An Investigation on Predictors of Occupational Functioning in Individuals with Bipolar Disorder

by

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DEDICATION

To Dr. Joseph Himle for his unwavering support and encouragement.

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ABSTRACT

The goal of this research was to identify predictors of poor occupational functioning (OF) in individuals with bipolar disorder (BD). This investigation involved three distinct, but related studies. The first study investigated the effects of clinical, demographic and neurocognitive features on OF in individuals with BD. Previous work found that as depression and neurocognitive deficits increased, OF decreased. However, few studies have examined these features over time using distinct aspects of work functioning. This study employed multilevel modeling (MLM) to determine which demographic, clinical and neurocognitive characteristics influence 4 aspects of work functioning over 5 years: attendance, conflict, enjoyment, performance. Those with higher levels of depression were more likely to experience difficulties in all work domains that persisted over the entire 5 years.

The second study investigated the influence of interpersonal features of individuals with BD on OF. Prior work has typically investigated traditional features of BD (e.g., clinical, neurocognitive) overlooking interpersonal characteristics. This study employed MLM to determine which demographic, clinical and interpersonal characteristics (i.e., personality, impulsivity, hostility, social anxiety) of individuals with BD affect work functioning across 5 years. Those with higher levels of depression were more likely to experience impairments related to work attendance, conflict with coworkers and supervisors, quality of work and enjoyment from work. At baseline, higher levels of mania were associated with improved attendance at work. Yet over time, mania negatively affected overall work functioning, attendance at work, and work performance.

Prior work on OF focuses mainly on the individual's features of BD neglecting the environment. The third study took a novel approach and evaluated the relationship between social aspects of the work environment and work outcomes among individuals with BD. This study employed regressions in order to determine which demographics, mood symptoms and aspects of the work environment (i.e., conflict, exclusion, social support, stigma) predict work status and work functioning for individuals with BD. Exclusion and stigma at work predicted unemployment, whereas depressive symptoms and conflict at work predicted poorer work functioning. Taken together, this dissertation aims to inform approaches to remediating poor OF ultimately improving the overall functioning of individuals with BD.

CHAPTER 1
INTRODUCTION

Bipolar Disorder (BD) is a chronic mood disorder characterized by recurrent mood episodes and profound impairments in psychosocial functioning (Huxley & Baldessarini, 2007; Kessler et al., 2006; Kupfer et al., 2002; Merikangas et al., 2007). Individuals with BD are less likely to be married (Abood, Sharkey, Webb, Kelly, & Gill, 2002), live independently (Revicki, Matza, Flood, & Lloyd, 2005); and achieve financial security (Ruesch, Graf, Meyer, Rossler, & Hell, 2004a). Among the most significant functional disabilities associated with BD are impairments in occupational functioning (OF). Individuals with BD are more likely to be unemployed (as high as 65%), and up to 80% experience vocational impairments despite higher education levels than the general population (Carlborg, Ferntoft, Thuresson, & Bodegard, 2014; Huxley & Baldessarini, 2007; Kupfer et al., 2002; Schoeyen et al., 2011). As many as 54% of working individuals with BD experience a decline in employment status over a 5-year period (Marwaha, Durrani, & Singh, 2013). These high rates of employment problems within the BD population are of considerable importance due to the severe consequences associated with these functional impairments.

Unemployment for those with BD leads to high levels of financial disability worldwide and is associated with $14.1 billion (salary-equivalent) lost productivity within the United States on an annual basis (Kessler et al., 2006; Murray & Lopez, 1996). Poor work outcomes have been associated with more frequent depression (Kessler et al., 2006), reduced rates of emotional support, lower self-esteem, and a poorer quality of life (i.e., physical well-being, social relationships, quality of living environment; Priebe, Warner, Hubschmid, & Eckle, 1998; Ruesch et al., 2014). A lack of employment robs individuals with BD of the invaluable benefits associated with working such as a sense of identity, a purpose in life, and status in society (Priebe et al.,1998) . Given the variety of economic, psychological, and psychosocial consequences one can suffer as a result of poor OF, it is essential that work deficits associated with BD are given substantial attention during treatment.

Current best-practice treatments for BD, which include mood stabilizing medications and bipolar-specific psychotherapy, have little effect on remediating OF deficits (Kessler et al., 2006). Results from a long-term outpatient study, the Systematic Treatment Enhancement Program for Bipolar Disorder (STEP-BD), demonstrated that evidence-based treatments for BD lead to symptomatic remission and relapse

prevention but have little to no effect on work outcomes (Miklowitz et al., 2007; Miklowitz & Scott, 2009). Occupational therapy interventions, such as supported employment, cognitive skills and social skills training, are effective for those with severe impairments in cognition and daily functioning (i.e., schizophrenia) but do not generalize well to individuals with BD (Arbesman & Logsdon, 2011). Lastly, a limited number of cognitive-behavioral treatments have been designed to address OF for those with mental health conditions but none have been tested among individuals with BD (Heimberg et al., 1990; Himle et al., 2014; Moitra, Beard, Weisberg, & Keller, 2011; Stein & Kean, 2000; Tolman et al., 2009). Current available treatments are clearly limited in how well they address work deficits in those with BD emphasizing the need for more effective work interventions specifically designed for this illness. However, one must first have a better understanding of which features of the disorder are associated with these poor work outcomes.

Studies aimed at identifying predictors of poor employment outcomes in individuals with BD traditionally examine disease-specific features such as clinical symptoms and neurocognition (Bonnín et al., 2010; Bora, Yucel, & Pantelis, 2009; Cerit, Filizer, Tural, & Tufan, 2012; Rosa et al., 2009; Ryan et al., 2013) and do not accurately capture the entire range of possible predictors (Tse, Chan, Ng, & Yatham, 2014). Additional features of the disorder, such as interpersonal characteristics, may also predict work functioning but have generally been overlooked within the literature (E. Gilbert & Marwaha, 2013; Tse et al., 2014). To maintain successful work functioning, most employment situations benefit from the employee's ability to foster positive working relationships particularly in the face of work problems (Depp et al., 2012; Tse et al., 2014). Therefore, individuals with BD who exhibit high levels of certain characteristics known to interfere with interpersonal functioning (e.g., neuroticism, impulsivity, hostility, social anxiety) may experience greater OF deficits than individuals who are better adjusted socially. In addition, theoretical models of BD suggest that interpersonal stressors within one's work environment (e.g., conflict at work, exclusion from others, reduced social support, stigma at work) could lead to impairments in work performance (Dienes, Hammen, Henry, Cohen, & Daley, 2006; Frank et al., 2005; Grandin, Alloy, & Abramson, 2006; Kennedy, 1983; Monk, 1990). Further research including a more comprehensive inclusion of predictors may contribute to the development of better interventions aimed at improving work conditions for those with BD.

Determining predictors of work outcomes for those with BD also requires that further research address the current limitations in the way OF is measured. OF is generally defined as either work status (employed vs. unemployed) *or* work functioning (impairments at work). Work status and work functioning are two distinct measures that often yield inconsistent findings, making it difficult to accurately identify which aspects of OF are most problematic for those with BD or to generalize results across this body of literature. Research including two distinct measures of OF (work status *and* work

functioning) within the same group of participants would help to determine whether interventions designed for work recovery must vary based on the particular work outcome being targeted during treatment (e.g., unemployment versus problems at work).

Similarly, when assessing employed individuals with BD, work functioning is generally assessed as a unidimensional measure (e.g., overall work impairments), making it difficult to discern specifically which aspects of work certain features of BD affect the most. Depressive symptoms (i.e., anhedonia, low energy, lack of motivation), for example, could be associated with several areas of work functioning including attendance at work, work quality and even enjoyment at work. Common symptoms within manic episodes, such as irritability, grandiose thinking and pressured speech, could result in strained relationships with coworkers and supervisors. Further research measuring more specific aspects of work functioning (e.g., performance, attendance, conflict, enjoyment) would better clarify the relationships between features of BD and work functioning among employed persons with the illness

Lastly, the methodology used within the current literature limits our understanding of how poor employment outcomes present for individuals with BD over time. Most studies are cross-sectional and of the few longitudinal studies available, many are limited in terms of small sample sizes of adults with BD (e.g., n=33-53) (Bauer, Kirk, Gavin, & Wiliford, 2001, Dickerson et al., 2010; Tse et al., 2014). BD is a chronic, fluctuating disorder, with the course of illness generally expected to worsen over time (Bowden et al., 2012; Coryell, Scheftner, Keller, & Endicott, 1993). Therefore, longitudinal studies that measure changes in work outcomes over an extended period of time would more clearly determine the influence features of BD have on OF.

In addition, the type of statistical method used to conduct the longitudinal analyses is important to consider. Traditional methods of longitudinal analysis (e.g., ordinary least squares or logistic regressions, or repeated measures ANOVAs), although commonly employed, can be limiting in several ways. Such methods do not easily accommodate missing time points, potentially reducing the power of the study and biasing the results. More traditional analytic methods often treat changes in time as linear and they only estimate an overall average change of the sample. Multilevel modeling (MLM), on the other hand, has the ability to handle unbalanced and missing data, allowing for more flexible growth trajectories (e.g., curvilinear), and estimates variance on two levels, including the unobserved differences between participants in the study. MLM can be a powerful analytical tool with which to understand more accurately which features of BD are the greatest predictors of impaired OF.

The goal of this dissertation is to identify significant predictors of OF (long-term and cross-sectional) among individuals with BD in order to capture a more accurate picture of which features of BD are associated with the poor employment outcomes commonly found in those with the illness. Ultimately, this research is needed in order to identify clear targets for the development of more effective

treatments to help those with BD to achieve successful OF outcomes. This dissertation is comprised of the following three studies:

1. The goal of this study is to use multilevel modeling to identify associations of clinical and neurocognitive features to predict 4 specific areas of work functioning across a 5-year period in a large sample of individuals with BD. Based on current research, it is hypothesized that, out of a subset of clinical, neurocognitive, and demographic features, higher depressive symptomatology and lower cognitive skills will be most strongly associated with declines in all areas of work functioning over time.

2. The goal of this study is to use multilevel modeling to identify associations of mood and interpersonal characteristics to predict 4 specific areas of work functioning across a 5-year period in a large sample of individuals with BD. Based on current research, it is hypothesized that, out of a subset of clinical, interpersonal and demographic features, higher depressive symptomatology and social anxiety will be associated with declines in long-term work functioning within a range of occupational domains. In addition, based on prior research, lower levels of extraversion and higher degrees of impulsivity will be associated with declines in work functioning as well.

3. The goal of this study is to identify associations of mood and social aspects of the work environment to predict work status (working versus not working) and work functioning among a sample of individuals with BD. Based on current research, it is hypothesized that, out of a subset of demographics, mood symptoms, and social aspects of the work environment, age, education, higher depressive symptomatology, lower levels of social support and higher degrees of stigma at work will be associated with poorer work functioning and a nonworking status.

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CHAPTER 2

THE EFFECTS OF CLINICAL, DEMOGRAPHIC, AND NEUORCOGNITIVE FEATURES OF EMPLOYMENT OUTCOMES IN INDIVIDUALS WITH BIPOLAR DISORDER

Background and Significance

Bipolar Disorder (BD) is a chronic disorder characterized by recurrent mood episodes and gross impairments in interpersonal, residential and occupational functioning (OF) (Huxley & Baldessarini, 2007; Kessler et al., 2006; Kupfer et al., 2002; Merikangas et al., 2007). Among the most significant functional disabilities associated with BD are OF impairments. Specifically, unemployment can be as high as 65% and vocational disability can be as high as 80% among individuals with BD despite their averaging higher education levels than members of the general population (Carlborg et al., 2014; Huxley & Baldessarini, 2007; Kupfer et al., 2002; Schoeyen et al., 2011). According to the World Health Organization, BD is the sixth leading cause of disability in the world among all other diseases for individuals ages 15 to 44 (Murray & Lopez, 1996). Unemployment associated with BD increases levels of psychopathology, reduces levels of social support and deprives sufferers of structured schedules and a centrally important source of self-esteem. It is notable that psychosocial treatments for BD seek to increase social support and encourage the establishment of structured daily schedules (Priebe et al., 1998). Further, the presence of work in one's life provides intangible benefits, such as a sense of identity, life purpose, and social status (Priebe et al., 1998). Given the variety of economic, psychological, and psychosocial consequences one can suffer as a result of poor OF, it is essential that OF deficits associated with BD are given substantial attention during treatment.

Current best-practice treatments for BD (i.e., mood stabilizing medications and bipolar-specific psychotherapy) have little or no significant positive effect on OF outcomes (Kessler et al., 2006; Miklowitz et al., 2007; Miklowitz & Scott, 2009) and interventions designed to directly target OF, such as supported employment, do not appear to generalize to individuals with BD (Arbesman & Logsdon, 2011; Osuji & Cullum, 2005; Tse & Yeats, 2002) or are not readily available. Similarly, a limited number of cognitive-behavioral treatments have been developed to address OF for those with mental health conditions, yet none have been tested among individuals with BD (Heimberg et al., 1990; Himle et al., 2014; Moitra et al., 2011; Stein & Kean, 2000; Tolman et al., 2009). There is a clear need for more

effective interventions to address OF for individuals with BD and the first step is a better understanding of which features of the illness affect poor work outcomes.

The most common features of BD found to be associated with poor OF are mood symptoms, primarily depression, (Bauer et al., 2001; Bonnín et al., 2010; Cerit et al., 2012; Elinson, Houck, & Pincus, 2007; Judd et al., 2005; Rosa et al., 2009) and neurocognitive deficits in the areas of executive functioning, attention and verbal memory (Arts, Jabben, Krabbendam, & Os, 2008; Bora et al., 2009; Ryan et al., 2013; Torres, Boudreau, & Yatham, 2007). Current depressive symptoms have been found to account for up to half of the variance in work impairments (Bauer et al., 2001) . Even following symptom remission, depressive symptoms predicted slower work recovery rates at 9 months post-treatment (Gitlin, Mintz, Sokolski, Hammen, & Altshuler, 2011). Although less consistent, mania has also been found to predict unemployment in individuals with BD and when combined, depression and manic symptoms have been significantly associated with overall work dysfunction (Bauer et al., 2001; Bonnín et al., 2012; Elinson et al., 2007; Hammen, Gitlin, & Altshuler, 2000). Lastly, neurocognitive deficits have been associated with poor OF above mood, demographic and other clinical variables in a range of cross-sectional studies (Bonnín et al., 2010; Depp et al., 2012; Fleck, Shear, Madore, & Strakowski, 2008; Harvey, Wingo, Burdick, & Baldessarini, 2010; Ryan et al., 2013). Specifically, deficits in executive functioning, verbal learning, working memory, and self-reported attention predict poor work outcomes over 3-month to 1-year follow-ups.

There is an abundance of evidence demonstrating strong associations between mood and neurocognitive deficits and OF. However, limitations in the way OF is measured, either as work status (employed vs. unemployed) or as a unidimensional measure of work functioning (e.g., overall work impairments), makes it difficult to discern specifically which aspects of work these features of BD affect the most. Depressive symptoms (e.g., anhedonia, low energy, lack of motivation), for example, could be associated with several areas of work functioning including attendance at work, work quality and even enjoyment at work. Common symptoms within manic episodes, such as irritability, grandiose thinking and pressured speech, could result in strained relationships with coworkers and supervisors. Lastly, neurocognitive deficits often interfere with planning of daily activities, organizing tasks, managing multiple projects, and recalling important information, all essential tasks for successful work performance (Deckersbach et al., 2010; Martinez-Aran et al., 2007). Further research measuring distinct aspects of work (e.g., performance, attendance, conflict, enjoyment) would better clarify the relationships between mood symptoms, neurocognitive deficits and work functioning among persons with BD. This specific information would also likely inform treatment innovations that could improve OF outcomes for BD patients.

Other prominent features of BD, specifically psychosis and course of illness (e.g., number of hospitalizations), are not as consistently associated with OF, perhaps due to limitations in how they are studied. At least half of individuals with bipolar I disorder (BDI) experience psychotic symptoms (hallucinations and delusions) in their lifetime, and the presence of psychosis has been associated with a higher degree of social role dysfunction for those with BD (Miklowitz, 1992). Despite the high prevalence and negative functional impact, a history of psychosis has not been found as a significant predictor of OF (Ryan et al., 2013; Tse et al., 2014). A possible explanation for these null findings may relate to the way in which psychosis is typically measured as a categorical variable, i.e., with or without a history of psychosis. However, the range of psychosis experienced by individuals with BD varies considerably from fleeting psychotic symptoms during one mood episode to more frequent psychosis throughout most episodes, which could affect OF in very different ways. Measuring the chronicity and severity of psychosis may more accurately represent the relationship this clinical feature has to work functioning.

The course of one's bipolar illness has also been found to predict OF, with the greater number of years battling the illness and more frequent hospitalizations as the two clinical features most consistently identified as predictors of poor OF (Altshuler et al., 2007; Burdick, Goldberg, & Harrow, 2010; Dickerson et al., 2010; Elinson et al., 2007; Mur, Portella, Martinez-Aran, Pifarre, & Vieta, 2009; Tse et al., 2014). All of the above referenced studies finding a longer course of illness to be a negative predictor of OF have been cross-sectional. Although some longitudinal studies have found course of illness to be a significant factor influencing OF (Burdick et al., 2010; Hammen et al., 2000), the longitudinal studies that did not find this significant relationship all used work status (employed versus unemployed) as their OF measure (Bonnín et al., 2010; Hammen et al., 2000; Zimmerman et al., 2010). BD is a chronic, fluctuating disorder, with the course of illness generally expected to worsen over time (Bowden et al., 2012; Coryell et al., 1993). Therefore, an extended longitudinal study that measures changes in work outcomes beyond just work status would more clearly determine the influence psychotic symptoms and the overall course of illness have on work functioning.

Other socio-demographics important to consider as predictors of work functioning include education, sex, age, and ethnicity. Lower levels of education are consistently associated with poorer work outcomes in BD and therefore, should be included when studying predictors of OF (Depp et al., 2012; Haro et al., 2011; Mur et al., 2009; Wingo, Baldessarini, Holtzheimer, & Harvey, 2010). Sex differences have not been found to predict work outcomes in those with BD (Mur et al., 2009; Reed, Goetz, Vieta, Bassi, & Haro, 2010; Ryan et al., 2013), yet none of these studies are longitudinal with extended follow-up periods. In terms of age, most cross-sectional studies found that older individuals with BD are more likely to be unemployed or on disability (Elinson et al., 2007; G. E. Simon, Ludman, Unützer,

Operskalski, & Bauer, 2008; Waghorn, Chant, & Jaeger, 2007) with the exception of one 2-year study that found younger individuals with BD to experience poorer work functioning compared to the older individuals (Hammen et al., 2000). Similarly, studies of ethnicity or race are also mixed; most studies did not find any significant associations with employment status or occupational recovery (Bearden et al., 2011; A. M. Gilbert et al., 2010; Gitlin et al., 2011) except for one study that found whites were more likely to be employed than nonwhites among a sample of individuals with BD (Elinson et al., 2007). These mixed results highlight the need for further investigation into the relationships between sex, age, and ethnicity/race and OF as they relate to BD.

When understanding how features of BD affect the long-term nature of OF outcomes, the type of statistical method used to conduct longitudinal analysis is an important consideration. Traditional methods of longitudinal analysis (ordinary least squares or logistic regressions, repeated measures ANOVAs) can be limiting in several ways. Such methods do not easily accommodate missing time points potentially reducing the power of the study as well as potentially biasing the results. Due to the fluctuating nature of mood symptoms within this disorder coupled with the significant time commitment of longitudinal research, missing follow-up data are expected. Therefore, to reduce the sample to participants with available data at all waves of a longitudinal study may not be representative of the larger population of those with BD. Multilevel modeling (MLM) is becoming increasingly popular for longitudinal analysis due to its ability to handle unbalanced and missing data (Hedeker, 2004). Another limitation of more traditional methods is that changes over time are most often treated as linear changes. Changes in human behavior over time do not necessarily follow such a continuous and predictable path and the use of MLM allows for more flexible growth trajectories (e.g., curvilinear). Lastly, traditional methods of longitudinal analysis only estimate an overall average change of the sample, whereas MLM estimates variance on two levels including the unobserved differences between participants in the study. Utilizing MLM can be a powerful analytical tool to more accurately understand which features of the disorder are the greatest predictors of OF for individuals with BD.

