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Cognitive Ability and Vocational Interest Predictors of Case Closure for Individuals with Psychiatric Disabilities

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Abstract

This study sought to explore the utility of cognitive ability and vocational interest predictors of case closure for individuals with psychiatric disabilities. The predictive utility of an index of aptitude-interest congruence was also examined. Vocational interests were the only variables that emerged as significant predictors of case closure, clarifying the role of interest assessment as a core element in vocational rehabilitation (VR) protocols. Interests that correspond generally, with occupational domains that are associated with higher placement rates predicted case closure status. Although cognitive ability is a well-established predictor of the acquisition of job-related knowledge and job performance, it did not predict case closure in the present study. Further, aptitude-interest congruence did not predict case closure, suggesting that there are multiple and distinct influences between the characteristics of the person and the characteristics of the occupation that ultimately affect vocational success in this population. The present study highlights the relative importance of non-cognitive predictors to employment outcome in a psychiatrically disabled population. Further research is needed to clarify the relationship between vocational interests and case closure and the potential pathways, time course and direction of effects.

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Table of Contents

Chapter I: Introduction	7
Predicting Vocational Outcomes for Individuals with Psychiatric Disabilities	8
Clinical Predictors of Vocational Outcome	10
The Role of Assessment in Developing Rehabilitation Plans	11
Cognitive Ability as a Predictor of Vocational Outcome	12
The Need for Assessment Efficiency	13
Economic Considerations	13
Case Closure	14
Cognitive Considerations	15
Testing Considerations for Individuals with Psychiatric Illness	17
The Wonderlic Personnel Test: An Efficient Measure of Cognitive Functioning	17
The Role of Interest Assessment in Vocational Rehabilitation	20
Person-Environment Congruence and Outcomes	22
Career Scope Aptitude and Interest Assessment	23
Aims and Hypotheses	24
Chapter II: Method	26
Participants	26
Measures	26
Procedures	28
Analyses	
Chapter III: Results	33
Chapter IV: Discussion	40

CareerScope Interests	40
Aptitude-Interest Congruence	42
The Wonderlic Personnel Test	42
Limitations	44
Conclusions and Future Directions	46

List of Tables and Figures

Table 1
Comparisons of Demographic Variables Across Closure Status
Table 2
Comparisons of WPT, CS Aptitude and Interest variables and Aptitude-Interest Congruence
across Case Closure Status
Table 3
Comparison of WPT and CS Aptitude Scores to Normative Sample Scores
Table 4
Correlations between CareerScope Aptitude Scores and the Wonderlic Personnel Test
Table 5
Summary of Multiple Logistic Regression Analysis for Case Closure Group
Table 6
Classification Statistics for Multiple Logistic Regression Analysis
Figure 1
Receiver Operating Characteristics (ROC) Curve for Predicting Case Closure

Chapter I

Introduction

Mental disorders are the leading cause of disability in the U.S. for individuals between the ages of 15 and 44, and the 22% employment rate in individuals with these conditions is far lower than those of the general population (64.5%; Karakus, Frey, Goldman, Fields & Drake, 2011). Despite this low rate of employment, individuals with psychiatric disabilities often express a desire to work, and employment is known to substantially contribute to recovery (Anthony, Rogers, Cohen & Davies, 1995; Bond, 2011; Cook, 2006; Farkas & Anthony, 2010; Rinaldi et al., 2010). Researchers have identified several aspects of improved functioning in individuals with mental illness who obtain employment. The increased self-esteem associated with a change in role status, introduction of structure and routine that accompanies work, and increased socialization all have been associated with symptom reduction and remission (Bond et al., 2001; Provencher, Gregg, Mead & Meuser, 2002). Furthermore, individuals with severe mental illness who work report a significantly higher quality of life (Nordt, Muller, Rossler & Lauber, 2007; Watzke & Galvao, 2007). Moreover, work is a means for people with psychiatric disabilities to alleviate poverty and avoid homelessness. Thus, obtaining and maintaining employment is a critical outcome of the vocational rehabilitation process.

The purpose of this study was to examine psychometric predictors of vocational rehabilitation (VR) outcomes in a sample of individuals with psychiatric disorders. Two specific instruments were used: the Wonderlic Personnel Test (WPT; 1992; 2010), a brief intelligence screener, and CareerScope (CS; 2003), a multiple aptitude and interest assessment. This introduction will begin by presenting a brief overview of employment barriers for individuals with psychiatric disabilities. For the purposes of this exposition, psychiatric disability refers to

individuals who have met diagnostic criteria for one or more of a broad range of Axis I disorders, including schizophrenia and other psychotic disorders as well as mood and anxiety disorders (Diagnostic and Statistical Manual for Mental Disorders; DSM-IV, American Psychiatric Association, 1994). Next, research on clinical predictors of employment will be reviewed, and lastly, the potential utility of these specific instruments will be described.

Predicting Vocational Outcomes for Individuals with Psychiatric Disabilities

Successful VR rates are lower for individuals with psychiatric illness (22%) than for those with other disabilities (33%; Bond, 2011), and decreased labor force participation is associated with vocational immaturity, limited vocational opportunity and success, as well as decreased and often inadequate social support (Fabian, 2000; Wieworski & Fabian, 2004). One reason for lower VR rates is that early symptom onset often interferes with educational attainment, which can limit the job market to low paying, high turnover positions (Rinaldi et al., 2010). Individuals who successfully obtain competitive employment prior to illness onset can experience difficulty re-entering the workforce after a period of illness. These factors oftentimes lead to a permanent loss of competitive employment (Rinaldi et al., 2010). Major life transitions such as attending college or entering the job market have also been associated with symptom onset and exacerbation for individuals with mental illness (Rinaldi et al., 2010). In addition, ecological factors such as discrimination in hiring practices can contribute to difficulties in obtaining employment, and social stigma and a poor understanding of mental illness often sustain unemployment for those with psychiatric disabilities (Cook, 2006).

Further, many individuals with psychiatric disabilities tend to have an unrealistic view of their own employability, current work demands and/or their ability to meet workplace expectations (Shaw, Sumsion, McWilliam & MacKinnon, 2004). Lack of opportunity to explore

different work-related tasks can be a barrier to an individual's capacity to form realistic selfappraisals and to make informed vocational choices. Poor insight into one's deficits can be a symptom of the mental illness itself (Goldberg, Green-Paden, Lehman & Gold, 2001), and cognitive decline from premorbid abilities (Gold, Goldberg, McNary, Dixon, & Lehman, 2002) further complicates realistic self-appraisal. For these reasons, individuals frequently overestimate their work-related capacities, which can lead to frustration and failure in the training or work setting. Conversely, lack of awareness of work-related strengths can result in a fear of work or an unwillingness to work. Such fears may be misperceived as a "lack of motivation" by others, including VR professionals. In extreme cases, individuals may avoid work altogether (Fabian, 2000).

These challenges create a need for extensive counseling and assessment in order to facilitate a supportive relationship between client and VR provider. A collaborative relationship is particularly valuable in terms of a client's understanding and development of appropriate vocational directions. Spending more time interviewing and discussing vocational options has been associated with better vocational outcomes for individuals with psychiatric illness (Donnell, Lustig & Strauser, 2002) as well as for individuals with other disabilities (e.g., orthopedic injury, traumatic brain injury, etc.; Lustig, Strauser, Rice & Rucker, 2002; Lustig, Strauser, Weems, Donnell & Smith, 2003). Furthermore, when VR consumers and providers agree upon a common vocational goal, services improve and better outcomes are more likely to follow (Donnell et al., 2002). For VR psychologists, therefore, the overarching goal is to match clients to work that is commensurate with their measured abilities and interests in order to increase the likelihood of obtaining and maintaining employment (Anthony et al., 1995; Bond,

et al. 2001). Surprisingly, few studies have focused on the role of aptitudes and interests in predicting successful VR outcomes.

Clinical Predictors of Vocational Outcome

Research on clinical predictors of vocational outcomes in individuals with psychiatric illness has been inconsistent and even contradictory (Cook et al., 2008). A lack of standardization of study methods and measures as well as heterogeneity among study samples has contributed to this inconsistency (Cook & Razzano, 2000; Wiewiorski & Fabian, 2004). Studies that rely on retrospective reports of symptoms often do not yield significant associations with vocational outcomes (Tsang, Lam, Ng, & Leng, 2000). Even when symptoms are measured concurrently, functional recovery is generally a stronger predictor of outcome. Moreover, recovery rate and prognosis cannot be inferred from an individual's constellation of symptoms. Specifically, variability in disease course, medication response and compliance, social support and demographic factors can all play a part in the time course from symptomatic recovery to functional recovery. In 2003, a 12-month study of individuals with bipolar disorder found that while 48% of patients demonstrated syndromic recovery (i.e., DSM-IV criteria were no longer met), only 26% also met criteria for symptomatic recovery (i.e., improvement in the magnitude of symptoms) during that period. Functional recovery, or a return to previous levels of work and psychosocial function, was observed in just 24% of patients over the one-year period. Further, individuals of higher socioeconomic status progressed more rapidly relative to other patients (Keck et al., 2003). An influential study by Anthony and Jansen (1984) found that in a group of individuals who identified a job goal, psychosocial interventions emerged as a stronger predictor of obtaining and maintaining employment than did symptoms. A 24-month study by Cook and colleagues (2008), determined that individuals with schizophrenia were more likely to work

competitively when they received coordinated services from interdisciplinary teams in programs emphasizing rapid job search, ongoing support without time limits and placements in their preferred fields. They outperformed their counterparts with diagnoses of bipolar disorder and major depressive disorder in control condition programs despite having more severe symptoms, spending more time as inpatients, and having a younger age of illness onset compared to individuals with diagnoses other than schizophrenia (Cook et al., 2008).

There are a number of longitudinal studies however, that have demonstrated an association between psychiatric symptoms and functional recovery in individuals with schizophrenia. Although McGurk and Mueser (2004) showed that the predictive value of symptom status was low, especially in prospective studies, negative symptoms did predict work status in four out of seven of the studies. In general, negative symptoms have been associated with worse employment outcomes than psychotic symptoms (Green, 1996). Nevertheless, neither symptoms alone nor diagnostic category emerge as consistent predictors of employment (Farkas & Anthony, 2010; Fabian, 2000).

The Role of Assessment in Developing Rehabilitation Plans

The Rehabilitation Services Administration (RSA), an agency of the U.S. Department of Education, uses federal and state dollars to fund a wide range of supportive services for adults with disabilities (Cook, 2006). These services include vocational evaluation, personal adjustment training, work adjustment, job coaching and job placement. Assessment plays an important role in vocational evaluation, especially during the initial phases when measurement of cognitive and vocational capacities is used to inform the development of an individual's comprehensive vocational plan. During the assessment phase, VR psychologists may recommend various supported vocational services such as job development, job coaching, educational upgrading, and/or psychological counseling. Information gathered during these assessments can be used to predict vocational and independent living functioning levels, as well as to identify cognitive disabilities in need of further examination.

