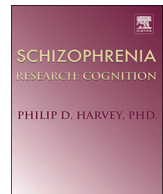




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Short Communication

Modified Work Behavior Inventory assessment: Evaluation of psychometric properties

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ABSTRACT

The Work Behavior Inventory (WBI) is a widely used and validated assessment of work functioning in people with schizophrenia. WBI ratings are based on workplace observation and interview with work supervisors. Workplace observation may not be acceptable in all employment settings. A WBI assessment based only on supervisor interview may offer more utility. The current study evaluated the psychometric properties of a modified WBI among individuals with schizophrenia participating in VA vocational rehabilitation programs – similar to the original WBI validation study. Results suggest evidence for reliability, validity and sensitivity to change for an interview only format. Limitations and future research directions are discussed.

1. Introduction

Schizophrenia is marked by significant functional impairment including in the vocational domain (Anthony et al., 1995; Carpenter and Strauss, 1991; Harvey and Strassnig, 2012; Razzano et al., 2005). The ongoing emphasis on the recovery of valued roles in the community makes vocational functioning an important treatment outcome for individuals with schizophrenia (Drebing et al., 2012). While there has been development of broad outcome measures of real world functioning in schizophrenia, specific assessment of work performance may identify additional treatment targets that can impact vocational outcomes in schizophrenia (Drebing et al., 2012; Lystad et al., 2016).

The Work Behavior Inventory (WBI) is a situational assessment measure of work performance specifically developed for individuals with schizophrenia (Bryson et al., 1997). It includes a worksite behavioral observation, and a semi-structured interview with work supervisors. It has strong psychometric properties (Bryson et al., 1997; Bryson et al., 1999; Bull et al., 2015) and has been widely used as a functional measure in schizophrenia (Kukla et al., 2018; Kern et al., 2018; Mervis et al., 2017; McGuire et al., 2007). It has demonstrated sensitivity to change in vocational rehabilitation (VR) intervention trials (Bell et al., 2003; Bryson et al., 2003), a characteristic necessary for assessment of functional outcomes (Bellack et al., 2007; Mautsach

et al., 2009).

As VR is increasingly focused on competitive employment via supported employment (SE), the WBI worksite behavioral observation presents some limitations because this observation may be undesirable to the participant and/or not always feasible (Allot et al., 2013; McGuire et al., 2007). A modified WBI assessment protocol based on only the interview with the supervisor may be more acceptable and has been used successfully in a recent trial of augmented SE (Kern et al., 2018). However, the psychometrics of a modified WBI assessment have yet to be evaluated. The current study evaluated a modified WBI in a sample and setting similar to the original WBI validation study and had three aims: 1) to evaluate its reliability, 2) to provide preliminary data on its validity and 3) to demonstrate its sensitivity to change.

2. Methods

2.1. Participants

Participants were 51 Veterans enrolled in a Veterans Administration VR program who met DSM-IV criteria for schizophrenia or schizoaffective disorder. Diagnostic eligibility was determined by a structured diagnostic interview (First et al., 1994). See Table 1 for sample characteristics.

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Table 1
Baseline characteristics and sample descriptives.

Variable	Mean (SD)		
Age	49 (5.6)		
Gender, male	92%		
Race, African American	59%		
Marital status, never married	61%		
Living situation, supervised housing	63%		
Length of illness (years)	26 (7.3)		
Lifetime hospitalizations (#)	11.2 (9.2)		
Receiving entitlement income	83%		
Most recent competitive job (years)	13.6 (10.7)		
Type of most recent competitive job, unskilled labor	53%		
Tenure in current VR position (months)	21.7 (28.1)		
Hours worked per week during 2 month baseline ^a	20.9 (5.9)		
Hourly wage during 2 month baseline ^a	\$1.76 (\$1.39)		
Modified WBI Scale		Bell et al. (2003) ^b	McGuire et al. (2007) ^c
Social skills	20.9 (5.8)	20.7 (4.5)	–
Cooperativeness	23.7 (5.8)	24.2 (5.7)	–
Work habits	22.6 (6.2)	24.4 (6.3) ^d	–
Work quality	23.0 (6.8)	23.3 (6.0)	–
Personal presentation	23.0 (4.8)	22.5 (5.5)	–
Modified WBI total	113.2 (25.1)	115.1 (24.7)	112.6 (33.5)

(Note. Wages were noncompetitive and provided as incentive for therapeutic work activity program. Veterans participating in other VA VR programs (e.g., CWT) typically receive minimum wage or higher).

^a Baseline data reflects the months immediately preceding and following administration of baseline WBI measure.

^b Sample of Veterans with schizophrenia (N = 33) in similar VA VR program.

