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# NEUROPSYCHOLOGY OF BORDERLINE PERSONALITY DISORDER AND IMPLICATIONS FOR TREATMENT IN A COGNITIVE-BEHAVIORAL PARTIAL HOSPITAL PROGRAM

A dissertation presented by

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#### **ABSTRACT**

Borderline personality disorder (BPD) is a mental illness with etiological foundations in psychodynamic theory. BPD is characterized by difficulty with emotion regulation and social functioning. Major theoretical orientations have varying accounts of the causes of BPD, and these theoretical approaches have guided treatment. However, neuropsychological studies of people with BPD have identified specific deficits, which may have implications for treatment efficacy. In this dissertation, individuals with BPD were recruited from a cognitive-behavioral partial hospital program. Treatment outcome measures were administered as part of a larger study on program effectiveness. The study participants were administered the Picture Arrangement subtest of the WAIS, as well as the Stroop Color-Word Test. According to the results of regression analyses, Picture Arrangement and Stroop were significant predictors of substance abuse reduction between intake and discharge. However, lower Picture Arrangement scores were predictive of more symptom remission in depression and substance abuse, while higher Stroop scores predicted more symptom remission. These results are discussed in terms of their clinical implications, highlighting the relationships between BPD, nonverbal functioning, and treatment outcomes in cognitive-behavioral therapy.

#### CHAPTER ONE

#### INTRODUCTION

Chapter 1 begins with a discussion of the purpose of this study and a statement of the problem, highlighting the central gap in the literature that is addressed in this dissertation.

Following the statement of the problem, the background of the problem is discussed. Divergent theoretical perspectives on borderline personality disorder (BPD) are described.

Neuropsychological findings regarding BPD are then introduced. The theoretical implications and rationale of the study follow. As the chapter concludes, research questions are listed and key terms are defined. Finally, the chapter ends with a summary of the material discussed.

Purpose of the Study

This study was designed to explore the relationship between neuropsychological functioning and treatment outcome in individuals with BPD who were being treated with cognitive-behavioral therapy (CBT) in a partial hospital program.

Statement of the Problem

Despite significant advances in the treatment of BPD, psychotherapists who work with BPD sufferers continue to debate as to its etiology, accurate diagnosis, levels of severity, and veracity as a legitimate illness (Neuhaus, 2006). BPD sufferers present a clinical challenge that is unlike any other in psychotherapy. Clients with BPD can be appealing, charming those around them with their spontaneity while lavishing others with praise and adoration. They can also be bright, accomplished, fashionable, quirky, and artistic. However, although these wonderful characteristics attract new relationships and appear to indicate success on the part of the sufferer, they are only one part of the story. BPD sufferers cannot maintain a consistent "functional" appearance for long. Those who get to know individuals with BPD soon witness the other side of

the bright, inviting personality that once attracted them. Before long, BPD sufferers will show irrational and intense anger, even hatred for people they normally care about. They will also act impulsively, sometimes harming themselves in order to manage emotional pain. Their lives, which can initially appear interesting and spontaneous, eventually reveal constant drama and chaos. Most people cannot maintain a relationship with a BPD sufferer and maintain their own mental health at the same time. Thus, BPD sufferers often have many "stormy" relationships rather than a few long-term, stable ones (Zanarini, Frankenburg, Chauncey, & Gunderson, 1987).

Individuals who present for treatment with BPD are sometimes hard to identify. One of the trademark complaints of BPD client is "depression" (Taylor, 2009). Because BPD is often a misunderstood phenomenon, clients who report that their moods frequently turn dark and sad tend to be diagnosed with major depressive disorder, or bipolar disorder, rapid cycling.

In fact, the experience of BPD sufferers is depressing, but it is not adequate to call it depression. To make an accurate diagnosis, the clinician must look at the circumstances of the client's life and at her treatment history. For example, a typical depressed client will present for treatment with one complaint (depressed mood) and a history of trying a few medications and a few treatments. A client with BPD, however, will present for treatment complaining of depression, but when queried, will reveal that she has an unstable sense of self, chaotic relationships, a lengthy list of medications (often with a number of tranquilizers on the current medication list), and will be unaccountably disturbed when the treatment session comes to an end (i.e., fear of abandonment). It is vital to make the distinction between a client with an Axis I disorder and a client with BPD, because the treatment for an Axis I disorder (e.g., depression) will not help a client with BPD to make sustainable changes. Furthermore, clients with BPD are

at imminent risk for self-harm and suicide attempts, which are hard for clinicians to predict because their moods change so rapidly.

BPD is a life-threatening disorder that causes its sufferers a great deal of psychic pain. BPD sufferers report that their emotions range from numbness and dissociation to unbearable emotional distress, and that overwhelming emotional pain can arise out of nowhere (Taylor, 2008). Further, they lack the ability to self-soothe or tolerate distress, leading to risky or parasuicidal behaviors.

When asked to articulate the reasons for self-harm, clients with BPD frequently state that when they are upset or overwhelmed, they are desperate to discharge the difficult emotions they are experiencing. One participant in the present study stated, "I am afraid that if I use healthy coping skills, it will be like a chore: it will take too long, and it won't make me feel much better. That's the way it always goes when I try not to self-harm. I know that if I cut [myself], I'll get relief and I'll have a few days of functioning normally. The trade-off is worth it to me."