Cognitive Ability as a Predictor of Vocational Outcome

Empirical evidence linking cognitive capacities to vocational success spans more than ninety years of research (Moustafa & Miller, 2003). Because cognitive ability has been a strong predictor of skill acquisition and job performance, assessment has been regarded as an essential initial step in the VR process for individuals regardless of disability type (Cook & Razzano, 2000; Kreuzpointner, 2009). VR psychologists use a variety of psychometric methods to match clients to appropriate vocations. Intelligence tests or tests of general cognitive ability (e.g., IQ) as well as aptitude and achievement assessment are used to develop a comprehensive picture of clients' likelihood of mastering work related skills in certain occupations. While these instruments measure overlapping skills and abilities, they can be broadly ordered on a continuum from general to specific. For example, general cognitive ability or IQ tests can be thought of as the most general measures of ability while aptitude tests are understood to tap skills that are more specific. Achievement tests assess specific abilities that tend to be more dependent on educational experiences. Despite these differences, the evidence linking abilities to vocational success, particularly job performance is compelling (Gold et al., 2002; Goldberg et al., 2001; Lubinski, 2010; Van Winkel et al., 2007).

For instance, Gold and colleagues (2002) showed that cognitive abilities facilitated adaptive work functioning in a psychiatrically disabled sample (Gold et al., 2002). Poorer performance on a brief measure of general intellectual ability was associated with longer-term unemployment for a group of individuals with severe mental illness (Goldberg et al., 2001). In a follow-up study, general intellectual functioning predicted the number of hours worked and work tenure at 12 and 24-months (Gold et al., 2002). These studies highlight the practicality of cognitive assessment, particularly at a time when poor labor market conditions complicate successful return to work.

Further, aptitude batteries do not assume that the client has extensive educational or vocational experience. This makes them practical for individuals with psychiatric disabilities (Bolton, 2001), many of whom often overestimate or underestimate their current vocational capabilities due to limited work experience or poor insight associated with psychiatric illness. While there is a large literature demonstrating the criterion validity of aptitude measurements in non-disabled populations (e.g., Bolton, 1994; Hartigan & Wigdor, 1989), there are few studies that focus on the role of aptitude tests in predicting stable employment for individuals with psychiatric disabilities. Some researchers have suggested that cognitive measures lose their longer-term predictive power for individuals with psychiatric disabilities (e.g., Anthony, 2010; Wieworski & Fabian, 2004).

The Need for Assessment Efficiency

Economic Considerations

The recent recession created federal budgetary challenges, higher unemployment rates and general economic downturns, and these realities have placed unprecedented performance demands on state VR programs. Drastically reduced funding for individual client services, in particular, has driven an increased emphasis on efficient assessment methods. VR counselors, who are responsible for coordinating assessment, counseling, job development and placement services for individuals, must carefully allocate funds and contain costs. As such, it is important that money spent on vocational and cognitive assessment services results in improved VR outcomes. Interestingly, until recently, assessment methods and instruments used in VR settings were not validated in a disabled sample (Michon, van Weeghel, Kroon, Smit & Schene, 2006). With the advent of evidence-based health care and greater emphasis on VR provider accountability, however, establishing the predictive utility of vocational and cognitive assessments is essential. Thus, empirical evidence supporting the utility of assessment tools that provide the basis for occupational recommendations and successful vocational outcomes has become increasingly important for researchers and practitioners alike (Pruett, Rosenthal, Swett, Lee & Chan, 2008).

Case Closure

Case closure is a widely accepted index of successful vocational outcome. Successful case closure (i.e., "status 26") is described by RSC as maintaining gainful employment for 90 days following a vocational intervention. Alternatively, unsuccessful case closure (i.e., "status 28") refers to circumstances in which the individual was found eligible for services and those services were at least partially fulfilled, but employment was not obtained or maintained for at least ninety days. Rehabilitation counselors code closure statuses as well as reasons for unsuccessful case closure. For instance, a case may be closed due to a change in rehabilitation potential because of worsening illness, determination that an individual is unable to work in an integrated work setting, the client moving out of the state where service eligibility was established, client refusal of services, or death. Individuals with disabilities often receive services beyond the 90 days and, technically, they may receive services as long as they meet qualification criteria. Such post-employment supports have been associated with higher employment retention rates for individuals with disabilities (Roessler, 2002).

Cognitive Considerations

When cognitive dysfunction accompanies psychiatric illness (Ackerman & McReynolds, 2005; Bryson & Bell, 2003; Green, 2006) it is often associated with reduced capacity to work, impaired work performance and poorer overall vocational outcomes (Gold et al., 2002; Goldberg et al., 2001). The nature and severity of cognitive deficits can vary greatly among individuals with psychiatric illness and a wide range of inefficiencies including learning and memory, problem-solving abilities, attention and concentration and abstract reasoning abilities may be manifested. Still, neuropsychological assessment has led to the identification of relatively distinct cognitive profiles for many psychiatric disorders (Green, 2006).

For example, schizophrenia has been associated with deficits in attention, processing speed, learning, working memory, reasoning, problem-solving and social cognition (Green, 2006). While premorbid IQ has been shown to predict functional outcomes in individual with schizophrenia, IQ at first hospitalization has not (Van Winkel et al., 2007). Working memory, verbal memory and processing speed accounted for 52% of the variance in return to work at nine months in a sample of individuals with recent-onset schizophrenia (Nuechterlein et al., 2011). Bryson and Bell (2003), found that while a continuous performance task best predicted work performance in the initial stages of work (first 12 weeks), a verbal memory measure was the strongest predictor of work performance during weeks 13-26 in an outpatient sample of individual with schizophrenia and schizoaffective disorder. Similarly, Jaeger et al., (2006), noted that working memory was the only domain to predict school and work outcomes at 18-months following initial vocational placement. Overall, studies have shown a stronger relationship

functional outcome in individuals with schizophrenia (Green, 1996; 2006). Moreover, cognitive deficits have consistently predicted the ease with which individual's progress through rehabilitation programs (Green, 2006; Mueser & McGurk, 2004).

Studies of individuals with Major Depressive Disorder (MDD) have reported mild deficits in attention (Porter, Gallagher, Thompson & Young, 2003; Weiland-Fiedler et al., 2004), psychomotor speed (Sobin & Sackeim, 1997; Austin et al., 1999), executive function (Grant, Thase & Sweeney, 2001; Paelecke-Habermann, Pohl & Leplow, 2005) and memory (Austin et al., 1992; Mega & Cummings, 1994). More specifically, complex attentional processes such as working memory and sustained attention that require effortful processing have been implicated in MDD (Rose & Ebmeier, 2006), and these inefficiencies have persisted even for remitted individuals (Weiland-Fiedler et al., 2004). On the Wisconsin Card Sort Task (Channon, 1996), a measure of executive function which assesses concept formation, set-shifting, planning, inhibition and working memory, individuals with MDD tend to produce more perseverative responses and errors and complete fewer categories (as cited in Grant & Adams, 2009). Slower completion time on the Trail Making Test Part B, a test of mental flexibility and psychomotor speed, has also been observed in individuals with MDD as has reduced letter generation on verbal fluency tests, a measure of verbal production (Porter et al., 2003). While Weiland-Fiedler (2004) found that most memory decrements subsided in individuals with remitted symptoms, recurrent depression has been associated with poorer memory performance relative to single depressive episodes (Bornstein, 1999), and memory impairment has been reported for both verbal and nonverbal mediated material.

Although individuals with bipolar disorder generally demonstrate a similar pattern of cognitive inefficiencies relative to individuals with MDD, worse performance on measures of

learning and memory, executive function and psychomotor speed are typical (Olley et al., 2005; Quraishi & Frangou, 2002). Impairment in working and verbal memory and inattention has been associated with episodes of mania (Larson, Shear, Krikorian, Welge & Strakowski, 2005; Sweeney, Kmiec, & Kupfer, 2000). Slower reaction times and cognitive inflexibility are also frequently demonstrated (Fleck, Shear, & Strakowski, 2005; Hawkins et al., 1997) and executive functioning deficits have been demonstrated cross-culturally (Liu, Tsai, Fleck & Strakowski, 2011). Such deficits, especially executive functioning and memory deficits, have persisted during euthymia, or periods of non-depressed, normal mood (Nehra, Chakrabarti, Pradhan, & Khehra, 2006; Robinson et al., 2006).

Testing Considerations for Individuals with Psychiatric Illness

In clients with psychiatric illness, it is challenging to determine the degree to which poor effort, reduced motivation, decreased goal-directed behavior and decreased efficiency in planning contribute to poor performance (Grant &Adams, 2009). These types of deficits, although common to cognitive dysfunction in psychiatric illness, can vary greatly across testing sessions. This makes it impractical to administer comprehensive psychometric batteries in VR settings. Increased bureaucratic and financial constraints also limit the time allocated to testing. Therefore, efficient measures are needed in order to match clients' residual functional capacities to an appropriate vocational goal. Overall, the use of brief, efficient measures of general cognitive ability would be expected to expedite and enhance the rehabilitation process (Airaksinen, Larsson & Forsell, 2005). Nevertheless, there have been few studies devoted to this issue in recent years, especially for individuals with psychiatric disabilities.

The Wonderlic Personnel Test: An Efficient Measure of Cognitive Functioning

The Wonderlic Personnel Test (Wonderlic, 1992; 2010) is an individually or group administered alternative to more time-consuming instruments. It provides insight into the likelihood that an individual can be expected to be successfully trained for a particular job, to adapt to and solve problems within the workplace, and to be satisfied with job demands (Wonderlic, 1992; 2010). The WPT has been categorized as a screening instrument that provides a full-scale IQ (FSIQ) estimate, according to Dodrill (1981; Wonderlic, 1992; 2010). Such an approximation of an individual's IQ often is sufficient to answer referral questions generated by VR counselors. For example, when the referral question asks for feedback regarding functional capacities such as, "Can the person work and if so, in what types of jobs might he/she be successful?" the WPT would seem to be an efficient and economical choice of instruments.

