



## Insight and negative symptoms as predictors of functioning in a work setting in patients with schizophrenia

Molly Erickson <sup>a,\*</sup>, Nematollah Jaafari <sup>b</sup>, Paul Lysaker <sup>c,d</sup>

<sup>a</sup> Department of Psychology, Indiana University, Bloomington, IN, USA

<sup>b</sup> Unité de recherche clinique intersectorielle Centre Hospitalier Henri Laborit, INSERM CIC-P 0802, CHU et faculté de médecine de Poitiers, France

<sup>c</sup> Roudebush VA Medical Center, Indianapolis, IN, USA

<sup>d</sup> Department of Psychiatry, Indiana University School of Medicine, Indianapolis, IN, USA

### ARTICLE INFO

#### Article history:

Received 9 January 2011

Received in revised form 13 June 2011

Accepted 23 June 2011

#### Keywords:

Schizophrenia

Negative symptoms

Insight

Vocational rehabilitation

### ABSTRACT

The present study was conducted to explore correlates of vocational outcome for individuals with schizophrenia. Seventy-eight individuals with schizophrenia were recruited to take part in a supported employment program in which they were provided with approximately 6 months of part-time work through a VA hospital. Positive symptoms, negative symptoms, and level of insight into mental illness were assessed once every 4 weeks, in addition to a work performance evaluation with participants' supervisors. Hierarchical longitudinal regression analysis revealed that negative symptom severity and impaired insight were significantly associated with poor work performance, and this relationship persisted over time. By contrast, positive symptom severity was not significantly associated with work performance. These results indicate that insight and negative symptoms, which can fluctuate over time, may be driving fluctuations in work performance and may therefore be a valuable target for future interventions.

© 2011 Published by Elsevier Ireland Ltd.

### 1. Introduction

For an individual with schizophrenia, maintaining employment is perhaps one of the greatest challenges to living independently. Following the onset of a psychotic illness, these individuals are more likely to be unemployed than their psychiatrically healthy peers. According to some estimates, fewer than 10% of persons with schizophrenia are able to maintain employment, compared to approximately 72% of the general population (see [Marwaha and Johnson, 2004](#) for a review). As a result, many of these people must depend on supplemental income from government programs, which contributes to the substantial annual costs of the mental illness on a national level ([Baron and Salzer, 2002](#); [Huxley and Thornicroft 2003](#)). In light of these observations, supported employment and other vocational rehabilitation programs have expanded considerably in recent years, with the purpose of re-integrating those with severe mental illness into the work force. Considering the moderate success of these programs ([Bond et al., 1997](#); [Cook and Razzano, 1999](#); [Twamley et al., 2003](#); [Lysaker et al., 2005](#); [Burns et al., 2007](#); [Lysaker et al., 2009](#); [Tsang et al., 2009](#)), it is of primary interest to understand how symptomatology and other psychological variables are related to vocational outcome in these patients. In particular, it will be increasingly important to be able to predict which individuals are

most likely to benefit from vocational rehabilitation or supported employment, and how fluctuations in psychological factors associated with mental illness contribute to success in the workplace.

Previous work in the area of vocational rehabilitation for individuals with schizophrenia has largely focused on symptom severity and its ability to predict patients' success in the work environment. While baseline positive symptom severity has only a weak association with work outcome, if any ([Marwaha and Johnson 2004](#)), baseline negative symptoms appear to be strongly associated with subsequent work performance in supported employment or vocational rehabilitation programs. For instance, [Hoffmann et al. \(2003\)](#) demonstrated that negative symptom severity prior to placement in a vocational rehabilitation program was able to account for the largest percentage of the variance in work performance over the following year and a half of available employment opportunity. These findings reaffirmed previous observations from the same group ([Hoffmann and Kupper, 1997](#)) and have since been replicated in other independent samples ([Milev et al., 2005](#), [Ventura et al., 2009](#); [Tsang et al., 2010](#)). It has been suggested that the affective flattening, loss of pleasure and social withdrawal that characterizes negative symptoms may be contributing to impoverished performance in settings such as the work environment, where communication and motivation to succeed are crucial ([Marwaha and Johnson, 2004](#); [Leifker et al., 2009](#)). By contrast, severity of hallucinations, delusions, and disorganization does not appear to significantly affect vocational outcome, at least among those participating in a vocational rehabilitation program. There is some evidence to suggest that positive symptom severity is associated with poorer

