that poorer baseline social cognition associated strongly with poorer work productivity at 12-months follow-up ( $r = .57, p < .001$ ), even after accounting for symptomatology.

Social cognition has received limited attention within studies of vocational rehabilitation for psychosis. One study examining predictors of work rehabilitation success in schizophrenia-spectrum disorders found that poorer social cognition predicted social discomfort on the job, which in turn led to poorer vocational outcomes (Bell et al., 2009). Another study showed that interpersonal problems on the job was the most common reason for unsatisfactory job terminations for people with chronic schizophrenia participating in supported employment (Becker et al., 1998).

To our knowledge, neither neurocognitive nor social cognitive predictors of vocational outcome have been examined with FEP participants participating in vocational rehabilitation (Major et al., 2010; Baksheev et al., 2012). Furthermore, prediction of being enrolled in education, a developmentally important vocational role in FEP, remains unexamined. It is plausible that domains of neurocognition and social cognition may differentially influence work and educational outcomes. The aim of this study was to extend previous work by simultaneously investigating the contribution of neurocognition and social cognition to vocational outcomes in FEP. Specifically, we sought to examine whether neurocognition and social cognition measured at baseline predicted vocational outcomes following 6 months of IPS versus treatment as usual in FEP. We hypothesised that poorer neurocognition and social cognition would be both associated with lower rates of employment and education and lower hours of employment over 6-months.

## 2. Methods

### 2.1. Setting and study design

The study was conducted at the Early Psychosis Prevention and Intervention Centre (EPPIC), Melbourne, Australia. EPPIC is a specialised public mental health service for people aged 15–25 years living in the north-western suburbs of metropolitan Melbourne who have experienced a first episode of psychosis. The study was a RCT of 6 months of IPS plus treatment as usual (TAU) versus TAU alone (Australia New Zealand Clinical Trials # ACTRN12608000094370). Participants were assessed at baseline and 6-months (post-intervention) by trained research assistants who were blind to treatment allocation. The study was approved by the Melbourne Health Mental Health Research and Ethics Committee. All participants provided written informed consent, including parental/guardian consent for those <18 years of age. A full description of the trial is provided elsewhere (Killackey et al., in press).

### 2.2. Participants

Inclusion criteria were a DSM-defined psychotic disorder confirmed using the Structured Clinical Interview for DSM-IV-TR (First et al., 2001) and the expression of a desire to pursue a vocational goal. Exclusion criteria included intellectual disability and florid psychosis that prevented the ability to provide informed consent and/or insufficient English to enable completion of the assessments. There were 171 individuals assessed for eligibility to the study. Of these, 25 were excluded (23 declined, 2 were unwell) and 146 were randomised ( $n = 73$  per group). For the neurocognitive and social cognitive data presented here, a further 11 participants were excluded due to being ineligible on account of a history of traumatic brain injury ( $n = 6$ ), epilepsy ( $n = 4$ ), or other neurological impairment ( $n = 1$ ). Thus, there were 135 participants included in the proceeding analysis (IPS  $n = 69$ ; TAU  $n = 66$ ).

### 2.3. Measures

Baseline demographic information was collected in addition to the following.

#### 2.3.1. Neurocognition

A comprehensive neurocognitive battery examining the neurocognitive domains commonly impaired in FEP (Mesholam-Gately et al., 2009) was administered. The Wide Range Achievement Test-Fourth Edition (WRAT-4)-Word Reading subtest (Wilkinson and Robertson, 2006) was used to estimate premorbid IQ. The following Wechsler Adult Intelligence Scale-Third Edition (WAIS-III) (The Psychological Corporation, 1997) subtests were administered: Digit Span, Letter-Number Sequencing, Similarities, Information and Picture Completion. Additionally, Trail Making Test A and B (TMT) (Reitan, 1955), Symbol Digit Modalities Test (SDMT) (Smith, 1982), Rey Auditory Verbal Memory

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