The WPT has been used widely in both the government and private sectors and in career and occupational settings to evaluate applicants for employment and occupational training (Leverett, Matthews, Lassiter, Kerry & Bell, 2001; Wonderlic, 1992; 2010). Recent data provided by the Wonderlic Corporation indicate that it has been administered to over 200,000,000 people across a wide range of occupations to assist corporations and businesses in making hiring decisions among qualified applicants (Wonderlic, 2011). The relationship between WPT minimum scores and the U.S. Department of Labor selected occupational characteristic scores (SOC), a measure of each job's complexity level, has been established for 134 job titles (*r* = .83; Wonderlic, 1991). Findings from this study were used to generate an expanded list of minimum WPT scores and job applicant median scores as well as minimum scores for specific job families (as cited in Wonderlic, 1992). Because the WPT has been used primarily in candidate selection settings, its value as a VR assessment tool is not known. In a non-clinical population, Dodrill (1981) found that only 8% of a sample of 60 healthy community dwellers (five cases) demonstrated a 10-point or greater discrepancy between WPT IQ estimated scores and actual FSIQ (as determined by administration of the Wechsler Adult Intelligence Scale (WAIS; 1958). Dodrill (1983) also found that WPT-generated IQ estimates demonstrated high test-retest reliability (ranging from .90-.98). Only a few studies have examined the WPT within a psychiatrically disabled population (Dodrill & Warner, 1988; Hawkins, Faraone, Pepple, Seidman & Tsuang, 1990; Restrepo, 2007). Further, no study has explored the empirical relationship between WPT scores and vocational outcomes in a psychiatrically disabled population even though the WPT, when used with general samples, has shown excellent criterion related validity in occupational settings.

In administering the WPT and WAIS to hospitalized psychiatric, non-psychiatric epileptic, psychiatric epileptic and normal samples, Dodrill and Warner (1988) demonstrated that mean IQ scores predicted by the WPT fell within 1.3 points of the actual FSIQ in three of the four groups. In the combined psychiatric-epileptic group, the WPT tended to underestimate WAIS IQ scores by 3.2 points (p < .05). Still, in 81% of cases, the WPT scores fell within 10 points of WAIS scores for the psychiatric-neurological patients; 84% in the nonpsychiatric people with epilepsy; 88% in the normal controls and 94% in the hospitalized psychiatric patients. Hawkins and colleagues also found the WPT to be suitable in estimating intelligence in a mixed sample of individuals diagnosed with schizophrenia, schizoaffective disorder, or bipolar disorder (Hawkins et al., 1990). The WPT predicted WAIS FSIQs within 10 points, again suggesting that it broadly taps intellectual functions. Nevertheless, updated norms as well as validity studies are needed to confirm the relationship between the WPT and current IQ tests. Self-administered tests like the WPT, may present an added benefit to a psychiatrically disabled population by reducing test-related anxiety associated with the presence of an examiner (Hawkins et al., 1990). Additionally, the lack of examiner prompting during administration suggests that the WPT could provide a measure of cognitive ability as well as a measure of processing speed or motivation, which translates to work contexts (Dodrill, 1981). Unlike comprehensive IQ tests, WPT performance may approximate more closely an individual's response to the unstructured demands of work.

The Role of Interest Assessment in Vocational Rehabilitation

General cognitive ability is but one of many relevant factors involved in occupational choice, vocational planning and ultimate vocational success (Lehman et al., 2002). Also relevant are the interests and goals of the client (Anthony et al., 1995). The influential Boston University Model of psychiatric recovery (Anthony, Cohen & Farkas, 1990) proposes that better mental health and vocational outcomes result when VR practices are tailored to the personal interests and abilities of clients. Vocational interests reflect preferences for doing certain types of work and working in particular environments. Interests are believed to influence the way individuals behave at work by increasing motivation to perform preferred work tasks as well as motivating people to gain knowledge and skills pertinent to those preferred tasks (Van Iddekinge, Putka & Campbell, 2011). Despite the hypothesized importance of interests in determining job choice, interests have been largely overlooked in the VR literature as contributors to job success.

One reason why vocational interests have not been regarded as important predictors of case closure status is the assumption that interests are secondary to, or derived from cognitive ability (Ackerman & Heggested, 1997). Hence, many have assumed that it is mainly cognitive ability that underlies the development of vocational interests and thus, determines job success.

That is, according to the gravitational hypothesis proposed by McCormick, DeNisi & Shaw (1979), people self-select work based on their own personal attributes or abilities (as cited in Ackerman & Heggested, 1997). Thus, individuals with high ability levels are likely to select more complex work tasks when faced with choices on an interest inventory. Likewise, people with more modest abilities tend to gravitate toward less mentally complex jobs. In the actual workplace, longitudinal studies have shown that success in work tasks increases measured interest in those tasks whereas unsuccessful attempts at task performance decreases interest (Wilks, Desmairais & Sackett, 1995; Wilks & Sackett, 1996). Nevertheless, correlations between interests and aptitudes are quite small in the vocational counseling literature (e.g., Ackerman & Heggested, 1997; Van Iddekinge et al., 2011).

Another reason why researchers have neglected vocational interests as predictors of job success is the assumption that they are simply an expression of personality within the work context (Holland, 1985). While interests are understood to determine motivation to attempt a task, personality is understood to play a role in determining vocational success in those tasks. For instance, work that fulfills self-perceived needs is likely to lead to increased effort, which in turn enhances job performance and tenure (Dawis & Lofquist, 1984; Dawis, 1996; Holland, 1997). Incorporating this information into career selection results in more rewarding and stable employment outcomes for VR clients (Becker et al., 1996; Beveridge & Fabian 2007; Dawis & Lofquist, 1984; Roessler, 2002) as well as the general population (Van Iddekinge et al., 2011). Vocational interest assessment that requires respondents to endorse specific job tasks has been identified as a more sensitive index of interests related to congruence than more general indices such as Holland codes (e.g., RIASEC) that tend to reflect underlying personality traits (Armstrong, Rounds & Hubert, 2008; Rottinghaus, Hees & Conrath, 2009). Furthermore, basic interests, as the level of analysis, have been linked to outcomes such as job satisfaction in the general population (Rottinghaus et al., 2009).

Person-Environment Congruence and Outcomes

It is widely assumed that people search, choose and flourish in work environments where there is a good fit between their own characteristics and the characteristics of the chosen occupation (Dawis, 1986). The degree of person-environment correspondence or "fit" predicts work-related outcomes such as job satisfaction (Becker et al., 1996; Dawis, 1996; Freedman, 1996; Holland, 1992), performance (Dawis & Lofquist, 1984) and tenure (Becker et al., 1996; Roessler, 2002). Beveridge & Fabian (2007) showed that individuals who obtained a vocational outcome congruent with their job goal achieved higher wages compared to those who did not, regardless of disability type.

While congruence (i.e., between ability and environment as well as interest and environment) has been commonly studied, the intersection between cognitive capacity and vocational interests has been left relatively unexplored. Very few studies have focused on whether consistency between an individual's aptitudes and interests (aptitude-interest congruence) increases the likelihood of successful VR outcomes. Still, there is evidence that these constructs represent overlapping yet distinct domains and the incremental predictive validity of aptitudes and interests relative to one another is well established in the vocational selection literature (Ackerman & Heggested, 1997; Lubinski, 2010; Reeve & Heggested, 2004). Considering both aptitudes and interests simultaneously arises from the fact that abilities and interests do not always align. Even when congruence between the two exists, it may differentially impact employment outcomes for individuals with psychiatric abilities (Farkas & Anthony, 2010). For instance, congruence between aptitudes and interests can lay the foundation for vocational success, especially when an individual is matched to a job that is consistent with their abilities and interests. However, it is widely accepted that the opportunities available to this population are constrained by the limited number of employer participants as well as the level and quality of employer involvement (Cook, 2006). Time-limited and inadequate VR post-employment services can also undermine an individual's likelihood of maintaining employment. *Career Scope Aptitude and Interest Assessment*

CareerScope (CS; Vocational Research Institute; VRI; 2003) is a computer administered multiple aptitude and interest battery. CS was developed in 1995 and was based on APTICOM (Harris & Danski, 1991), a dedicated computer replacement for the General Aptitude Test Battery (GATB; United States Department of Labor, 1970). When results from the aptitude and interest batteries are considered simultaneously, CS will identify the most viable work groups to be considered based on the client's joint career interest preferences and learning capacities. An individual can qualify for training in jobs within a particular GOE work group based on his or her aptitude profile alone, or based on the match between his or her aptitude profile as well as the interest profile. CS has not been widely researched, and only one study has examined CS Aptitudes in a psychiatrically disabled population (Restrepo, 2007).

A study of the concurrent validity of CS Aptitudes and the GATB generated correlations ranging from .36 to .86 in a small sample (N = 46) of undergraduate and graduate college students majoring in education (Lustig et al., 1998). Correlations of .52 to .82 were obtained in a larger sample of high school students and adults (N = 115) with a greater range of educational achievement (VRI, 2003). The General Learning Ability composite score correlated in the .80 to .85 range with the GATB in both studies. Test-retest reliability coefficients ranged from .70 to .83.

In a VR sample of individuals with psychiatric disabilities, Restrepo (2007) found that CS General Learning Ability Aptitude was significantly correlated with WPT scores (r = .74, p =.01). Although no significant relationship between CS Aptitudes and severity of depressive symptoms was reported, she did show statistically significantly differences between mood disordered and non-mood disordered individuals on the following CS aptitude measures: General Learning Ability (p = .01), Verbal (p = .03) and Numerical (p = .003). Therefore, further exploration of the utility of CS Aptitudes in a similar population is of interest.

Aims and Hypotheses

1. The first aim of this study is to explore the validity of the WPT and CS Aptitudes in a psychiatrically disabled VR population. It is hypothesized that (a) WPT and CS Aptitude mean scores will be lower in this sample relative to the normative sample; (b) the WPT will demonstrate appropriate convergent validity with related constructs in expected directions. For example, the WPT will be positively associated with CS General Learning Ability and Verbal Ability, as has been found in a similar psychiatric VR sample (Restrepo, 1997). Further, these associations will exist regardless of case closure status.

2. The second and primary aim of this study is to investigate the utility of the WPT and CS Aptitude and Interests as predictors of closure status in a psychiatrically disabled population. Based on research findings in the broader rehabilitation literature, it is hypothesized that the both the WPT and CS Aptitudes will significantly predict successful case closure as these two instruments measure overlapping, yet distinct aspects of cognitive functioning (i.e., general cognitive ability versus aptitudes). Further, it is expected that CS Interests will significantly predict successful case closure, since there is evidence suggesting that vocational interests uniquely contribute to VR outcomes (Becker et al., 1996; Beveridge & Fabian 2007; Dawis & Lofquist, 1984; Roessler, 2002).

3. The third aim of this study is to determine the relative contribution of each predictor to case closure. It is hypothesized that the WPT will provide incremental predictive utility over and above CS Aptitudes and Interests. The WPT appears to be an efficient index of cognitive skills and abilities as well as motivational factors related to obtaining employment. Further, the literature seems to suggest that the WPT is relatively robust with regard to the effects of acute psychiatric symptoms.