The goal of this study is to use MLM to identify associations of clinical and neurocognitive features to predict specific areas of work functioning across a 5-year period in a large sample of individuals with BD. Based on current research, it is hypothesized that, out of a subset of clinical, neurocognitive, and demographic features, higher depressive symptomatology and lower cognitive skills will be most strongly associated with declines over time in OF areas.

Methods

Sample and Design

The participants for this study were recruited and enrolled in a naturalistic, longitudinal study (prospective) of BD (Prechter Longitudinal Study of BD), with the goal of gathering phenotypic information and biological material for the Prechter Bipolar Repository at the University of Michigan (Langenecker, Saunders, Kade, Ransom, & McInnis, 2010). Recruitment for the longitudinal study occurred through an outpatient specialty clinic, an inpatient psychiatric unit, and through advertisements on the web, in newspapers, on the radio, and on billboards. Written and verbal consent was obtained from the participants. The study was approved by the University of Michigan Institutional Review Board.

Evaluation at the baseline interview included the Diagnostic Interview for Genetic Studies (DIGS, Nurnberger et al, 1994), which captures clinical and psychosocial histories, neuropsychological assessment, and self-report measures of mood symptoms and work functioning. Participants' final diagnoses were determined by two MD- or PhD-level investigators using a best-estimate final diagnostic process that involved DIGS and a review of the participant's medical records. Following the baseline evaluation, bimonthly mailings were sent to participants in order to gather further clinical and socio-demographic information. These mailings included questionnaires of symptom and work functioning. Exclusion criteria included a diagnosis of schizophrenia, schizoaffective disorder - depressed type, or any medical illness associated with depressive symptoms (e.g., cancer, stroke).

Age, gender (male/female) and education (completed number of years in school) were collected from the DIGS during the baseline interview. Ethnicity and race was collected and a dichotomous variable named Ethnicity Code (Majority/Nonmajority) was created. All individuals who identified as Caucasian/Not Hispanic were placed in the Majority category while all others were placed in the Nonmajority category.

Of the 987 participants in the longitudinal follow-up study who had varied diagnoses, the present study includes 273 adult individuals with a DSM-IV diagnosis of bipolar I disorder (BDI; N=173), bipolar II disorder (BDII; N=69) and bipolar not otherwise specified (BDNOS; N=31). These individuals were chosen based on diagnosis and available data across the 5 years. Demographic, clinical, neuropsychological, and work functioning data were collected at the baseline interview (Year Baseline). In addition, follow-up symptom and work functioning data gathered from the mailings each year up to 5 years were used in this study (Year 1; Year 2; Year 3; Year 4; Year 5).

Clinical Variables

Number of hospitalizations and duration with BD illness were taken from the DIGS interview at baseline. Duration of illness is a continuous variable measured by the amount of time an individual has

been living with the illness. Information about psychosis was collected during the baseline DIGs interview based on ratings from the interviewer regarding the chronicity of the participant's psychotic symptoms that occurred during mood episodes, and these categories included 1) no psychosis, 2) fleeting psychosis, 3) occurring during only 1 episode, 4) occurring during 2 or more episodes.

Mood Symptoms

Mood symptoms were measured using standardized self-report questionnaires at baseline and by mail for years 1 through 5.

The Altman Self-Rating Mania Scale (ASRM) is a 5-item self-report mania severity scale used to assess DSM-IV manic symptoms over the past week where higher scores indicate more manic-like symptoms. A score of 6 or higher indicates a high probability of a manic/hypomania episode (Altman, Hedeker, Peterson, & Davis, 1997) (See Appendix A). The ASRM is found to have a specificity of 85.5 and a sensitivity of 87.3 (Altman et al., 1997). Additionally, the ASRM is compatible with DSM-IV criteria, and when compared to Clinician Administered Rating Scale for Mania (CARS-M) (Altman et al., 1997; Altman, Hedecker, Peterson, & Davis, 2001) and the Young Mania Rating Scale (YMRS) (Young, Biggs, Ziegler, & Meyer, 1978) , the ASRM demonstrates good internal consistency and concurrent validity.

The PHQ-9 is a 9-item self-report scale used to assess depression symptoms over the past two weeks. Scores of 5, 10, 15 and 20 indicate mild, moderate, moderately severe and severe depression (Kroenke, Spitzer, & Williams, 2001) (See Appendix B). A sensitivity of 88% and specificity of 88% for a diagnosis of major depression disorder has been found for scores ≥ 10 and internal consistency reliability was determined to be .89 among a large sample of 3000 primary care patients (Kroenke et al., 2001). Construct validity was established with a strong association between PHQ-9 scores and functional status measured by the Medical Outcomes Study Short-Form General Health Survey (SF-20) (Kroenke et al., 2001).

Neurocognition

Cognitive functioning was measured during the baseline interview using an extensive neuropsychological test battery focusing on areas commonly affected in BD (memory, attention and executive functioning, processing speed, emotion processing): Wisconsin Card Sorting Test (cognitive flexibility/set shifting) (Heaton, 1981) , Rey-Osterrieth Complex Figure Test Immediate and Delayed Recall (visual learning and memory) (Meyers & Meyers, 1995) , California Verbal Learning Test-II Total, Short Delay Recall, and Long Delay Recall (verbal learning and memory; Delis & Kaplan, 2000) , The Trail Making Test-Parts A and B (processing speed and cognitive flexibility) (Armitage, 1946) ,

Wechsler Adult Scale of Intelligence and Digit Symbol Total (overall IQ; processing speed) (Wechsler, 1997), Purdue Pegboard (fine motor dexterity) (Lezak, 1995) , The Stroop Color and Word Test (processing speed; Golden, 1978) , Emotion Perception Test (emotional processing) (Green & Allen, 1997), Facial Emotion Perception Test (emotional processing) (Rapport, Friedman, Tzelepis, & Van Voorhis, 2002), Controlled Oral Word Association Test and Animal Fluency (FAS verbal fluency) (Benton & Hamsher, 1976; Lezak, 2004) , and the Parametric Go/ No-Go task (reaction time) (Langenecker et al., 2010) .

Work Functioning

The Life Functioning Questionnaire (LFQ) is a self-report questionnaire designed to assess work and role functioning in individuals with psychiatric disorders (Altshuler, Mintz, & Leight, 2002) (See Appendix C) and was administered at all 6 time points (Year Baseline-Year 5). In the LFQ, the term "work" designates individuals who are "usefully employed," even if not traditionally compensated or paid at all; thus, students and volunteers are included (Altshuler, Mintz, & Leight, 2002). The LFQ is a gender-neutral, 5-minute, 14-item self-report scale that assesses four domains, including "leisure time with friends" (3 items), "leisure time with family" (3 items), "duties at home" (4 items) and "duties at work, school or activity center" (4 items). Only the work domain was used for this study. The work items measure degree of difficulty functioning in: 1) "Time: amount of time spent at work"[1]; 2) "Performance: quality of work"; 3) "Conflict: getting along with coworkers and supervisors"; and 4) "Enjoyment: enjoyment/satisfaction and interest from work". Each item is rated on a 4-point scale: 1=no problems, 2=mild problems, 3=moderate problems, 4=severe problems. A score of $\leq$1 (no problems) indicates no impairment. A score of $\geq$2 on any item indicates some impairment in that domain. For the purposes of this study, the total score from the 4 items is used as the measure of work functioning to create functioning categories: 4=no problems/minimal problems: 5-8=mild problems, 9-12=moderate problems: 13-16=severe problems. The LFQ work scale was found to have very good test-retest reliability (r=.76) and excellent internal consistency reliability (α=.87) (Altshuler et al., 2002) . Good concurrent validity was found between the LFQ work subscale and the SAS-SR work items (r=.61) (Altshuler et al., 2002) . Chronbach's alpha for the 4 work items for each year were calculated specifically for this study and found to be strong for all years: .81 (Year Baseline), .87 (Year 1), .88 (Year 2), .88 (Year 3), .88 (Year 4), .78 (Year 5).

[1] The work item measure "Time" will be discussed as attendance at work throughout the paper.

Statistical Analysis

The data was analyzed using IBM SPSS version 22 (Statistical Package for the Social Sciences) and Stata version 13.1. Descriptive statistics and frequency distributions of the independent and dependent variables were created and provided in Tables 1 and 2. Bivariate Pearson or Spearman correlations were conducted between all continuous or dichotomous independent variables (i.e., demographic, clinical, neurocognitive) and the dependent variable (i.e., work functioning using LFQ). Significant relationships between the independent variables and the dependent variable were then used to determine predictors in the MLM. To determine the relationship between psychosis chronicity, an ordinal variable, and work functioning, one-way ANOVAs were conducted to determine group differences in psychosis chronicity (no psychosis, fleeting, 1 episode, 2 or more episodes). Tukey post-hoc tests were performed when significance was found between groups.

MLM with a random intercept was then employed. A two-level model was used, based on the ability to evaluate LFQ on two levels: level 1 (individual time point of each year; 6 time points total) and level 2 (the individual). MLM adjusts for standard errors over repeated administrations. This analysis was also used to predict the influence of time-varying variables (i.e., current depressive and manic symptoms) and time-constant variables (i.e., ethnicity code, sex[2], education, age, duration of illness, psychosis chronicity, Digit Symbol Total score, Parametric Go/No-Go Task reaction time to set-shifting, Wisconsin Card Sorting Test score, California Verbal Learning Test-II – long delay score) on work functioning (LFQ score) across 6 time points (Year Baseline to Year 5). Five models were run in order to identify predictors of the LFQ overall work functioning score (LFQ Total) as well as the individual LFQ item scores (LFQ Time, LFQ Conflict, LFQ Enjoyment, LFQ Performance).

Results

Descriptive Statistics

Descriptive statistics are reported in Tables 2.1 and 2.2. The average LFQ total score for all BD individuals at Baseline (first time point) was 7.24 (SD=2.95) with a minimum score of 0 and a maximum score of 16, which indicates moderate levels of impairment in work functioning. Mean age was 44 years (SD=2.95). Mean PHQ baseline score (depression at baseline) was 10.6 (SD=6.35), indicating moderate levels of depression, and mean ASRM baseline score (hypomania/mania at baseline) was 4.05 (SD=3.48), which is below the cut-off for a hypomanic/manic episode (6). Mean for duration of illness was 28 years (SD=13.9).

[2] Ethnicity code and sex were included in the MLM analyses, even though correlations to work functioning were not significant, because evidence from prior studies suggested that they had impact on work outcomes (Depp et al., 2012; Haro et al., 2011; Mur et al., 2009; Wingo et al., 2010).

Table 2.1: Descriptive Statistics of Continuous Variables

	N	Mean	SD	Min	Max
Work Functioning Outcome					
LFQ Total Baseline	74	7.24	2.95	4	16
LFQ Total Year 1	102	6.50	2.68	4	16
LFQ Total Year 2	75	6.50	3.08	4	16
LFQ Total Year 3	60	6.90	3.03	4	16
LFQ Total Year 4	34	5.90	2.74	4	16
LFQ Total Year 5	13	5.00	1.87	4	10
Demographic Variables					
Age	273	43.70	13.90	20	87
Education	273	15.08	2.16	9	21
Clinical Variables					
PHQ Baseline	140	10.60	6.35	0	27
PHQ Year 1	166	9.31	6.98	0	26
PHQ Year 2	134	7.94	6.53	0	27
PHQ Year 3	95	8.06	7.20	0	27
PHQ Year 4	47	7.09	6.56	0	27
PHQ Year 5	20	4.95	3.93	0	13
ASRM Baseline	141	4.05	3.48	0	16
ASRM Year 1	169	3.41	3.52	0	15
ASRM Year 2	137	2.70	2.97	0	14
ASRM Year 3	100	2.90	3.24	0	13
ASRM Year 4	49	2.35	2.95	0	12
ASRM Year 5	21	2.14	2.95	0	13
Duration of Illness	221	27.70	14.10	3	61
Neurocognitive Variables					
Verbal Memory	270	-0.24	1.28	-4.50	3.50
Cognitive Flexibility	265	36	30	1	99
Processing Speed	267	9.21	2.74	2.00	17.00
Attention/Response Control	267	477	58	372	707

Work Functioning Measure: LFQ=Life Functioning Questionnaire

Clinical Measures: PHQ=Patient Health Questionnaire

ASRM=Altman Self-Rating Mania Scale

Table 2: Frequency Distributions

Variable	Value	N	%
Psychosis Chronicity*			
No Psychosis	0	113	59
1 episode	1	35	18
2 or more episodes	2	44	23
Nonmajority Status*			
Nonmajority	0	45	17
Majority	1	221	81
Gender*			
Male	1	93	34
Female	2	180	66

*Collected at one time point during baseline clinical interview

Predictors Identified from Correlations and ANOVAs

Correlation results, reported in Appendix D, were considered significant if $p < .05$. Of the clinical variables included in these analyses, duration of illness (r=.45) and PHQ (r<.68) were found to be significantly correlated with LFQ Total. Demographic variables found to be significantly correlated with LFQ Total included age (r=.41) and education (r=-.25). Neurocognitive variables significantly correlated with LFQ Total included Rey Complex Figure Test (verbal memory; r=.22), cognitive flexibility (Wisconsin Card Sorting Test) (cognitive flexibility; r=-.30), Digit Symbol Total (processing speed; r=.27), and Parametric Go/No-Go test (reaction time to set-shifting; r=.39.

Significant between-group differences were found for psychosis chronicity and LFQ Total Year 3, F(4, 52)=3.54, p=.01. A post-hoc Tukey test revealed that those with fleeting psychosis had significantly higher scores on the LFQ Total (more overall work difficulty) than those with a history of psychosis in 1 episode or those with a history of psychosis in 2 or more episodes. See Appendix E.

Two-Level Model for LFQ Total

Results are reported in Table 2.3. The overall model was found to be significant (X^2=48.69, p<.001). Twelve predictors were added to the model to determine which clinical, neurocognitive and demographic variables were associated with LFQ Total (overall work functioning). PHQ, duration of illness, and cognitive flexibility were all significant as main effects indicating that individuals with higher depressive symptoms, longer duration of illness and greater deficits in cognitive flexibility start out with more difficulty with attendance at work. As PHQ increases by 1 point, LFQ Total increases by .17, indicating more work impairment and suggests a small substantive effect. As duration of illness increases by 1 year, LFQ Total increases (worsens) by .06, which suggests a very small substantive effect. As one's Wisconsin Card Sorting Test score (cognitive flexibility) increases (improves) by 1 percentage point, LFQ Total decreases (improves) by .04, a small effect. There was not a significant time trend. Interaction effects were analyzed for PHQ and ASRM. PHQ was found to be significant, suggesting that a high depression score has a small negative effect on work functioning (.035) over time. Lastly, 47% of LFQ Total (work functioning outcome) is explainable by time-invariant characteristics of individuals.

Table 2.3: Two-Level Model Results for LFQ Total (Overall Difficulty at Work)

Main Effects	**β**	**SE**	**z**	***p*-value**
Year	-0.24	0.17	-1.41	0.16
Ethnicity Code (Nonmajority)	0.75	0.59	1.28	0.20
Education	-0.17	0.11	-1.60	0.11
Age	-0.05	0.03	-1.58	0.11
Gender (Female)	-0.70	0.47	-1.49	0.14
PHQ	0.17	0.04	4.26	<.001**
ASRM	-0.04	0.06	-0.57	0.57
Years Ill	0.06	0.03	2.06	0.04**
Psychosis Chronicity (1 episode)	0.22	0.47	0.46	0.65
Psychosis Chronicity (2 or more episodes)	-0.18	0.47	-0.38	0.71
Verbal Memory	0.24	0.17	1.43	0.15
Cognitive Flexibility	-0.01	0.01	-2.14	0.03
Processing Speed	0.13	0.08	1.63	0.10
Response Control	0.01	0.00	1.40	0.16
Random Effects	**Estimate**	**SE**		
Var(u0)	2.08	0.60		
Var(residual)	3.65	0.42		
Interactions	**β**	**SE**	**z**	***p*-value**
PHQ	0.04	0.02	1.94	0.05**
ASRM	0.01	0.03	0.34	0.73

** = Statistically significant with *p*-value ≤ .05
Work Functioning Outcome: LFQ=Life Functioning Questionnaire
Clinical Measures: PHQ=Patient Health Questionnaire; ASRM=Altman Self-Rating Mania Scale

Two-Level Model for LFQ Time (Attendance at Work)

Results are reported in Table 2.4 for this model. The overall model was significant (X^2=27.62, *p*<.001). Of the 12 predictors included in this model, 6 were significant as main effects. Age, gender, PHQ, duration of illness, Wisconsin Card Sorting Test score (cognitive flexibility) and Digit Symbol Total score (processing speed) all explain initial differences in LFQ Time (attendance at work). All 6 variables had minimal to small substantive effects on LFQ Time with gender having the greatest association; being male is associated with a .25 increase in difficulty with attendance at work. As age increases by 1 year, LFQ Time decreases by .02, suggesting that older individuals with BD have less difficulty with attendance at work. As PHQ score increases by 1 point, LFQ Time increases by .06, indicating that a higher degree of depression predicts greater difficulty with time at work. LFQ Time increases by .02 as duration of illness increases by 1 year, suggesting that the longer someone is ill, the more problems they have with attendance at work. An increase (improvement) in the Wisconsin Card Sorting Test score by 1 percentage point is associated with a decrease in LFQ Time by .004, which suggests that those with better cognitive flexibility have less difficulty with attendance at work. Lastly, as the Digit Symbol Total score increases by 1 point, the LFQ Time score increases by .04, indicating the greater processing speed is associated with greater problems with attendance at work. The time trend and

interactions (PHQ and ASRM) were not significant for this model. Lastly, time-invariant characteristics of individuals with BD explain 33% of LFQ Time (work functioning outcome).

Table 2.4: Two-Level Model Results for LFQ Time (Difficulty with Attendance at Work)

Main Effects	**β**	**SE**	**z**	***p*-value**
Year	-0.06	0.06	-1.10	0.27
Ethnicity Code(Nonmajority)	0.10	0.15	0.66	0.51
Education	-0.03	0.03	-1.25	0.21
Age	-0.02	0.01	-2.42	0.02**
Gender (Female)	-0.25	0.12	-1.99	0.05
PHQ	0.06	0.01	4.62	0**
ASRM	0.00	0.02	-0.04	0.97
Duration of Illness	0.02	0.01	2.93	<.001**
Psychosis Chronicity (1 episode)	0.08	0.12	0.68	0.50
Psychosis Chronicity (2 or more episodes)	-0.07	0.12	-0.57	0.57
Verbal Memory	0.06	0.04	1.36	0.17
Cognitive Flexibility	0.00	0.00	-2.52	0.01**
Processing Speed	0.04	0.02	2.26	0.02**
Response Control	0.00	0.00	1.46	0.14
Random Effects	**Estimate**	**SE**		
Var(u0)	0.04	0.04		
Var(residual)	0.47	0.05		
Interactions	**β**	**SE**	**z**	***p*-value**
PHQ	0.01	0.01	1.67	0.10
ASRM	-0.01	0.01	-0.56	0.58

** = Statistically significant with *p*-value ≤ .05
Work Functioning Outcome: LFQ=Life Functioning Questionnaire
Clinical Measures: PHQ=Patient Health Questionnaire; ASRM=Altman Self-Rating Mania Scale

Two-Level Model for LFQ Conflict at Work

Results are reported in Table 2.5 for this model. The overall model was significant (X^2=37.80, p<.001). Of the 12 predictors included in this model, none were significant as main effects or interaction effects. A time trend was not found to be significant, either. Forty-four percent of LFQ Conflict (work functioning outcome) is explainable by time-invariant characteristics of individuals.