Although sufferers do not set out to engage in life-threatening behavior, self-harm often works like any other drug: users gradually move from small amounts to more dangerous use. Patients in the present study described frightening patterns of self-harm or suicide attempts that resulted in severed tendons, infected surgical wounds, and loss of digestive function, to name a few of the damaging consequences of BPD.

Self-harm is not the only life-threatening factor in BPD. Patients with BPD are more likely than their non-BPD peers to be involved in a range of risky behaviors. These behaviors include intravenous drug use, involvement with known abusers or rapists, starting physical altercations, and severe nutritional restriction.

BPD is also extremely difficult to treat. Treatment approaches to BPD have been based on theories of personality that do not take into account the neuropsychological underpinnings of behavior. However, results of neuropsychological research suggest that individuals with BPD manifest specific deficits in functioning. These deficits may be associated with the symptomatology of BPD, and may affect the ability of individuals with BPD to benefit from treatment.

#### Background of the Problem

In this section, the phenomenon of BPD will be outlined, including prevalence, features, and treatment concerns.

Prevalence. In Western countries, epidemiological research has indicated that approximately 2-3% of the overall population suffers from BPD; 75% of these sufferers are female (Bjorklund, 2006; Gunderson, 2001). A 1989 estimate of BPD prevalence in the patient population indicated that 8-11% of outpatients and 14-20% of inpatients met criteria for BPD (Widiger & Frances, 1989). Though there are no specific data regarding the prevalence of BPD worldwide, Paris (1996) indicated that it was likely most prevalent in North America, Europe, and the United Kingdom.

Features. BPD is characterized as a "personality disorder" or "character disorder," a series of illnesses that fall into the Axis II spectrum of the DSM-IV-TR (American Psychiatric Association, 2000). (See the section entitled "Definition of Terms" at the end of this chapter for diagnostic criteria for BPD.) It is classified as such because its primary features are associated with poor interpersonal effectiveness.

BPD is arguably the most pernicious and stigmatized of the Axis II disorders. People with BPD suffer from psychic pain that they cannot manage; they harm themselves at alarming

rates, and they have difficulty maintaining healthy relationships though they depend wholly on others for solace. Furthermore, one of the cardinal symptoms of BPD is an unstable sense of self. People with BPD often refer to themselves as "hollow" or "empty," without any cohesive sense of self to guide their actions. Suicide is completed in people with BPD at a rate of 6-8% (Levy, Clarkin, et al., 2006; McGlashan, et al., 2005).

A study by Zanarini and Frankenburg (1994) detailed the nature and extent of suffering experienced by newly admitted inpatients with BPD. In a list of 50 dysphoric internal experiences (negative feelings and thoughts), patients with BPD reported feeling all of them more often than did patients without BPD. Those feelings that were reported at the highest rates were characteristic of the BPD experience: feeling overwhelmed, worthless, very angry, lonely, misunderstood, abandoned, betrayed, evil, out of control, like a small child, and with urges to self-harm.

Treatment concerns. In addition to the pain it causes its sufferers, BPD is considered to be the most difficult mental illness to treat (Levy et al., 2006). Clients with BPD have a reputation for psychically draining their therapists, manipulating their willingness to help and then attacking them for the slightest perceived abandonment (Aviram, Brodsky, & Stanley, 2006). Further, patients with BPD often "split" clinicians, encouraging conflict by idealizing one and devaluing another. If clinicians are not able to maintain appropriate boundaries in the face of being idealized or devalued, they are likely to be overwhelmed by the burden of BPD patients' views of them.

Shook and Braverman (1987), in an article designed to help nurses identify patients with BPD, described a typical BPD presentation via the concepts of hostility and splitting. They described a patient, Ms.W., who entered the emergency room yelling loudly at her boyfriend,

after slashing her wrists with his razor. They then went on to detail the devaluation of some staff by Mrs. W., who indicated that she believed the nurse working with her was not as competent as her peers. Finally, she went on to physically assault the nurse who was suturing her wrists, which led to Ms. W. being placed in four-point restraints. This type of behavior is not uncommon to encounter in patients with BPD, and treating such a patient requires quite a different approach than most clinicians use.

In addition to the immediate clinical challenges described above, BPD sufferers' levels of recidivism and parasuicidal behavior are discouraging to to clients as well as those who seek to help them (Levy et al., 2006). One study of patients in a psychiatric emergency room found that while patients with BPD made up only 1% of the population seeking help, they accounted for 12% of all visits. Psychotherapists understandably struggle with the best methods for treating this group while maintaining their own mental health.

When therapists do treat patients with BPD, a team approach is often necessary to prevent therapist burnout and maintain appropriate therapist boundaries (Bateman, 1999; Rivera, 2002). On a treatment team, a group of professionals (often a psychiatrist, psychologist, and case manager) collaborate and compare notes after treatment sessions, to maintain an effective "hold" on the patient and prevent splitting. When teams are cohesive enough, borderline patients are not able to control the emotional experiences of their clinicians. Thus, the clinicians are able to carry out the treatment plan without becoming overly involved in the emotional life of the patient.

