



## Supported employment among veterans with serious mental illness: the role of cognition and social cognition on work outcome



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### ABSTRACT

Unemployment is a primary functional deficit for the majority of adults with schizophrenia. Research indicates that over two-thirds of adults living in the community with schizophrenia are unemployed. Despite effective programs to assist with job identification and placement, the ability to attain and maintain employment remains a pressing concern. Neurocognitive functioning is widely acknowledged to be a determinant of work outcome; however, effect sizes tend to be in the small to medium range. The present study sought to further understand the determinants of work outcome among a sample of 104 veterans with schizophrenia enrolled in a supported employment program. A small percentage of veterans in the study got competitive jobs; 53% who secured jobs maintained employment for longer than 6 months. Cognition, social cognition, and symptoms were unrelated to job attainment. However, speed of processing and social cognition were significant predictors of work outcomes such as wages and tenure. These findings suggest that cognitive abilities including processing speed and the ability to accurately interpret and respond to social cues are significant determinants of whether individuals with schizophrenia remain employed. The results are discussed in light of current available treatment options and domains to target in synergy with work rehabilitation efforts.

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### 1. Introduction

Work is identified as a primary component of rehabilitation and recovery for many individuals with schizophrenia and serious mental illness (SMI) (Dunn et al., 2008; Provencher et al., 2002). However, the vast majority of adults with SMI are unemployed with estimates ranging from 70% to 90% (Burns et al., 2009; Rosenheck et al., 2006). Although the rates of competitive employment are low, interventions for job placement and support are associated with gains in attaining and maintaining employment. There are a host of factors that influence work outcomes, of which cognitive ability is frequently identified. Neurocognitive deficits, such as executive functioning, attention, learning and memory, and processing speed correlate closely with vocational rehabilitation and competitive employment outcomes (Bryson and Bell, 2003; Evans et al., 2004; McGurk and Meltzer, 2000; McGurk and Mueser, 2006; McGurk et al., 2007). More recently, social cognition has also been identified as having a close link with work outcome (Bell et al., 2009; Fett et al., 2011; Horan et al., 2011). The current study examined the role of neurocognition and social cognition on work outcome within the context of Supported Employment.

Established in the mid-1990s, a leading evidence-based model of Supported Employment, Individual Placement and Support (IPS; Becker

and Drake, 2003), is based on the following principles: a) eligibility based on client choice (i.e. zero exclusion criteria), b) emphasis on good job match based on interest and skill level, c) including work rehabilitation as an integral component of mental health treatment, d) competitive employment as the primary goal, e) rapid job search, f) attention to consumer preferences, g) systematic job development, and h) continuous individualized follow-along support (Bond et al., 2012). IPS is consistently supported in favor of traditional vocational rehabilitation for job attainment (Burns et al., 2007; Crowther et al., 2001; Twamley et al., 2003). A meta-analysis of four high-fidelity IPS randomized controlled trials (RCTs) with a total of 681 participants followed for 18-months found a 70.4% job acquisition rate in the IPS conditions, compared to 24.3% in the well-established vocational programs (Campbell et al., 2011). The findings concerning job maintenance have been more mixed. A large review of high-fidelity programs published in 11 studies concluded that while 61% of IPS participants obtained work (compared to 23% of controls), average tenure for first job was 24 weeks, out of a 52-week follow-up (Bond et al., 2008). In the Campbell et al. meta-analysis, total mean number of weeks worked in any competitive employment position within the 18-month follow-up period was 20.5 weeks for the 307 IPS participants, and longest tenure in one job was 17.4 weeks. On the other hand, in a summary of seven IPS RCTs, the total mean hours worked during an 18-month follow-up was three times greater for IPS participants than for controls (Bond et al., 2012), and a separate 24-month study that included 80 prospective and 60 retrospective (already employed) participants with SMI in high-fidelity IPS programs reported an average of 12.86 months worked (Bond and Kukla, 2011).

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While neurocognition is widely acknowledged as a key determinant of functional outcome in schizophrenia, and to be related to work outcome in particular, its role within the context of IPS Supported Employment is largely unknown. To date, there are no published studies on the role of social cognition in IPS work outcomes. The few studies that have directly examined the impact of cognition on IPS outcomes have yielded conflicting results. One study reported no discernible cognitive predictors of work outcome (Campbell et al., 2011), while another reported a significant relationship between cognition and job tenure, but not attainment (Gold et al., 2002).