Table 2.5: Two-Level Model Results with LFQ Conflict (Difficulty Getting Along with Coworkers and Supervisors)

Main Effects	**β**	**SE**	**z**	***p*-value**
Year	-0.02	0.04	-0.36	0.72
Ethnicity Code (Nonmajority)	0.29	0.17	1.73	0.08
Education	-0.04	0.03	-1.33	0.19
Age	0.00	0.01	0.09	0.93
Gender (Female)	-0.10	0.13	-0.77	0.44
PHQ	0.00	0.01	0.09	0.93
ASRM	0.02	0.02	1.01	0.32
Years Ill	0.00	0.01	0.27	0.79
Psychosis Chronicity (1 episode)	-0.08	0.13	-0.58	0.56
Psychosis Chronicity (2 or more episodes)	0.07	0.13	0.54	0.59
Verbal Memory	0.03	0.05	0.63	0.53
Cognitive Flexibility	0.00	0.00	-1.51	0.13
Processing Speed	0.01	0.02	0.26	0.79
Response Control	0.00	0.00	0.34	0.74
Random Effects	**Estimate**	**SE**		
Var(u0)	0.19	0.05		
Var(residual)	0.24	0.03		
Interactions	**β**	**SE**	**z**	***p*-value**
PHQ	0.01	0.01	1.55	0.12
ASRM	0.00	0.01	-0.39	0.70

** = Statistically significant with *p*-value ≤ .05
Work Functioning Outcome: LFQ=Life Functioning Questionnaire
Clinical Measures: PHQ=Patient Health Questionnaire; ASRM=Altman Self-Rating Mania Scale

Two-Level Model for LFQ Enjoyment at Work

Results are reported in Table 2.6 for this model. The overall model was significant (X^2=36.58, p<.001). Of the 12 predictors added to the model, PHQ and Digit Symbol Total score (processing speed) were significant as main effects for LFQ Enjoyment. As the PHQ score increases by 1 point, LFQ Enjoyment goes up by .07, and as the Digit Symbol Total score (processing speed) increases by 1 point, LFQ Enjoyment increases by .05 points. Both predictors have small effects on the dependent variable. These findings indicate that higher depressive symptoms and greater processing speed predict greater difficulty in enjoying work for those with BD. A time trend and interactions with PHQ and ASRM were not significant for this model. Thirty-nine percent of LFQ Enjoyment (work functioning outcome) is explainable by time-invariant characteristics of individuals with BD.

Table 2.6: Two-Level Model Results for LFQ Enjoyment (Difficulty with Enjoyment at Work)

Main Effects	**β**	**SE**	**z**	***p*-value**
Year	-0.04	0.06	-0.67	0.50
Ethnicity Code	0.05	0.19	0.27	0.79
Education	-0.06	0.04	-1.61	0.11
Age	-0.01	0.01	-1.40	0.16
Gender (Female)	-0.19	0.15	-1.25	0.21
PHQ	0.07	0.01	4.97	<.001**
ASRM	-0.03	0.02	-1.26	0.21
Years Ill	0.01	0.01	1.47	0.14
Psychosis Chronicity (1 episode)	0.02	0.15	0.14	0.89
Psychosis Chronicity (2 or more episodes)	-0.02	0.15	-0.15	0.88
Verbal Memory	0.06	0.05	1.05	0.29
Cognitive Flexibility	0.00	0.00	-0.95	0.34
Processing Speed	0.05	0.03	2.16	0.03**
Response Control	0.00	0.00	1.42	0.16
Random Effects	**Estimate**	**SE**		
Var(u0)	0.14	0.06		
Var(residual)	0.57	0.06		
Interactions	**β**	**SE**	**z**	***p*-value**
PHQ	0.01	0.01	0.83	0.40
ASRM	0.01	0.01	1.20	0.23

** = Statistically significant with *p*-value ≤ .05
Work Functioning Outcome: LFQ=Life Functioning Questionnaire
Clinical Measures: PHQ=Patient Health Questionnaire; ASRM=Altman Self-Rating Mania Scale

Two-Level Model for LFQ Performance at Work

Results are reported in Table 2.7 for this model. The overall model was significant (X^2=36.43, p<.001). Two of the 12 predictors were significant, PHQ and Wisconsin Card Sorting Test score (cognitive flexibility). As PHQ score increases by 1 point, LFQ Performance (difficulty with one's quality of work) increases by .06 points, which is a small substantive effect. An increase (improvement) in Wisconsin Card Sorting Test score (cognitive flexibility) by 1 percentage point is associated with a decrease in LFQ Performance by .01, a very small substantive effect. These findings suggest that as depression and cognitive flexibility worsen, individuals with BD have increased difficulties with the quality of their work. There was not a significant time trend, and interactions with PHQ and ASRM were not significant either. Lastly, time-invariant characteristics of individuals with BD explain 40% of the work functioning outcome, LFQ Performance.

Table 2.7: Two-Level Model Results for LFQ Performance (Difficulty with Quality of Work)

Main Effects	**β**	**SE**	**z**	***p*-value**
Year	-0.06	0.05	-1.17	0.24
Ethnicity Code	0.25	0.17	1.46	0.14
Education	-0.04	0.03	-1.23	0.22
Age	-0.01	0.01	-0.98	0.33
Gender (Female)	-0.03	0.14	-0.23	0.82
PHQ	0.06	0.01	4.56	<.001**
ASRM	-0.02	0.02	-0.91	0.36
Years Ill	0.01	0.01	1.16	0.25
Psychosis Chronicity (1 episode)	-0.01	0.14	-0.08	0.94
Psychosis Chronicity (2 or more episodes)	-0.03	0.14	-0.20	0.84
Verbal Memory	0.06	0.05	1.29	0.20
Cognitive Flexibility	-0.01	0.00	-2.65	0.01**
Processing Speed	0.03	0.02	1.31	0.19
Response Control	0.00	0.00	1.80	0.07
Random Effects	**Estimate**	**SE**		
Var(u0)	0.15	0.05		
Var(residual)	0.40	0.05		
Interactions	**β**	**SE**	**z**	***p*-value**
PHQ	0.01	0.01	0.99	0.32
ASRM	0.01	0.01	0.82	0.41

** = Statistically significant with p-value ≤ .05

Work Functioning Outcome: LFQ=Life Functioning Questionnaire

Clinical Measures: PHQ=Patient Health Questionnaire; ASRM=Altman Self-Rating Mania Scale

Discussion

This study employed MLM to determine which demographic, clinical and neurocognitive characteristics of individuals with BD predict work functioning over a 5-year period. Depression and cognitive flexibility accounted for participants' greatest impediments in overall work functioning.

Depression

As hypothesized, and in keeping with prior literature (Altshuler et al., 2007; Altshuler et al., 2006; Bearden et al., 2011; Gitlin et al., 2011; Rosa et al., 2009; Swann, Lijffijt, Lane, Steinberg, & Moeller, 2009; Tse et al., 2014), depression symptoms were significantly associated with many aspects of work functioning. Compared to individuals with BD with lower levels of depression, those with higher levels of depression had poorer work attendance, lower quality of work and reduced satisfaction from work. These findings reporting on specific employment domains extend beyond most other prior studies in that they provide a more detailed examination of different areas of OF associated with BD compared to reporting on a single measure of overall work functioning. Identifying specific vocational associations with depression reveal more precise intervention targets than are captured by a unidimensional measure of overall occupational functioning. Although job satisfaction and work performance are significant aspects of work functioning, attendance at work is of particular importance given that missing work on a regular basis is more likely to lead to job loss compared to problems in other domains.

A second extension over prior studies is the understanding that the association between higher depression and poorer work functioning persists over a 5-year period. Prior longitudinal studies typically only extend over a 1-year period (Bauer et al., 2001; Gitlin et al., 2011). Investigating predictors of work over time is necessary given the chronic nature of BD (Judd et al., 2003) and the persistence of functional impairments (Altshuler et al., 2006). Additionally, the increasing negative effect that depression has on work outcomes over time, based on these findings, underscores the importance of intervening to improve depression, even subclinical symptoms, which can likely have beneficial effects on OF over the long term.

Cognitive Flexibility

Consistent with prior literature (Altshuler et al., 2007; Bearden et al., 2011; Bonnín et al., 2010; Martinez-Aran et al., 2007), neurocognitive deficits in cognitive flexibility (i.e., the inability to generate multiple ideas and consider alternative responses) were significantly associated with work functioning. Cognitive flexibility deficits were associated with greater attendance problems and poorer work performance. Our findings provide a unique contribution to the literature by revealing that deficits in specific areas of the neurocognitive domain can predict differing work problems. This again emphasizes the importance of measuring work functioning as a multidimensional concept as well as considering specific neurocognitive areas. In addition, these findings suggest that taking a general approach to neurocognitive remediation[3] may not be as beneficial as targeting specific deficits in the context of their relative work impairments.

Mania and Processing Speed

Although mania has been associated with poor work status in previous studies (Elinson et al., 2007), none of the models within this study found mania to be a predictor of work functioning. Curiously, and contrary to prior research (Bonnín et al., 2010; Depp et al., 2012; Elinson et al., 2007; Fleck et al., 2008), higher rates of processing speed were associated with *poorer* attendance at work and *reduced* enjoyment at work. This result seems counter-intuitive given that faster processing speed would appear to be an advantage in the workplace. However, it is possible that the increased processing speed in this study may be best considered as an early-stage manic symptom that could be interfering with work attendance and enjoyment. The ASRM, the mania scale used in this study, only assesses 5 manic symptoms (i.e., feelings of elation, increased self-esteem, decreased need for sleep, increased talkativeness, increase in activity) and does not measure accelerated thinking. It is possible that that

[3] Neurocognitive remediation is an intervention designed to reduce cognitive deficits through ongoing practice of cognitive-related tasks.

work-related hardships associated with increased processing speed are better attributed to an indication of mania as opposed to an indication that high processing speeds impair work functioning directly.

Another plausible explanation for the association between faster processing speed and greater occupational hardships may relate to the fact that many individuals with BD are working at levels well below their functional ability (Coryell et al., 1993; Marwaha et al., 2013). Working below one's functional ability is likely associated with increased frustration and boredom on the job. This fits with consistent findings indicating that individuals with BD have higher levels of education than the general population (Carlborg et al., 2014; Schoeyen et al., 2011), yet have far greater work impairments and unemployment rates (Huxley & Baldessarini, 2007; Kupfer et al., 2002). Determining the precise nature of the relationships between processing speed, manic symptoms, and work functioning is beyond the scope of this study. However, further research in this area could provide significant insights that could inform interventions aimed at increasing OF among those with BD.

Additional Predictors

This study found duration of illness and age each to be significant contributors to work functioning in BD. Consistent with prior work (Altshuler et al., 2007; Burdick et al., 2010; Elinson et al., 2007), longer duration of illness is associated with overall poor work functioning, particularly with attendance at work. Inconsistent with most findings on age (Elinson et al., 2007; G. E. Simon et al., 2008; Waghorn et al., 2007), this study found that younger individuals with BD had greater difficulty with OF (i.e., attendance at work). In fact, only one other study has found that younger individuals with BD experience poorer work functioning compared to older individuals (Hammen et al., 2000). Aside from the current study, this was the only other longitudinal study to include age as a predictor while measuring OF in terms of work functioning as opposed to work status (employed vs. unemployed).

The present study also revealed that among any age group of individuals with BD, those with a longer duration of illness are at an elevated risk of poor work attendance. However, between age groups, younger individuals with a longer duration of illness fared worse at work than older individuals with the same length of illness. A potential explanation for this finding is that younger individuals with an early disease onset have spent less time in the workforce and are therefore more vulnerable to negative impacts from BD symptoms in the workplace. Additional research examining this interaction between duration of illness and age as it relates to work functioning may help to reveal the need for more tailored treatments based on a history of BD symptoms as well as work experience.

Lastly, this study did not find psychosis chronicity to be a significant predictor of work functioning. This lack of significance may be due to mediating relationships between psychosis, cognitive flexibility deficits and work outcomes. Psychosis, for example, has been associated with deficits

in cognitive flexibility in individuals with BD (Arts et al., 2008) and cognitive flexibility deficits predicted work functioning within this study. It may be that psychotic symptoms worsen cognitive flexibility deficits, which in turn directly impact work functioning. Understanding the nature of this relationship is beyond the scope of the present study. However, further research studying this interplay may reveal the need for more tailored treatments targeting psychosis and cognitive flexibility deficits within the context of work.

Individual Variance

Prior research examining predictors of work functioning use traditional methods for longitudinal analysis [e.g., logistic regressions and repeated measures ANOVAs (Gilbert et al., 2010; Tse et al., 2014)], which do not account for unobserved differences between participants in the study. This study is the first to employ MLM, a technique that measures individual variance, and found that individual-level, time-invariant characteristics accounted for a moderate amount of variance (33-47%) in work functioning outcomes over time. These findings suggest that qualities unique to each person (e.g., personality characteristics, employee-job fit) and unrelated to the BD features included in this model account for almost half of the variation in how they perform at work. This highlights the importance of developing interventions for functional recovery that not only focus on the impact of the illness but on specific traits of each person receiving the treatment.

Limitations

In order to gather work functioning information, we used a self-report measure that was mailed out to all participants bimonthly. A clinician-administered instrument may provide more detailed and more accurate data on impairments at work (e.g., clarifying questions by the clinician or the consideration of the impact of mood symptoms on responses). However, due to the size (over 1,000 participants) and the duration of this longitudinal study, bimonthly mailings were determined to be the most efficient means of capturing data. This study also did not separate out BD diagnostic categories (bipolar I disorder, bipolar II disorder, bipolar disorder NOS) in the analysis, despite known differences among the groups in terms of clinical and neurocognitive outcomes (Solé et al., 2010). Future research that segregates and compares these groups may help identify work-outcome predictors unique to each group, and thus may identify treatment targets unique to each group. This study was also unable to account for medication use, raising concern of a potential medication effect on cognition and/or employment, but the study was not sufficiently powered to detect medication effects given that few patients were not taking medication and participants on medication were taking a wide variety of medications. Finally, our sample

included only individuals residing in a single Midwestern county and results obtained from this group may not generalize to the broader BD population.

Conclusions

The main findings from this 5-year longitudinal study with a large sample size reveal that depressive symptoms and deficits in cognitive flexibility are the greatest predictors of how well individuals with BD function at work, above all other clinical, demographic and neurocognitive features. Results from this study also suggest that individuals with BD experience difficulties in various aspects of work functioning with the greatest difficulty involving attendance at work. Work attendance problems are notable not only because consistent attendance at work can prevent job loss, but attending work also provides individuals with BD with a structured schedule and a greater chance for support from both coworkers and supervisors (Priebe et al., 1998). In addition, the present study is the first study to examine predictors of work conflict among BD patients quantitatively and found that those with BD may not have substantial difficulty getting along with coworkers and supervisors due to their clinical symptoms as prior qualitative research suggests.

Finally, this study emphasizes the need for interventions that specifically focus on the treatment of depressive symptoms and neurocognitive deficits within the context of work functioning, particularly attendance at work. Work impairments within this population may threaten job stability and a steady income and lead to a worse course of illness (Huxley & Baldessarini, 2007; Priebe et al., 1998). Therefore, if developed and applied effectively, such therapeutic techniques may enable BD patients to live more productive, financially secure and satisfying lives.

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CHAPTER 3

EFFECTS OF INTERPERSONAL FEATURES OF INDIVIDUALS WITH BIPOLAR DISORDER ON EMPLOYMENT OUTCOMES

Background and Significance

Bipolar disorder (BD) is a chronic psychiatric condition that leads to profound disruptions in psychosocial functioning: as few as 19% of those suffering from BD are married (compared to 60% of the general population) (Abood, Sharkey, Webb, Kelley, & Gill, 2002) , 25% are unable to live independently (Revicki et al., 2005), and adults with BD are more likely than healthy controls to live below the poverty level (Ruesch, Graf, Meyer, Rossler, & Hell, 2004b). Occupational functioning (OF) is particularly concerning for persons with BD due to their high unemployment rates (65%) and their high rates of vocational impairment (80%) (Carlborg et al., 2014; Huxley & Baldessarini, 2007; Schoeyen et al., 2011). These poor employment outcomes lead to high levels of financial disability worldwide and $14.1 billion (salary-equivalent) lost productivity within the United States on an annual basis (Kessler et al., 2006; Murray & Lopez, 1996). Those with BD not only suffer the financial loss of unemployment but also experience greater psychopathology, lower rates of social support and self-esteem, and a poorer quality of life (Nordt, Müller, Rössler, & Lauber, 2007; Priebe et al., 1998; Ruesch et al., 2004b). Given the variety of negative consequences a person with BD can suffer as a result of poor OF, it is essential for these deficits to be successfully remediated.

Current evidence-based BD treatments (medication plus bipolar-specific psychotherapy) do not effectively address employment outcomes (Miklowitz et al., 2007; Miklowitz & Scott, 2009). Following bipolar-specific treatment, as few as 25% achieve functional recovery due to persistent work impairments, unemployment, and disability status (Gitlin et al., 2011; Hammen et al., 2000; Keck et al., 1998; Strakowski et al., 1998; Tohen et al., 2012; Tohen et al., 2003).

A limited number of cognitive-behavioral treatments have been developed to remediate poor OF for those with mental health conditions, yet none have been tested in BD (Heimberg et al., 1990; Himle et al., 2014; Moitra et al., 2011; Stein & Kean, 2000; Tolman et al., 2009). Finally, occupational therapy interventions, such as supported employment, have been designed to target OF, but do not generalize to the BD population (Arbesman & Logsdon, 2011; Osuji & Cullum, 2005; Tse & Yeats, 2002). There is a

clear need for more effective interventions targeting poor work functioning for those with BD. However, a better understanding of which features of the illness affect OF is first required.

Studies aimed at identifying predictors of OF among individuals with BD traditionally examine clinical, neurocognitive, and socio-demographic variables (Bauer et al., 2001; Bonnín et al., 2010; Cerit et al., 2012; Judd et al., 2005; Rosa et al., 2009). Additional features of the disorder, such as interpersonal characteristics, may be associated with work functioning but have generally been overlooked within the literature (A. M. Gilbert et al., 2010; Tse et al., 2014). To maintain successful work functioning, most employment situations benefit from the employee's ability to foster positive working relationships with supervisors or coworkers, particularly in the face of work problems (Depp et al., 2012; Tse et al., 2014). Therefore, individuals with BD who exhibit high levels of certain characteristics known to interfere with interpersonal functioning (e.g., neuroticism, impulsivity, hostility, social anxiety) may experience greater OF deficits than individuals who are better adjusted socially. Further research identifying how interpersonal characteristics affect work functioning in those with BD could inform novel approaches to remediating functional outcomes for this population.

Enduring dimensions of the human personality that impact actions, thoughts, and feelings are found to differ in those with BD compared to healthy controls (Barnett et al., 2011; McCrae & Costa, 1997)[4]. Euthymic individuals with BD are higher in neuroticism and openness but lower in extraversion, conscientiousness, and agreeableness. Although personality traits have been associated with employment status (Kanfer, Wanberg, & Kantrowitz, 2001) and job motivation (Judge, Erez, Bono, & Thoresen, 2002; Salgado & Rumbo, 1997) in healthy controls, their influence on work outcomes in individuals with BD is not clearly understood. Of the two known studies examining the relationship between personality traits and OF outcomes (Hammen et al., 2000; Ryan et al., 2013), extraversion was the only trait found to be positively associated with better job status at a 6-month follow-up (Hammen et al., 2000). There is a clear need for more research examining how personality traits of individuals with BD affect OF.

In addition, due to differences in how personality traits present themselves, they may be associated with work functioning in distinct ways. For example, individuals with higher degrees of neuroticism (i.e., moodiness/anxiety) could experience impaired work performance and lack of enjoyment at work, whereas those low in conscientiousness (i.e., self-discipline) could have difficulty with attendance at work. Research measuring distinct aspects of work functioning (e.g., performance, attendance, conflict, enjoyment) may reveal significant associations between personality traits and specific work functioning domains and may better inform treatment innovations for those with BD.

[4] Costa and McCrae (1992) identified 5 stable personality traits (neuroticism, extraversion, openness to experience, agreeableness, conscientiousness) that have been well established within the literature to represent the dimensions of personality that exist cross-culturally (McCrae & Costa, 1997).