A further treatment concern is the number of Axis I disorders that are typically comorbid with BPD (Gunderson, 2001; Gunderson, et al., 2006; Levy, Clarkin, et al., 2006; Skodol, Gunderson, et al., 2002; Skodol, Siever, et al., 2002; Trull & Durett, 2003). Most patients with BPD met criteria for major depressive disorder (MDD) (Gunderson, 2001). Additionally, BPD

can frequently be mistaken for bipolar II disorder, the treatment for which is inappropriate for patients with BPD (Gunderson et al., 2006). Gunderson (2001) argued that when presented with a client who meets criteria for BPD in addition to Axis I diagnoses or even other Axis II diagnoses, treatment should be geared toward the benefit of the patient, i.e., reducing threat of self-harm before attending the to the patient's remaining hierarchy of needs.

Divergent Theoretical Perspectives on BPD

Since the designation of BPD in the DSM-III (APA, 1980), major theories of personality have been used to describe its etiology. In this section, BPD will be discussed in terms of each theoretical perspective. As each theoretical orientation is explained, treatment goals will be briefly reviewed.

Psychodynamic. Early (pre-1950's) accounts of symptoms related to BPD were considered to fit into the diagnostic framework for schizophrenia. The disorder was first described by Adolph Stern (1938; in Gunderson, 2001), who noted that there was a subgroup of patients whose symptoms were somewhat different from the symptoms of schizophrenia. Rather than remaining in a psychotic state, these patients vacillated between psychotic and neurotic. It was because of this vacillation that Stern (1938; in Gunderson, 2001) conceptualized these patients as being on the "borderline" between neurosis and psychosis.

These "borderline" patients were most symptomatic in the context of relational or social issues. They tended to spur hospital staff to disagree with each other, thus diminishing staff cohesion. This lack of cohesion caused a decline in the quality of care available to patients.

When less support was available, these patients tended to regress (Gunderson, 2001). (This characteristic of BPD is perhaps the most descriptive of the disorder: people with BPD tend to

express the need for a great deal of social support, but their actions in social situations sabotage this support, leaving the borderline patient feeling desolate.)

In the late 1960's, Otto Kernberg (1967; in Gunderson, 2001) identified BPD as "borderline personality organization," to be differentiated from "psychotic personality organization" and "neurotic personality organization." Kernberg identified the following symptoms of borderline personality organization: weak identity formation, primitive defenses, and reality testing that was inconsistent in times of stress. Kernberg (1984) posited the theory that people with BPD were impaired in their ability to tolerate the ambiguity inherent in their own and others' personalities: they needed self and others to be "all good" or "all bad." In service to this need, they persistently employ psychic defenses that skew their views of reality. For example, if a partner forgets to pick up bread at the market, a person with BPD may be unable to tolerate feeling frustrated with a loved one (as this frustration threatens to make the BPD sufferer "all bad"). Instead, the partner is seen as "all bad" so that the BPD sufferer can simplify the equation and reduce internal conflict.

Accordingly, treatment for BPD within Kernberg's framework is designed to strengthen the ability of the client to integrate these fragmented representations of self and others into more coherent wholes, tolerating the contamination of the good with the bad. This approach is intended to result in more flexible thinking and more positive relational ability (Kernberg, 1984; Levy et al., 2006).

*Mentalization-based treatment*. In their theory of mentalization, Fonagy and Target (1998) suggested that a central problem in the development of BPD is that individuals with BPD are unable to conceptualize the meaning and motivation behind others' actions. In other words,

whereas most people are able to mentalize, or "walk in another's shoes," people with BPD cannot.

Problems with mentalization begin in early childhood. Fonagy and Target proposed that BPD begins when children are unable to see their minds as separate from those of others, due to inadequate mirroring by attachment figures. Without seeing their own minds described and commented upon by their parents, children fail to develop an independent sense of self. They then depend on others for the visceral sense of continuity that most people consider "feeling alive." Without the ability to view oneself as independent and whole, the prospect of being without others, even for a moment, is akin to annihilation.

Although Fonagy and Target suggested that poor mentalization is the central deficit in BPD, they indicated that mentalization is not always absent in BPD sufferers. They proposed that when attachment-related emotion is heightened for people with BPD, it interferes with the functioning of the prefrontal cortex and results in impulsive and destructive behavior. In other words, individuals with BPD can mentalize better when emotions are not intense, but become unable to mentalize about individuals with whom they are in intimate relationships (Fonagy & Bateman, 2006).

Mentalization-based therapy is designed to provide an environment in which the patient is "mentalized about" in a safe, structured setting. The rationale behind this approach is that when provided the opportunity, patients will recover the mentalizing ability that did not develop in early childhood. In mentalization-based treatment, the therapist focuses primarily on the experience of the patient's current mental states, emphasizing the naming and expressing of those internal states as subjective truths (Fonagy & Bateman, 2006). Thus, the focus in MBT is the maintenance of the attachment relationship while simultaneously fostering the patient's

ability to mentalize (Bateman & Fonagy, 2004a, 2004b). Bateman and Fonagy (1999) advocated 18-month partial hospitalization for the mentalization-based treatment of individuals with BPD, amounting to three hours per week of group analytic psychotherapy, 1 hour per week of expressive psychodrama, and a weekly community meeting, in addition to monthly individual meetings with psychopharmacologists and case administrators.