\* Corresponding author at: 1101 E. 10th Street, Bloomington, IN, 47401, USA.  
E-mail address: [ericksma@indiana.edu](mailto:ericksma@indiana.edu) (M. Erickson).

work performance in the general psychiatric population (for a review see McGurk and Mueser, 2004).

In addition to symptom severity, studies examining the relation between insight and work performance have also yielded important findings. For instance, it has been demonstrated that placement in a vocational rehabilitation program is associated with improved insight into mental illness in a majority of participants with schizophrenia (Lysaker and Bell, 1995), although there was no difference in the number of hours worked for those that improved in insight and those that did not. Lysaker et al. (2002) later followed up on this observation with a study demonstrating that baseline levels of insight predicted future success in the workplace. These authors divided individuals with schizophrenia according to whether insight regarding mental illness was intact or impaired, and found that individuals with intact insight tended to have better work performance after seven weeks of employment, as indicated by performance reviews conducted by employers (Lysaker et al., 2002). Taken together, these results indicate that (1) better insight in patients at baseline predicts better work performance in the future, but also (2) following placement in an employment program, changes in insight are taking place such that a majority of patients report improved awareness of their psychiatric condition.

The studies described thus far indicate that evaluating negative symptoms and insight impairment is a promising avenue when exploring vocational outcomes in these patients. Most studies to date have approached the issue of predicting vocational improvement by assessing baseline symptom expression and comparing future performance in the workplace to those earlier symptom measurements. However, since it is known that symptoms and insight can change substantially within an individual over the course of the illness (Carone et al., 1991; Reicher-Rössler and Rössler, 1998; Kupper and Tschacher, 2002), it remains unclear whether symptoms and work performance vary together across time. Though cross-sectional snapshots have revealed that those with fewer negative symptoms and intact insight tend to demonstrate more success in the workplace (e.g., Lysaker et al., 2002; Hoffmann et al., 2003), the important question of whether these measures fluctuate together over time remains unanswered.

The purpose of the present study is to determine whether changes in negative symptoms and insight are associated with increases and decreases in work performance over time. Furthermore, we were interested in whether a true relationship between positive symptoms and work performance can be found when examined in a longitudinal design. In the present study, individuals with schizophrenia were given part-time work placement with an opportunity to work as many as 20 h per week for monetary compensation. Vocational success was measured using the Work Behavior Inventory (WBI; Bryson et al., 1997), an interview-based assessment that was administered to participants' employers on a regular basis over the course of their 6-month employment. The analyses used in the present study were designed to evaluate whether scores on the WBI were associated with positive symptoms, negative symptoms, and insight across seven separate assessments conducted at intervals of approximately 1 month.

## 2. Methods

### 2.1. Participants

Seventy-eight individuals meeting DSM-IV-TR criteria for schizophrenia ( $N=53$ ) or schizoaffective disorder ( $N=25$ ) were recruited from a local VA Medical Center (VAMC) to participate in a larger study of the effects of cognitive behavioral therapy (CBT) on vocational rehabilitation (48 male; mean age=46.28, S.D.=9.17 years). Psychiatric diagnosis was determined using the Structured Clinical Interview for the DSM-IV (SCID-I; Spitzer et al., 1994); patients meeting criteria for current substance dependence or a chart diagnosis of mental retardation were excluded from the study. All participants were in a post-acute phase of illness, which was defined by no changes in medication, hospitalization or housing within the last 30 days. On average, participants had

12.69 years of education (S.D.=2.30) and 6.78 psychiatric hospitalizations (S.D.=8.46). Thirty-two participants (41%) were white, 45 (58%) were black, and one (1%) was Latino.