Other prominent interpersonal characteristics of BD, specifically impulsivity, hostility, and social anxiety (Merikangas et al., 2007; Swann, Lijffift, Lane, Steinberg, & Moeller, 2009) , are not well studied within the context of work functioning despite these characteristics persisting throughout all mood states (i.e., euthymic, depressed, manic, and mixed states) (Dervic et al., 2015) and impacting the long-term course of the illness (Strakowski et al., 2010; Swann et al., 2009). Trait-impulsivity, the tendency to make decisions hastily and to act without thinking, was measured in only one cross-sectional study and was correlated with work impairments (Jimenez et al., 2010). Hostility, the experience of frequent negative affect and a readiness to express anger in response to conflict, has not been examined as a predictor in any literature on work functioning in individuals with BD. Lastly, social anxiety one of the most common comorbidities of BD (McElroy et al., 2001; Merikangas et al., 2007), involves the excessive, persistent fear of being judged or humiliated and often results in the avoidance of interpersonal interactions (N. M. Simon et al., 2004). Surprisingly, social anxiety was not found to be a significant predictor of work status (employed vs. unemployed) for individuals with BD (Pini et al., 2006; Ryan et al., 2013; Zimmerman et al., 2010), perhaps due to the way OF was measured. Considering the profound impact impulsivity, hostility, and social anxiety could potentially have at work (e.g., rash decisions at work, altercations with coworkers and supervisors, avoidance of work entirely), further research measuring impairments in work performance may better determine the association they have on poor employment outcomes for individuals with BD. In addition, an extended longitudinal study that measures changes in work outcomes would more clearly determine the influence of impulsivity, hostility and social anxiety have on work functioning for those with BD over time.

Mood symptoms are the features of BD most commonly associated with poor work outcomes and are therefore important to consider when determining predictors of OF (Bauer et al., 2001; Bonnín et al., 2010; Cerit et al., 2012; Elinson et al., 2007; Gitlin et al., 2011; Judd et al., 2005; Rosa et al., 2009). Current depressive symptoms have been found to account for up to half of the variance in work impairments (Social Adjustment Scale) (Bauer et al., 2001) and mania has been found to predict unemployment (Elinson et al., 2007). The large amount of variance in work impairments explained by mood symptoms may be due to the limited research also examining interpersonal characteristics, despite an overlap of presentation between these two. Neuroticism (i.e., moodiness) and social anxiety, for example, appear similar to symptoms of depression, whereas, impulsivity and hostility present similarly to certain manic symptoms. The major difference is that interpersonal characteristics persist, even in the absence of mood symptoms, and could likely predict ongoing work impairments. Therefore, examining personality traits, impulsivity, hostility, and social anxiety in the same longitudinal model as depression and mania may provide a more accurate understanding of the degree to which mood symptoms—as opposed to interpersonal characteristics of BD—influence OF.

When examining how features of BD affect long-term OF outcomes, it is essential to consider the type of statistical method used to conduct longitudinal analyses. Traditional methods of longitudinal analysis (e.g., ordinary least squares or logistic regressions, or repeated measures ANOVAs) can be limiting in several ways. Such methods do not easily accommodate missing time points, potentially reducing the power of the study and biasing the results. The fluctuating nature of mood symptoms in this disorder, coupled with the significant time commitment of longitudinal research, lead one to expect missing follow-up data. Therefore, reducing the sample to participants with available data at all waves of a longitudinal study may not represent the larger population of those with BD. Multilevel modeling (MLM) has the ability to handle unbalanced and missing data. Another limitation of more traditional analytic methods is that changes over time are most often treated as linear. But changes in human behavior over time do not necessarily follow continuous and predictable paths, and the use of MLM allows for more flexible growth trajectories (e.g., curvilinear). Lastly, traditional methods of longitudinal analysis only estimate an overall average change of the sample, whereas MLM estimates variance on two levels, including the unobserved differences between participants in the study. MLM can be a powerful analytical tool with which to understand more accurately which features of BD are the greatest predictors of impaired OF.

The goal of this study is to use MLM to identify associations of mood and interpersonal characteristics to predict specific areas work functioning across a 5-year period in a large sample of individuals with BD. Based on current research, it is hypothesized that, out of a subset of clinical, interpersonal and demographic features, higher depressive symptomatology and social anxiety will be associated with declines in long-term work functioning within a range of occupational domains. In addition, based on prior research, lower levels of extraversion and higher degrees of impulsivity will be associated with declines in work functioning

Methods

Sample and Design

The participants for this study were recruited and enrolled in a naturalistic, longitudinal study (prospective) of individuals with BD (Prechter Longitudinal Study of BD) with the goal of gathering phenotypic information and biological material for the Prechter Bipolar Repository at the University of Michigan (Langenecker et al., 2010). Recruitment for the longitudinal study occurred through an outpatient specialty clinic, an inpatient psychiatric unit, and through advertisements on the web, in the newspaper, on the radio and on billboards. During enrollment, written and verbal consent was obtained from the participants. The study was approved by the University of Michigan Institutional Review Board.

Evaluation at the baseline interview included the Diagnostic Interview for Genetic Studies (DIGS) (Nurnberger et al., 1994), which captures clinical and psychosocial histories, neuropsychological assessment and self-report measures of mood symptoms and work functioning. Participants' final diagnoses were determined by two M.D. or Ph.D. level investigators using a best estimate final diagnostic process using the DIGS and review of medical records. Annual follow-up interviews (years 1-5) were conducted to gather further clinical, socio-demographic and neuropsychological data. Exclusion criteria for BD groups included a diagnosis of schizophrenia, schizoaffective disorder - depressed type, or a medical illness that is associated with depressive symptoms (e.g., cancer, stroke).

Age, gender (male/female) and education (completed number of years in school) were collected from the DIGS during the baseline interview. Ethnicity and race was collected and a dichotomous variable named Ethnicity Code (Majority/Nonmajority) was created. All individuals who identified as Caucasian/Not Hispanic were placed in the Majority category while all others were placed in the Nonmajority category.

Of the 987 participants in the longitudinal follow-up study who have varied diagnoses, the present study includes 187 adult individuals with a DSM-IV diagnosis of bipolar I disorder (BDI; 138), bipolar II disorder (BDII; 36) and bipolar disorder not otherwise specified (BD NOS; 13). These individuals were chosen based on diagnosis and the availability of data specifically needed for this study (e.g., assessment of social anxiety and interpersonal characteristics). Demographic, clinical, neuropsychological and work functioning data were collected during the baseline interview (initial assessment following enrollment). In addition, follow-up symptom and work functioning data gathered from the mailings each year up to 5 years were used in this study (Year 1; Year 2; Year 3; Year 4; Year 5).

Mood Symptoms

Mood symptoms were measured using standardized self-report questionnaires at baseline and by mail for years 1 through 5.

The Altman Self-Rating Mania Scale (ASRM) is a 5-item self-report mania severity scale used to assess DSM-IV manic symptoms over the past week where higher scores indicate more manic-like symptoms. A score of 6 or higher indicates a high probability of a manic/hypomanic episode (Altman et al., 1997) (See Appendix A). The ASRM is found to have a specificity of 85.5 and a sensitivity of 87.3 (Altman et al., 1997). Additionally, the ASRM is compatible with DSM-IV criteria, and when compared to Clinician Administered Rating Scale for Mania (CARS-M) (Altman et al., 1997; Altman, Hedeker, Peterson, & Davis, 2001) and the Young Mania Rating Scale (YMRS) (Young, Biggs, Ziegler, & Meyer, 1978) , the ASRM demonstrates good internal consistency and concurrent validity.

The PHQ-9 is a 9-item self-report scale used to assess depression symptoms over the past two weeks. Scores of 5, 10, 15 and 20 indicate mild, moderate, moderately severe and severe depression (Kroenke et al., 2001) (See Appendix B). A sensitivity of 88% and specificity of 88% for a diagnosis of major depression disorder has been found for scores ≥ 10 and internal consistency reliability was determined to be .89 among a large sample of 3000 primary care patients (Kroenke et al., 2001). Construct validity was established with a strong association between PHQ-9 scores and functional status measured by the Medical Outcomes Study Short-Form General Health Survey (SF-20) (Kroenke et al., 2001) .

Social Anxiety

The presence of a comorbidity of social anxiety was taken from the best estimate final diagnostic process based on the DIGS and review of medical records at baseline interview.

Personality Traits

The revised NEO Personality Inventory (NEO-PI-R) captures five global personality traits: neuroticism, extraversion, openness to experience, agreeableness, conscientiousness (P. T. Costa, Jr. & McCrae, 2008; P. T. Costa & McCrae, 1992) and was administered at one time point during the baseline interview. This measure has good consensual validity between self and the spouse (.53-60), as well as good convergent/discriminant validity compared to other well-established personality measures including the Minnesota Multiphasic Personality Inventory and the Million Clinical Multi-axial Inventories (McCrae & Costa, 1989, 1992). The NEO has been tested across age, gender and culture and found to have good universality and test-retest reliability was found to be .70-.79 (P. T. Costa & McCrae, 1992).

Impulsivity

Impulsivity was measured at baseline interview using the Barratt Impulsiveness Inventory, version 11 (BIS-11) (Patton, Stanford, & Barratt, 1995), a 30-item, self-report measure with three subscales that were tested using an exploratory principal component analysis: cognitive impulsivity (making quick cognitive decisions), motor impulsivity (acting without thinking) and non-planning impulsivity (lack of planning for the future) (See Appendix F). Items are rated from 1 (rarely/never) to 4 (almost always/always) with scores ranging from 30-120. A higher score indicates higher levels of impulsivity. Further psychometrics properties of this measure have been widely tested in both adults and adolescents and BIS-11 was found to have good internal consistency (.69-.83), test-retest reliability (.66-.83), and criterion-related validity in nonclinical and clinical populations (Vasconcelos, Malloy-Diniz, & Correa, 2012).

Hostility

The Buss-Durkee Hostility Inventory (BDHI) (Buss & Durkee, 1957) is a self-report measure that assesses eight areas of hostility: indirect hostility, verbal hostility, irritability, negativism, resentment, suspicion, guilt, and assault (See Appendix G). A higher total score based on true or false questions indicates a greater amount of overall hostility. The BDHI was found to have a test-retest reliability (r=.82) and high internal consistency (Biaggio, Supplee, & Curtis, 1981). Furthermore, there is also a positive correlation between the BDHI and other self-report hostility measures, providing evidence of convergent validity for the BDHI (Matthews, Jamison, & Cottington, 1985).

Work Functioning

The Life Functioning Questionnaire (LFQ) is a self-report questionnaire designed to assess work and role functioning in individuals with psychiatric disorders (Altshuler, Mintz, & Leight, 2002) (see Appendix C) and was administered at all 6 time points (Year Baseline-Year 5). In the LFQ, the term "work" designates individuals who are "usefully employed," even if not traditionally compensated or paid at all; thus, students and volunteers are included (Altshuler et al., 2002). The LFQ is a gender-neutral, 5-minute, 14-item self-report scale that assesses four domains, including "leisure time with friends" (3 items), "leisure time with family" (3 items), "duties at home" (4 items) and "duties at work, school or activity center" (4 items), only the work domain was used for this study. The work items measure degree of difficulty functioning in: 1) "Time: amount of time spent at work"[5]; 2) "Performance: quality of work"; 3) "Conflict: getting along with coworkers and supervisors"; and 4) "Enjoyment: enjoyment/satisfaction and interest from work". Each item is rated on a 4-point scale: 1=no problems, 2=mild problems, 3=moderate problems, 4=severe problems. A score of ≤1 (no problems) indicates no impairment. A score of ≥2 on any item indicates some impairment in that domain. For the purposes of this study, the total score from the 4 items is used as the measure of work functioning to create functioning categories: 4=no problems/minimal problems: 5-8=mild problems, 9-12=moderate problems: 13-16=severe problems. The LFQ work scale was found to have very good test-retest reliability (r=.76) and excellent internal consistency reliability (α=.87) (Altshuler et al. 2002) . Good concurrent validity was found between the LFQ work subscale and the SAS-SR work items (r=.61) (Altshuler et al., 2002) . Chronbach's alpha for the 4 work items for each year were calculated specifically for this study and found to be strong for all years: .81 (Year Baseline), .87 (Year 1), .88 (Year 2), .88 (Year 3), .88 (Year 4), .78 (Year 5).

[5] The work item measure "Time" will be discussed as attendance at work throughout the paper.

Statistical Analysis

The data was analyzed using IBM SPSS version 22 (Statistical Package for the Social Sciences) and Stata version 13.1. Descriptive statistics and frequency distributions of the independent and dependent variables are provided in Tables 1 and 2. Bivariate Pearson and Spearman correlations were conducted between all continuous or dichotomous independent variables (i.e., demographic and clinical) and the dependent variable (i.e., work functioning using LFQ). Significant relationships between the independent variables and the dependent variable were then used to determine predictors in the MLM.

MLM with a random intercept was then employed. A two-level model was used, based on the ability to evaluate LFQ on two levels: level 1 (individual time point of each year; 6 time points total) and level 2 (the individual). MLM adjusts for standard errors over repeated administrations. This analysis was conducted to predict the relationship of time invariant variables (i.e., neuroticism, agreeableness, openness, extraversion, conscientiousness, impulsivity, hostility, social anxiety diagnosis, ethnicity code, education, age, gender[1]) and time-varying variables (i.e., current depressed and manic symptoms) with work functioning (LFQ) across 6 time points (Year Baseline to Year 5). Five models were run in order identify predictors of the LFQ overall work functioning score (LFQ Total) as well as the individual LFQ item scores (LFQ Time, LFQ Conflict, LFQ Enjoyment, LFQ Performance).

Results

Descriptive Statistics

Descriptive statistics are reported in Tables 3.1 and 3.2. The average LFQ total score at Baseline (first time point) was 7.9 (SD=3.4) with a minimum score of 0 and a maximum score of 16, which indicates mild levels of impairment in work functioning. Mean age was 48 years (SD=13) and mean level of education was 16.1 years (SD=3). Mean PHQ baseline score (depression at baseline) was 9.1 (SD=.8), a mild level of depression. Mean ASRM baseline score (hypomania/mania at baseline) was 3.7 (SD=3.7) which is below the cut-off a hypomanic/manic episode (6).

[1] Ethnicity code, education, age, and gender were included in the MLM analyses even though correlations to work functioning were not significant due to evidence from prior studies suggesting their potential association with work outcomes (Depp et al., 2012; Elinson et al., 2007; Hammen et al., 2000).

Table 3.1: Descriptive Statistics of Continuous Dependent and Independent Variables

	N	Mean	SD	Min	Max
Work Functioning Outcome					
LFQ Total Baseline	13	7.90	3.40	4	16
LFQ Total Year 1	36	6.00	2.50	4	13
LFQ Total Year 2	12	6.90	3.80	4	13
LFQ Total Year 3	74	6.62	3.00	4	16
LFQ Total Year 4	73	6.41	2.90	4	13
LFQ Total Year 5	68	5.94	2.70	4	16
Demographics Variables					
Age	187	48	13	24	74
Education	182	16	3	10	30
Clinical Variables					
PHQ Baseline	179	9.10	0.80	0	27
PHQ Year 1	166	8.27	6.60	0	27
PHQ Year 2	146	6.94	6.27	0	27
PHQ Year 3	141	7.20	6.33	0	27
PHQ Year 4	118	6.38	6.04	0	27
PHQ Year 5	103	6.03	5.84	0	27
ASRM Baseline	184	3.75	3.73	0	17
ASRM Year 1	169	3.36	3.84	0	17
ASRM Year 2	153	3.01	3.37	0	14
ASRM Year 3	144	2.44	2.90	0	13
ASRM Year 4	123	2.46	2.80	0	12
ASRM Year 5	105	2.61	3.37	0	18
Impulsivity	187	66.70	7.90	42	96
Hostility	185	31.45	10.60	6	56
Neuroticism	187	63.80	14.50	26	97
Extraversion	187	48.00	12.00	18	79
Openness	187	57.10	12.90	28	91
Agreeableness	187	48.50	12.60	1	74
Conscientiousness	187	45.00	12.70	8	86

Work Functioning Measure: LFQ=Life Functioning Questionnaire
Clinical Measures: PHQ=Patient Health Questionnaire
ASRM=Altman Self-Rating Mania Scale

Table 2: Frequency Distributions

Variable	Value	N	%
Social Anxiety			
No	0	157	78
Yes	1	30	15
Gender			
Male	1	47	23
Female	2	136	67
Ethnicity Code			
Nonmajority	1	24	13
Majority	0	156	83

Relationships between Clinical/Demographic Variables and Work Functioning

Correlation results, reported in Appendix H, were considered significant if $p < .05$. Of the clinical variables included in these analyses, depression (PHQ score; r<.75), mania (ASRM score; r<.60), hostility

(Buss-Durkee score; r<.30), neuroticism (NEO; <.47), extraversion (NEO; r=.38), and social anxiety (r=.30) were found to be significantly correlated with LFQ Total. The only demographic variable found to be significantly correlated to LFQ Total was gender (r=.23).

Two-Level Model for LFQ Total

Results are reported in Table 3.3. The overall model was found to be significant (χ^2=20.60, p<.001). Ten predictors were added to the model to determine which clinical and demographic variables were associated with LFQ Total (overall work functioning). PHQ (depression score) was the only significant main effect; as PHQ increases by 1 point (greater depression), LFQ Total increases by .28, indicating more work impairment and suggests a small substantive effect. There was not a significant time trend. Interaction effects were analyzed for PHQ and ASRM, and the interaction of ASRM and time was found to be significant suggesting that a high mania score has a small negative effect on the trajectory of work functioning (.07) over time. Lastly, 37% of variation in LFQ Total is attributed to the individual with BD.

Table 3.3: Two-Level Model Results for LFQ Total (Overall Difficulty at Work)

Main Effects	**β**	**SE**	**z**	***p*-value**
Year	-0.24	0.19	-1.26	0.21
Age	0.02	0.01	1.40	0.16
Education	0.06	0.06	0.98	0.33
Sex (Male)	-0.36	0.40	-0.90	0.37
Ethnicity Code (Nonmajority)	-0.62	0.47	-1.31	0.19
PHQ	0.28	0.07	4.08	<.001**
ASRM	-0.18	0.10	-1.84	0.07
Neuroticism	0.01	0.02	0.53	0.60
Extraversion	0.01	0.02	0.83	0.40
Hostility	0.02	0.02	0.98	0.33
Social Anxiety (Yes)	0.72	0.54	1.33	0.18
Random Effects	**Estimate**	**SE**		
Var(u0)	0.69	0.67		
Var(residual)	4.97	0.72		
Interactions	**β**	**SE**	**z**	***p*-value**
PHQ	-0.01	0.02	-0.35	0.73
ASRM	0.07	0.03	2.64	0.01**

** = Statistically significant with p-value ≤ .05

Work Functioning Outcome: LFQ=Life Functioning Questionnaire

Clinical Measures: PHQ=Patient Health Questionnaire; ASRM=Altman Self-Rating Mania Scale

Two-Level Model for LFQ Time (Attendance at Work)

Results are reported in Table 3.4 for this model. The overall model was found to be significant (χ^2=23.66, p<.001). Ten predictors were added to the model to determine which clinical and demographic

variables predicted LFQ Time. PHQ and ASRM were both significant as main effects. As PHQ increases by 1 point, LFQ Time increases by .06 suggesting a small effect. This finding indicates that those with higher depressive symptoms start out with greater difficulty in attendance at work. As ASRM increases by 1 point, LFQ Time decreases by .07, a small effect, suggesting that individuals with higher manic symptoms have less difficulty with amount of time spent at work. There is a significant time trend for this model; each year LFQ score decreases by .14. This result indicates that with each year in the study, individuals with BD experience slightly less difficulty with the amount of time spent at work. Interaction effects were analyzed for PHQ and ASRM. ASRM was found to be significant suggesting mania moderates the time trend, in that a higher mania score has a minimal negative effect on attendance at work (.03) over time. Lastly, 40% of variation in LFQ Time is attributed to the individual with BD.

Table 3.4: Two-Level Model Results for LFQ Time (Difficulty with Attendance at Work)

Main Effects	**β**	**SE**	**z**	***p*-value**
Year	-0.14	0.06	-2.54	0.01**
Age	0.01	0.00	1.80	0.07
Education	0.03	0.02	1.56	0.12
Sex (Male)	-0.13	0.13	-1.00	0.32
Ethnicity Code (Nonmajority)	-0.26	0.15	-1.72	0.09
PHQ	0.06	0.02	2.97	<.001**
ASRM	-0.07	0.03	-2.46	0.01**
Neuroticism	0.00	0.00	-0.39	0.70
Extraversion	0.01	0.00	1.09	0.28
Hostility	0.01	0.01	1.87	0.06
Social Anxiety (Yes)	0.19	0.17	1.12	0.26
Random Effects	**Estimate**	**SE**		
Var(u0)	0.09	0.06		
Var(residual)	0.44	0.06		
Interactions	**β**	**SE**	**z**	***p*-value**
PHQ	0.00	0.01	0.19	0.85
ASRM	0.03	0.01	3.20	<.001**

** = Statistically significant with p-value ≤ .05

Work Functioning Outcome: LFQ=Life Functioning Questionnaire

Clinical Measures: PHQ=Patient Health Questionnaire; ASRM=Altman Self-Rating Mania Scale

Two-Level Model for LFQ Conflict

Results are reported in Table 3.5 for this model. The overall model was significant (χ^2=10.02, p<.001). Of the 10 predictors included in this model, PHQ was significant as a main effect; As PHQ increases by 1 point, LFQ Conflict increases by .06. This suggests that higher depressive symptoms slightly and negatively predict how well an individual with BD gets along with coworkers and supervisors. A time trend was not found to be significant. Interaction effects were analyzed for PHQ and ASRM and neither variable was found to be significant. 28% of variation in LFQ Conflict is attributed to the individual with BD.