4. The final aim is to determine whether a group comprised of individuals who demonstrate compatible aptitudes and interests are more likely to achieve a successful case closure (employment for 90 days) than a group of individuals who do not show correspondence between measured aptitudes and interests. It is hypothesized that an index of aptitude-interest congruence group will contribute to the prediction of case closure status. Because the literature shows that individuals who obtain employment consistent with their abilities and interests have greater job tenure rates and report higher job satisfaction, it stands to reason that an index that captures individuals whose aptitude scores meet a minimum score required for work that is aligned with their interests, will increase the likelihood of maintaining employment.

Chapter II Method

Participants

Participants were drawn from 447 referrals to the Behavioral Neuropsychology Clinic at the University of Cincinnati for psychological and vocational evaluations between January 1999 and May 2006. In order to be part of the sample, referred individuals were required to qualify for or be receiving assistance from the Bureau of Vocational Rehabilitation (BVR), a division of the Rehabilitation Services Commission (RSC) of Ohio. To qualify for vocational rehabilitation (VR) services, a physician or psychologist confirmed the presence of a disability, and the disability was judged by the VR counselor to constitute a substantial barrier to obtaining or maintaining employment. The inclusion criteria were: (1) age 18 years or older; (2) case closure status 26 or 28; (3) Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; American Psychiatric Association, 1994) Axis I diagnosis; (4) Wonderlic Personnel Test (WPT, 1992; 2010) age corrected raw score \geq 8; Dodrill's (1981) estimated Wechsler Adult Intelligence Scale (WAIS; Wechsler, 1958) full scale IQ (FSIQ) estimate \geq 75 and (5) a sixth grade reading level or higher. Case closure status 8 (individuals who did not meet the federal criteria for VR services or who were not interested in VR services and 30 (individuals who were closed in a nonrehabilitative status before VR services were initiated) as well as various other statuses deemed ineligible for services were excluded. Participants who had an intellectual disability or neurological disorder were also excluded. Diagnoses were assigned by the clinic staff based on self-report, referral reports and records and clinical observations. Eighty-nine participants met study criteria.

Measures

The WPT is a 50-item, 12-minute, measure of general cognitive functioning that consists of a variety of question types including word comparisons, disarranged sentences, sentence parallelism, following directions, number comparisons, number series, analysis of geometric figures and story problems that incorporate either logical solutions or mathematics (Wonderlic, 1992; 2010). A sixth grade reading level is required. Three practice items are administered to demonstrate that participants understand the instructions. Age corrected raw scores (Dodrill, 1981) were used for all analyses.

The CareerScope (CS; Vocational Research Institute; VRI, 2003) assessment and guidance system was designed to generate interest and aptitude assessment results corresponding to common requirements for success in specific Guide for Occupational Exploration (GOE; 1979) system work groups. All member occupations within a given work group demand the same constellation of critical aptitudes at score levels established by the Department of Labor (United States Department of Labor, 1979). The aptitude assessment establishes an individual's potential to be successfully trained for employment in each of the 59 work groups.

The aptitude portion of CS consists of six scores, including General Learning Ability, Verbal Aptitude, Numerical Aptitude, Spatial Aptitude, Form Perception, and Clerical Perception (Lustig et al., 1998). According to the CareerScope User Manual (VRI, 2003), General Learning Ability is a composite measure of pattern visualization, numerical reasoning, and word meaning skill. Verbal Aptitude measures language comprehension and word relationship ability, while the Numerical Aptitude subtest assesses computation and spatial reasoning skills. Spatial Aptitude measures the ability to visualize geometric forms, to comprehend the two-dimensional representation of three-dimensional objects, and to recognize the relationships resulting from the movement of objects in space. Abilities involving perception to detail in objects or in graphic material, or visual discriminations and comparisons among shapes of varying size, shading, width, and length are tested in the Form Perception subtest. Clerical Perception evaluates perception to pertinent detail in verbal or tabular material and the ability to proofread words, numbers, and written text (VRI, 2003). CS standardized scores with a mean of 100 and a standard deviation of 20 for each of the six aptitudes were used in the analyses. "Average performance" includes standard scores ranging from a low of 80 to a high of 120.

CS Interest Areas are separated into 12 domains: Artistic, Scientific, Plants/Animals, Protective, Mechanical, Industrial, Business Detail, Selling, Accommodating, Humanitarian, Leading/Influencing and Physical Performing. Percentile ranks correspond to Department of Labor GOE codes. Within the GOE career exploration system, the world of work is divided into twelve broad interest areas. All occupations nested within a particular area demand similar interests. The twelve broad interest areas are further subdivided into smaller and more homogeneous occupational clusters or work groups. The 145-question interest inventory forces the test taker to indicate one of three choices (i.e., "Dislike" "Don't Know" or "Like") in response to job tasks that are coded into one of the twelve interest areas. An individual profile analysis determines career interest "Like" scores that are relatively higher than others. *Procedure*

The University of Cincinnati Institutional Review Board approved all aspects of this research. Each participant provided written informed consent that included permission to allow the use of BVR data for approved research that may benefit rehabilitation efforts. Participants were referred to the clinic by their BVR counselor or another qualified agency. Participants completed a personal history questionnaire. The WPT and CS were individually administered.

Various additional psychological or vocational tests may have been administered to answer the referral question. Most of the assessments were completed in one day, over the course of three to four hours; a one-hour clinical interview was also conducted. Examiners followed the standardized procedures published in the manuals for administering and scoring each instrument. Trained doctoral students in the Clinical Psychology program completed all testing procedures. Order of administration of the testing measures could not be controlled due to exigencies of the clinic setting. Data were collected at the University of Cincinnati clinic or at a nearby branch office of RSC.

Analyses

The study is a retrospective analysis of the utility of the WPT and CS in predicting vocational outcomes in a psychiatrically disabled VR sample. The criterion variable, case closure was coded as 1 = successful (status 26) or 0 = unsuccessful (status 28). CS individual profile analysis rankings were used to determine aptitude-interest congruence coded as 1 = congruent or 0 = non-congruent. Aptitude-interest congruence is defined as an event in which an individual's critical aptitudes met the minimum requirements for any occupation that corresponded to an expressed first or second ranked interest area (coded as 1 = congruent). In the event that an individual's critical aptitudes did not met the minimum score for one of his/her top two ranked occupational/interest areas, these outcomes were coded as 0 = non-congruent. This classification system reflects VR practices in which psychologists base recommendations on one or two appropriate interest domains, each comprising several work groups (Lustig et al., 1998; Tay, Drasgow, Rounds & Williams, 2009).

Appropriate statistical tests were conducted to determine whether differences in demographic, psychometric and aptitude-interest congruence variables existed between closure

groups in this sample. In order to investigate the validity of using the WPT and CS Aptitudes to predict case closure in a psychiatrically disabled sample, box plots of WPT and CS Aptitude scores were examined for ceiling and floor effects and mean WPT and CS Aptitude scores were compared to the normative sample. In addition, bivariate correlations were computed to examine the convergent and/or discriminant validity of the WPT and CS Aptitudes.

In order to evaluate the relative contribution of each predictor to case closure, a series of logistic and multiple logistic regressions were conducted for predicting employment outcome (case closure status 26, successful or 28, unsuccessful). The first model included WPT raw scores. The second model included CS Verbal, Numerical, Spatial, Form Perception and Clerical Perception Aptitude tests. A model including CS Interests area "Like" scores (Artistic, Scientific, Plants/Animals, Protective, Mechanical, Industrial, Business Detail, Selling, Accommodating, Humanitarian and Leading/Influencing) as well as the congruence variable was also examined. The interest area Physical Performing was excluded from the analysis due to the impracticality of this interest area in terms of its lack of correspondence with viable jobs options and limited number of qualified candidates. Although an individual's interest in activities that correspond to physical performance jobs may be used to generate hypotheses about potential vocational recommendations, vocations that fall into this domain do not represent realistic long-term vocational choice for most clients (e.g., movie stunt performer, juggler, professional athlete, coach, performer, etc.). Tolerance and variance proportions were examined to assess potential collinearity among predictor variables. Examination of the regression coefficients, the Wald Chi-Square statistics, Hosmer and Lemeshow Tests and classification plots indicated that a reduced model would be more appropriate for the data. Therefore, a reduced logistic regression analysis was used to evaluate a more parsimonious model for predicting case closure.

The final model consisted of CS Scientific, Plants/Animals, Protective, Industrial,

Accommodating, and Humanitarian Interest areas. Receiver operating characteristics (ROC) curves and area under the curve (AUC) were determined to assess the model's utility. AUC can range from zero to one with .50 representing the lower limit of AUC or the equal probability of the occurrence of an event versus a nonevent (e.g., successful case closure, status 26 versus unsuccessful case closure, status 28).

Chapter III

Results

Eighty-eight participants were included in the final analyses. Closure status 26 (successful, N = 41) and 28 (unsuccessful, N = 47) groups were not significantly different on any of the predictors. Descriptive statistics and comparisons of demographic variables across closure status are presented in Table 1. Descriptive statistics and comparisons of the Wonderlic Personnel Test (WPT; Wonderlic, 1992; 2010) and CareerScope (CS; United States Department of Labor, 1997) Aptitude and Interest test variables across closure status are presented in Table 2.

In order to explore the construct validity of the WPT and CS Aptitudes in a psychiatrically disabled vocational rehabilitation (VR) population, Mean WPT scores and Mean CS Aptitude scores were compared to the WPT and CS Aptitude normative samples. Overall sample (N = 88) scores were significantly lower than the normative sample on several variables including the WPT, CS General Learning Ability, Verbal, Numerical and Spatial Aptitude tests, as expected (refer to Table 3). Box plots did not indicate floor or ceiling effects.

Bivariate correlations (see Table 4) showed that CS General Learning Ability was significantly correlated with WPT scores (r = .75) as well as CS Verbal Aptitudes (r = .87). Because CS General Learning Ability is considered a composite of CS Verbal, Numerical and Spatial Aptitudes and shares several items with the Verbal Aptitude test, in particular, this finding was expected. The overlap among CS General Learning Ability Aptitude and WPT scores is not surprising given the WPT's ability to tap verbal, numerical and spatial reasoning abilities (Restrepo, 2007). These results support the construct validity of using the WPT and CS Aptitude variables in a psychiatrically disabled VR sample, or in psychiatric populations more generally (Hawkins et al., 1990).