Cognitive-behavioral therapy and dialectical behavior therapy. In the cognitive-behavioral framework, human behavior occurs in an ongoing interaction between the individual and the environment. Individual development is guided by this interaction: each child learns what kinds of behaviors result in getting her needs met, and which behaviors result in negative consequences, including disapproval and/or neglect. The behaviors that are most effective begin to form a pattern of behavior (i.e., personality). With regard to children who eventually develop BPD, cognitive-behavioral theory suggests that poor self-regulation and unpredictable behavior may have been an effective way to get care in the home environment. Thus adults with BPD do not know how to self-regulate, because effective self-regulation was not supported or rewarded in childhood. As a result of poor self-regulation, an adult with BPD may respond to distress by creating more and more chaos around her, engaging in impulsive and dangerous in an attempt to get her environment to respond as it did in her childhood. Unfortunately, adults frequently find that when they cannot self-regulate, others find them overwhelming and often make distance from them.

In cognitive-behavioral treatment, the patient with BPD is supported in identifying the real consequences of self-destructive behavior, in order to help her realize that it is no longer having the desired effect. To teach self-regulation skills, a cognitive-behavioral therapist may

encourage a client to plan calming activities, or write down a list of calming techniques that can be used in moments of distress (Katz & Levendusky, 1990).

In the past decade, traditional cognitive-behavioral therapy of BPD has been eclipsed by Marsha Linehan's protocol of Dialectical Behavior Therapy (DBT). DBT has been extensively embraced as an effective, skills-based approach to alleviating BPD symptomatology. Linehan was trained as a cognitive-behavioral therapist; she is also a student of Zen Buddhism. She conceptualized BPD as a result of poor emotion regulation, which is assumed to arise from a combination of biological and environmental factors (Linehan, 1993a). Specifically, Linehan posited that BPD sufferers have greater emotional reactivity to the world while having been parented in an "invalidating environment," one in which the child's affirmation of internal experiences is denied or ridiculed.

Further, Linehan commented on the phenomenon of "dialectical failure," or rigid thinking: that is, a failure to integrate disparate elements of the environment into a layered worldview. This concept of dialectical failure is in keeping with Kernberg's comment on tolerance of ambiguity; people with BPD "split" reality into "all bad" or "all good," thus, no mature perspective is available (Kernberg, 1984). Linehan's focus on the dialectic is geared toward achieving both change and acceptance. While the patient learns to tolerate difficult emotions, she is also given strategies for reducing negative affect (Linehan, 1993a).

DBT is a protocol-based, structured treatment with four main foci: mindfulness skills ("radical acceptance" of emotions and behaviors), interpersonal effectiveness, emotion regulation skills, and distress tolerance (Linehan, 1993b). Skills training is conducted in weekly groups as a complement to individual psychotherapy. Results of research on DBT has validated it as an approach that reduces self-harm and therapy-interfering behaviors (Bohus, Haaf, Simms,

Limberger, Schmahl, & Unkel, 2004; Linehan, 1997; Linehan et al., 2006; Nee & Farman, 2005; Salsman & Linehan, 2006).

Feminist-multicultural-ecological therapy. Because personality is shaped by cultural and gender-based expectations, it is necessary to examine the phenomenon of personality disorder from a cultural perspective (Paris, 2004). Further, because culture is the primary determinant of gender norms, culture and gender are viewed as overlapping phenomena by most ecological, multicultural, and feminist theorists. For this reason, critiques about cultural and gender-based views of health and wellness are discussed in the same section, which is intended to explicate the connections between these two societal constructs as regards personality. Feminist, multicultural, and ecological theorists dedicate their efforts to critiquing the manner in which the dominant paradigm fosters assumptions about how people should behave; who is sick and who is well, and what kind of suffering is worth the attention of the medical and psychological community.

Personality disorders are defined in the DSM-IV (APA, 2000) as chronic patterns of thought and behavior that deviate from cultural expectations to such an extent as to cause impairment in functioning. More colloquially, patients are diagnosed with personality disorders when their presenting problems are seen as resulting from maladaptive interpersonal functioning.

Feminist psychology is largely focused on the relationship between the dominant paradigms of Western, male-dominated culture and patriarchal conceptualization of mental health and illness. As such, feminist psychology does not provide a unified theory that can be compared on a parallel with other theoretical orientations. Instead, feminists point out that mental health and illness in Western culture are conceptualized in terms of patriarchal norms, goals, and ideals (Brown & Ballou, 1992).

Similarly, multicultural and ecological psychologists critique the circular reasoning inherent in the Western psychiatric system: all behaviors that comply with Western norms are, by definition, normative; behaviors that deviate are deviant (Ballou & Brown, 2002; Brown & Ballou, 1992; Jane, Oltmanns, South, & Turkheimer, 2007). Rather than viewing the world as comprised of insiders (those who can comply with established norms) and outsiders (those who cannot), feminist/multicultural/ecological theorists strive to see each individual in context, existing in continuity between themselves and the world around them. Paranoia, for example, is generally considered a symptom of psychosis, i.e., detachment from reality. However, for many people, an ongoing fear of others is an adaptation to membership in a marginalized group, whether that group is of women, people of color, or people of non-traditional sexual orientations. Feminist, multicultural, and ecological therapists seek to understand the big picture in hopes of ameliorating not only the suffering of their clients, but the cultural and societal conditions from which that suffering has arisen (Brown & Ballou, 1992).

Approximately 70% of BPD patients are women; this predominance has led feminist theorists to question the connection between gender and BPD (Ballou & Brown, 2002; Bjorklund, 2006; Boggs, et al., 2005; Brown & Ballou, 1992; Eubanks-Carter & Goldfried, 2006; Fish, 2004; Reardon, 1995). Feminist theorists have questioned the validity of the BPD diagnosis for a number of reasons. These questions concern social constructs such as gender and sexual orientation, as well as the frequency with which women with BPD report histories of physical, sexual, or emotional abuse.