### 2.2. Instruments

#### 2.2.1. Work-Behavior Inventory (WBI; Bryson et al., 1997)

The Work Behavior Inventory (WBI) is a 35-item evaluation designed to assess participants' work performance. Trained and calibrated raters assigned a score of 1–5 for each item following direct observation of participant's work performance and an interview with each participant's employer. A score of "1" would indicate that the individual has persistent problems in the assessed domain, whereas a score of "5" would indicate that the participant performs well consistently. The 35 items from the WBI can be divided into five sub-scales: social skills, cooperativeness, work habits, work quality, and personal presentation. For the purposes of the present study, the average score of all 35 items has been used to index work performance; this was done to ensure that all aspects relevant to vocational success were included in estimates of work place performance.

#### 2.2.2. Scale to Assess Unawareness of Mental Disorder (SUMD; Amador et al., 1993)

The Scale to Assess Unawareness of Mental Disorder (SUMD) is a semi-structured interview designed to assess participants' level of insight into their mental illness. Participants are asked a variety of questions about their symptoms, including whether they believe they currently have symptoms of mental illness, whether they believe they have had symptoms of mental illness in the past, and what they believe caused their mental illness. Trained and calibrated raters with at least a bachelor's degree assigned a score from 1 to 5, with higher scores indicating reduced insight. This semi-structured interview demonstrates good reliability (Amador et al., 1993) and validity (Young et al., 2003; Jovanovski et al., 2007) for use in schizophrenia patients. There are multiple factors that comprise the SUMD, including illness insight, symptom insight, and attribution; however, for the purposes of this study we used three central items of the SUMD: awareness of mental disorder, awareness of the consequence of the mental disorder, and awareness of effectiveness of treatment. The total of each of these three items was used to measure insight in the present study; a total of 3 (1 point for each of the three items) would indicate excellent insight, while a total of 15 (5 points for each item) would indicate very poor insight.

#### 2.2.3. Positive and Negative Syndrome Scale (PANSS; Kay et al., 1987)

The Positive and Negative Syndrome Scale (PANSS) is a 30-item semi-structured interview designed to assess five symptom categories associated with schizophrenia: positive symptoms (i.e., hallucinations and delusions), negative symptoms (i.e., avolition and anhedonia), cognitive symptoms (i.e., thought disorder), hostility, and depression (Bell et al., 1994). Trained and calibrated raters assigned a score from 1 to 7 for each item, with higher scores indicating more severe psychopathology. For the purposes of this study, we focused exclusively on the positive symptom and negative symptom composite scores as they relate to work performance. The items that fell into the positive and negative symptom domains were determined based on the five-factor model of the PANSS described by Bell et al. (1994).

### 2.3. Procedures

The procedures for this study were approved by the institutional review committees of Indiana University and the Roudebush VA Medical Center, and all participants provided informed consent. Volunteers meeting criteria for participation in the study were given part-time employment provided through the VAMC and were randomly assigned to receive a biweekly cognitive behavioral intervention or a non-specific, supportive psychotherapy comparison treatment. The program included 6 months of employment, and two weekly sessions with a therapist (one individual and one group session). Once every 4 weeks, a trained and calibrated research assistant administered the WBI to participants' employers, and the SUMD and PANSS interviews to the participants themselves. Over the course of the 26 weeks, seven separate assessments of work performance, insight, positive and negative symptoms were collected at equal intervals. Of the 78 participants, 34 missed one, two or three of the seven testing sessions. These missing data points were estimated using a multiple imputation technique described by Rubin (1987).

### 2.4. Data analysis

The first set of analyses was aimed at establishing the global relation between measures of trait insight, trait severity of positive and negative symptoms, and overall WBI average score. Trait insight and trait psychopathology were defined as the average of SUMD and PANSS positive and negative symptom scores across all seven time points, respectively.