Table 1

-	-	Succe	essful	Unsuc	cessful			
		N =	41	N =	- 47			
Variable		М	SD	М	SD	Т	р	d
Age		33.07	13.29	33.32	12.40	.09	.93	.02
Years of I	Education	12.34	1.48	12.45	1.36	.35	.73	.08
			Categor	rical Variables	S			
		9	6	Q	%	X^2	р	φ
Race	White	56.	.10	55	.30		-	
	Non-							
	White	43.	.90	44	.70	.01	.94	.01
Sex	Male	58.	.50	63	.80			
	Female	41.	.50	36	.20	.26	.62	.05

Comparisons of Demographic Variables Across Case Closure Status

Table 2

-		26		28 ^a			
	М	SD	М	SD	t	р	d
WPT ^b	17.10	5.88	18.04	6.54	0.71	0.48	0.15
		Career S	Scope Aptit	udes ^c			
General Learning	91.85	17.28	90.11	15.23	-0.50	0.62	0.11
Verbal Aptitude	94.22	18.61	93.49	16.44	-0.20	0.85	0.04
Numerical Aptitude	84.66	16.16	85.51	15.20	0.26	0.80	0.05
Spatial Aptitude	96.12	18.38	92.98	22.03	-0.72	0.47	0.15
Form Perception	105.21	23.28	102.15	22.92	-0.60	0.55	0.13
Clerical Perception	111.02	24.90	106.32	22.22	-0.94	0.35	0.20
		Career Sc	ope Interes	t Areas ^d			
Artistic	29.82	27.51	31.55	26.07	0.30	0.76	0.07
Scientific	26.40	32.11	39.48	31.62	1.92	0.06	0.41
Plants & Animals	28.61	30.45	28.80	24.37	0.03	0.97	0.01
Protective	27.60	28.48	24.03	26.44	-0.61	0.54	0.13
Mechanical	25.24	32.90	28.65	32.64	0.48	0.63	0.36
Industrial	24.22	28.31	16.35	19.72	-1.53	0.13	0.27
Business Detail	31.61	31.84	31.11	27.89	-0.08	0.94	0.31
Selling	27.36	27.03	33.96	30.00	1.08	0.28	0.23
Accommodating	22.54	24.37	24.38	24.40	0.35	0.72	0.08
Humanitarian	41.33	34.82	38.66	29.42	-0.39	0.70	0.08
Leading/Influencing	30.65	28.86	35.09	30.42	0.70	0.49	0.15
		Aptitudo I	ntarast Con	cruonco ^e			

Comparisons of WPT, CS	Aptitude and	Interest varia	ibles and A	Aptitude-Interest
Congruence across Closu	re Status			

Aptitude-Interest Congruence^e

	%	%	X^2	р	Φ
N/	20.00	27.50			
Yes	38.60	37.50			
No	8.00	15.90			
			1.95	0.16	0.15

Note. ^a 26 = Successful, n = 41; 28 = Unsuccessful, n = 47. ^b N = 88. Wonderlic Personnel Test standard score (M = 20, SD = 7). ^c CareerScope standard score (M = 100, SD = 20). ^d Percentage "Like" responses. ^e Minimum aptitude score required for a first or second ranked interest choice.

Table 3

Comparison of WPT and CS Aptitude Scores to Normative Sample Scores

M	SD	t	р	d
17.60	6.23	-3.61	.001	.39
90.92	16.14	-5.28	<.001	.56
93.83	17.38	-3.33	.001	.35
85.11	15.57	-8.97	<.001	.96
94.44	20.36	-2.56	.012	.27
103.53	23.01	1.44	.153	.15
108.51	23.49	3.40	.001	.36
	<i>M</i> 17.60 90.92 93.83 85.11 94.44 103.53 108.51	M SD 17.60 6.23 90.92 16.14 93.83 17.38 85.11 15.57 94.44 20.36 103.53 23.01 108.51 23.49	M SD t 17.60 6.23 -3.61 90.92 16.14 -5.28 93.83 17.38 -3.33 85.11 15.57 -8.97 94.44 20.36 -2.56 103.53 23.01 1.44 108.51 23.49 3.40	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$

Note. ^a Wonderlic Personnel Test standard score (M = 20, SD = 7).

^b CareerScope standard score (M = 100, SD = 20). N = 88.

Table 4

Correlations between CareerScope Aptitude Scores and the Wonderlic Personnel Test

CS Aptitudes	WPT
General Learning	.751*
Verbal Aptitude	.696*
Numerical Aptitude	.513*
Spatial Aptitude	.322*
Clerical Perception	.231*
Form Perception	.401

Note. *p < .01, two-tailed. N = 88.

In order to establish the predictive validity of the WPT, CS Aptitudes and Interests and aptitude-interest congruence to case closure status in a psychiatrically disabled sample, a logistic regression analysis and a series of multiple logistic regression analyses were conducted. The first logistic regression investigated the predictive utility of the WPT to case closure status. WPT scores did not predict case closure, $X^2(1) = .51$, p = .47. The model correctly classified 26.8% of those who obtained employment ≥ 90 days and 74.5% of individuals who did not, for an overall success rate of 52.3%. The Hosmer and Lemeshow test $X^2(8) = 10.23$, p = .25 indicated that this model was not a good fit for the data. Receiver operating characteristics (ROC) curve and area under the curve (AUC) was = .54. Graphical analysis of the residuals and diagnostic statistics suggested the removal of one case (SR = -7.62).

A second model was evaluated to explore the predictive utility of CS Aptitude subtest scores (Verbal, Numerical, Spatial, Form Perception and Clerical Perception) to case closure. CS General Learning Ability was excluded from the analysis due to its multicollinearity with WPT and CS Verbal Aptitude scores. CS Aptitude subtest scores did not predict case closure, X^2 (5) = 2.81, p = .77. The model correctly classified 31.7% of those who obtained employment ≥ 90 days and 72.3% of individuals who did not, for an overall success rate of 53.4%. The Hosmer and Lemeshow test and classification indices indicated that this model did not provide an adequate fit for the data, X^2 (8) = 4.86, p = .773, AUC = .59.

A multiple logistic regression was conducted in order to determine the predictive utility of CS Interest scores (Artistic, Scientific, Plants/Animals, Protective, Mechanical, Industrial, Business Detail, Selling, Accommodating, Humanitarian and Leading/Influencing) as well as the aptitude-interest congruence variable. Although this model significantly outperformed the null model, examination of the regression coefficients and classification statistics and plots indicated that reducing the number of parameter estimates would produce a more parsimonious model. Thus, these indices were used as decision criteria for maximizing model fit. A reduced model was obtained that included CS Scientific, Plants/Animals, Protective, Industrial, Accommodating and Humanitarian Interests. The final model significantly outperformed the null model, X^2 (6) = 19.45, p = .003 and correctly classified 65.9% of those who obtained employment \ge 90 days and 72.3% of individuals who did not, for an overall success rate of 69.3%. The Hosmer and Lemeshow Test, X^2 (8) = 4.54, p = .81 and AUC (.76), indicated that this model fit the data appropriately. However, comparison of the AUC for the full model and the reduced model indicated that the difference between the two models was not statistically significant (z = 1.40, p = .16). The ROC curve for the final prediction model is presented in Figure 1. Interestingly, AUC for the final model as well as the initial were good, despite the exclusion of cognitive predictors (i.e., WPT and CS Aptitude variables). Results of the multiple logistic regression are shown in Table 5. Classification statistics are shown in Table 6.

The primary hypothesis that WPT and CS Aptitudes and Interests would predict case closure status was only partially supported. While it was expected that CS Interests would predict case closure, it was surprising that WPT scores did not predict case closure, given the wide use of this instrument and overall utility in candidate selection processes (Leverett et al., 2001). Thus, the second and third hypotheses that WPT scores would predict case closure as well as provide incremental validity over and above CS Aptitude and Interest scores was not supported.

Further, the finding that CS Aptitude subtests did not predict case closure was unexpected in light of studies showing that aptitudes are predictive of vocational performance (Bolton, 1994). Moreover, the aptitude-interest congruence index did not emerge as a viable predictor of case closure and, therefore, was not retained in the final model. These results were somewhat counterintuitive given the VR literature showing that individuals who obtain employment consistent with their abilities and interests report increased job tenure and higher job satisfaction

(Becker et al., 1996; Beveridge & Fabian 2007; Roessler, 2002).

Table 5

Summary of Multiple Logistic Regression Analysis for Case Closure Group

			12,110	e			
Variable	В	SE	Wald	p	Odds	95%	C. I.
					Ratio	Lower	Upper
Constant	-1.112						
Artistic	.021	.014	2.350	.125	1.021	.994	1.049
Scientific	039	.013	9.210	.002	.962	.938	.986
Plants & Animals	014	.012	1.250	.264	.987	.963	1.010
Protective	.038	.015	6.896	.009	1.039	1.010	1.069
Mechanical	012	.011	1.134	.287	.988	.967	1.010
Industrial	.053	.021	6.441	.011	1.054	1.012	1.098
Business Detail	.011	.014	0.564	.453	1.010	.983	1.039
Selling	023	.016	1.942	.163	.977	.946	1.009
Accommodating	046	.020	5.487	.019	.955	.919	.993
Humanitarian	.029	.013	4.740	.029	1.030	1.003	1.057
Leading/Influencing	006	.018	.122	.727	.994	.959	1.030
A-I Congruence ^a	.966	.687	1.978	.160	2.629	.959	1.030
	Final M	Iodel (df =	= 6; AUC	(= .758)			
Constant	202						
Scientific	035	.011	9.745	.002	.966	.944	.987
Plants & Animals	008	.010	.585	.444	.992	.973	1.012
Protective	.026	.012	4.831	.028	1.026	1.003	1.050
Industrial	.040	.016	6.479	.011	1.041	1.009	1.074
Accommodating	040	.017	6.479	.016	.961	.930	.993
Humanitarian	.023	.011	4.624	.032	1.023	1.002	1.045

Initial Model (df = 12; AUC = .806)

Note. ^a A-I Congruence = Aptitude-Interest Congruence; B = unstandardized regression coefficient;

SE = standard error; Wald = Wald Test; p = significance test; CI = confidence interval. N = 88.



Figure 1. Receiver Operating Characteristics (ROC) curve for predicting case closure status.

Table 6

Variable	Initial Model %	Reduced Model %
Accuracy	71.6	69.3
Sensitivity ^a	63.4	65.9
Specificity ^b	78.7	72.3
PPV ^c	72.2	67.5
NPV^{d}	71.1	70.8
AUC	.81	.76
(95% CI)	(71.6 to 89.6)	(65.8 to 85.8)

Classification Statistics for Multiple Logistic Regression Analysis

Note. ^a Sensitivity = TP/(TP+FN); ^b Specificity = TN/(FP+TN); ^c PPV = TP/(TP+FP); ^d NPV = TN/(FN+TN) with TP = true positives;

TN = true negatives; FP = false positives; FN = false negatives.

Chapter IV

Discussion

In the present study, participants completed a brief assessment of general cognitive ability as well as a vocational aptitude and interest battery. In the present sample, the only variables that emerged as viable predictors of case closure were vocational interests, Perhaps the most meaningful finding from the present study of people with psychiatric disabilities is that none of the cognitive ability measures predicted case closure.