The current study examined the role of neurocognition and social cognition in job placement and tenure in a sample of SMI veterans enrolled in a VA IPS program. Cognitive functioning and symptoms were assessed at baseline, and employment outcomes were assessed for up to one year. The study had two aims: a) to examine the role of neurocognition and social cognition in work attainment, and b) to examine the relationship of neurocognition and social cognition with work outcome (i.e. weeks worked, hours worked, and wages). Given the IPS emphasis on optimal job matching based on client preference and skill, we expected there to be little relationship between cognition and job attainment. The more varied outcomes that have been reported in job tenure may be explained by variability in cognitive functioning that IPS programs cannot directly address. Hence, we predicted cognition and social cognition to play a stronger role in work outcome.

## 2. Methods

### 2.1. Subjects

The sample included 104 veterans (95 men, 9 women) with SMI. Participants were recruited for the study from the Veteran's Competitive Employment Development program (VCED) at the Greater Los Angeles VA Healthcare Center. The program implemented the IPS model of Supported Employment. The veterans were clinically stable outpatients (no psychiatric hospitalizations in the past three months and no medication changes in the past two months); antipsychotic medication type and dose were maintained by the veterans' treating physicians. All participants were a minimum of 21 years of age and expressed an interest in working. The study was approved by the UCLA Institutional Review Board, and all participants provided written informed consent to participate in the study.

Following enrollment in the Supported Employment program and informed consent for the research, veterans received a baseline clinical and neurocognitive assessment. Veterans then worked with their respective employment specialist with the aim of attaining a community-based job, and were followed by study personnel until they obtained a job or were discharged from the VCED program by decision of the VCED team. Veterans who got competitive jobs were followed for 12 months after initial job start date. Fidelity was assessed annually using the Supported Employment Fidelity Scale.

### 2.2. Measures

#### 2.2.1. Cognition

The MATRICS Consensus Cognitive Battery (MCCB; Nuechterlein and Green, 2006) was used to assess neurocognition and social cognition. The MCCB provides normed scores and includes tests that assess seven domains including speed of processing, attention/vigilance, working memory, verbal learning, visual learning, reasoning and problem solving, and social cognition (Kern et al., 2008; Nuechterlein et al., 2008). T-scores from the seven domains, as well as the composite score derived from the average of T-scores minus social cognition, served as indices of neurocognitive function. The social cognition T-score served as the index of social cognition.

#### 2.2.2. Clinical symptoms

Psychiatric symptoms were assessed using the expanded 24-item version of the Brief Psychiatric Rating Scale (BPRS; Ventura et al., 1993). All interviewers were trained to a minimum intra-class correlation coefficient of .80 by the MIRECC Treatment Unit. Positive, negative, and total symptom scores served as indicators of clinical symptom severity.

#### 2.2.3. Employment status and work outcome

Employment status was measured as a dichotomous variable defined as attaining employment at any point during the course of participation in the study. For those who got jobs, hours worked, weeks worked, and dollars earned were used as continuous dependent variables to indicate tenure.

### 2.3. Statistical analyses

Initially, we performed descriptive statistics (Table 1) and compared workers and non-workers in terms of demographics, symptoms, and cognition. We modeled our primary analyses to be consistent with previous studies of work rehabilitation outcome. Because of the non-normal distribution of work outcome measures, we used nonparametric methods to confirm the results obtained from the parametric analyses.

For each of the analyses, our primary focus was on cognition. First, we used logistic regression to examine cognitive predictors of job attainment. The next aim was to examine cognitive predictors of job tenure and earnings. We did this in two ways: a) parametric correlations using Pearson's *r* and b) nonparametric correlations using Spearman's *rho*. Pearson's correlations allow for detection of associations between participants who are outliers in terms of both work tenure and cognition, while Spearman's correlations allow for detection of significant associations aside from those attributable to irregularities in distribution. To further examine work outcomes, we included only participants that obtained work and conducted linear regression analyses with hours worked, weeks worked, and wages earned as the dependent variables.

**Table 1**  
Sample demographics and clinical characteristics (N = 70).

Demographics	N (%)
Gender Male	63 (90%)
Race	
White	19 (27%)
African American	37 (53%)
Other	14 (20%)
Diagnosis	
Schizophrenia	33 (44%)
Schizoaffective	15 (20%)
Other*	26 (35%)
	<b>M (SD)</b>
Age	49.9 (9.6)
Education	13.4 (2.1)
Parental Education	12.2 (3.1)
Illness chronicity (years)	20.7 (11.6)
Symptoms	
BPRS Positive	6.3 (3.5)
BPRS Negative	5.5 (2.3)
BPRS Total	41.1 (8.6)
MCCB	
Processing Speed	35.6 (13.0)
Attention/vigilance	38.5 (12.8)
Working memory	38.2 (12.0)
Verbal learning	41.9 (9.7)
Visual learning	41.8 (12.0)
Reasoning problem solving	42.4 (9.1)
Social cognition	39.6 (11.8)
Overall composite	33.1 (13.5)

\* Other diagnoses: e.g., Psychosis NOS; major depressive disorder with psychotic features; bipolar disorder.