Table 3.5: Two-Level Model Results with LFQ Conflict (Difficulty Getting Along with Coworkers/Supervisors)

Main Effects	**β**	**SE**	**z**	***p*-value**
Year	0.01	0.05	0.15	0.88
Age	0.01	0.00	1.77	0.08
Education	0.01	0.02	0.80	0.42
Sex (Male)	-0.05	0.12	-0.44	0.66
Ethnicity Code (Nonmajority)	0.05	0.14	0.34	0.73
PHQ	0.06	0.02	3.06	<.001**
ASRM	-0.02	0.03	-0.79	0.43
Neuroticism	0.01	0.00	1.33	0.18
Extraversion	0.00	0.00	0.60	0.55
Hostility	0.00	0.01	0.24	0.81
Social Anxiety (Yes)	-0.10	0.15	-0.63	0.53
Random Effects	**Estimate**	**SE**		
Var(u0)	0.09	0.05		
Var(residual)	0.34	0.05		
Interactions	**β**	**SE**	**z**	***p*-value**
PHQ	0.00	0.01	-0.73	0.46
ASRM	0.01	0.01	1.47	0.14

** = Statistically significant with p-value ≤ .05

Work Functioning Outcome: LFQ=Life Functioning Questionnaire

Clinical Measures: PHQ=Patient Health Questionnaire; ASRM=Altman Self-Rating Mania Scale

Two-Level Model for LFQ Enjoyment

Results are reported in Table 3.6 for this model. The overall model was significant (χ^2=6.45, p=.01). Of the 10 predictors added to the model, ethnicity code, PHQ, and social anxiety were significant as main effects with ethnicity having the greatest association; being a nonmajority is moderately associated with a .29 increase in difficulty experiencing enjoyment and interest at work. As PHQ score increases by 1 point, LFQ Enjoyment increases by .10, a small substantive effect, suggesting that higher depressive symptoms are mildly associated with difficulty with level of enjoyment and interest at work. Social anxiety is associated with an increase in LFQ Enjoyment by .40 suggesting that individuals with BD and social anxiety experience moderately greater difficulty with their level of enjoyment at work. A time trend and interactions with PHQ and ASRM were not significant for this model. 21% percent of variation in LFQ Enjoyment is attributed to the individual with BD.

Table 3.6: Two-Level Model Results for LFQ Enjoyment (Difficulty with Enjoyment at Work)

Main Effects	**β**	**SE**	**z**	***p*-value**
Year	0.00	0.07	0.04	0.97
Age	0.00	0.00	0.38	0.70
Education	0.00	0.02	0.03	0.98
Sex (Male)	-0.14	0.13	-1.07	0.28
Ethnicity Code (Nonmajority)	-0.29	0.16	-1.88	0.06
PHQ	0.10	0.02	4.36	<.001**
ASRM	-0.04	0.03	-1.21	0.23
Neuroticism	0.00	0.01	0.71	0.48
Extraversion	0.00	0.01	-0.01	0.99
Hostility	0.00	0.01	-0.15	0.88
Social Anxiety (Yes)	0.37	0.18	2.05	0.04**
Random Effects	**Estimate**	**SE**		
Var(u0)	0.02	0.07		
Var(residual)	0.67	0.09		
Interactions	**β**	**SE**	**z**	***p*-value**
PHQ	-0.01	0.01	-1.36	0.17
ASRM	0.02	0.01	1.60	0.11

** = Statistically significant with *p*-value ≤ .05

Work Functioning Outcome: LFQ=Life Functioning Questionnaire

Two-Level Model for LFQ Performance

Results are reported in Table 3.7 for this model. The overall model was significant (χ^2=25.47, p<.001). One of the 10 predictors was significant, the PHQ. As PHQ score increases by 1 point, LFQ Performance (difficulty with one's quality of work) increases by .05 points, which is a small substantive effect. These findings suggest that as depression worsens individuals with BD have greater difficulties with the quality of their work. There was not a significant time trend. Interaction effects were analyzed for PHQ and ASRM and ASRM was found to be significant suggesting that a high mania score has a minimal negative effect on work performance (.02) over time. Lastly, 41% of variation in LFQ Performance is attributed to the individual with BD.

Table 3.7: Two-Level Model Results for LFQ Performance (Difficulty with Quality of Work)

Main Effects	**β**	**SE**	**z**	***p*-value**
Year	-0.09	0.06	-1.58	0.11
Age	0.00	0.00	0.56	0.58
Education	0.02	0.02	0.96	0.34
Sex (Male)	-0.06	0.13	-0.46	0.64
Ethnicity Code (Nonmajority)	-0.10	0.16	-0.61	0.54
PHQ	0.05	0.02	2.64	0.01**
ASRM	-0.05	0.03	-0.17	0.08
Neuroticism	0.00	0.01	0.19	0.85
Extraversion	0.00	0.01	0.87	0.38
Hostility	0.01	0.01	1.34	0.18
Social Anxiety (Yes)	0.23	0.18	1.32	0.19
Random Effects	**Estimate**	**SE**		
Var(u0)	0.14	0.07		
Var(residual)	0.40	0.06		
Interactions	**β**	**SE**	**z**	***p*-value**
PHQ	0.00	0.06	0.73	0.47
ASRM	0.02	0.01	2.52	0.01**

** = Statistically significant with p-value ≤ .05

Work Functioning Outcome: LFQ=Life Functioning Questionnaire

Clinical Measures: PHQ=Patient Health Questionnaire; ASRM=Altman Self-Rating Mania Scale

Discussion

This study employed MLM to determine which demographic, clinical and interpersonal characteristics of individuals with BD predict work functioning at baseline and across a 5-year period. Depressive and manic symptoms accounted for participants' greatest impediments to overall work functioning.

Depression

Consistent with previous literature (L. L. Altshuler et al., 2006; Bearden et al., 2011; Gitlin et al., 2011; Rosa et al., 2009), the present study found that depression in individuals with BD was the greatest predictor of impaired work functioning. Those with higher rates of depression were more likely to experience impairments related to work attendance, conflict with coworkers and supervisors, quality of work and enjoyment from work. These prior studies all report on a single measure of overall work functioning, whereas this study measures work functioning as four separate domains. The results thus provide a more detailed understanding of how depression specifically affects employment outcomes. Further, these findings help to reveal more precise intervention targets that are better captured using a multidimensional measure of work functioning. Attendance at work, for example, may be particularly important to address in treatment, given that missing work is likely to result in job loss.

The models in this study did not find depression to predict ongoing impairments in work functioning, unlike prior results (Bauer et al., 2001; Gitlin et al., 2011; Judd et al., 2005; Mur et al., 2009). This

inconsistency may be due to the minimal to mild depressive symptoms found within this sample. Individuals with higher levels of depressive symptoms experience greater work impairments over time than those with lower levels of depression (Gitlin et al., 2011). Perhaps participants' levels of depression in this study were not high enough to result in a significant association with work functioning over the 5-year period. In addition, there was little variation in depression levels across time within this sample, which could also prevent our finding significant results. Further longitudinal studies are necessary to provide a more detailed understanding of how changes in the severity of depression predict work functioning over time.

Mania

Findings from this study indicated that mania was a significant predictor of work functioning. At baseline, higher levels of mania actually correlated with improved attendance at work. Yet over time, manic symptoms negatively affected overall work functioning, attendance at work, and work performance. Only two other known longitudinal studies found manic symptoms to predict work status and work impairments 6 months and 2 years out (Elinson et al., 2007; Gutierrez-Rojas, Jurado, & Gurpegui, 2011; Reed et al., 2010) while the majority of studies did not find any significant associations between mania and impaired work functioning (Bauer et al., 2001; Bearden et al., 2011; Bowie et al., 2010; Goldberg & Harrow, 2011; Judd et al., 2005; Martinez-Aran et al., 2007). This study provides a unique contribution to the literature by demonstrating that manic symptoms are initially associated with higher rates of work attendance compared to BD patients without manic symptoms. These results actually fit with our understanding of hypomanias and mild manias, in that slight increases in feelings of elation, energy, activity, and self-esteem have a tendency to improve productivity and functional performance. However, our results indicate that, as manic symptoms persist over time, attendance will decline and performance will be impaired. Therefore, intervening during early phases of hypomanic/manic episodes may prevent the onset of work impairments that eventually result from these ongoing mood symptoms.

Enjoyment at Work

Within the present study, social anxiety and nonmajority status were significantly associated with only one work domain-- enjoyment at work. Most prior studies did not find any significant associations between social anxiety or ethnicity/race and OF, likely due to the way OF was measured, either as work status (employed vs. unemployed) or as a unidimensional measure of work functioning (Bearden et al., 2011; A. M. Gilbert et al., 2010; Gitlin et al., 2011; Pini et al., 2006; Ryan et al., 2013; Zimmerman et al., 2010). By measuring distinct aspects of work functioning, this study revealed a unique finding in that

neither social anxiety nor a nonmajority status predicted actual work performance but predicted the level of satisfaction derived from work. Social anxiety involves a persistent and excessive fear of being judged by others, which results in extremely distressing interpersonal interactions (American Psychiatric Association, 2013; Simon et al., 2004). It is likely that individuals with both social anxiety and BD have greater difficulty in the social milieu at work, resulting in less enjoyment derived from their work. Those with a nonmajority status may also struggle interpersonally within their work environments. Individuals with BD already report the experience of stigma and feelings of alienation at work, due to their mental illness (Michalak, Yatham, Maxwell, Hale, & Lam, 2007; Sanchez-Moreno et al., 2010). Perhaps the additional experience of belonging to a nonmajority race or ethnicity further alienates people at work due to additional stigma, resulting in a lack of enjoyment or interest in work. These findings highlight the importance of measuring separate aspects of work functioning that may be overlooked by a general measure. In addition, research identifying ways to reduce levels of dissatisfaction at work due to anxiety or feelings of alienation has the potential to improve the quality of work life for a great number of individuals with BD.

Interpersonal characteristics

None of the interpersonal characteristics (i.e., neuroticism, extraversion, hostility) included in the multilevel model were found to be significant predictors of work functioning. One previous study found higher levels of extraversion to be correlated with being employed at 6-month follow-up (Hammen et al., 2006). Within this study, when looked at individually (i.e., correlation), this finding was replicated. However, when examined within a MLM among other potential predictors of work functioning such as mood, extraversion was not significant. This lack of significance may be due to mediating relationships between mood symptoms, interpersonal characteristics and work outcomes. Personality traits, impulsivity, and hostility are present at much higher rates during mood episodes (Barnett et al., 2011; Dervic et al., 2015; Lozano & Johnson, 2001; Strakowski et al., 2010; Swann et al., 2009). It may be that these interpersonal characteristics worsen mood symptoms/episodes, which in turn directly impact work functioning. Understanding the nature of this relationship is beyond the scope of the present study. However, further research studying the interplay between interpersonal characteristics, mood and work functioning may reveal the need for more tailored treatments targeting interpersonal functioning and mood symptoms within the context of work.

Individual Variance

This study employed MLM, a novel methodological approach to longitudinal analysis. Prior research has used more traditional methods to examine predictors of work functioning (e.g., logistic

regression and repeated measures ANOVA) (Gilbert et al., 2013; Tse et al., 2014) , which do not account for unobserved differences between participants. MLM, however, not only accounts for overall average changes of the sample but also measures individual variance. The findings from this study indicate that, at the individual level, time invariant characteristics account for a small to moderate amount of variance (21-41%) in work functioning, with attendance at work and work performance having the highest amount of variance (40-41%). These findings suggest that qualities unique to each person–unrelated to the features of BD included in this model–account for almost half of the variation in work performance and attendance at work. This highlights the importance of developing interventions for functional recovery that not only focus on the impact of the illness but on specific traits of each person receiving the treatment.

Limitations

In order to gather work functioning information, we used a self-report measure that was mailed out to all participants bimonthly. A clinician-administered instrument may provide more detailed and more accurate data on impairments at work by allowing for clarifying questions by the clinician and for the consideration of the impact of mood symptoms on responses. However, due to the size (over 1,000 participants) and the duration of this longitudinal study, bimonthly mailings were determined to be the most efficient means of capturing this data. This study also did not separate out BD diagnostic categories (bipolar I disorder, bipolar II disorder, bipolar disorder NOS) in the analysis, despite known differences among the groups in terms of clinical and neurocognitive outcomes (Solé et al., 2012). Future research that segregates and compares these groups may help identify work-outcome predictors unique to each group, and thus may identify treatment targets unique to each group. This study was also unable to account for medication use, raising concern of a potential medication effect on cognition and/or employment, but the study was not sufficiently powered to detect medication effects given that few patients were not taking medication and participants on medication were taking a wide variety of medications. Finally, our sample included only individuals residing in a single Midwestern county and results obtained from this group may not generalize to the broader BD population.

Conclusions

The major findings from this 5-year longitudinal study with 187 participants revealed that depressive and manic symptoms are the greatest predictors of work functioning, over demographics and interpersonal features of the disorder. More specifically, manic symptoms initially improved work functioning, but their persistence over time was associated with increased work impairment. Results from this study also suggest that individuals with BD experience particular difficulties related to attendance at

work. This is notable, considering that consistent work attendance among individuals with BD may prevent job loss, provide a structured schedule and greater social support, and reduce overall psychopathology (Priebe et al., 1998).

This study emphasizes the need for interventions that specifically focus on the treatment of mood symptoms within the context of work functioning. Even with the presence of evidence-based treatments designed to directly remediate mood symptoms and episodes, employed individuals with BD are still at risk for severe OF deficits (Gitlin et al., 2011; Hammen et al., 2000; Keck et al., 1998; Strakowski et al., 1998; Tohen et al., 2012; Tohen et al., 2003). The development of proper psychosocial interventions that effectively address both clinical aspects of the disorder and employment outcomes has significant implications for this population in terms of better clinical outcomes, financial security, interpersonal functioning and overall quality of life.

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CHAPTER 4

RELATIONSHIP BETWEEN SOCIAL ASPECTS OF THE WORK ENVIRONMENT AND WORK FUNCTIONING AMONG INDIVIDUALS WITH BIPOLAR DISORDER

Bipolar Disorder (BD) is a chronic mood disorder characterized by recurrent mood episodes and gross impairments in interpersonal, residential and occupational functioning (OF) (Huxley & Baldessarini, 2007; Kessler et al., 2006; Kupfer et al., 2002; Merikangas et al., 2007). As few as 19% of those suffering from BD are married (compared to 60% of the general population) (Abood et al., 2002); 25% are unable to live independently (Revicki et al., 2005); and adults with BD are more likely than healthy controls to live below the poverty level (Ruesch et al., 2004a). Occupational functioning (OF) is particularly problematic for individuals with BD due to high rates of unemployment (65%) and vocational impairments (80%) within this population (Carlborg et al., 2014; Huxley & Baldessarini, 2007; Schoeyen et al., 2011). Poor employment outcomes lead to high levels of financial disability worldwide and $14.1 billion (salary-equivalent) lost productivity within the United States on an annual basis (Kessler et al., 2006; Murray & Lopez, 1996). Beyond the financial loss, unemployed persons with BD experience greater psychopathology, lower rates of self-esteem, and a poorer quality of life (Nordt et al., 2007; Priebe et al., 1998; Ruesch et al., 2004a). Given the negative consequences a person with BD can suffer as a result of poor OF, it is essential for these deficits to be successfully remediated.

Current evidence-based BD treatments, medication plus bipolar-specific psychotherapy, do not effectively address employment outcomes (Miklowitz et al., 2007; Miklowitz & Scott, 2009). Even following bipolar-specific treatment, as few as 25% of individuals with BD achieve functional recovery due to persistent work impairments, unemployment, and disability status (Gitlin et al., 2011; Hammen et al., 2000; Keck et al., 1998; Strakowski et al., 1998; Tohen et al., 2012; Tohen et al., 2003). Of the limited number of evidence-based psychosocial treatments developed to remediate poor OF for those with mental health conditions, none have been tested in individuals with BD (Heimberg et al., 1990; Himle et al., 2014; Moitra et al., 2011; Stein & Kean, 2000; Tolman et al., 2009). In addition, supported employment, an occupational therapy intervention designed to target OF, does not generalize well to the BD population (Arbesman & Logsdon, 2011; Osuji & Cullum, 2005; Tse & Yeats, 2002). There is a

clear need for more effective interventions mitigating poor OF for those with BD and the first step is a better understanding of which features of the illness contribute to these work deficits.

Studies aimed at identifying predictors of OF among individuals with BD traditionally examine clinical, neurocognitive, and socio-demographic variables (Bauer et al., 2001; Bonnín et al., 2010; Cerit et al., 2012; Judd et al., 2005; Rosa et al., 2009). However, theories on the course of BD suggest that interpersonal stressors within one's work environment (e.g., conflict with a coworker or stigma at work[6]) could trigger mood symptoms and lead to impairments in work performance (Dienes et al., 2006; Grandin et al., 2006; Kennedy, 1983; Monk, 1990). Prior research has shown that individuals with bipolar illness experience greater interpersonal difficulties at work than those without the disorder. In a large sample of individuals with psychiatric disorders, 81% of individuals with mood disorders experienced severe bullying at work in the form of conflict or exclusion[7] compared to 55.7% for those with anxiety disorders and 51% for those with adjustment disorders (Nolfe, 2010). A qualitative study interviewing individuals with BD found that interpersonal problems (i.e., difficulty getting along with others, social isolation from work relationships, exposure to stigma at work) were reported as common experiences in the workplace (Michalak et al., 2007). A clear understanding of which interpersonal difficulties exert the greatest influence on those with BD and whether those difficulties are associated with poor OF may help to reduce the high rates of employment problems within the BD population (Huxley & Baldessarini, 2007).

Literature on social aspects of the work environment (e.g., conflict, exclusion, social support, stigma) among individuals with BD is limited in favor of a greater focus on individual features of the disorder (E. Gilbert & Marwaha, 2013; Tse et al., 2014). No known quantitative studies examined the associations between conflict or exclusion at work and OF. Only one qualitative study was identified that directly examined the relationship between work conflict and OF and found that individuals with BD reported that work conflict negatively impacted their work functioning (Michalak et al., 2007). There is a limited amount of literature on social support within the workplace and the results are inconsistent. Prior research has indicated that greater amounts of social support are associated with improved employment status and reduced disability rates among individuals with BD (Nordt et al., 2007; Priebe et al., 1998; Ruesch et al., 2004a), yet a recent cross-sectional study on predictors of OF in those with BD did not find social support to be a significant predictor of employment status (Ryan et al., 2013). Lastly, no known studies have directly measured the association between stigma at work and OF specifically among participants with BD. Although the current evidence demonstrates that individuals with BD are likely to experience conflict/exclusion from others, a lack of social support and exposure to stigma at work, it is

[6] Stigma at work within this study is defined as discrimination from others at work in response to negative stereotypes held about individuals with BD.

[7] Exclusion is a form of bullying that involves a one-way prolonged oppression towards another at work (Stoetzer, Ahlberg, Bergman, Hallsten, & Lundberg, 2009).

unclear whether these aspects of the work environment interfere with one's ability to successfully function at work or even maintain employment. A comprehensive examination of which social aspects of the work environment influence OF has the potential to contribute to the development of better interventions aimed at improving work conditions for those with BD and remediating poor work outcomes.