Gender and sexual orientation. There is an apparent gender bias in the diagnosis of BPD (Becker, 2000). Women are diagnosed with BPD far more often than men; 3:1 is the current ratio (Hodges, 2003). Other groups are susceptible to this kind of bias as well. Eubanks-Carter and

Goldfried (2006) conducted a study in which 141 psychologists were asked to review a hypothetical case in which the patient presented symptoms that could be construed as a sexual identity crisis or as BPD. They found that psychologists were significantly more likely to diagnose BPD in a man they perceived to be gay. Specifically, given the same case information except for differences in sexual orientation, psychologists diagnosed BPD in 61% of homosexual men but only 36% of heterosexual men.

Trauma. The pejorative connotation of BPD leads some to question its ethical implications. Because of the behavioral symptoms of BPD, the disorder is probably the most stigmatized in the DSM-IV (Aviram, Brodsky, & Stanley, 2006; Fish, 2004; Lenzenwenger & Cicchetti, 2005; Nehls, 1998). Feminist theorists posit that BPD is better characterized as a response to long-term relational trauma. Some (e.g., Hodges, 2003) argue that when female trauma survivors are "good" (i.e., appealing and easy to treat), they are given the diagnosis of Post Traumatic Stress Disorder (PTSD), which implies that their symptoms are largely due to their circumstances.

In contrast, female trauma survivors who are angry and aggressive are given the diagnosis of BPD, which is based on deficits intrinsic to their personalities. Given this explanation, it is not hard to see the pejorative connotation that BPD can bring. It has been speculated that people with BPD are often misdiagnosed simply because their clinicians dislike them (Gunderson, 2001; Hodges, 2003). Any woman's self-harming behaviors are liable to be characterized as symptoms of BPD, regardless of other symptoms displayed.

Before its current conceptualization as a disorder of the character, some symptoms of BPD were ascribed to hysteria (from the Greek word for "womb"). In the late nineteenth century, the diagnosis of hysteria was used to describe a number of neurological and psychological

ailments, many of which were associated with women. In general, hysteria was diagnosed in connection with emotional (i.e., irrational) behavior, as well as numbness and other physical symptoms (Lasiuk & Hegadoren, 2006). Pierre Janet, studying female psychiatric patients who had known histories of child abuse or other trauma, noted that when reminded of a traumatic situation, these women would react much in the way that we would now consider symptomatic of BPD: outbursts and out-of-control behavior against themselves and others, as well as dissociation (Lasiuk & Hegadoren, 2006).

Some have proposed a reformulation of PTSD to accommodate the extreme symptoms that can result from extensive traumatization ("Complex PTSD," e.g., Spitzer, et al., 2009). Others have proposed that the term "personality disorder" should remain a descriptor of the effects of extensive trauma, and have proposed multiple diagnoses to accommodate the stability of attachment evidenced by each patient. Based on the findings related to attachment security, patients would either be diagnosed with PTPD-D (Post-Traumatic Personality Disorder – Disorganized) or PTPD-O (Post-Traumatic Personality Disorder- Organized, (e.g., Classen, Pain, Field, & Woods, 2006).

Feminist, multicultural, and ecological perspectives, as stated earlier, do not provide a particular treatment protocol to follow; rather, they emphasize a focus on non-hierarchical, non-pathologizing treatment where truths are co-constructed in the therapeutic relationship. As such, a specific treatment is not prescribed, and no governing body dictates how treatment should be conducted.

An example of feminist treatment is given by Margo Rivera in her chapter, "The Chrysalis Program: Feminist treatment community for individuals diagnosed with personality disordered" (Rivera, 2002). At the Chrysalis program, which is a day program conducted for four

days per week, feminist theory underlies the approach to treatment. However, other treatments are provided within this context. Cognitive-behavioral therapy, dialectical behavior therapy, and psychodynamic treatment groups are offered, as well as occupational and life skills training and expressive therapies. Rather than demanding that clients be "treatment compliant," which is a common term used in more traditional settings, clients are challenged to find within themselves a motivation to change, to use the program to its fullest, and to question themselves when they retreat from the program's offerings. Clients set their own goals and measure their own progress in weekly groups. The goal is for clients to leave the program with a stronger sense of who they are and what is important to them; this enhanced sense of self is intended to aid in relational functioning as well as impulse control and self-monitoring (Rivera, 2002).

Toward a Neuropsychological Conceptualization of BPD

In this section, the neuropsychology of BPD will be introduced. Deficits in functioning will be described and their implications will be discussed. The full literature review of neuropsychological findings will be presented in Chapter 2; this section is intended to provide an overview and a logical basis for the present study.

While psychological research is largely based on the idea of the brain as a "black box," (i.e., a machine whose processes are unobservable except by behavior), a minority of psychologists have used neuropsychological studies to explore the phenomenon of BPD. The existing research does suggest some important differences in the cognitive functions of people with BPD and those without. These neuropsychological findings have implications for the ongoing reconceptualization and treatment of BPD.

The DSM-IV-TR describes BPD as an illness for which the major features include instability in interpersonal relationships, emotion regulation, and self-image (APA, 2000). These

three areas of functioning have long been associated with nonverbal intelligence and with the right hemisphere of the brain (e.g., Palombo, 1996; Wasserstein, 2000).