There are two potential explanations for this finding. It is possible that VR professionals over-relied on IQ estimates and initially limited the list of job choices presented to the consumer as being realistic. If so, then measures associated with general cognitive ability might not be expected to emerge as viable predictors of case closure. Therefore, it would be useful to know the specific job titles held by the people who achieved a successful closure status. Further, status 26 is a challenging outcome criterion that can be understood better as an index of job tenure, rather than just job initiation, or successfully obtaining employment. It would be interesting to explore whether cognitive variables would emerge as predictors of job initiation versus case closure status 26. Additionally, it should be noted that VR researchers have raised the issue of whether salary is a better measure of outcome since it reflects the quality of the outcome. That is, status 26 is often assigned to people who hold noncompetitive jobs that are associated with poverty-level pay (Capella, 2012; Cook, 2006). Thus, it would be of considerable interest to determine the ability of cognitive measures to predict salaries.

As noted, there has been considerable attention paid to the role of cognitive deficits for individuals with psychiatric illness in both the VR literature (e.g., Gold et al., 2002; Goldberg et al., 2001; Van Winkel et al., 2007) and the neurocognitive literature (e.g., Bryson & Bell, 2003;

Grant & Adams, 2009; Green, 1996; 2006). However, recent VR research reflects an emphasis on self-report predictors such as self-efficacy, motivation and self-skills ratings that integrate the role of personal choice in vocational success (Van Iddekinge, Putka & Campbell, 2011). Thus, it is noteworthy that VR researchers have moved away from the use of aptitude tests as predictors (Farkas & Anthony, 2010). According to Power (2006), aptitude tests should be considered as only one indicator of the potential to benefit from training rather than as general predictors of vocational success. The results of the present study seem to bear out this recommendation. Moreover, while cognitive ability is a well-established predictor of job performance, particularly the acquisition of job-related knowledge, occupational interest may be a more theoretically relevant predictor of the motivational factors underpinning successful vocational outcomes. These results provide evidence for this theory in an applied VR context.

CareerScope Interests

It is axiomatic in the VR literature that a person's preferences for or interest in various activities influences the type of jobs that are sought. Finding work that is compatible with one's interests and goals improves job performance, job satisfaction and job tenure (Becker et al., 1996; Freedman, 1996). In the present study, only vocational interests were retained in the final prediction model. This finding is consistent with studies showing that vocational interests predict employment and oftentimes provide incremental predictive validity beyond cognitive variables alone (Van Iddekinge et al., 2011). In the present study, successful case closure (i.e., 90 days of employment) was associated with endorsement of questionnaire items that correspond to Protective, Industrial and Humanitarian occupations. In contrast, endorsing an interest in tasks that correspond with Scientific, Plants/Animals and Accommodating occupations was associated with failure to obtain employment or maintain employment for 90 days.

It is interesting that jobs that fell into the Protective, Industrial and Humanitarian categories are ones that are commonly associated with higher placement rates according to state and federal outcome studies (RSC, 2010; Smith, & Clark, 2007). Occupations that align with Accommodating interests, which are also typically associated with high placement rates, were not predictive of successful case closure in the present study. Low pay and greater turnover in these jobs may explain why individuals with these interests were less likely to maintain employment. Nevertheless, it is important to note that inferences regarding specific vocational interest areas to case closure are tenuous in light of the null finding between the relative accuracy of the full versus the reduced, final prediction models.

One limitation with the interest measure relates to response patterns. For example, since the present study used percentage of "Like" scores to predict case closure status, potentially meaningful information that may have been gleaned from "Unsure" and "Dislike" responses and the relationship among item responses was not considered. Further, results may have been confounded by individual response style or invalid or inconsistent response patterns (Wieworski & Fabian, 2004).

Aptitude-Interest Congruence

That participant aptitude-interest congruence did not contribute significantly to case closure status was unexpected since the literature has shown that individuals who obtain employment consistent with their aptitudes <u>and</u> their interests experience increased job tenure and job satisfaction (Becker et al., 1996; Beveridge & Fabian 2007; Dawis & Lofquist, 1984; Roessler, 2002). It is important to note that for some people aptitudes and interests are symbiotic whereas for others the two constructs may be competing (Reeve & Heggested, 2004). Regardless, of congruence, aptitudes and interests can influence vocational adjustment differentially.

Further, in the present study, the congruence index may not have been sensitive enough to detect an effect. That is, only 20.4% of participants lacked the required minimum aptitudes for one of their preferred two interest areas. It would be interesting to determine whether this base rate approximates the prevalence in other psychiatrically disabled VR populations.

Moreover, to understand case closure better, it is important to view congruence in the context of both aptitude-environment and interest-environment congruence. Thus, there are multiple and distinct influences between the characteristics of the person and the characteristics of the occupation that ultimately affect vocational choice and success. For example, in the vocational counseling literature among individuals whose primary interest fell into the Investigative and Artistic interest domains, higher levels of g were positively associated with interest-environment fit. For individuals whose primary interest fell into Realistic and Conventional domains however, higher g was associated with lack of interest-environment fit, whereas lower levels of g were associated with adequate fit, or congruence (Reeve & Heggested, 2004). Thus, it stands to reason that further research is needed to determine whether systematic relationships between aptitudes, interests and ultimately congruence, hold in psychiatrically disabled populations as well.

Moreover, psychiatrically disabled people who do have the cognitive capacity to work often do not receive the post-employment supports that they need because their functional limitations are less apparent than someone who is lower functioning. As a result, appropriate and ongoing job accommodations that target work tolerance and interpersonal issues might be overlooked, especially when the employee has acquired the work-related knowledge and skills to demonstrate adequate job performance. This can ultimately impact vocational outcomes such as job satisfaction and tenure.

The Wonderlic Personnel Test

The fact that WPT scores did not predict case closure was unexpected, given the longstanding and widespread use of this instrument in job candidate selection processes across many industries. The overlap among CS General Learning Ability and WPT scores is not surprising given the WPT's ability to tap verbal, numerical and spatial reasoning abilities (Restrepo, 2007). While these results seem to suggest that using both instruments in VR testing protocols might be unnecessary, the continued use of the WPT in VR settings and in psychiatric populations may be more generally beneficial (Hawkins et al., 1990). For instance, compared to more comprehensive measures (i.e., IQ tests), brief tests have been associated with higher test completion rates. These types of screening instruments have also been shown to account for functional disability just as well as longer assessment procedures (Keefe et al., 2006). Further, paper and pencil measures have been associated with higher test completion rates in comparison to computer-administrated tasks in similar populations (Keefe et al., 2006). Taken together, these findings support the use of the WPT in light of its brevity and straightforward administration procedures.

Limitations

Although CS Interests emerged as viable predictors of case closure, there is considerable room for improvement in the prediction of closure status given the modest effect sizes in the present study. Because of the small sample size, the current study did not provide adequate power to detect small to moderate effect sizes of some of the test scores used to predict outcome. More generally, a major limitation of the present study is its retrospective, cross-sectional nature. Many questions about the relationships between aptitudes and interests and case closure status involve uncertainty as to the pathways (personality, social, cognitive, cultural and economic), time course and direction of effects. A more comprehensive understanding of the contributing variables can best be obtained by prospective, longitudinal studies. Further, the impact of employment opportunities and local unemployment rates on outcome should be considered in order to develop a comprehensive understanding of the complexities involved in return to work for this population (Migliore & Butterworth, 2008). Balancing consumers' expressed interests with current VR programming and economic constraints as well as local job market limitations will continue to be important to VR psychologists when formulating individualized vocational recommendations.

In terms of sample characteristics, one limitation relates to selection bias. Only participants whose files contained the predictor variables were included in the present study. The sample was relatively heterogeneous compared to other psychiatric samples that employed stricter exclusion criteria (e.g., Bryson & Bell, 2003; Evans et al., 2004; Milev et al., 2005; Sanchez, et al., 2009). These factors may limit generalizability to other patient populations. At the same time, broader inclusion criteria did allow for participants with a wide range of psychiatric disabilities, which is characteristic of the overall VR population and would be expected to enhance the external and ecological validity of the present study.

Another limitation of the present study involves the outcome variables. Without access to the reported reason for unsuccessful case closure, it is difficult to draw conclusions based on inferences derived from the dichotomous coding procedures. Thus, using a broader range of case closure statuses would likely allow researchers' to refine their conclusions regarding protective characteristics of those who achieve VR success as well as predictive factors related to success.

Conclusions and Future Directions

The present study highlights the relative importance of non-cognitive predictors to employment outcome in a psychiatrically disabled population. In light of these findings, further research is needed to clarify the relationship between job seekers' expressed interests and case closure and the potential pathways, time course and direction of these effects. The combined impact of social, cognitive, cultural and economic factors on individual response patterns is complex. Thus, traditional predictors such as cognitive skills and abilities may not emerge as viable predictors of case closure when ecological factors such as lack of transportation, job unavailability and VR service limitations and constraints are considered. Identifying and quantifying variables that capture these effects as well as moderating factors would likely lead to rich and rewarding areas of scientific inquiry, enhancing outcomes for researchers, practitioners and the clients whom they serve.

References

- Ackerman, G. W., Heggested, E. D. (1997). Intelligence, personality, and interests: Evidence for overlapping traits. *Psychological Bulletin, Vol. 121, No. 2*, 219-245.
- Ackerman, G.W., & McReynolds, C.J. (2005). Strategies to promote successful employment of people with psychiatric disabilities. *Journal of Applied Rehabilitation Counseling*, *36*(4), 35-40.
- Airaksinen, E., Larsson, M. & Forsell, Y. (2005). Neuropsychological functions in anxiety disorders in population-based samples: Evidence of episodic memory function. *Journal* of Psychiatric Research, 39, 207-214.
- American Psychiatric Association (1994). *Diagnostic and statistical manual of mental disorders* (Revised 4th Ed.). Washington, DC: Author.
- Anthony, W. A., Jansen, M. A. (1984). Predicting the vocational capacity of the chronically mentally ill: Research and policy implications. *American Psychologist, 39*, 537-544.
- Anthony, W. A., Cohen, M. R. & Farkas, M. D. (1990). *Psychiatric Rehabilitation*. Boston,MA: Boston, University, Center for Psychiatric Rehabilitation.
- Anthony, W. A., Rogers, E. S., Cohen, M. & Davies, R. R. (1995). Relationships between psychiatric symptoms, work skills, and future vocational performance. *Psychiatric Services*, 46, 353-358.
- Armstrong, P. I., Rounds, J., & Hubert, L. (2008). Re-conceptualizing the past: Historical data in vocational interest research. *Journal of Vocational Behavior*, 72, 284–297.
- Austin, M. P., Ross, M., Murray, C., O'Carroll, R. E., Ebmeier, K. P., Goodwin, G. M., (1992).Cognitive dysfunction in major depression. Journal of Affective Disorders, 25, 21-29.