When examining predictors of OF for individuals with BD, one should also consider the influence of depression and mania given that mood symptoms, primarily depression, are the most common features of BD found to be associated with poor OF (Bauer et al., 2001; Bonnín et al., 2010; Cerit et al., 2012; Elinson et al., 2007; Gitlin et al., 2011; Judd et al., 2005; Rosa et al., 2009). Current depressive symptoms have been found to account for up to half of the variance in work impairments (Social Adjustment Scale) (Bauer et al., 2001) and mania has been found to predict unemployment (Elinson et al., 2007). However, there are limitations in the way OF is measured. This literature measures work outcomes in a variety of ways making it difficult to discern specifically which aspects of work these features of BD affect the most. Depressive symptoms (e.g., anhedonia, low energy, lack of motivation), for example, could be associated with how someone performs at work while manic episodes, such as irritability, grandiose thinking and impulsive behaviors, could more likely result in job loss. Further research measuring distinct aspects of work (work status versus functioning) within the same group of participants would better clarify the relationship between BD and poor OF. This improved understanding would inform treatment innovations that could lead to better work outcomes for BD patients.

Lastly, demographics important to consider as predictors of work functioning include education, age, and ethnicity due to prior research identifying significant associations with OF for individuals with BD. Older age and lower levels of education are consistently associated with poorer work outcomes in BD (Depp et al., 2012; Elinson et al., 2007; Haro et al., 2011; Mur et al., 2009; G. E. Simon et al., 2008; Waghorn et al., 2007; Wingo et al., 2010). In addition, whites were more likely to be employed than nonwhites among a sample of individuals with BD (Elinson et al., 2007). Sex differences have not been found to be significantly associated with work outcomes in those with BD (Mur et al., 2009; Reed et al., 2010; Ryan et al., 2013), yet these prior studies did not examine sex differences as they relate to interpersonal functioning while at work. It is uncertain whether sex differences would likely emerge as significant under these circumstances and should therefore be included in this analysis.

The goal of this study is to identify associations of mood and social aspects of the work environment to predict work status (working versus not working) and work functioning among a sample of individuals with BD. Based on current research, it is hypothesized that, out of a subset of demographics, mood symptoms, and social aspects of the work environment, age, education, and higher depressive symptomatology will be associated with poorer work functioning and a nonworking status. In

addition, lower levels of social support and higher degrees of stigma at work will also be associated with poorer work functioning and nonworking status.

Methods

Sample and Design

The participants for this study were recruited and enrolled in a prospective, naturalistic, longitudinal study of BD (Prechter Longitudinal Study of BD), with the goal of gathering phenotypic information and biological material for the Prechter Bipolar Repository at the University of Michigan (Langenecker et al., 2010). Recruitment for the longitudinal study occurred through an outpatient specialty clinic, an inpatient psychiatric unit, and through advertisements on the web, in newspapers, on the radio, and on billboards. Written and verbal consent were obtained from the participants. The study was approved by the University of Michigan Institutional Review Board.

Evaluation at the baseline interview included the Diagnostic Interview for Genetic Studies (DIGS) (Nurnberger et al., 1994), which captured clinical and psychosocial histories, neuropsychological assessment, and self-report measures of mood symptoms and work functioning. Participants' final diagnoses were determined by two MD- or PhD-level investigators using a best-estimate final diagnostic process that involved DIGS and a review of the participant's medical records. Exclusion criteria included a diagnosis of schizophrenia, schizoaffective disorder - depressed type, or any medical illness associated with depressive symptoms (e.g., cancer, stroke).

All participants for this present study were recruited from the above Prechter Longitudinal Study of Bipolar Disorders (HUM606) at the University of Michigan Department of Psychiatry via a mailing containing a letter of invitation to enroll in the study, consent form, and surveys. Of the 987 participants in the longitudinal follow-up study who have varied diagnoses, the present study included a mailing to all 400 adults with a DSM-IV diagnosis of bipolar I disorder (BDI) and bipolar II disorder (BDII) enrolled in the longitudinal study. The response rate for this mailing was 35% (140 participants), which is a standard return rate for this sample.

Conflict at Work

Interpersonal Conflict at Work Scale (ICAWS) is a 4-item, self-report measure on the amount of conflict experienced with other people at work (Spector & Jex, 1998) (See Appendix I). Responses range from 1, "never", to 5, "very often". A higher score indicates frequent conflict with others. Individuals were asked to respond based on their current job or if not currently working, the most recent paid job they have held. Internal consistency of the ICAWS was found to be .74 across 13 studies. Convergent/discriminant validity was also tested; correlations were .2-.4 with other job strain scales, .4

for role conflict and .33 for negative affectivity (Spector & Jex, 1998). Chronbach's alpha was calculated specifically for this study and found to be .78, which is moderately strong.

Exclusion at Work

The two questions assessing exclusion at work were taken from the Stockholm County Public Health Questionnaire: "Do you feel excluded by your superiors?" and "Do you feel excluded by your coworkers?" (Stoetzer et al., 2009) (See Appendix J). Responses range from 1, "Yes, to a large extent", to 4, "Not at all", and a *lower* score indicates greater exclusion. Individuals were asked to respond based on their current job or if not currently working, the most recent paid job they've held. No psychometric properties were identified for this measure. Chronbach's alpha was calculated for the 2 items specifically for this study and was found to be moderately strong at .71.

Social Support

Social Support at Work is a subscale within the Job Content Questionnaire, a 21-item, self-report measure, of which 8 items ask specifically about social support from coworkers and supervisors (Karasek et al., 1998) (See Appendix K). Responses range from 1, "strongly disagree", to 4, "strongly agree" and a higher score indicates greater social support at work. Individuals were asked to respond based on their current job or if not currently working, the most recent paid job they have held. No psychometric properties were identified for this measure. The Chronbach's alpha calculated specifically for this study was strong at .94.

Stigma at Work

In order to assess stigma in the workplace, questions were taken from the Workplace Stigma Survey which is a 38-item, self-report measure with four sections: "stigma and your work", "stigma and your work environment", "stigma and your recovery process" and "your personal background" (Russinova, Griffin, Bloch, Wewiorski, & Rosoklija, 2011) (See Appendix L). Stigma at work was measured based on one's perceived experience with stigma and this was assessed in two ways for this study. "Stigma impact on keeping a job" assesses how much stigma of mental illness has impacted one's ability to keep a job. "Stigma impact on everyday work" assesses how stigma of mental illness has impacted one's everyday work. Responses range from 1, "no negative impact", to 10, "very strong negative impact". Individuals were asked to respond based on their current job or if not currently working, the most recent paid job they've held. No psychometric properties were identified for this measure.

Mood Symptoms

The Beck Depression Inventory (BDI) is a 21-item self-report measure used to assess the severity of symptoms of depression. A total score of 0-13 is considered minimal range, 14-19 is mild, 20-28 is moderate and 29-63 is severe (Beck, Steer, Ball, & Ranieri, 1996) (See Appendix M). This measure has well-established construct validity and high reliability regardless of population with alphas less than .05. Coefficient alphas were found to be .92 for outpatients and .93 for college students (Beck et al., 1996). The instrument was highly correlated to the Hamilton Depression Rating scale (r=.71) and was shown to have one-week test-retest reliability (r=.93) (Beck et al., 1996) (See Appendix J). The Chronbach's alpha for items within the BDI for this study was strong at .95.

The Altman Self-Rating Mania Scale (ASRM) is a 5-item self-report mania severity scale used to assess DSM-IV manic symptoms over the past week where higher scores indicate more manic-like symptoms. A score of 6 or higher indicates a high probability of a manic/hypomania episode (Altman et al., 1997) (See Appendix A). The ASRM was found to have a specificity of 85.5 and a sensitivity of 87.3 (Altman et al., 1997). When compared to Clinician Administered Rating Scale for Mania (CARS-M; Altman et al., 1997; Altman, Hedeker, Peterson, & Davis, 2001) and the Young Mania Rating Scale (YMRS) (Young et al., 1978), the ASRM demonstrated good internal consistency and concurrent validity. The Chronbach's alpha for items within the BDI for this study was strong at .86.

Work Functioning

The Life Functioning Questionnaire (LFQ) is a self-report questionnaire designed to assess work and role functioning in individuals with psychiatric disorders (Altshuler et al., 2002) (See Appendix C). In the LFQ, the term "work" designates individuals who are "usefully employed," even if not traditionally compensated or paid at all; thus, students and volunteers are included (Altshuler et al., 2002). The LFQ is a gender-neutral, 5-minute, 14-item self-report scale that assesses four domains, including "leisure time with friends" (3 items), "leisure time with family" (3 items), "duties at home" (, 4 items) and "duties at work, school or activity center" (4 items), only the work domain was used for this study. The work items measure degree of difficulty functioning in: 1) "Time: amount of time spent at work"[8]; 2) "Performance: quality of work"; 3) "Conflict: getting along with co-workers and supervisors"; and 4) "Enjoyment: enjoyment/satisfaction and interest from work". Each item is rated on a 4-point scale: 1=no problems, 2=mild problems, 3=moderate problems, 4=severe problems. A score of ≤1 (no problems) indicates no impairment. A score of ≥2 on any item indicates some impairment in that domain. The LFQ work scale was found to have very good test-retest reliability (r=.76) and excellent internal consistency reliability (α=.87) (Altshuler et al., 2002). Good concurrent validity was found between the LFQ work subscale and

[8] The work item measure "Time" will be discussed as attendance at work throughout the paper.

the Social Adjustment Scale – Self Report work items (r=.61) (Altshuler et al., 2002; Weissman et al., 1978).

For the purposes of this study, a total score (Life Functioning Questionnaire – work subscale; LFQ-W) from 3 of the 4 items (time, enjoyment, performance) was used as the measure of work functioning to create functioning categories: 3=no problems/minimal problems: 4-6=mild problems, 7-9=moderate problems: 10-12=severe problems. The item, conflict, was removed from the total LFQ score due to conflict also being measured as a predictor within these analyses. Chronbach's alpha for these 3 work items was calculated specifically for this study and found to be .69.

Work Status

Participants were asked whether they were currently employed. Those who responded "yes" were included in the "working group". Those who responded "no' were included in the "not working group".

Statistical Analyses

The data were analyzed using IBM SPSS version 22 (Statistical Package for the Social Sciences) and Stata version 13.1. Descriptive statistics and frequency distributions of the independent and dependent variables were created and provided in Tables 1 and 2. Bivariate Pearson correlations were conducted between all continuous or dichotomous independent variables (demographic, mood, work environment) and the dependent variables (work status and work functioning using LFQ-W). Significant relationships between the independent variables and the dependent variable were then used to determine predictors in the regressions.

Logistic and linear regressions were then employed. A logistic regression was conducted in order to predict the relationship of variables (i.e., current depressive symptoms, conflict at work, exclusion at work, social support at work, impact of stigma on keeping a job, age, education) with work status (working versus not working). A multiple, linear regression was conducted in order to predict the influence of variables (i.e., current depressive symptoms, current manic symptoms, conflict at work, exclusion at work, social support at work, impact of stigma on everyday work) with a self-report measure of work functioning (LFQ work subscale) among only the working individuals within this study.

Results

Descriptive Statistics

Descriptive statistics are reported in Tables 4.1 and 4.2. Mean age was 47 years (SD=13.31) for the not working group and 51 years (SD=12.35) for the working group. The working and not working

groups did not differ on educational attainment (p=.14) and the most common level of education for these groups was a bachelor's degree for both working (N=24) and not working groups (N=17). See Table 4.2. Mean BDI score was 19.43 (SD=13.57) for the not working group, a mild level of depression. Mean BDI score was 10.33 (SD=9.54) for the working group, below the cut-off for a depressive episode (14). Mean ASRM score (hypomania/mania) was 2.90 (SD=3.33) for the not working group and 1.63 (SD=2.35) for the working group, which are both below the cut-off a hypomanic/manic episode (6). The average LFQ score for the working group was 4.9 (SD=2.0) with a minimum score of 3 and a maximum score of 11, which indicates mild levels of impairment in work functioning.

Table 4.1: Demographic, Mood, and Work Environment Characteristics of Working and Not Working Groups

	Not Working N=61	Working N=68	Group Difference	*p*-value
Demographics				
Age	46.59 (13.31)	51.12 (12.35)	4.02 (1, 127)	0.05
NonMajority (Majority)	50 (9)	57 (9)	X^2 (1, N=125)=.07	0.8
Gender (Male)	47 (14)	54 (14)	X^2 (1, N=129)=.11	0.75
Mood				
BDI	19.43 (13.57)	10.33 (9.54)	19.35 (1, 122)	<.001
ASRM	2.90 (3.33)	1.63 (2.35)	6.37 (1, 127)	0.01
Work Environment				
Conflict at Work	.83 (.71)	.52 (.60)	6.52 (1, 118)	0.01
Exclusion at Work	2.73 (.97)	3.43 (.68)	21.60 (1, 117)	<.001
Social Support	2.62 (.75)	3.10 (.66)	12.60 (1, 107)	0.001
Stigma Impact on Keeping a Job	5.56 (3.27)	2.50 (2.54)	33.64 (1, 119)	<.001
Stigma Impact on Everyday Work	5.44 (3.15)	2.70 (2.36)	29.85 (1, 119)	<.001

Mood Measures: BDI=Beck Depression Inventory; ASRM=Altman Self-Rating Mania Scale

Table 4.2: Frequency Distribution

	Not Working N=59	Working N=68
Education		
Less than high school education	2	1
High school graduate /General Equivalency Diploma (GED)	3	3
Some college/No degree	15	13
Associate's degree	8	6
Bachelor's degree	17	24
Graduate /Professional degree	14	21

Relationships between Demographic/Mood/Work Environment Variables and Work Status

Correlation results, reported in Appendix N, were considered significant if $p < .05$. Of the demographic and mood variables, age (r=.18), education (r=.13), current depression (BDI; r=-.37), and

current mania (ASRM; r=-.22) were found to be significantly associated with work status. Older individuals, individuals with higher levels of education, and individuals with lower depressive and manic symptoms were more likely to be working. All work environment variables were found to be significantly correlated with work status; conflict at work (r=-.23), exclusion at work (r=.40), social support at work (r=.33), and impact of stigma on keeping a job (r=-.47) indicating that individuals reporting less conflict, exclusion, and stigma at work and greater social support at work were more likely to be working.

Relationships between Demographic/Mood/Work Environment Variables and Work Functioning

Correlation results, reported in Appendix N, were considered significant if $p < .05$. Of the demographic and mood variables, current depression (BDI; r=.53), current mania (ASRM; r=.30) were found to be significantly associated with work functioning. Higher depressive and manic symptoms were associated with greater work impairments. All work environment variables were found to be significantly correlated with work functioning; conflict at work (r=.56), exclusion at work (r=-.38), social support at work (r=-.39), and impact of stigma on everyday work (r=.46).

Predictors of Work Status

A logistic regression was calculated to predict work status based on depressive symptoms (BDI), manic symptoms (ASRM), conflict at work, exclusion at work, social support at work, impact of stigma on keeping a job, age, and education (See Table 4.3). A test of the full model was statistically significant (χ^2 (8, N=96)=41.11), Nagelkerke R^2 of .47, indicating that the set of predictors reliably and moderately distinguished between working and not working participants with BD. The Hosmer-Lemeshow goodness-of-fit test has a significance of .63, indicating the model is a good fit.

The model correctly classified 75% of all cases, with 83% of the working BD participants. Exclusion and stigma were both significant predictors, *p-value* <.01). When the exclusion at work score increased by 1 point (lower degree of exclusion at work), participants with BD had an odds of working that was 2.73 times as high as someone with 1 less point on the exclusion scale. When the impact of stigma on keeping a job score increases by 1 point (higher degree of stigma), participants with BD had an odds of working that was .72 as high as someone with 1 less point on the exclusion scale.

Table 4.3: Binomial Logistic Regression Predicting Work Status

	Odds Ratio	95% CI	*p*-value
BDI	0.98	.93-1.03	0.36
ASRM	0.88	.73-1.05	0.16
Age	0.99	.95-1.03	0.65
Education	1.43	.90-2.30	0.13
Social Support at Work	1.30	.49-3.46	0.60
Exclusion at Work	2.73	1.25-5.97	0.01*
Conflict at Work	1.97	.71-5.45	0.19
Stigma Impact on Keeping a Job	0.72	.58-.90	< .001**

* =statistically significant with *p*-value < .05, ** = statistically significant with *p*-value < .001

Mood Measures: BDI=Beck Depression Inventory; ASRM=Altman Self-Rating Mania Scale

Predictors of Work Functioning Among Those Who Were Working

A multiple regression was calculated to predict working functioning (LFQ-W score) based on BDI (current depression), ASRM (current mania), conflict at work, exclusion at work, social support at work, and impact of stigma of mental illness on everyday work (See Table 4.4). A significant regression was found ($F(6, 55)=8.12$, $p<.001$) with an adjusted R^2 of .41. BDI (depression score) and conflict at work were significant predictors. As BDI increases by 1 point (greater depression), LFQ-W score increases by .07, indicating more work impairment and suggests a small substantive effect. As conflict at work increased by 1 point (greater depression), LFQ-W score increased by .84, indicating more work impairment and suggests a moderate effect.

Table 4.4: Multiple Regression Predicting Work Functioning

Overall Model Fit	Adjusted R Squared	*p*-value
	0.41	< 0.001
Predictors	**B**	***p*-value**
BDI	0.07	< 0.001**
ASRM	0.07	0.31
Conflict at Work	0.84	0.04*
Exclusion at Work	0.37	0.31
Social Support at Work	-0.43	0.25
Stigma Impact on Everyday Work	0.08	0.43

* = Statistically significant with p-value < .05, ** = statistically significant with *p*-value < .001

Mood Measures: BDI=Beck Depression Inventory; ASRM=Altman Self-Rating Mania Scale

Discussion

This study employed logistic and multiple linear regressions to determine which demographic variables, mood symptoms and aspects of the work environment were associated with work status (working versus not working) and work functioning for individuals with BD. Exclusion at work and the

impact of stigma on keeping a job significantly predicted work status, whereas current depressive symptoms and conflict at work predicted work functioning.

Work Status: Stigma at Work and Exclusion at Work

This is the first known quantitative study to demonstrate an association between externalized stigma at work and work status in BD. A prior qualitative study assessed the impact of stigma at work on OF and found that most individuals with BD reported their experience with stigma at work resulted in feelings of alienation, job demotions, missed opportunities for promotions and even job loss (Michalak et al., 2007). Similarly, results from this study suggest that individuals with BD who experienced stigma at work were more likely to be unemployed. Based on the negative stereotypes commonly attributed to individuals with BD (e.g., incompetence, weakness, laziness, dangerousness; Hawke, Parikh, & Michalak, 2013), it is plausible that someone whose illness is disclosed at work is more likely to experience negative consequences such as job loss. This finding highlights a crucial dilemma often faced by employed individuals with BD. In order to ensure better work performance through special accommodations, individuals with BD must disclose their illness at work. However, in doing so, our findings suggest this may actually prove to be harmful by risking job security. Further research in this area may aid in the development of more effective ways to provide safer and more supportive work environments for individuals with BD that promote better work outcomes. Individuals with BD may also benefit from an intervention helping them develop more strategic ways to disclose their illness at work, cope with exposure to stigma at work, and effectively address stigma in the workplace.

Exclusion in the work place, a passive form of bullying, was also associated with work status within this study; individuals with BD who experienced a greater amount of exclusion from coworkers and supervisors were less likely to be employed. This is the only known study to examine the association between exclusion from others at work and work status. Being excluded in the work environment could lead to a variety of negative consequences. Exclusion reduces the amount of social support one receives from others at work, which is an essential component in the successful management of BD. In addition, exclusion may also reduce one's perceived value at work by coworkers and supervisors putting them in greater jeopardy for job loss. Results from this study provide a unique perspective on the meaningful role work relationships may play in determining employment outcomes for individuals with BD and underscore the importance of intervening to improve relationships with coworkers and supervisors.

Another important consideration based on the results of this study is the potential relationship between stigma and exclusion at work; the only two predictors found to be significantly associated with work status. There may be an important interplay between these two variables in that employees who are seen as different and less competent are more likely to be excluded by their coworkers and even

supervisors. Therefore, stigma at work due to having a mental illness may result in both direct negative consequences as well as indirect work hardships due to exclusion from others at work. Understanding exactly how these predictors interact with each other and how they impact work status is beyond the scope of this study. However, determining the precise nature of the relationships between stigma at work, exclusion at work, and work status through further research could inform interventions aimed at improving OF among those with BD.