A number of tests are designed to identify strengths and weaknesses in nonverbal functioning in different populations. Within the literature on BPD and neuropsychology, however, the WAIS-R and WAIS-II are used for their ability to measure general intelligence, compare verbal to nonverbal intelligence, and to compare results of different studies to one another. Because neuropsychological batteries typically include an estimate of IQ, the Wechsler scales are often used to describe overall cognitive functioning, with briefer or more specialized measures added to the battery for further diagnostic clarification.

Other measures used to identify weaknesses in nonverbal functioning include the Rey-Osterrieth Complex Figure (Meyers & Meyers, 1995), a drawing test intended to capture the participant's ability to remember a picture, sort it into its component parts, and plan to draw it in an efficient and effective way. Further, the Stroop Color-Word Test (Golden, 1978) is frequently added to neuropsychological batteries for clients or participants who are prone to impulsive behavior, as the Stroop is used to identify weaknesses in executive functioning and/or response inhibition.

Several studies (e.g., Hymowitz, Hunt, Carr, Hurt, & Spear, 1983; Mandes & Kellin, 1993; Segal, Westen, Lohr, & Silk, 1993; Swirsky-Sacchetti, et al., 1993) have shown significant differences between people with BPD and without BPD on Wechsler subtests (Wechsler, 1997), most notably on subtests that are associated with social functioning (e.g., Picture Arrangement). Where differences were found, individuals with BPD scored lower than those without on Wechsler tests in general, and on Picture Arrangement in particular.

Further, differences have been found between people with BPD on tests such as the Rey-Osterrieth Complex Figure, which is a test associated with visuospatial functioning (Meyers & Meyers, 1995). As with results from the Picture Arrangement and Comprehension subtests (two subtests of the WAIS-R), some researchers have found a positive correlation between nonverbal functioning and social cognition (Edgin & Pennington, 2005; Wasserstein, 2000). Nonverbal functioning is also associated with emotional resilience and general cognitive flexibility (Edgin & Pennington, 2005; Wasserstein, 2000).

Additionally, people with BPD have been shown to obtain lower scores on the Stroop Color-Word Test, which is associated with response inhibition (Golden, 1978; Legris & van Reekum, 2005). Response inhibition is necessary for social functioning in that one's behavior must, to some degree, be understandable and even pleasing to others. People with BPD are typically dealing with intense emotion; difficulty in inhibiting this emotion may be associated with the intense social ups and downs that they experience (Lynch, Chapman, Rosenthal, Kuo, & Linehan, 2006; Zanarini & Frankenburg, 1994).

The results described in the preceding paragraphs suggest that there is concordance between the diagnostic construct of BPD (i.e., BPD sufferers' greatest problems are in the areas of social relationships, sense of self, and impulsivity) and the neuropsychology of BPD. Specifically, results of studies on subjects with BPD and without BPD on the Wechsler subtests (Comprehension and Picture Arrangement) and the Rey-Osterrieth Complex Figure indicate a possible deficit in the area of nonverbal functioning, and by extension, social functioning. Further, results of these studies also indicate that there is an association between BPD and impulse inhibition/executive functioning, a possible indicator that the impulsivity in BPD is brain-based.

Psychotherapy, in all its forms, involves social bonding as well as learning from others (Schechtman & Katz, 2007). Clients attend therapy in order to learn how to change their lives for the better, and psychotherapists offer verbal and nonverbal coaching on how to do so, using the social bond between therapist and client as a lever for reinforcement and motivation. As an example, patients who become very distressed while talking about personal issues may prompt their therapists to lean forward, establish strong eye contact, and talk in a soothing voice in order to comfort the patient and model self-regulation skills. If it is more difficult for clients with BPD to read the nonverbal cues described above, the benefit of the therapist's behavior will be missed.

If the areas of difficulty listed above hold true in general for those with BPD, then it is not surprising that the psychiatric community struggles to find appropriate, effective treatments for BPD. For example, when Kernberg (1984) indicated that people with BPD could not tolerate ambiguity, he could have been identifying a biological aspect of BPD rather than a psychodynamic vulnerability. Further, an understanding of the relationship between cognitive functions and treatment response in individuals with BPD may lead to more effective treatment. Theoretical Implications and Rationale of the Study

There is a growing body of literature on the neuropsychological underpinnings of mental illness, which is likely to make a contribution to the conceptualization of Axis I and Axis II disorders in the Diagnostic and Statistical Manual of Mental Disorders (APA, 2000). While it is established that people with BPD demonstrate distinct differences from control groups in cognitive and neuropsychological functions, these differences have not been examined in terms of their relationship to treatment utilization and outcomes.

This present study attempted to address the missed connections between the neuropsychology of BPD and the treatment modalities that are appropriate for its treatment. The

study was conducted within a cognitive-behavioral partial hospital program, in which all participants had either an Axis I or Axis II diagnosis. Participants first contributed self-report data to a larger ongoing study at the PHP. Participants in the present study were screened for BPD, and then administered the Picture Arrangement subtest from the WAIS-II and the Stroop Color-Word Test. To reduce confounding variables and to account for the high proportion of female BPD sufferers, all subjects were women.