### 3. Results

Of the original 104 participants enrolled in the study, we excluded those who were randomized to an active intervention condition aimed at promoting work outcome ( $n = 15$ ), those who enrolled in school ( $n = 2$ ), those who opted for transitional work ( $n = 5$ ) and those who withdrew or were lost to follow-up within 60 days of enrolling ( $n = 11$ ; noncompleters). There were no differences between completers and noncompleters on any of the demographic, symptom, or cognitive variables. The resulting sample of 70 participants was included in the analyses. As presented in Table 1, the sample was predominantly male veterans (90%) with a mean age of 50 and 13.4 years of education. Fifty-three percent were African-American, 27% were white, and 20% were Asian or Latino. Participants were living independently or in a semi-supervised setting, and 39% of the sample was receiving service-connected military benefits (13 veterans were 100% connected, 14 were 10%–70% connected).

During the one-year follow-up, 21% ( $n = 15$ ) of the veterans obtained competitive employment. Of the 15 who did get jobs, 8 worked over six months, and five participants worked for one full year or longer. The median number of hours worked during the one-year follow-up period was 728 with a range from 12 to 2080. The median amount of wages earned was \$3068.00, with a range from \$120 to \$45,080. The median length of employment (tenure) was 27 weeks, with a range from <1 to 52 weeks. To compare veterans who got a job with those who did not, we used logistic regression analyses with age, symptoms, and baseline cognition entered as predictors (Table 2). None of the variables were significant predictors of getting a job and there were no differences in neurocognition or social cognition between workers and non-workers.

Next, we used correlational analyses to examine associations between cognition and work outcomes. After correcting for multiple comparisons, parametric correlations revealed a significant relationship between processing speed and weeks worked, and social cognition was significantly correlated with hours worked and dollars earned (Table 3). The nonparametric correlations confirmed the parametric results with a very similar pattern: processing speed was significantly correlated with both weeks and hours worked ( $\rho = .68, .56$ , respectively); social cognition was significantly related to wages earned ( $\rho = .57$ ). Therefore, we used these two cognitive variables in the following analyses to examine predictors of work outcome in veterans who got jobs.

The processing speed and social cognition variables were normally distributed but the work outcome indices were skewed. Hence, we transformed weeks worked, hours worked, and wages earned to include as dependent variables in linear regression analyses. Social cognition and processing speed were significant predictors of the work outcome indices. Specifically, social cognition predicted hours worked and wages earned, and processing speed predicted weeks worked (Table 4).

### 4. Discussion

Consistent with our hypotheses, we found no significant cognitive predictors of job attainment in the IPS program. However, we did find

**Table 2**  
Logistic regression model for work attainment ( $N = 70$ ).

	B	Wald	Sig. (p)
Processing Speed	.16	.52	.47
Attention/vigilance	.12	.32	.57
Working memory	.18	.71	.40
Verbal learning	.11	.26	.61
Visual learning	.16	.59	.44
Reasoning problem solving	.14	.39	.53
Social cognition	.16	.50	.48
Overall composite	-.61	.43	.51

**Table 3**  
Pearson correlations of neurocognition, symptoms, and age with work outcome ( $N = 15$ ).

	Weeks worked	Hours worked	Wages
Neurocognition			
Processing Speed	.70	.50	.45
Attention/vigilance	.39	.20	.10
Working memory	.19	.13	.18
Verbal learning	.03	-.20	-.37
Visual learning	.29	.13	.06
Reasoning problem solving	.55	.36	.22
Social cognition	.37	.59	.72*
Overall composite	.56	.30	.31
BPRS Positive	-.14	-.22	-.25
BPRS Negative	-.15	-.18	-.10
BPRS Total	-.28	-.15	.05
Age	.33	.20	.22

\*  $p < .01$ .

processing speed and social cognition to be significantly related to job success (i.e., tenure and earnings). For job attainment, IPS's emphasis on optimal job matching based on client preference and skill level may increase chances that patients will get jobs and reduce the impeding effects of cognitive impairment on job attainment (for a review see McGurk and Mueser, 2004). For work outcome, our findings are consistent with others that have shown both processing speed (Evans et al., 2004; Lysaker et al., 2005; Sanchez et al., 2009) and social cognition (Couture et al., 2006; Kee et al., 2003) to be closely related to work functioning.