^c Sample of individuals with schizophrenia (N = 44) participating in community VR program.

^d Based on results of one sample t-test work habits mean score in Bell sample was significantly greater ($t(50) = -2.12; p < .05$). There were no other significant differences observed between scale or total scores in current sample and Bell or McGuire sample.

2.2. Procedures

The current study used data collected in the context of a larger investigation for Veterans with schizophrenia enrolled in VR (Tenhula et al., 2007). Participants were engaged in prevocational therapeutic work activity in 14 different work sites at the local VA hospital (e.g., laundry facility, mailroom, environmental management service etc.). These placements offered Veterans an employment experience working alongside other VA employees, yet provided supportive supervisors who could offer accommodations and support (see Bell et al., 1996). In contrast to competitive employment, the current placements were brokered by VR who developed strong partnerships with supervisors. Participants were paid a nominal hourly wage or on a piece-rate basis and typically performed specific work tasks as opposed to being assigned responsibilities of a specific position (e.g., custodian).

For the purposes of the study, participants completed baseline assessments, a month-long waitlist period, and subsequently participated in an 8-session social skills training (SST) intervention focused on social interactions at work (Bellack et al., 2004). WBI interviews were completed at baseline, immediately prior to beginning the intervention, and within one week following completion of the intervention. All procedures were approved by the local institutional review board.

2.3. Measures

2.3.1. Work Behavior Inventory (WBI; Bryson et al., 1997)

The WBI is a 35-item rating instrument that consists of five scales Social Skills, Cooperativeness, Work Habits, Work Quality, and Personal Presentation. Individual items are behaviorally anchored and rated on a 5-point scale. The WBI ratings for the present study were based only on a semi-structured interview with the individual's immediate work supervisor. We consulted with the original WBI authors and used a similar interview procedure. Interviews were conducted by 9 trained masters and doctoral-level research staff. Training included observation of interviews, conducting interviews under live supervision and rating five audiotaped interviews with criterion ratings. Interviewers attended bi-weekly supervision meetings for the duration of the study to prevent rater drift. Twenty-two different supervisors, who were generally responsive and cooperative, were interviewed. Interviews were usually completed in 20–30 min.

2.3.2. Employment data

Number of hours worked and wages earned were collected from bi-weekly time cards. Employment data collected a month prior to entering the study and the first month of the study were summed to represent baseline hours and earnings and used as evidence for concurrent validity of the modified WBI. We used hours and earnings collected at six months following study entry as evidence for the predictive validity of the modified WBI.

2.4. Data analyses

We assessed the internal consistency by examining alpha coefficients of each WBI scale. Pearson correlations between WBI scores collected at baseline and following waitlist period were computed to measure test-retest reliability. For inter-rater reliability analyses, 7 raters (blind to study time-point) independently completed WBI ratings on ten randomly selected audiotapes of WBI interviews with work supervisors. Intra-class correlations for scale scores and total score were computed for raters and each set of ratings. Evidence for concurrent and predictive validity was assessed by conducting Pearson correlations between WBI baseline total and scale scores and baseline and 6-month employment data, respectively. Sensitivity to change was assessed by examining changes in mean levels of functioning from baseline to post SST in WBI total and scale scores using paired sample t-tests. It was hypothesized that only those domains targeted by the intervention (Social Skills and Personal Presentation) would improve following treatment.

3. Results

3.1. Descriptive statistics

Table 1 shows the descriptive statistics for modified WBI total and scale scores in the current sample at the initial assessment. Overall, these mean item scores fall within the same range as original published WBI data (Bryson et al., 1997) and are consistent with published data from two studies using the standard WBI assessment procedure with individuals diagnosed with schizophrenia spectrum disorders (Bell et al., 2003; McGuire et al., 2007).

3.2. Reliability, concurrent and predictive validity

As shown in Table 2, all scales demonstrated adequate internal consistency and inter-rater reliability and moderate test-retest reliability. These values were largely consistent with the reliability statistics of the original WBI (Bryson et al., 1997). As shown in Table 3, there was

Table 2
Reliability of the Modified Work Behavior Inventory (WBI).

	Internal consistency ^a	Test-retest reliability ^b	Inter-rater reliability ^c
Social skills	.90	.67	.76
Cooperativeness	.90	.60	.74
Work habits	.83	.61	.80
Work quality	.93	.55	.87
Personal presentation	.79	.63	.74
Total score	–	.63	.78

^a Alpha coefficient.

^b Pearson correlation coefficient. All correlations were significant at $p < .01$.