Treatment effects were measured as part of a larger study (n=250) being conducted simultaneously at the McLean Behavioral Health Partial Hospital Program (PHP). The larger study is exploring the effectiveness of treatment within the PHP by administration of measures at intake and discharge. These measures include the Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977), BASIS-24 scores (Eisen, 2001) and Global Assessment of Functioning (GAF) scores (APA, 2000). They also include measures designed to address acquisition of cognitive-behavioral skills, as this acquisition is the primary goal of cognitive-behavioral therapy (Beck, Freeman, & Davis, 1990).

Beyond the measures associated with the larger study being conducted at the PHP, measures specific to the present study were added. These measures included a screening for BPD using the SCID-II (First, Gibbon, Spitzer, & Williams, 2002), a short form of the WAIS-III which included the Vocabulary and Matrix Reasoning subtests (Wechsler, 1997), the Picture Arrangement subtest of the WAIS-III (Wechsler, 1997) and the Stroop Color-Word Test (Golden, 1978).

Results of the present study will inform the psychological community as to the relationship between cognitive functions in BPD and treatment outcome in a cognitive-behavioral partial hospital program.

#### Research Questions

In this section, research questions will be detailed.

Research Question #1 Do scores on the Picture Arrangement subtest of the WAIS or the Stroop Color-Word Test predict treatment outcome in women with BPD as determined by the CES-D, the BASIS 24, and GAF scores?

<u>Hypothesis #1</u>: Based on the documented relationships between borderline symptomatology, social cognition, and response inhibition, it is hypothesized that both Picture Arrangement and Stroop scores will be positive predictors of treatment outcome in women with BPD as determined by the CES-D, the BASIS-24, and GAF scores.

<u>Research Question #2</u>: Which is a stronger predictor of treatment outcome in women with BPD: the Picture Arrangement subtest of the WAIS, or the Stroop Color-Word Test?

<u>Hypothesis #2</u>: Based on the more frequent and robust findings regarding the relationship between social cognition and treatment outcome, it is hypothesized that scores from the Picture Arrangement subtest will be a stronger predictor of treatment outcome in women with BPD than scores from the Stroop Color-Word Test.

Description of the Present Study

In this section, a brief description of the present study will be provided.

Data from a larger study on treatment outcome in a cognitive-behavioral partial hospital program was analyzed in conjunction with data that was gathered for the smaller, present study. The goal of the study was to determine whether scores on neuropsychological tests (the Picture Arrangement subtest of the WAIS-R and the Stroop Color-Word Test) predicted outcome scores in women with BPD, and to identify the relative strengths of these predictions.

As part of the larger outcome study at the PHP, participants completed self-report outcome measures associated with depression and functioning at the beginning and end of treatment. For this study, 25 women with BPD, all of them naïve to cognitive-behavioral treatment, were recruited from this larger pool of participants.

After being screened for inclusion criteria (see "Inclusion Criteria", Chapter 3), participants were administered a short form of the WAIS-III for a brief estimate of IQ, as well as two brief neuropsychological measures, detailed below.

For the purposes of this study, the WAIS-III was used in two ways. The Matrix Reasoning and Vocabulary subtests were used as a short form of the WAIS-III to obtain a brief estimate of IQ in order to control for IQ in regression analyses. The short form of the WAIS-III used in this study identified by Ringe et al. (2002) as having concurrent validity of .90 with the full administration of the WAIS-III.

The Matrix Reasoning subtest of the WAIS is a 24-item subtest for which the subject is presented cards with matrices containing blank or missing elements. The subject is asked to choose from a multiple-choice list of designs, and is asked to choose the item that best fits the missing area. The problems become harder to solve as the subtest continues, involving more and more complex matrices.

The Vocabulary subtest is considered to be a measure of general word knowledge and verbal conceptualization. It consists of 21 questions, which begin with everyday words (e.g., "what is a car?") and progress to more challenging or abstract words (e.g., "what is forbearance?").

To obtain a brief measure of IQ, the Matrix Reasoning and Vocabulary subtest raw scores are summed, and the sum of the raw scores is used to find a standard score corresponding to a Full-Scale IQ.

The Picture Arrangement (PA) subtest was used as a measure of nonverbal functioning and an independent variable. The PA subtest is widely considered to measure social reasoning and nonverbal cognition (Segal et al., 1993). Scores from the PA subtest were expected to positively predict changes in functioning between intake and discharge in the present study, and to be a better predictor of these changes than the Stroop Color-Word Test. Items on the PA subtest are presented in the form of sets of cards depicting a social interchange (e.g., holding the door while someone walks through it). However, the cards are presented to the examinee in incorrect order, so that the social story is nonsensical. In order to score correctly, the examinee must put the cards in an order that makes sense.

The Stroop Color-Word Test was used as a measure of executive functioning or response inhibition and an independent variable. The Stroop Color-Word test measures a phenomenon called the "Stroop Effect", that is, the degree to which the examinee can control her attention despite interference (Golden, 1978). Scores from the Stroop Color-Word test were expected to positively predict changes in functioning between intake and discharge, but they were expected to be a poorer predictor of these changes than the Picture Arrangement subtest. There are three timed conditions in the Stroop Color-Word Test: Word (in which the examinee reads lists of color words printed in black and white), Color (in which the examinee identifies colors in a printed list u) and Color-Word (in which the examinee is asked to identify the colors of a list of color-words printed in mismatched ink, e.g., the word "blue" printed in red ink). The Stroop Effect is created when the examinee has to inhibit the impulse to read the word presented rather

than identifying the color of the word. Thus, the Color-Word test was of primary interest as an independent variable in this study.