The second set of analyses aimed to explore the relation between measures of insight, symptom severity and work performance as they change over time. Hierarchical linear random regression models were estimated to test the hypotheses that insight, positive symptoms, and negative symptoms are associated with changes in work performance over time, separately. To evaluate predictors of change in WBI scores, the first level of the regression model was set to account for WBI score at the previous time point. To test the first hypothesis, the second level of the regression

model was the score on insight at that same time point. In this way, we evaluated whether accounting for level of insight significantly improved the prediction of work performance even when accounting for work performance at the previous time point. The second and third hypothesis was tested using positive and negative symptoms, respectively, for the second level of the model. A statistically significant beta weight for insight (SUMD) or positive or negative symptoms (PANSS) in the regression model after accounting for the score of the dependent measure at the previous time point would indicate improved prediction of the dependent variable when accounting for autocorrelations within these measures. All analyses were conducted using Predictive Analysis Software (PASW) 17.0.

### 3. Results

The average scores for insight, symptomatology, and work performance are depicted in Table 1. When averaging all seven assessments together, work performance was significantly related to negative symptom expression ( $r = -0.40$ ,  $p < 0.001$ ), with poorer work performance associated with increased severity in negative symptoms (see Table 2). Work performance was not significantly associated with insight or positive symptoms ( $r$ 's =  $-0.03$  and  $-0.16$  respectively,  $p$ 's  $> 0.16$ ). Insight was weakly associated with negative symptoms ( $r = 0.24$ ,  $p < 0.05$ ), but not positive symptoms ( $r = 0.01$ ,  $p = 0.90$ ), and positive symptoms were significantly (albeit weakly) associated with negative symptoms ( $r = 0.27$ ,  $p < 0.05$ ). Thus, when aggregated across all time points, negative symptoms were strongly associated with work performance, while insight and positive symptoms were only mildly associated with negative symptoms.

The pattern of results changed somewhat when fluctuation in the relationship between the measures was examined over the 6-month period (see Table 3). In this longitudinal approach, positive symptoms continued to reveal a lack of association with work performance over time; when accounting for WBI score at the previous time point, the beta weight or contribution of positive symptoms on current WBI score was non-significant ( $\beta = -0.04$ ,  $p = 0.12$ ). The relationship between negative symptom expression and work performance was similarly maintained; when considering fluctuations in these scores across the seven time points, negative symptoms were significantly associated with changes in WBI score, even after accounting for the WBI score at the previous time point ( $\beta = -0.12$ ,  $p < 0.01$ ). Finally, the previously non-significant association between insight and work performance became a significant association when comparing changes in insight as they relate to changes in WBI scores over time. Specifically, improvements in insight were associated with improvements in WBI scores, even when accounting for the WBI score at the previous time point ( $\beta = -0.18$ ,  $p < 0.001$ ). Taken together, it appears that both insight and negative symptoms are significantly associated with work performance and that this relationship is maintained as performance in these domains fluctuate over time.

### 4. Discussion

The purpose of the present study was to explore the ways in which symptomatology, insight, and work performance vary together over time. Consistent with previous literature, positive symptom severity was not related to work performance; average positive symptom

**Table 1**  
Average scores from each measure across seven sessions over a period of 6 months.

	1	2	3	4	5	6	7
Positive symptoms (range = 6–29)	14.66	14.52	15.13	14.61	14.79	14.97	14.79
Negative symptoms (range = 9–40)	20.06	20.26	20.47	20.79	21.52	20.81	21.86
SUMD (range = 3–15)	7.95	8.03	8.00	8.13	8.35	8.28	8.54
WBI (range = 1–5)	2.94	3.08	3.17	3.11	3.05	3.05	3.15

**Table 2**  
Correlations between average scores of all measured variables.

	Average positive symptoms	Average negative symptoms	Average insight	Average work performance
Average positive symptoms	–	0.27*	0.01	–0.16
Average negative symptoms		–	0.24*	–0.41**
Average insight			–	–0.03
Average work performance				–

\*  $p < 0.05$ .