Work Functioning: Depression and Conflict at Work

Consistent with prior research, depression and conflict at work were significantly associated with work functioning for employed individuals with BD (Bauer et al., 2001; Bonnín et al., 2010; Cerit et al., 2012; Elinson et al., 2007; Gitlin et al., 2011; Michalak et al., 2007; Rosa et al., 2009). The findings from this study extend beyond the current literature in two ways. First, these results support a biopsychosocial approach to understanding work outcomes in BD by demonstrating that clinical features of the disorder as well as environmental factors can influence how an individual with BD functions at work. Therefore, intervening within the work environment to address problematic relationships with coworkers and/or supervisors may be as important to address as symptom recovery when seeking to improve OF among patients with BD.

In addition, this study is novel in that it measures two distinct work outcomes within the same group of participants, revealing that both depression and conflict at work have a greater influence on work functioning over employment status. Being depressed and having difficulty getting along with others at work may impair how someone performs at work but may not necessarily result in unemployment. These findings reporting on two specific employment domains provide a more detailed examination beyond prior research of how specific features of BD influence different areas of OF. Further research identifying specific vocational impacts of depression and conflict at work may reveal the need for more precise intervention targets.

Mania

Manic symptoms were not associated with work status or work functioning in either of the models within this study. This confirms results from both cross-sectional and longitudinal studies, most of which have found that subthreshold and clinical hypomanic/manic symptoms do not predict employment status or functioning at work (Bauer et al., 2001; Bearden et al., 2011; Bowie et al., 2010; Goldberg & Harrow, 2011; Judd et al., 2005; Martinez-Aran et al., 2007). Individuals with BD experience depression at far greater rates than they experience mania (Judd et al., 2003), which may explain why depressive symptoms drive work impairments to a much larger degree than does mania.

Age and Education

Contrary to our hypotheses, age and education were not found to be significant predictors of work status. Previous literature has consistently found older individuals and those with lower levels of education to more likely be unemployed (Elinson et al., 2007; Mur et al., 2009; Waghorn et al., 2007). These inconsistent findings may be due to the inclusion of environmental factors within this study. Perhaps the social difficulties found to be associated with work status (i.e., conflict and exclusion) account for the variance typically attributed to demographics, age and education, in more traditional regression models. Further research exploring the influence of demographics commonly associated with poor OF while also assessing the work environment could help to clarify this.

Limitations

In order to gather work functioning information, we used a self-report measure that was mailed out to all participants. A clinician-administered instrument may provide more detailed and more accurate data on impairments at work by allowing for clarifying questions by the clinician and for the consideration of the impact of mood symptoms on responses. However, due to the size (140 participants) of this study, a mailing was determined to be the most efficient means of capturing this data. This study also did not separate out BD diagnostic categories (bipolar I disorder and bipolar II disorder) in the analysis, despite known differences among the groups in terms of clinical and neurocognitive outcomes (Solé et al., 2012). Future research that segregates and compares these groups may help identify work-outcome predictors unique to each group, and thus may identify treatment targets unique to each group. This study was also unable to account for medication use, raising concern of a potential medication effect on cognition and/or employment, but the study was not sufficiently powered to detect medication effects given that few patients were not taking medication and participants on medication were taking a wide variety of medications. Our sample included only individuals residing in a single Midwestern county and results obtained from this group may not generalize to the broader BD population. Finally, stigma was assessed in this study using a self-report measure, which risks responder bias. Assessing stigma in the actual work environment (e.g., evaluating the employer) may eliminate this issue. However, due to the importance and impact of the subjective experience of stigma, much of the literature examining stigma in the BD population measures stigma based on the experience of the affected individuals (Hawke et al., 2013).

Conclusions

The major findings from this cross-sectional study including 140 participants revealed that greater stigma at work and exclusion at work predict unemployment and higher degrees of depression and conflict at work predict work impairments for those who are employed. By measuring two distinct measures of work outcomes within the same group of participants, this study provides a unique insight into this literature by revealing that predictors of OF vary based on the specific measure of work outcomes used.

Even with the presence of evidence-based treatments designed to directly remediate mood symptoms and episodes, employed individuals with BD are still at risk for severe OF deficits (Gitlin et al., 2011; Hammen et al., 2000; Keck et al., 1998; Strakowski et al., 1998; Tohen et al., 2012; Tohen et al., 2003). This study emphasizes the need for treatments that specifically intervene not only with clinical features of the disorder but within the work environment as well. In addition, these results suggest that targets for treatments to remediate poor work outcomes may vary based on whether the individual with BD is presently employed versus seeking employment. Overall, the development of psychosocial interventions that effectively address both clinical aspects of the disorder and employment outcomes have significant implications for this population by improving clinical outcomes, interpersonal functioning, financial security and an overall quality of life.

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CHAPTER 5

CONCLUSION

Summary

Significant Findings

The overall goal for this dissertation project was to identify predictors of work outcomes for individuals with BD. This work extends beyond the existing body of literature in a number of ways. Unlike prior studies that mainly focus on disease-specific features of BD, this research assessed interpersonal characteristics to provide a more comprehensive analysis of potential influences on OF. These characteristics included interpersonal traits commonly found in individuals with BD as well as social aspects of their work environment. In addition, these studies used innovative methodical approaches to assess work outcomes over time. The present work utilized MLM, a powerful and sophisticated analytical tool, to more accurately understand which features of the disorder are the greatest predictors of OF over an extended period of time. Lastly, this research included novel ways of measuring OF in order to develop a more detailed representation of which work domains are most problematic for this population. Overall, through the use of these novel investigative approaches, key themes have emerged contributing to our understanding of the poor work outcomes prevalent in individuals with BD.

The most robust theme to emerge across all 3 studies was the consistent associations between depression and work functioning. Those with higher rates of depression were more likely to experience difficulties related to work including attendance, conflict with coworkers and supervisors, quality of work and enjoyment from work. This close association between higher levels of depression and poor work outcomes persisted over a 5-year period in the two longitudinal studies included in this dissertation. Despite this strong association between depression and poor OF, it is clear that current best-practice treatments aimed at remediating depressive symptoms are not sufficiently effective in remediating work impairments. The development of an intervention that treats depressive symptoms within the work context might have greater impact on both symptom and functional recovery. Understanding the temporal relationship between depression and work was beyond the scope of this study but is also important to investigate in the future. Although it is plausible that being depressed at work could result in work deficits, it is just as reasonable to assume that poor work functioning could trigger depressive

symptoms. Perhaps it is most likely that the relationship between depression and vocational hardships iS complex, variable from person to person and bidirectional. Clarifying the nature of this relationship could result in an even greater understanding of how best to design treatments aimed at addressing depression at work.

The findings from studies 1 and 2 also revealed that among the four aspects of work functioning examined, attendance at work was the most problematic domain for individuals with BD. Although work performance, conflict with others, and job satisfaction are significant aspects of work *functioning*, attendance at work is of particular importance given that missing work on a regular basis is more likely to lead to job loss compared to problems in other domains. These findings emphasize the importance of targeting work attendance during treatment to promote better work functioning and perhaps prevent job loss. Further, reducing the amount of work absenteeism among the BD population would also reduce the high rates of annual lost workdays and $14.1 billion (salary-equivalent) lost productivity within the United States associated with BD on an annual basis (Kessler et al., 2006).

Another theme that emerged within study 3 is that assessing social aspects of the work environment, in addition to features of the disorder, also provides valuable insight into understanding work outcomes for those with BD. Specifically, exclusion and stigma at work predict unemployment whereas conflict with others at work predicts greater work impairment. These findings may reveal why current best-practice interventions designed to treat the symptoms of individuals with BD are useful for improving clinical outcomes but often fall short in facilitating functional recovery. Intervening within the work environment to address problematic relationships with coworkers and/or supervisors may be as important as addressing symptom recovery when seeking to improve OF among patients with BD. In addition, developing strategies with employed individuals during treatment aimed at developing better skills to cope with negative interactions at work, address problematic work relationships and effectively disclose their illness at work could enhance work outcomes.

Lastly, studies 1 and 2 are the first known studies to employ MLM, a technique that measures individual variance. This approach revealed that individual-level, time-invariant characteristics accounted for a moderate amount of variance (up to 47%) in work functioning outcomes over time. Therefore, qualities unique to each person (e.g., personality characteristics, employee-job fit) and unrelated to having BD (based on these models) account for almost half of the variation in how they perform at work. For the development of more effective interventions to enhance functional recovery, treatments should not only focus on the impact of the illness but on specific traits of each person receiving the treatment.

Unexpected Findings

An unexpected and interesting finding within study 2 was the significant association identified between manic symptoms and work functioning. Manic symptoms were initially found to predict better work functioning (i.e., attendance at work), yet over time, they were negatively associated with overall work functioning, attendance at work and work performance. Results from this model suggest that hypomanic and even mild manic symptoms (e.g., increases in feelings of elation, energy, activity, and self-esteem) may actually improve functional performance, specifically work presenteeism. However, as these symptoms persist over time, both attendance and performance at work will be impaired. This emphasizes the importance of closely monitoring mood symptoms for those with BD in order to intervene during early phases of hypomanic/manic episodes. In doing so, this may prevent the onset of work impairments that eventually result from these ongoing mood symptoms.

Although there were a number of significant predictors identified across these 3 studies, there were a few hypothesized predictors that were not found to be significantly associated with work functioning. None of the personality traits (i.e., neuroticism, extraversion, hostility) examined in study 2 were found to significantly predict work functioning in the multilevel model. This lack of significance may be due to mediating relationships between mood symptoms, interpersonal characteristics and work outcomes. Increased neuroticism has been found to predict higher rates of depression (Barnett et al., 2011; Lozano & Johnson, 2001), whereas increased extraversion and impulsivity have been associated with manic episodes (Barnett et al., 2011; Swann et al., 2009). Therefore, it may be that neuroticism, extraversion and impulsivity increase the likelihood of mood symptoms, which in turn impact work functioning. The direction of these relationships is unclear and beyond the scope of the current research. However, further research providing a more detailed examination of the interplay between personality characteristics, mood and work functioning may reveal a more complete understanding of these relationships.

In addition, cognitive flexibility and processing speed were the only two significant neurocognitive predictors of work functioning despite prior research also identifying verbal memory and attention as predictors of OF (Arts et al., 2008; Bora et al., 2009; Ryan et al., 2013; Torres et al., 2007). The inconsistency may be due to the length of time work functioning was assessed. Most prior studies are cross-sectional (Bonnín et al., 2010; Depp et al., 2012; Fleck et al., 2008; Harvey et al., 2010; Ryan et al., 2013) and of the few longitudinal studies published, follow-up periods extend only as far as one year (Bearden et al., 2011; Burdick et al., 2010; A. M. Gilbert et al., 2010). Study 1 examines the association of neurocognition to work functioning across a longer time period, 5 years. Some prior research indicates that neurocognitive deficits are trait characteristics of the disorder that remain stable over time and during all symptom profiles (Arts et al., 2008; Chaves et al., 2011; Delaloye et al., 2011; Depp et al., 2012; Fleck et al., 2008; Samamé, Martino, & Strejilevich, 2012; Sarapas, Shankman, Harrow, & Goldberg, 2012). It

may be that neurocognitive deficits initially affect work functioning, but their influence then stabilizes over time as individuals with BD accommodate for these deficits at work. More studies examining work functioning over extended periods of time are needed in order to better clarify which features of BD, such as neurocognitive deficits, affect poor OF throughout the course of the illness versus those who may only have an initial affect. Overall, these unexpected findings point to the challenges of predicting poor OF for individuals with BD.

Future Directions for the Study of Bipolar Disorder

This current body of work has also highlighted important future directions for research studying employment outcomes within the BD population. One important opportunity to improve the quality of this research is to include better assessment of work-related domains. The present studies largely employed self-report measures to collect a large portion of employment-related data. Although self-report measures are easy to comprehend and are convenient to use for a variety of reasons, one of the major drawbacks concerns responder bias. Self-report measures usually rely on the accuracy of the individual's reporting which could be influenced by a number of factors including culture, religion, language, strength of memory, mood and time (Schwarz & Oyserman, 2001). One important and growing approach to improve the accuracy of assessment in the field of mental health is to utilize various technological methods to obtain data (New Freedom Commission on Mental Health, 2003). Due to the strong presence that technology has in our society and the accessibility, ease of use and affordability of computers, smartphones, software, etc., the use of technology-based assessments has great feasibility. One potential use of technology-enhanced assessments within the BD population is the use ecological momentary assessments (EMA), to assess clinical and functional outcomes. EMAs are computer-assisted methodologies used to assess self-reported symptoms and real-time behaviors (Ebner-Priemer & Trull, 2009) conducted through an electrical signaling device such as a smartphone, PDA or tablet that prompts an individual to provide information for researchers. EMAs maintain the convenience of self-report measures but improve on their validity by conducting real-time assessments. Further research utilizing technology-enhanced assessments (e.g., simultaneously tracking mood *and* work productivity throughout the work day) has great potential to gather a more accurate understanding of how the fluctuating nature of BD impacts an individual's functioning while at work.

There is an abundance of research, including the present studies, identifying a variety of severe functional impairments among adults with BD, yet this research has not yet resulted in the development of interventions that are highly effective in remediating work and other functional impairments (Kessler et al., 2006; Miklowitz et al., 2007; Miklowitz & Scott, 2009). Research focusing on younger individuals

within this population may provide a better understanding of how to effectively intervene in poor OF. Very little research is available on functional impairments among children and adolescents with BD or the effectiveness of evidence-based treatments on functional recovery in this vulnerable group. Further research examining the etiology and course of functional impairments (e.g., academic performance, interpersonal functioning) in younger populations with BD has the potential to aid in the prevention of future functional deficits including work dysfunction.

Finally, underemployment is a significant concern within the BD population that has not been adequately studied. Despite higher education levels than members of the general population (Kupfer et al., 2002), individuals with BD experience a decline in employment status over a 5-year period (up to 54%; Marwaha, Durrani, & Singh, 2013) and are more likely than healthy controls to live below the poverty level (Ruesch et al., 2004a). These findings suggest that individuals with BD who are working are likely to be underemployed in that they are not maximizing their full work potential. Working below one's abilities and skills could easily result in low motivation to work, poor job satisfaction and even the onset of depression. These consequences of underemployment could account for some of the serious work hardships (e.g., high absenteeism, demotions, lower income) found in those with BD (Coryell et al., 1993; Kessler et al., 2006; Marwaha et al., 2013). There is a clear need for further research examining the prevalence of those who are underemployed and better ways to prevent and reduce this prevalence.

Implications for the Mental Health Field

Bipolar Disorder is a serious mental illness that can lead to devastating and chronic consequences including poor psychosocial functioning, disability dependence, poverty and homelessness. Occupational impairments are particularly profound within this group. It is clear that current best-practice treatments for BD do not successfully address poor work outcomes in those with BD. Despite the unavailability of effective interventions, mental health clinicians including social workers and psychologists must attempt to intervene to improve the employment-related needs of their clients such as identifying impairments, improving work performance, gaining employment or determining qualifications for disability. Therefore, developing better ways to assess and treat OF within individuals with BD has both practical and clinical relevance to mental health practice. In addition, through the use of the empirical knowledge on OF developed within the field of social work and other mental health fields, mental health experts could be at the forefront of uncovering future research needs, remediating work impairments and outcomes and ultimately improving the overall functioning of individuals with BD.

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APPENDIX A

Altman Self-Rating Mania Scale (ASRM)

Instructions: On this questionnaire are groups 5 statements. Read each group of statements carefully. Choose the statement that best describes the way you have been feeling for the past week. Circle the number next to the statement you picked.

Please note: The word "occasionally" when used here means once or twice and "often" means several times or more; "frequently" means most of the time

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1)	0	I do not feel happier or more cheerful than usual.
	1	I occasionally feel happier or more cheerful than usual.
	2	I often feel happier or more cheerful than usual.
	3	I feel happier or more cheerful than usual most of the time.
	4	I feel happier or more cheerful than usual all of the time.
2)	0	I do not feel more self-confident than usual
	1	I occasionally feel more self-confident than usual.
	2	I often feel more self-confident than usual.
	3	I feel more self-confident than usual most of the time.
	4	I feel extremely self-confident all of the time.
3)	0	I do not need less sleep than usual.
	1	I occasionally need less sleep than usual.
	2	I often need less sleep than usual.
	3	I frequently need less sleep than usual.
	4	I can go all day or night without any sleep and still not feel tired.
4)	0	I do not talk more than usual.
	1	I occasionally talk more than usual.
	2	I often talk more than usual.
	3	I frequently talk more than usual.
	4	I talk constantly and cannot be interrupted.
5)	0	I have not been more active (either socially, sexually, at work, home or school) than usual.
	1	I have occasionally been more active than usual.
	2	I have often been more active than usual.
	3	I have frequently been more active than usual.
	4	I am constantly active or on the go all the time.

APPENDIX B

Patient Health Questionnaire (PHQ-9)

Over the last 2 weeks, how often have you been bothered by any of the following problems?		Not at all **0**	Several days **1**	More than half the days **2**	Nearly every day **3**
1.	Little interest or pleasure in doing things	☐	☐	☐	☐
2.	Feeling down, depressed, or hopeless	☐	☐	☐	☐
3.	Trouble falling or staying asleep or sleeping too much	☐	☐	☐	☐
4.	Feeling tired or having little energy	☐	☐	☐	☐
5.	Poor appetite or overeating	☐	☐	☐	☐
6.	Feeling bad about yourself or that you are a failure or have let yourself or your family down	☐	☐	☐	☐
7.	Trouble concentrating on things, such as reading the newspaper or watching television	☐	☐	☐	☐
8.	Moving or speaking so slowly that other people could have noticed. Or the opposite- being so fidgety or restless that you have been moving around a lot more than usual	☐	☐	☐	☐
9.	Thoughts you would be better off dead or of hurting yourself in some way	☐	☐	☐	☐

If you checked off *any* problem on this questionnaire so far, how *difficult* have these problems made it for you to do your work, take care of things at home, or get along with other people?