- Austin, M.-P., Wilhelm, K., Parker, G., Hickie, I., Brodaty, H., Chan, J., et al., (1999). Cognitive function in depression: A distinct pattern of frontal impairment in melancholia? *Psychological Medicine*, 29, 73-85.
- Becker, D. R., Drake, R. E., Farabough, A. and Bond, G. R. (1996). Job preferences of clients with severe psychiatric disorders participating in supported employment programs, *Psychiatric Services*, 47, 1223-1226.
- Beveridge, S. & Fabian, E. (2007). Vocational Rehabilitation outcomes: Relationship between Individualized Plan for Employment goals and employment outcomes. *Rehabilitation Counseling Bulletin. 50*, 238-246.
- Bolton, B. (1994). USES General Aptitude Test Battery (GATB)/USES Interest Inventory (USES-II). In J. Kapes, M. Mastie, & E. Whitfield (eds.), A counselor's guide to career assessment instruments (3rd ed., pp. 117-123). Alexandria, VA: National Career development Association.
- Bolton, B. F. (2001) Handbook of Measurement and Evaluation in Rehabilitation. Gaithersburg,MD, Aspen Publishing.
- Bond, G. R. & Friedmeyer, M. H. (1987). Predictive validity of situational assessment at a psychiatric rehabilitation agency. *Psychosocial Rehabilitation Journal*, *11*, 61-77.
- Bond, G. R., Resnick, S G., Drake, R. E., Xie, H., McHugo, G. J. & Bebout, R. R. (2001). Does competitive employment improve nonvocational outcomes for people with severe mental illness? *Journal of Counseling and Clinical Psychology*, 69 (3), 489-501.
- Bond, G. R. (2011). Employment of people with mental disabilities. U.S. Equal Employment Opportunity Commission, March 15, 2011 meeting.

- Bornstein, R. A., Baker, G. B., & Douglas, A. B. (1999). Depression and memory in major
 depressive disorder. *Journal of Neuropsychiatry & Clinical Neurosciences*, *3*, 78 80.
- Bryson, G. & Bell, M. D. (2003). Initial and final work performance in schizophrenia: Cognitive and symptom predictors. *Journal of Nervous and Mental Disease*, 191, 87-92.
- Burke-Miller, J. K., Cook, J. A., Grey, D. D., Razzano, I. A., Blyler, C. R., Leff, H. S. et al., (2006). Demographic characteristics and employment among people with severe mental illness in a multi-site study. *Community Mental Health Journal*, 42, 143-159.
- Capella, M. E. (2012). Predicting Earnings of Clients with Visual Impairments. Journal of Rehabilitation.
- Cook, J. A. & Razzano, L. (2000). Vocational rehabilitation for persons with schizophrenia: Recent research and implications for practice. *Schizophrenia Bulletin, 26*, 87-103.
- Cook, J. A. (2006). Employment barriers for persons with psychiatric disabilities: Update of a report for the president's commission. *Psychiatric Services*, *57*, 1391-1405.
- Cook, J. A., Blyler, C. R., Burke-Miller, J. K., McFarlane, W. R., Leff, H. S. Mueser, K. T. et al.,
 (2008). Effectiveness of supported employment for individuals with schizophrenia:
 Results of a multi-site, randomized trial. Clinical Schizophrenia & Related Psychoses,
 37-46.
- Dawis, R. (1996). The theory of work adjustment and person-environment correspondence counseling. In D. Brown, L. Brooks, & Associates (Eds.), *Career choice and development (3rd ed.*, pp. 75120). San Francisco: Jossey Bass.
- Dawis, R. V., & Lofquist, L. H. (1984). A psychological theory of work adjustment. Minneapolis, MN: University of Minnesota Press.

- Dodrill, C.B. (1980). Rapid evaluation of intelligence in adults with epilepsy. *Epilepsia*, 21, 359-367.
- Dodrill, C.B. (1981). An economical method for the evaluation of general intelligence in adults. *Journal of Consulting and Clinical Psychology*, *49*(5), 668-673.
- Dodrill, C.B. (1983). Long-term reliability of the Wonderlic Personnel Test. *Journal of Consulting and Clinical Psychology*, *51*(2), 316-317.
- Dodrill, C.B., & Warner, M.H. (1988). Further studies of the Wonderlic Personnel Test as a brief measure of intelligence. *Journal of Consulting and Clinical Psychology*, *56*(1), 145-147.
- Donnell, C. M., Lustig, D. C. & Strauser, D. R. (2002). The working alliance: Rehabilitation outcomes for persons with severe mental illness. *Rehabilitation Psychology*, 47, 367.
- Evans, J. D., Bond, G. R., Meyer, P. S., Kim, H. W., Lysaker, P. H., Gibson, P. J. et al., (2004).
 Cognitive and clinical predictors of success in vocational rehabilitation in schizophrenia.
 Schizophrenia Research, 70, 331-342.
- Fabian, E. S. (2000). Social cognitive theory of careers and individuals with serious mental health disorders: Implications for psychiatric rehabilitation programs. *Psychiatric Rehabilitation Journal, 23*. Retrieved December 16, 2007 from *Psychology and Behavioral Sciences Collection*. 1-11.
- Farkas, M. & Anthony, W. A. (2010). International Review of Psychiatry, 22(2): 114-129.
- Fiszdon, J. M., Bryson, G. J., Wexler, B. E. & Bell, M. D. (2004). Durability of cognitive remediative training in schizophrenia: performance on two memory tasks at 6-month and 12-month follow-up. *Psychiatric Research*, 1251-7.

- Fleck, D. E., Shear, P. K. & Strakowski, S. M. (2005). Processing efficiency and directed forgetting in bipolar disorder. *Journal of the International Neuropsychological Society: JINS*, 11(7), 871-80.
- Freedman, R. I. (1996). The meaning of work in the lives of people with significant disabilities: Consumer and family perspectives. *Journal of Rehabilitation*, 62, 49-55.
- Gold, J., & Harvey, P. D. (1993). Cognitive deficits in schizophrenia. In: Peter Powchik and S.C. Schultz (eds.), Psychiatric clinics of North America (pp. 295-312). Philadelphia:William B. Saunders.
- Gold, J. M., Goldberg, R. W., McNary, S. W., Dixon, L. B. & Lehman, A. F. (2002). Cognitive correlates of job tenure among patients with severe mental illness. *American Journal of Psychiatry*, 159, 1395-1402.
- Goldberg, R. W., Green-Paden, L. D., Lehman, A. F., Gold, J. M. (2001). Correlates of insight in serious mental illness. *Journal of Nervous & Mental Disease, Vol. 189, (3),* 137-145.
- Goldberg, R. W., Lucksted, A., McNary, S., Gold, J. M., Dixon, L., & Lehman, A. (2001). Correlates of long-term unemployment among inner city adults with serious and persistent mental illness. *Psychiatry Services*, 52, 101-103.
- Grant, M. M., Thase, M. E., & Sweeney, J. A. (2001). Cognitive disturbance in outpatient depressed younger adults: Evidence of modest impairment. *Biological Psychiatry*, 50, 35-43.
- Grant, I. & Adams, K. M. (2009). Neuropsychological Assessment of Neuropsychiatric and Neuromedical Disorders third edition. Oxford University Press: New York, New York. Pp. 523-545.

- Green, M. F. (1996). What are functional consequences of neurocognitive deficits in schizophrenia? *The American Journal of Psychiatry*, *153*: 321-330.
- Green, M. F., Kern, R. S., Heaton, R. K. (2004). Longitudinal studies of cognition and functional outcome in schizophrenia: implications for MATRICS. *Schizophrenia Research, Vol. 72*, (1), 4-51.
- Green, M. F. (2006). Cognitive impairment and functional outcome in schizophrenia and bipolar disorder. *Journal of Clinical Psychiatry*, 67 (suppl 9), 3-8.
- Harris, J. & Danski, H. (1991). *APTICOM: System technical manual*. Philadelphia: Vocational Research Institute.
- Hartigan, J. & Wigdor, A. (1989). Fairness in employment testing: Validity generalization, minority issues, and the General Aptitude Test Battery. Washington, D.C.: National Academy Press.
- Hawkins, K.A., Faraone, S.V., Pepple, J.R., Seidman, L.J., & Tsuang, M.T. (1990). WAIS-R validation of the Wonderlic Personnel Test as a brief intelligence measure in a psychiatric sample. *Psychological Assessment: A Journal of Consulting and Clinical Psychology*, 2(2), 198-201.
- Hawkins, K. A., Hoffman, R. E., Quinlan, D. M., Rakfeldt, J., Docherty, N. M. & Sledge, W. H. (1997). Cognition, negative symptoms, and diagnosis: A comparison of schizophrenic, bipolar and control samples. *Journal of Neuropsychiatry and Clinical Neuroscience*, *9*, 81-89.
- Holland, J. L. (1985). *Making vocational choices: A theory of vocational personalities and work environments*. Englewood Cliffs, NJ: Prentice Hall.

- Holland, J. L. (1992). A theory of person-environment congruence. *Journal of Vocational Behavior, 40, 158-209.*
- Holland, J.L. (1997). Making vocational choices: A theory of vocational personalities and work environments. (3rd Ed.) Odessa, Fla.: Psychological Assessment Resources, Inc.
- Jaeger, J., Berns, S., Douglas, E., Creech, B., Glick, B. & Kane, J. (2006). Community-based vocational rehabilitation: Effectiveness and cost impact of a proposed program model. *Australian and New Zealand Journal of Psychiatry*, 40, 452-461.
- Karakus, M., Frey, W., Goldman, H., Fields, S. & Drake, R. (2011). Federal financing of supported employment and customized employment for people with mental illnesses: A final report. *Westat Inc.* Baltimore, MD: Centers for Medicare and Medicaid Services. http://aspe.hhs.gov/daltcp/reports/2011/supempFR.htm.
- Keck, P. E., McElroy, S. L., Strakowski, S. M., West, S. A., Sax, K. W., Hawkins, J. M., et al.,
 (2003). 12-Month outcome of patients with bipolar disorder following hospitalization for a manic or mixed episode. *Focus*, 1:44-52. American Psychiatric Association.
- Keefe, R. S. E., Bilder, R. M., Harvey, P. D., Davis, S. M., Palmer, B. W., Gold, J. M., et al., (2006). Baseline neurocognitive deficits in the CATIE schizophrenia trial. *Neuropsychopharmacology*, *31*, 2033-2046.
- Kreuzpointner, L. (2009). Predicting the success of occupational retraining using the occupational aptitude test battery. Rehabilitation, 48, 103-110.
- Larson, E. R., Shear, P. K., Krikorian, R. Welge, J. & Strakowski, S. M. (2005). Working memory and inhibitory control among manic and euthymic patients with bipolar disorder. *Journal of the International Society of Neuropsychology: JINS*, 11(2), 163-72.