\*\*  $p < 0.01$ .

subscale score was not associated with average WBI score, nor was fluctuation in positive symptom severity associated with changes in work performance. By contrast, negative symptom severity was associated with impairments in work performance. When averaging across all seven testing sessions, large negative symptom scores were associated with lower WBI scores. Furthermore, this relationship was maintained when examining fluctuating negative symptoms and work performance over time; exacerbation of negative symptoms from one assessment to the next was associated with poorer work performance reviews from participants' supervisors. Finally, improvement in insight from one assessment to the next was associated with improvement in work performance. When considering average insight across all seven testing sessions, however, there was no association between insight and work performance. The relationship between these variables was only revealed when using a longitudinal approach to data analysis.

The present results are consistent with, and extend, previous findings in the literature. Studies investigating predictors of vocational outcome have consistently found that positive symptoms are not associated with work performance, but that negative symptom severity is among the best predictor of later work performance (e.g., Hoffmann et al., 2003; Marwaha and Johnson, 2004). We similarly found that high negative symptom scores are associated with poorer work performance, and extended these findings by demonstrating that exacerbation of negative symptoms from one assessment to the next was associated with impairments in work performance within the individual. Likewise, it has been found that intact insight is associated with future vocational success (Lysaker et al., 2002), and that improvements in insight are observed in most patients who are given a job placement (Lysaker and Bell, 1995). We similarly found that improvements in insight between assessments were associated with improvements in work performance over time, although we did not find an association between average level of insight and average work performance.

Taken together, these results suggest that the psychological variables associated with success in the workplace are not static, but fluctuate over time and may lead to fluctuations in work performance

**Table 3**  
Beta weights for each predictor variable on work performance over the course of seven assessments.

	WBI
Positive symptoms	–0.04
Negative symptoms	–0.12**
Insight	0.18***

\*\*  $p < 0.01$ .

\*\*\*  $p < 0.001$ .

as well. Of note, this finding does seem at odds with the view that insight is an entirely static phenomenon. Furthermore, though it is possible that insight is related to neurocognitive function, which is considered relatively stable and trait-like, it may nevertheless fluctuate in response to environmental demands.

Though the results are largely consistent with previous reports, there are some limitations to the current study that reduce generalizability. The majority of participants were male veterans who demonstrated interest in participating in a vocational rehabilitation program. It is also important to note that the participants received two different types of interventions throughout the 26-week period; half of the participants received CBT and half of the participants received supportive psychotherapy. Although this does not necessarily change the conclusions about the relationship between symptomatology, insight, and work performance, future studies should explore the relationship between these variables in a group of patients with homogenous exposure to psychotherapeutic interventions. In addition to the sample and exposure characteristics, the study was designed such that assessments of insight and symptomatology were only administered once every 4 weeks. The relatively infrequent sampling rate thus limits conclusions about directionality; since symptom severity and insight impairments may fluctuate more quickly than once per month, we were unable to determine whether changes in one of these variables preceded or followed changes in another. Future studies may investigate assessments of these variables that are more easily administered on a daily or weekly basis. With a high frequency sampling rate, it may be possible to determine whether exacerbation in negative symptoms leads to impairments in work performance, or perhaps whether improvements in work performance lead to improvements in level of insight. A final limitation is related to the conceptual similarity between some of the items on the assessments used for the present study. For instance, both the WBI and the negative symptom score from the PANSS directly assess aspects of social function; it is possible that conceptual similarities between some of the items on these two assessments drive the significant associations between the measures. Future analyses may explore the possibility that specific symptoms such as social withdrawal is able to account for the relationship between negative symptoms and work performance.

The findings from the present study implicate two important targets for future research in vocational rehabilitation settings. First, given the considerable evidence that severe negative symptom expression is a strong predictor of impairment in work performance, future supported employment programs may direct efforts towards ameliorating such symptoms. Such interventions have so far resulted in limited success; when Vauth et al. (2005) compared a vocational rehabilitation treatment that addressed negative symptoms with a treatment that addressed cognitive symptoms, they found that the treatment that specifically addressed negative symptoms failed to yield a significant improvement in negative symptoms, and this group was outperformed in the workplace by the group that received cognitive training. Still another group found that when a specific domain of negative symptoms, social competence, was addressed as part of a vocational rehabilitation program, the group receiving social skills training had significantly longer durations of employment when compared to a standard vocational rehabilitation program (Tsang et al., 2009). Such studies suggest that while negative symptoms as a whole are highly resistant to treatment, targeting specific facets of negative symptoms that are conceptually linked to work performance may yield more positive results.