Not Difficult at all	Somewhat Difficult	Very Difficult	Extremely Difficult
☐	☐	☐	

APPENDIX C

Life Functioning Questionnaire (LFQ) – Part 1

Part I

How much difficulty have you had in the following areas over the **past month**? (*Please indicate by marking the box that best describes your **degree of difficulty**, if any, over the past month).*

Duties at work, school, or activity center (If you are not working or not in school, indicate this by placing a checkmark in this box □ , and go to the next page)

FUNCTIONING	DEGREE OF DIFFICULTY			
	No problems (1)	Mild (2)	Moderate (3)	Severe (4)
1) Time: amount of time spent at work, school, etc	☐	☐	☐	☐
2) Conflict: getting along with co-workers and supervisors	☐	☐	☐	☐
3) Enjoyment: enjoyment/satisfaction and interest from work	☐	☐	☐	☐
4) Performance: quality of work	☐	☐	☐	☐

If you are having ANY difficulty, what do you think is the cause? _____

APPENDIX D

Pearson Correlations Between Demographic, Clinical, and Neurocognitive Variables and Work Functioning Outcome (LFQ Total)

	LFQ Baseline	LFQ Year 1	LFQ Year 2	LFQ Year 3	LFQ Year 4	LFQ Year 5
Demographic Variables						
Age	-0.09	-0.03	-0.05	0.16	.41*	-0.35
Education	-0.10	-0.18	-.25*	0.05	-0.16	-0.25
Nonmajority	-0.10	-0.11	-0.14	0.01	0.22	0.24
Gender	-0.04	-0.05	0.08	0.10	0.30	0.37
Clinical Variables						
PHQ Baseline	.37**	.27*	.37*	.50**	.68*	NA
ASRM Baseline	-0.06	-0.02	0.13	0.10	-0.27	NA
PHQ Year 1	0.15	.59**	.53**	.45**	0.32	0.07
ASRM Year 1	-0.05	-0.03	0.01	0.17	-0.15	-0.17
PHQ Year 2	0.14	.45**	.59**	.38**	0.13	0.29
ASRM Year 2	-0.01	0.14	-0.05	0.15	0.03	-0.47
PHQ Year 3	0.22	0.16	.39**	.54**	.47**	0.00
ASRM Year 3	-0.13	-0.01	0.07	0.11	0.26	-0.26
PHQ Year 4	-0.84*	0.03	.68**	.39**	.68**	.73*
ASRM Year 4	-0.65	0.30	0.11	0.00	0.04	-0.05
PHQ Year 5	NA	-0.27	-0.02	0.28	-0.42	0.21
ASRM Year 5	NA	-0.21	-0.14	-0.24	-0.08	-0.04
Number of Hospitalizations	-0.18	0.11	0.05	0.19	0.02	-0.21
Duration of Illness	-0.03	0.02	0.09	0.20	.45**	-0.21
Neuropsychological Variables						
Visuoconstruction-Rey Copy	0.05	0.04	-0.01	0.13	-0.14	-0.15
Visual Memory-Rey Immediate Recall	0.07	-0.11	-0.11	0.07	-0.11	0.02
Visual Memory-Rey Delayed Recall	0.05	-0.09	-0.08	0.09	-0.05	-0.25
Motor Dexterity-Dominant Hand	0.00	0.01	-0.07	-0.01	-0.19	0.40
Motor Dexterity-Non Dominant Hand	0.00	-0.02	-0.14	-0.08	-0.02	0.24
Motor Dexterity-Both hands	-0.05	-0.04	-0.19	-0.04	-0.22	-0.18
Verbal Memory-CVLT Learning Score	0.05	0.18	0.02	0.02	0.06	-0.31
Verbal Memory-CVLT Short Free Recall	-0.04	.22*	-0.05	0.17	0.18	-0.23
Verbal Memory-CVLT Long Free Recall	0.03	0.22	-0.03	0.11	0.17	-0.31
Executive functioning-WCST Perseverative Responses	0.03	-0.06	-0.09	-.30*	0.12	0.24
Executive Functioning-WCST Perseverative Errors	0.04	-0.06	-0.10	-.30*	0.12	0.22
Executive Functioning-WCST Categories	0.10	0.05	-0.05	-0.07	0.03	0.12
Verbal IQ-WASI Vocab	-0.04	-0.06	-0.10	-0.07	0.06	0.11
IQ-WASI	-0.07	0.00	-0.10	-0.03	0.01	-0.02
Verbal Fluency-COWA Total Score	-0.01	-0.07	-0.02	0.07	-0.19	-0.18
Verbal Fluency-Animals Total Score	-0.07	0.00	0.06	0.17	-0.13	0.11
Visual Attention-TMT, Part A	0.10	0.03	0.01	-0.08	-0.08	-0.27
Executive Functioning-TMT, Part B	-0.15	-0.13	-0.07	-0.11	0.02	-0.06
Processing Speed-Digit Symbol	.27*	0.06	-0.03	0.07	0.05	-0.10
Processing Speed-Stroop Word T Score	-0.05	-0.04	0.00	0.05	0.03	0.14
Processing Speed-Stroop Word T Score	0.00	-0.06	-0.01	0.08	0.12	-0.30
Executive functioning-Stroop Interference T Score	0.12	0.19	0.07	0.11	0.13	-0.14
Fear Accuracy	-0.07	0.11	0.08	0.03	0.15	.28**
Reaction time-PGNG Level 1	-0.04	-0.19	-0.08	0.07	.39*	-0.27
Reaction time-PGNG Level 2	0.16	0.11	-0.17	-0.08	0.02	-.66*
Reaction time-PGNG Level 3	0.10	0.11	-0.13	-0.02	-0.16	-0.19

* = *p-value* < .05, ** = *p-value* < .001

Work Functioning Measure: LFQ=Life Functioning Questionnaire

Clinical Measures: PHQ=Patient Health Questionnaire; ASRM=Altman Self-Rating Mania Scale

Neuropsychological Variables: CVLT=California Verbal Learning Test-II; WCST=Wisconsin Card Sorting Test; WASI=Wechsler Adult Scale of Intelligence; COWA=Controlled Oral Word Association Test; TMT=The Trail Making Test; PGNG=Parametric Go/ No-Go task

APPENDIX E

Group Differences in Work Functioning Outcome (LFQ Total) for Psychosis Chronicity Groups (no psychosis, fleeting, 1 episode, 2 or more episodes)

	F (df)	*p-value*	Post-hoc Tukey
LFQ Baseline	1.77 (4,57)	0.15	
LFQ Year 1	2.35 (4,89)	0.06	
LFQ Year 2	1.48 (4,63)	0.22	
LFQ Year 3	3.54 (4,52)	0.01*	Fleeting > 1 episode and 2 or more episodes
LFQ Year 4	.33 (2,30)	0.72	
LFQ Year 5	.46 (2,10)	0.64	

APPENDIX F

Barratt Impulsiveness Scale (BIS-11)

Instructions: People differ in the ways they act and think in different situations. This is a test to measure some of the ways in which you act and think. Read each statement and put an X on the appropriate circle on the right side of this page. Do not spend too much time on any statement. Answer quickly and honestly.

		Rarely/ Never	Occasionally	Often	Almost Always/ Always
1	I plan tasks carefully.	☐	☐	☐	☐
2	I do things without thinking.	☐	☐	☐	☐
3	I make-up my mind quickly.	☐	☐	☐	☐
4	I am happy-go-lucky.	☐	☐	☐	☐
5	I don't "pay attention."	☐	☐	☐	☐
6	I have "racing" thoughts.	☐	☐	☐	☐
7	I plan trips well ahead of time.	☐	☐	☐	☐
8	I am self controlled.	☐	☐	☐	☐
9	I concentrate easily.	☐	☐	☐	☐
10	I save regularly.	☐	☐	☐	☐
11	I "squirm" at plays or lectures.	☐	☐	☐	☐
12	I am a careful thinker.	☐	☐	☐	☐
13	I plan for job security.	☐	☐	☐	☐
14	I say things without thinking.	☐	☐	☐	☐
15	I like to think about complex problems.	☐	☐	☐	☐
16	I change jobs.	☐	☐	☐	☐
17	I act "on impulse."	☐	☐	☐	☐
18	I get easily bored when solving thought problems.	☐	☐	☐	☐
19	I act on the spur of the moment.	☐	☐	☐	☐
20	I am a steady thinker.	☐	☐	☐	☐

21 I change residences.	☐	☐	☐	☐
22 I buy things on impulse.	☐	☐	☐	☐
23 I can only think about one thing at a time.	☐	☐	☐	☐
24 I change hobbies.	☐	☐	☐	☐
25 I spend or charge more than I earn.	☐	☐	☐	☐
26 I often have extraneous thoughts when thinking.	☐	☐	☐	☐
27 I am more interested in the present than the future.	☐	☐	☐	☐
28 I am restless at the theater or lectures.	☐	☐	☐	☐
29 I like puzzles.	☐	☐	☐	☐
30 I am future oriented.	☐	☐	☐	☐

APPENDIX G

Buss-Durkee Hostility Inventory (BDHI)

	True	False
1. I seldom strike back, even if someone hits me first.	T	F
2. I sometimes spread gossip about people I don't like.	T	F
3. Unless somebody asks me in a nice way, I won't do what they want.	T	F
4. I lose my temper easily, but get over it quickly.	T	F
5. I don't seem to get what's coming to me.	T	F
6. I know that people tend to talk about me behind my back.	T	F
7. When I disapprove of my friends' behavior, I let them know it.	T	F
8. The few times I have cheated, I have suffered unbearable feelings of remorse.	T	F
9. Once in a while I cannot control my urge to harm others.	T	F
10. I never get mad enough to throw things.	T	F
11. Sometimes people bother me just by being around.	T	F
12. When someone makes a rule I don't like I am tempted to break it.	T	F
13. Other people always seem to get the breaks.	T	F
14. I tend to be on my guard with people who are somewhat more friendly than I expected.	T	F
15. I often find myself disagreeing with people.	T	F
16. I sometimes have bad thoughts, which make me feel ashamed of myself.	T	F
17. I can think of no good reason for ever hitting anyone.	T	F
18. When I am angry, I sometimes sulk.	T	F
19. When someone is bossy, I do the opposite of what they ask.	T	F
20. I am irritated a great deal more than people are aware of.	T	F
21. I don't know any people that I downright hate.	T	F
22. There are a number of people who seem to dislike me very much.	T	F
23. I can't help getting into arguments when people disagree with me.	T	F
24. People who shirk on the job must feel very guilty.	T	F
25. If somebody hits me first, I let them have it.	T	F
26. When I am mad, I sometimes slam doors.	T	F
27. I am always patient with others.	T	F
28. Occasionally when I am mad at someone, I will give them the "silent treatment."	T	F
29. When I look back on what's happened to me, I can't help feeling mildly resentful.	T	F
30. There are a number of people who seem to be jealous of me.	T	F
31. I demand that people respect my rights.	T	F
32. It depresses me that I did not do more for my parents.	T	F
33. Whoever insults me or my family is asking for a fight.	T	F
34. I never play practical jokes.	T	F
35. It makes my blood boil to have somebody make fun of me.	T	F
36. When people are bossy, I take my time just to show them.	T	F
37. Almost every week I see someone I dislike.	T	F
38. I sometimes have the feeling that others are laughing at me.	T	F
39. Even when my anger is aroused, I don't use "strong language."	T	F
40. I am concerned about being forgiven for my sins.	T	F
41. People who continually pester you are asking for a punch in the nose.	T	F

42. I sometimes pout when I don't get my own way.	T	F
43. If somebody annoys me, I am apt to tell them what I think of them.	T	F
44. I often feel like a powder keg ready to explode.	T	F
45. Although I don't show it, I am sometimes eaten up with jealousy.	T	F
46. My motto is "never trust strangers."	T	F
47. When people yell at me, I yell back.	T	F
48. I do many things that make me feel remorseful afterward.	T	F
49. When I really lose my temper, I am capable of slapping someone.	T	F
50. Since the age of ten, I have never had a temper tantrum.	T	F
51. When I get mad, I say nasty things.	T	F
52. I sometimes carry a chip on my shoulder.	T	F
53. If I let people see the way I feel, I'd be considered a hard person to get along with.	T	F
54. I commonly wonder what hidden reason another person may have for doing something nice for me.	T	F
55. I could not put someone in their place, even if they needed it.	T	F
56. Failure gives me feelings of remorse.	T	F
57. I get into fights about as often as the next person.	T	F
58. I can remember being so angry that I picked up the nearest thing and broke it.	T	F
59. I often make threats I don't really mean to carry out.	T	F
60. I can't help being a little rude to people I don't like.	T	F
61. At times I feel I get a raw deal out of life.	T	F
62. I used to think that most people told the truth, but now I know otherwise.	T	F
63. I generally cover up my poor opinion of others.	T	F
64. When I do wrong, my conscience punishes me severely.	T	F
65. If I have to resort to physical violence to defend my rights, I will.	T	F
66. If someone doesn't treat me right, I don't let it annoy me.	T	F
67. I have no enemies who really wish to harm me.	T	F
68. When arguing, I tend to raise my voice.	T	F
69. I often feel that I have not lived the right kind of life.	T	F
70. I have known people who pushed me so far that we came to blows.	T	F
71. I don't let a lot of unimportant things irritate me.	T	F
72. I seldom feel that people are trying to anger or insult.	T	F
73. Lately, I have been kind of grouchy.	T	F
74. I would rather concede a point than get into an argument about it.	T	F
75. I sometimes show my anger by banging on the table.	T	F

APPENDIX H

Pearson Correlations between Demographic, Clinical Variables and Work Functioning Outcome (LFQ Total)

	LFQ Baseline	LFQ Year 1	LFQ Year 2	LFQ Year 3	LFQ Year 4	LFQ Year 5
Demographic Variables						
Age	0.27	0.07	-0.03	0.04	0.05	-0.09
Education	0.03	-0.19	0.35	0.01	-0.12	0.04
Gender	0.38	-0.06	-0.36	-0.23*	-0.09	0.05
Ethnicity Code (Majority/Nonmajority)	-0.35	0.16	-0.36	0.01	-0.04	0.04
Clinical Variables						
PHQ Baseline	0.10	0.17	0.05	.36**	0.39**	0.29*
PHQ Year 1	0.23	0.61**	0.63	.41**	0.50**	0.16
PHQ Year 2	0.39	0.53**	0.75**	.47**	0.51**	0.32
PHQ Year 3	-0.39	0.32	0.75*	.61*	0.40**	0.37**
PHQ Year 4	NA	0.24	-0.31	.52**	0.57**	0.48**
PHQ Year 5	NA	0.25	-0.41	.40**	0.40**	0.39**
ASRM Baseline	0.01	-0.07	-0.52	0.09	0.04	-0.14
ASRM Year 1	0.30	-0.19	-0.39	0.19	0.18	0.02
ASRM Year 2	0.45	0.08	-0.37	0.19	0.24	-0.04
ASRM Year 3	0.35	0.03	-0.39	0.04	0.10	-0.03
ASRM Year 4	-0.87	0.60**	0.32	-0.10	.24*	-0.20
ASRM Year 5	NA	-0.41	-0.48	0.19	0.11	0.10
Interpersonal Characteristics						
Impulsivity	-0.42	-0.08	-0.22	0.06	0.05	-0.18
Hostility	0.20	0.24	-0.07	0.27*	0.30*	0.21
Neuroticism	0.29	0.47**	0.05	0.14	0.37**	0.20
Extroversion	0.27	-0.38*	-0.40	0.04	-0.01	-0.12
Openness	0.26	-0.24	0.11	-0.05	-0.05	0.11
Agreeableness	-0.04	0.09	0.06	-0.07	-0.08	0.11
Conscientiousness	-0.25	-0.28	-0.23	-0.04	-0.20	-0.18
Social Anxiety	-0.16	0.20	0.50	0.09	.30*	0.16

* =statistically significant with p-value < .05, ** = statistically significant with p-value < .001

Work Functioning Measure: LFQ=Life Functioning Questionnaire

Clinical Measures: PHQ=Patient Health Questionnaire; ASRM=Altman Self-Rating Mania Scale

NA= Not available due to limited data points for this analysis

APPENDIX I

Interpersonal Conflict at Work Scale

		Never	Rarely	Sometimes	Quite Often	Very Often
4 items assessing how well one gets along with others	1. How often do you get into arguments with others at work? 2. How often do other people yell at you at work? 3. How often are people rude to you at work? 4. How often do other people do nasty things to you at work?					

APPENDIX J

Exclusion at Work

Exclusion by superiors	Yes, to a large extent
Do you feel excluded by your superiors?	To a certain extent
	To a small extent
	Not at all
Exclusion by coworkers	Yes, to a large extent
Do you feel exlcuded by your coworkers?	To a certain extent
	To a small extent
	Not at all

APPENDIX K

Job Content Questionnaire (JCQ)

	strongly disagree	disagree	agree	strongly agree
People I work with are competent in doing their jobs	1	2	3	4
People I work with take a personal interest in me	1	2	3	4
People I work with are friendly	1	2	3	4
People I work with are helpful in getting the job done	1	2	3	4
My supervisor is concerned about the welfare of those under him/her	1	2	3	4
My supervisor pays attention to what you are saying	1	2	3	4
My supervisor is helpful in getting the job done	1	2	3	4
My supervisor is successful in getting people to work together	1	2	3	4

APPENDIX L

Workplace Stigma Survey

1. Using a scale from 1 to 10, please evaluate the impact that stigma of mental illness has had on your ability to keep a job. *Please circle the number that represents best your opinion*

1	2	3	4	5	6	7	8	9	10
Stigma has not affected my ability to keep a job									*Stigma has affected to a great extent my ability to keep a job*

2. Using a scale from 1 to 10, please evaluate the impact that stigma of mental illness has had on your everyday work. *Please circle the number that represents best your opinion.*

1	2	3	4	5	6	7	8	9	10
No negative impact									*Very strong negative impact*

APPENDIX M

Beck Depression Inventory (BDI)

Circle the number next to the statement that best describes how you have been feeling for **the past few days**.

1	0	I do not feel sad.
	1	I feel sad.
	2	I am sad all the time and can't snap out of it.
	3	I am so sad or unhappy that I can't stand it.
2	0	I am not particularly discouraged about the future.
	1	I feel discouraged about the future.
	2	I feel I have nothing to look forward to.
	3	I feel that the future is hopeless and that things cannot improve.
3	0	I do not feel like a failure.
	1	I feel I have failed more than the average person.
	2	As I look back on my life, all I can see is a lot of failures.
	3	I feel I am a complete failure as a person.
4	0	I get as much satisfaction out of things as I used to.
	1	I don't enjoy things the way I used to.
	2	I don't get real satisfaction out of anything anymore.
	3	I am dissatisfied or bored with everything.
5	0	I don't feel particularly guilty.
	1	I feel guilty a good part of the time.
	2	I feel quite guilty most of the time.
	3	I feel guilty all of the time.
6	0	I don't feel I am being punished.
	1	I feel I may be punished.
	2	I expect to be punished.
	3	I feel I am being punished.
7	0	I don't feel disappointed in myself.
	1	I am disappointed in myself.

	2	I am disgusted with myself.
	3	I hate myself.
8	0	I don't feel I am worse than anybody else.
	1	I am critical of myself for my weaknesses or mistakes.
	2	I blame myself all the time for my faults.
	3	I blame myself for everything bad that happens.
9	0	I don't have any thoughts of killing myself.
	1	I have thoughts of killing myself, but I would not carry them out.
	2	I would like to kill myself.
	3	I would kill myself if I had the chance.
10	0	I don't cry any more than usual.
	1	I cry more now than I used to.
	2	I cry all the time now.
	3	I used to be able to cry, but now I can't even cry even though I want to.
11	0	I am no more irritated by things than I ever am.
	1	I am slightly more irritated now than usual.
	2	I am quite annoyed or irritated a good deal of the time.
	3	I feel irritated all the time now.
12	0	I have not lost interest in other people.
	1	I am less interested in other people than I used to be.
	2	I have lost most of my interest in other people.
	3	I have lost all of my interest in other people.
13	0	I make decisions about as well as I ever could.
	1	I put off making decisions more than I used to.
	2	I have greater difficulty in making decisions than before.
	3	I can't make decisions at all anymore.
14	0	I don't feel that I look any worse than I used to.
	1	I am worried that I am looking old or unattractive.
	2	I feel that there are permanent changes in my appearance that make me look unattractive.
	3	I believe that I look ugly.

15	0	I can work about as well as before.
	1	It takes an extra effort to get started at doing something.
	2	I have to push myself very hard to do anything.
	3	I can't do any work at all.
16	0	I can sleep as well as usual.
	1	I don't sleep as well as I used to.
	2	I wake up 1-2 hours earlier than usual and find it hard to get back to sleep.
	3	I wake up several hours earlier than I used to and cannot get back to sleep.
17	0	I don't get tired more than usual.
	1	I get tired more easily than I used to.
	2	I get tired from doing almost anything.
	3	I am too tired to do anything.
18	0	My appetite is no worse than usual.
	1	My appetite is not as good as it used to be.
	2	My appetite is much worse now.
	3	I have no appetite at all anymore.
19	0	I haven't lost much weight, if any, lately.
	1	I have lost more than five pounds.
	2	I have lost more than ten pounds.
	3	I have lost more than fifteen pounds.
20	0	I am no more worried about my health than usual.
	1	I am worried about physical problems such as aches or pains, or upset stomach, or constipation.
	2	I am very worried about physical problems and it's hard to think of much else.
	3	I am so worried about my physical problems that I cannot think about anything else.
21	0	I have not noticed any recent change in my interest in sex.
	1	I am less interested in sex than I used to be.
	2	I am much less interested in sex how.
	3	I have lost interest in sex completely.

APPENDIX N

Pearson Correlations between Demographics, Mood, and Work Outcomes

	N=140	Work Status	Work Functioning (LFQ)
Demographics			
Age		.18*	.07
Education		.13*	-.11
Nonmajority		-0.02	.01
Gender		0.03	.08
Mood			
BDI (depression)		-.37**	.53**
ASRM (mania)		-0.22*	.30**
Work Environment			
Conflict at Work		-.23*	.56**
Exclusion at Work		.40**	-.38**
Social Support		.33**	-.39**
Stigma Impact on Keeping a Job		-.47**	.37**
Stigma Impact on Everyday Work		-.45**	.46**

* =statistically significant with p-value < .05, ** = statistically significant with p-value < .001

Work Status: working/not working

Work Functioning Measure: LFQ=Life Functioning Questionnaire

Clinical Measures: BDI=Beck Depression Inventory; ASRM=Altman Self-Rating Mania Scale

NA= Not available due to limited data points for this analysis