- Lehman, A. F., Goldberg, R., Dixon, L. B., McNary, S., Postrado, L., Hackmen, A. & McDonnell, K. (2002). Improving employment outcomes for persons with severe mental illness. *Archives of General Psychiatry*, (59), 165-172.
- Lubinski, (2010). Neglected aspects and truncated appraisals in vocational counseling:
 Interpreting the interest-efficacy association from a broader perspective: Comment on
 Armstrong and Vogel (2009). *Journal of Counseling Psychology, Vol. 57, No. 2*, 226-238.
- Lui, Y. M., Tsai, S. Y., Fleck, D. E. & Strakowski, S. M. (2011). Cross-cultural comparisons on Wisconsin Card Sorting Test performance in euthymic patients with bipolar disorder. *Psychiatry Research*, 189, 469-471.
- Lustig, D.C., Brown, C. D., & Lott, A.C. (1998). Reliability of the CareerScope Career Assessment and Reporting System. *Vocational Evaluation and Work Adjustment Journal, Spring*, 19-21.
- Lustig, D., Strauser, D., Rice, N. & Rucker (2002). The relationship between working alliance rehabilitation outcomes. *Rehabilitation Counseling Bulletin*, *46*, 24-32.
- Lustig, D., Strauser, D., Weems, G., Donnell, C. & Smith, L. (2003). Traumatic brain injury and rehabilitation outcomes: Does working alliance make a difference? *Journal of Applied Rehabilitation Counseling*, 34, 30-37.
- McGurk, S. R. & Mueser, K. T. (2004). Cognitive functioning, symptoms, and work in supported employment: A review and heuristic model. *Schizophrenia Research*, 70, 147– 174.
- Mega, M. S. & Cummings, J. L., (2004). Frontosubcortical circuits and neuropsychiatric disorders. *The Journal of Neuropsychiatry and Clinical Neurosciences*, 6, 358-370.

- Michon, W. C., van Weeghel, J., Kroon, H., Smit, F. & Schene, A. H. (2006). Predictors of successful job finding in psychiatric vocational rehabilitation: An expert panel study. *Journal of Vocational Rehabilitation*, 25, 161-171.
- Migliore, A. & Butterworth, J. (2008). Trends in outcomes of the vocational rehabilitation program for adults with developmental disabilities: 1995-2005. *Rehabilitation Counseling Bulletin*, 52, 35-44
- 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 firstepisode study with 7-year follow-up. *American Journal of Psychiatry*, 162: 495-506.
- Moustafa, K. & Miller, T. (2003). Too intelligent for the job? The validity of upper-limit cognitive ability test scores in selection. *SAM Advanced Management Journal*. 5-55.
- Mueser, K. T. & McGurk, S. R. (2004). Schizophrenia. The Lancet, Vol. 363, 2063-72.
- Nehra, R., Chakrabarti, S., Pradhan, B.K., & Khehra, N. (2006). Comparison of cognitive functions between first- and multi-episode bipolar affective disorders. *Journal of Affective Disorders*, 93, 185-192.
- Nordt, C., Muller, B., Rossler, W., & Lauber, C. (2007). Predicitors and course or vocational status, income, and quality of life in people with severe mental illness: A naturalistic study. *Social Science & Medicine*, *65*, 140-1429.
- Nuechterlein, K. H., Subotnik, K. L., Green, M. F., Ventura, J., Asarnow, R. F., Gitlin, M. J., et al., (2011). Neurocognitive predictors of work outcome in recent-onset schizophrenia. *Schizophrenia Bulletin*, 37 (2), S33-S40.

Ohio Rehabilitation Services Commission. (2011). Retrieved from http://rsc.ohio.gov

- Olley, A., Malhi, G. S., Mitchell, P. B. Batchelor, J., Lagopoulos, J. & Austin, M. V. (2005). When euthymia is just not good enough. *Nervous and Mental Disease*, *193* (5), 323-330.
- Paelecke-Habermann, Y., Pohl, J. & Leplow, B., (2005). Attention and executive functions in remitted major depression patients. *Journal of Affective Disorders*, *89*, 125-135.
- Porter, R. J., Gallagher, P., Thompson, J. M. & Young, A. H. (2003). Neurocognitive impairment in drug-free patients with major depressive disorder. *British Journal of Psychiatry*, 182, 214-220.
- Power, P. W. (2006). A guide to vocational assessment. (4th ed.). Boston: Pro-Ed.
- Provencher, H. L., Gregg, R., Mead, S. & Mueser, K. T. (2002). The role of work in the recovery of persons with psychiatric disabilities. *Psychiatric Rehabilitation Journal*, *26*, 132-144.
- Pruett, S.R., Rosenthal, D. A., Swett, E. A., Lee, G. K. & Chan, F. (2008). Empirical evidence supporting the effectiveness of vocational rehabilitation. *Journal of Rehabilitation*, 74, 56-63.
- Reeve, C. L., & Heggested, E. D. (2004). Differential relations between general cognitive ability and interest-vocation fit. *Journal of Occupational and Organizational Psychology*, 77, 385-402.
- Restrepo, J. (2007). The Wonderlic Personnel Test in a vocational rehabilitation setting (*Doctoral Dissertation, University of Cincinnati,* 2007). Retrieved August 10, 2010 from http://etd.ohiolink.edu
- Rinaldi, M., Killackey, E., Smith, J., Shepherd, G., Singh, S. & Craig, T. (2010). First episode psychosis and employment: A review. International Review of Psychiatry, 22 (2); 148-162.

- Robinson, L. J., Thompson, J. M., Gallagher, P., Goswami, U., Young, A. H., Ferrier, I. N., et al., (2006). A meta-analysis of cognitive deficits in euthymic patients with bipolar disorder. Journal of Affective Disorders, 93, 105-115.
- Roessler, R. T. (2002). Improving job tenure outcomes for people with disabilities: The 3M model. *Rehabilitation Counseling Bulletin*, *45*, 207-212.
- Rose, E. J. & Ebmeier, K. P. (2006). Pattern of impaired working memory during major depression. Journal of Affective Disorders, 90, 149-161.
- Rottinghaus, P. J., Hees, C. K., & Conrath, J. (2009). Enhancing job satisfaction perspectives: Combining Holland themes and basic interests. *Journal of Vocational Behavior*, 75, 139-151.
- Sanchez, P., Ojeda, N., Pena, J., Elizagarate, E., Yoller, A. B., Gutierrez, M. & Ezcurra, J.
 (2009). Predictors of longitudinal changes in schizophrenia: The role of processing speed. *Journal of Clinical Psychiatry*, 70, 888-896.
- Shaw, L., Sumsion, T., McWilliam, C. & MacKinnon, J. (2004). Service provider perspectives on including consumers in the vocational rehabilitation process. *Journal of Vocational Rehabilitation*, 21, 123-136.
- Smith, F. A. & Clark, D. M. (2007). Disability and occupation. DataNote Series, DataNote XIII.Boston, MA: Institute for Community Inclusion.
- Sobin, C., & Sackeim, H. A., (1997). Psychomotor symptoms of depression. *American Journal* of Psychiatry, 154, 4-17.
- Subotnik, K. L., Nuechterlein, K. H., Green, M. F., Horan, W. P., Nienow, T. M., Ventura, J. & Nguyen, A. T. (2006). Neurocognitive and social cognitive correlates of formal thought disorder in schizophrenia patients. *Schizophrenia Research, Vol. 85, (1),* 84-95.

- Sweeney, J. A., Kmiec, J. A., & Kupfer, D. J. (2000). Neuropsychologic impairments in bipolar and unipolar mood disorders on CANTAB neurocognitive battery. *Biological Psychiatry*, 48, 674-685.
- Tay, L., Drasgow, F., Rounds, J. & Williams, B. A. (2009). Fitting measurement models to vocational interest data: Are dominance models ideal? *Journal of Applied Psychology*, *Vol. 94, No. 5*, 1287-1304.
- Thompson, J. M., Gallagher, P. & Hughes, J. H. et al. (2005). Neurocognitive impairment in euthymic patients with bipolar affective disorder. *British Journal of Psychiatry*, 186, 32-40.
- Tsang, H., lam, P., Ng, B. & Leung, O. (2000). Predictors of employment outcome for people with psychiatric disabilities: A review of the literature since the mid '80s. *The Journal of Rehabilitation*, 66, 19-31.
- United States Department of Labor. (1970). *Manual for the General Aptitude Test Battery, Section III: Development.* Washington, D.C.: United States Government Printing Office.
- United States Department of Labor (1979a).*Guide for occupational exploration*. Washington, D.C.: U.S. Government Printing Office.
- United States Department of Labor (1997). *CareerScope*. Washington, D.C.: U.S. Government Printing Office.
- Van Iddekinge, C. H., Putka, D. J. & Campbell, J P. (2011). Reconsidering vocational interests for personnel selection: The validity of an interest-based selection test in relation to job knowledge, job performance, and continuance intentions. (2011). *Journal of Applied Psychology*, 96, 13-33.

- Van Winkel, R., Myin-Germeys, I., DeHert, M., Delespaul, P. Peuskens, J. & VanOs, J. (2007). The association between cognition and functional outcome in first-episode patients with schizophrenia: Mystery resolved? *Acta Psychiatrica Scandinavica, Vol. 116, 2,* 119-124.
- Vocational Research Institute. (2003). CareerScope User Guide Release 6.0M. Philadelphia: Author.
- Watzke, S., Galvao, A. (2007). The feasibility of vocational rehabilitation in subjects with severe mental illness. *Vocational rehabilitation with severe mental illness*, 260-272.
- Wechsler, D. (1958). *The measurement and appraisal of adult intelligence* (4th Ed.). Baltimore:The Williams and Wilkins Company.
- Weiland-Fiedler, P., Erickson, K., Waldeck, T., Luckenbaugh, D. A., Pike, D., Bonne, O., et al., (2004). Evidence for continuing neuropsychological impairments in depression. *Journal* of Affective Disorders, 82, 253-258.
- Wiewiorski, N. J. & Fabian, E. S. (2004). Association between demographic and diagnostic factors and employment outcomes for people with psychiatric disabilities: A synthesis of recent research. *Mental Health Services Research*, 6, 9-21.
- Wilk, S. L., Desmarais, L. B., & Sackett, P. R. (1995). Gravitation to jobs commensurate with ability: Longitudinal and cross-sectional tests. *Journal of Applied Psychology*, 80, 79–85.
- Wilk, S. L., & Sackett, P. R. (1996). Longitudinal analysis of ability–job complexity fit and job change. *Personnel Psychology*, 49, 937–967.
- Wonderlic, E. F. (1992). *Manual of the WPT and Scholastic Level Exam П*. Libertyville, IL: Wonderlic Personnel Test, Inc.
- Wonderlic.com. (2011). Retrieved September 20, 2011, from http://www.wonderlic.com/resources/faq/default.asp

Wonderlic Inc, (2010). Wonderlic Classic Cognitive Ability Test (WPT). [Brochure]. Vernon Hills, IL: Author