A second consideration for treatment development is related to the non-linear nature of the course of the mental illness. Although it has been observed that improvements in insight are observed from baseline to follow-up assessments in vocational settings (i.e., Lysaker and Bell, 1995), this long-term improvement is often characterized by intermediate setbacks that are related to simultaneous declines in

work performance, as was observed in the present study. As such, interventions that can flexibly address such spontaneous declines in insight and other symptoms may lead to sustained success and lower attrition rates in vocational rehabilitation programs for schizophrenia patients.

## References

- Amador, X.F., Strauss, D.H., Yale, S.A., Flaum, M.M., Endicott, J., Gorman, J.M., 1993. Assessment of insight in psychosis. *The American Journal of Psychiatry* 150, 873–879.
- Baron, R.C., Salzer, M.S., 2002. Accounting for unemployment among people with mental illness. *Behavioral Sciences & the Law* 20, 585–599.
- Bell, M.D., Lysaker, P.H., Beam-Goulet, J.L., Milstein, R.M., Lindenmayer, J.P., 1994. 5-component model of schizophrenia—assessing the factorial invariance of the positive and negative syndrome scale. *Psychiatry Research* 52, 295–303.
- Bond, G.R., Drake, R.E., Mueser, K.T., Becker, D.R., 1997. An update on supported employment for people with severe mental illness. *Psychiatric Services* 48, 335–346.
- Bryson, G.J., Bell, M.D., Lysaker, P.H., Zito, W.X., 1997. The Work Behavior Inventory: a scale for the assessment of work behavior for clients with schizophrenia. *Psychiatric Rehabilitation Journal* 20, 47–55.
- Burns, T., Catty, J., Becker, T., Drake, R.E., Fioritti, A., Knapp, M., Lauber, C., Rossler, W., Tomov, T., van Busschbach, J., White, S., Wiersma, D., 2007. The effectiveness of supported employment for people with severe mental illness: a randomized controlled trial. *Lancet* 370, 1146–1152.
- Carone, B.J., Harrow, M., Westermeyer, J.F., 1991. Posthospital course and outcome in schizophrenia. *Archives of General Psychiatry* 48, 247–253.
- Cook, J.A., Razzano, L., 1999. Vocational rehabilitation for persons with schizophrenia: recent research and implications for practice. *Schizophrenia Bulletin* 26, 87–103.
- Hoffmann, H., Kupper, Z., 1997. Relationships between social competence, psychopathology and work performance and their predictive value for vocational rehabilitation of schizophrenic outpatients. *Schizophrenia Research* 23, 69–79.
- Hoffmann, H., Kupper, Z., Zbinden, M., Hirsbrunner, H.P., 2003. Predicting vocational functioning and outcome in schizophrenia outpatients attending a vocational rehabilitation program. *Social Psychiatry and Psychiatric Epidemiology* 38, 76–82.
- Huxley, P., Thornicroft, G., 2003. Social inclusion, social quality and mental illness. *The British Journal of Psychiatry* 182, 289–290.
- Jovanovski, D., Zakzanis, K.K., Atia, M., Campbell, Z., Young, D.A., 2007. A comparison between a researcher-rated and a self-report method of insight assessment in chronic schizophrenia revisited: a replication study using the SUMD and SAIQ. *The Journal of Nervous and Mental Disease* 195, 165–169.
- Kay, S.R., Fiszbein, A., Opler, L., 1987. The positive and negative syndrome scale for schizophrenia. *Schizophrenia Bulletin* 13, 261–276.
- Kupper, Z., Tschacher, W., 2002. Symptom trajectories in psychotic episodes. *Comprehensive Psychiatry* 43, 311–318.