^c Intra-class correlation coefficient.

moderate evidence for concurrent validity for the modified WBI. WBI total score and Work Habits scale score were positively correlated with total earnings at baseline while the Cooperativeness scale showed a moderate correlation although on the cusp of significance. There was also some evidence for the predictive validity of the Work Habits scale that predicted total earnings at 6 months. Number of hours worked was not correlated with WBI scales or total score at either time point.

3.3. Sensitivity to change

Following the SST intervention, significant improvements were found on the WBI scales Social Skills ($t(42) = 2.59, p = .01, d = 0.40$), Personal Presentation ($t(42) = 2.53, p = .02, d = 0.38$) and Work Habits ($t(42) = 2.55, p = .01, d = 0.39$). Differences between baseline and post-treatment on other scales were not significant.

4. Discussion

Results of the current study describe psychometric data for a modified WBI assessment based only on interview with a supervisor. Observed means and reliability statistics were largely consistent with other schizophrenia samples engaged in VR programs and our sample was clinically similar to original validation samples (Bell et al., 2003; Bryson et al., 1997; McGuire et al., 2007). We also found some evidence for the concurrent validity and predictive validity of the modified WBI. Higher WBI total scores, Work Habit and Cooperativeness scale scores were associated with greater earnings at baseline and baseline Work Habits scale score predicted earnings at six months. The modified WBI also demonstrated sensitivity to change in domains targeted by the SST intervention.

These results support extending the use of the WBI in a more flexible way (i.e., in settings where direct observation is not feasible), which could have important clinical and research benefits. Among individuals with psychiatric disabilities, cognitive and social functional deficits are

Table 3
Correlations between modified WBI scales and employment data at baseline and 6 months.

Employment data	Mean (SD)	Social skills	Cooperativeness	Work habits	Work quality	Personal presentation	Total score
Hours worked during 2-month baseline (n = 41)	167.7 (46.5)	.16	.23	.03	.15	–.03	.13
Money earned during 2-month baseline (n = 41)	\$289.34 (223.3)	.25	.32 [†]	.39*	.22	.26	.33*
Hours worked at 6-month follow up (n = 31)	72.7 (26.4)	–.09	.12	.10	.04	–.19	.01
Money earned at 6-month follow up (n = 31)	\$104.67 (65.0)	.16	.30	.39*	.11	.02	.23

Note. Baseline data reflects combined hours worked across the months immediately preceding and following administration of baseline WBI measure, thus reflecting 2 months of data.

* $p < .05$.

† $p = .05$.

common and associated with shorter job tenure and increased number of accommodations (Becker et al., 1998; MacDonald-Wilson et al., 2003). The WBI taps work behaviors that would be impacted by these functional limitations (e.g., social skills or work quality) and in turn has been shown to be correlated with neurocognitive domains typically impaired in schizophrenia (Evans et al., 2004; Lysaker et al., 2005; Lystad et al., 2016). As such, the WBI could be considered as a moderating/mediating variable of distal competitive employment outcomes (Drebing et al., 2012). Of note, in the current study evidence for the validity of the Work Habits scale was the most robust. Items comprising this scale address timeliness, promptness and compliance with break schedules which may be qualitatively more easily observable by the supervisor than items on other scales.

There are some notable limitations to the current study. First, the sample was engaged in traditional VR settings with supervisors with well-established partnerships with VA VR. Such partnerships obviated some of the challenges of disclosure of disability and obtaining supervisor buy-in to complete WBI interview that could occur in community settings. While VA continues to offer onsite VR work placements, increasingly, a greater emphasis is placed on community based employment (Resnick et al., 2006). Therefore, the practicability and generalization of the current findings to competitive employment settings or younger samples warrants caution. Future work should explore the development of a participant WBI interview which could offer even greater practicability.

A second limitation was the outcome data used to establish evidence of validity. These data were similar to those in original WBI validation studies (Bryson et al., 1999; McGuire et al., 2007), but do not include current recommended competitive employment outcomes (Drebing et al., 2012). However, some recent research suggests WBI ratings (based only on supervisor interview) predicted job tenure in SE (Kern et al., 2018).

In summary, a modified WBI assessment shows preliminary promise as a more flexible method for measuring vocational functioning in schizophrenia. Future research should include feasibility and validation among individuals in competitive employment settings, and how WBI scores are associated with other employment variables such as accommodations, job tenure, and job terminations.

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Conflicts of interest

The authors report no conflicts of interest.

CRedit authorship contribution statement

Jason E. Peer: Formal analysis, Writing - original draft Writing - review & editing. **Joanna E. Strong Kinnaman:** Formal analysis, Writing - original draft Writing - review & editing. **Wendy N. Tenhula:** Conceptualization, Funding acquisition, Project administration, Supervision, Writing - review & editing.

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