Processing speed was the only neurocognitive domain that showed a statistically significant relationship to work outcome. It is a robust and consistent marker of illness-related cognitive deficit (Dickinson et al., 2007a, 2007b; Rodriguez-Sanchez et al., 2007) and is frequently correlated with functional outcome (Bowie et al., 2008). Speculatively, processing speed may be a more sensitive measure for detecting a relationship with work outcome due to the fact that it is measured by three independent tests within the MCCB and all other domains are measured by a single test, other than working memory which has two. Hence, this domain may be a more reliable indicator of performance relative to the other MCCB domains. In addition, processing speed provides a general index of cognitive dysfunction in that performance on tests such as the BACS-Symbol Coding integrates several cognitive abilities including working memory, vigilance, and psychomotor speed, thus enhancing its sensitivity to general cognitive dysfunction.

Our finding of a relationship between the MSCEIT (i.e., emotion regulation in social situations) and functional outcome is consistent with past studies that found social cognition to mediate the relationship between neurocognition and community functioning (Couture et al., 2006, 2011; Fett et al., 2011; Schmidt et al., 2011). Beyond our circumscribed measure of emotion regulation, other social cognitive abilities such as social perception and emotion processing have been shown to be significantly related to work outcomes (Brekke et al., 2005; Kee et al., 2003; Sergi and Green, 2002), and future studies may

**Table 4**  
Linear regression results for the relationship between cognition and work outcome ( $N = 15$ ).

	Predictors		Model Summary
	B	Sig. (p)	R <sup>2</sup>
Weeks worked			.52
Processing Speed	.65	.01	
Social Cognition	.17	.44	
Hours worked			.46
Processing Speed	.36	.14	
Social Cognition	.48	.05	
Wages earned			.58
Processing Speed	.25	.23	
Social Cognition	.65	.006	

benefit by use of an expanded social cognitive battery to better capture the breadth of this area of functioning. Further, social competence predicts work outcome in adults with SMI (Bowie et al., 2008; Dickinson et al., 2007a,b; Nuechterlein et al., 2011). Although we did not measure social competence in the current study, it is highly correlated with social cognition and the deficits we detected on our measure of social cognitive abilities likely contributed to social skill deficits in social communication (verbal and nonverbal). Bell and colleagues showed neurocognition to be related to social cognition, and that poorer social cognition leads to social discomfort on the job, which in turn leads to poorer work rehabilitation outcomes (Bell et al., 2009). Future studies may aim to examine both social cognition and social skills with more ample measures and in a prospective design to more adequately describe the relationship between deficits and functional outcomes.

Clinical symptoms were not related to work outcomes in the present study. Past research has been mixed with regard to the predictive value of clinical symptomatology. Some studies show negative and psychotic symptoms to be related to Supported Employment outcomes (McGurk et al., 2003; Rosenheck et al., 2006; Slade and Salkever, 2001; Suslow et al., 2000), while others report no relation (Bond et al., 1995; Drake et al., 1996, 1999) or improvements in clinical symptoms associated with competitive employment (Bond et al., 2001; Mueser et al., 1997). The episodic and dynamic nature of clinical symptoms may partially explain the disparity in findings. Future studies may better elucidate the relationship with repeated frequent symptom assessments throughout the entire study.

Aspects inherent to the naturalistic design of the current study may create limitations. First, fidelity to the IPS model is consistently linked with efficacy rates. The program had fidelity ratings in the fair-to-good range over the course of the study and this may have contributed to lower job attainment rates. Second, we included a veteran population with chronic SMI and long-term unemployment histories. We did not find diagnostic group differences in work outcomes within the SMI sample, but research is needed to further explore the unique characteristics and potential barriers to successful work outcomes for veterans with SMI. Third, the study took place in Los Angeles, California at a time when the unemployment rate was between 10% and 12.6% (mostly heavily impacted workers without a college degree). These factors constrained the number of veterans who got jobs.

In summary, our findings indicate that processing speed and social cognition contribute significantly to work success for veterans with SMI. The next step toward increasing job tenure and continuing to improve work outcomes for individuals with SMI is to address the cognitive and skill deficits that contribute to early termination. Research has begun in this vein: the incorporation of cognitive remediation into work rehabilitation leads to improved gains in both cognitive and work outcomes (McGurk and Wykes, 2008; McGurk et al., 2009). In closing, beyond neurocognition, one of the factors likely tied to early termination of work is the social aspect of work. There were early precedents for this conclusion (i.e. Becker et al., 1998) and our results support continued emphasis on research to understand and intervene at the level of social cognition and social skills to enhance work outcome.

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### Contributors

Dr. Reddy managed the literature searches, undertook the statistical analysis, and wrote the first draft of the manuscript. RSK designed and conducted the study, and assisted with proofreading and refining the manuscript. Both authors contributed to and have approved the final manuscript.

### Conflict of Interest

Dr. Kern is an officer for MATRICS Assessment, Inc. and receives financial compensation for his role in that nonprofit organization. LFR has no financial interests or potential conflicts of interest.

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