- Leifker, F.R., Bowie, C.R., Harvey, P.D., 2009. Determinants of everyday outcomes in schizophrenia: the influences of cognitive impairment, functional capacity, and symptoms. *Schizophrenia Research* 115, 82–87.
- Lysaker, P., Bell, M., 1995. Work rehabilitation and improvements in insight in schizophrenia. *The Journal of Nervous and Mental Disease* 183, 103–106.
- Lysaker, P.H., Bryson, G.J., Bell, M.D., 2002. Insight and work performance in schizophrenia. *The Journal of Nervous and Mental Disease* 190, 142–146.
- Lysaker, P.H., Bond, G., Davis, L.W., Bryson, G.J., Bell, M.D., 2005. Enhanced cognitive-behavioral therapy for vocational rehabilitation in schizophrenia: effects on hope and work. *Journal of Rehabilitation Research and Development* 42, 673–681.
- Lysaker, P.H., Davis, L.W., Bryson, G.J., Bell, M.D., 2009. Effects of cognitive behavioral therapy on work outcomes in vocational rehabilitation for participants with schizophrenia spectrum disorders. *Schizophrenia Research* 107, 186–191.
- Marwaha, S., Johnson, S., 2004. Schizophrenia and employment: a review. *Social Psychiatry and Psychiatric Epidemiology* 39, 337–349.
- McGurk, S., Mueser, K., 2004. Cognitive functioning, symptoms, and work in supported employment: a review and heuristic model. *Schizophrenia Research* 70, 147–173.
- Milev, P., Ho, B.C., Arndt, S., Andreasen, N.C., 2005. Predictive values of neurocognition and negative symptoms on functional outcome in schizophrenia: a longitudinal first-episode study with 7-year follow-up. *The American Journal of Psychiatry* 162, 495–506.
- Reicher-Rössler, A., Rössler, W., 1998. The course of schizophrenic psychoses: what do we really know? A selective review from an epidemiological perspective. *European Archives of Clinical Neuroscience* 248, 189–202.
- Rubin, D.B., 1987. *Multiple Imputation for Nonresponse in Surveys*. John Wiley & Sons, Inc., Hoboken, New Jersey.
- Spitzer, R.L., Williams, J.B., Gibbon, M., First, M., 1994. *Structured Clinical Interview for DSM-IV*. Biometrics Research Department, New York.
- Tsang, H.W.H., Chan, A., Wong, A., Liberman, R.P., 2009. Vocational outcomes of an integrated supported employment program for individuals with persistent and severe mental illness. *Journal of Behavior Therapy and Experimental Psychiatry* 40, 292–305.
- Tsang, H.W.H., Leung, A.Y., Chung, R.C.K., Bell, M., Cheung, W.M., 2010. Review on vocational predictors: a systematic review of predictors of vocational outcomes among individuals with schizophrenia: an update since 1998. *The Australian and New Zealand Journal of Psychiatry* 44, 495–504.

- Twamley, E.W., Jeste, D.V., Lehman, A.F., 2003. Vocational rehabilitation in schizophrenia and other psychotic disorders—a literature review and meta-analysis of randomized controlled trials. *The Journal of Nervous and Mental Disease* 191, 515–523.
- Vauth, R., Corrigan, P.W., Clauss, M., Dietl, M., Dreher-Rudolph, M., Stieglitz, R.D., Vater, R., 2005. Cognitive strategies versus self-management skills as adjunct to vocational rehabilitation. *Schizophrenia Bulletin* 31, 55–66.
- Ventura, J., Helleman, G.S., Thames, A.D., Koellner, V., Nuechterlein, K.H., 2009. Symptoms as mediators of the relationship between neurocognition and functional outcome in schizophrenia: a meta-analysis. *Schizophrenia Research* 113, 189–199.
- Young, D.A., Campbell, Z., Zakzanis, K.K., Weinstein, E., 2003. A comparison between an interview and a self-report method of insight assessment in chronic schizophrenia. *Schizophrenia Research* 63, 103–109.