Multiple linear regression analyses were used to determine a) whether each neuropsychological measure was a predictor of treatment outcome; and b) if both were predictors, which relationship was stronger.

Significance of the Present Study

Results from this study offer information about the impact of cognitive functioning in women with BPD on their ability to make use of cognitive-behavioral treatment. In addition to the existing theoretical and behavioral data on the impact of BPD symptomatology on treatment outcomes, the field of psychology is informed by neuropsychological data.

#### Research Design

A descriptive research study design was used to examine relationships between neuropsychological test scores and treatment outcome. The dependent variables were identified as the degree of improvement in outcome measures between intake and discharge (i.e., decrease in depressive symptoms, improvement in social functioning, decrease in substance abuse, etc.) and the independent variables were identified as scores on the Picture Arrangement subtest of the WAIS, as well as scores on the Stroop Color-Word Test.

#### Definition of Terms

In this section, terminology that is relevant to the present study will be listed and defined. **Borderline Personality Disorder** is operationally defined in terms of the diagnostic criteria listed in the DSM-IV-TR (2000):

A pervasive pattern of instability of interpersonal relationships, self-image, and affects, and marked impulsivity beginning by early adulthood and present in a variety of contexts, as indicated by five (or more) of the following:

- frantic efforts to avoid real or imagined abandonment. Note: Do not include suicidal or self-mutilating behavior covered in Criterion 5.
- 2. a pattern of unstable and intense interpersonal relationships characterized by alternating between extremes of idealization and devaluation
- 3. identity disturbance: markedly and persistently unstable self-image or sense of self
- 4. impulsivity in at least two areas that are potentially self-damaging (e.g., spending, sex, substance abuse, reckless driving, binge eating). **Note:** Do not include suicidal or self-mutilating behavior covered in Criterion 5.
- 5. recurrent suicidal behavior, gestures, or threats, or self-mutilating behavior
- 6. affective instability due to a marked reactivity of mood (e.g., intense episodic dysphoria, irritability, or anxiety usually lasting a few hours and only rarely more than a few days)
- 7. chronic feelings of emptiness
- 8. inappropriate, intense anger or difficulty controlling anger (e.g., frequent displays of temper, constant anger, recurrent physical fights)
- 9. transient, stress-related paranoid ideation or severe dissociative symptoms

Symptoms of BPD were assessed using the Structured Clinical Interview for DSM-IV Personality Disorders (First, Gibbon, Spitzer, & Williams, 2002).

**Treatment Outcome** is operationally defined as change in scores on measures administered before and after treatment in a two-week, CBT-oriented partial hospital program. These

measures included the CES-D (Radloff, 1977), the BASIS-24 (Eisen, 2001), and difference in GAF from intake to discharge.

#### Chapter Summary

In the preceding chapter, a general overview of the present study was offered. This overview included a statement of the problem, the background of the problem, some divergent theoretical perspectives on BPD, and then a discussion of the neuropsychological conceptualization of BPD. Following these sections, the research questions and hypotheses were presented. The chapter ended with a description of the present study, along with the research design and definition of relevant terms.

## CHAPTER TWO

## LITERATURE REVIEW

This chapter begins with a review of studies in which the morbidity of BPD is described, as well as studies that detail the rates of common co-morbid disorders. Studies exploring the potential connection between trauma and BPD will then be reviewed. Following the review of literature on BPD and trauma, possible gender bias in diagnostic criteria for BPD will be discussed. Next, types of treatment for BPD will be detailed, including outcome studies for each major type. This chapter then reviews the neuropsychological literature related to IQ and personality; in particular, studies of the relationship between BPD symptomatology and IQ tests will be reviewed. Other neuropsychological findings pertaining to BPD will be described, and the implications of these findings for the study will be discussed.

Borderline Personality Disorder: Morbidity and Co-Morbid Disorders

In this section, BPD will be described in terms of its morbidity within the general population. Specifically, rates of occurrence will be reported, as well as data on the course of the illness. Further, data on life events associated with BPD will be detailed. Following morbidity data, studies will be reviewed regarding the co-morbidity of BPD with mood disorders and with PTSD.

*Morbidity*. BPD occurs at a rate of 1-2% in the general population. However, individuals with BPD account for 10% of outpatients and 15-20% of inpatients (Skodol, Gunderson, et al., 2002; Skodol, Siever, et al., 2002; Widiger, 1982). Suicide is completed at a rate that is 10-50 times higher in individuals with BPD than in those without (Skodol, Gunderson, et al., 2002).

Bender et al. (2001) conducted a study comparing the treatment utilization of individuals with personality disorder and individuals with Major Depressive Disorder (MDD). In the CLPS

sample of 668 patients, individuals with BPD were significantly more likely than those with MDD to have utilized individual, group, and family psychotherapy, to have had a psychiatric hospitalization, and to have lived in a group psychiatric treatment facility.

The Collaborative Longitudinal Study of Personality Disorders (CLPS; Boggs, et al., 2005; Gunderson, et al., 2006; Johnson, et al., 2003; McGlashan, et al., 2005; Pagano, et al., 2004) is an ongoing study being conducted at a number of university teaching hospitals in the U.S. In this study, 668 participants were recruited from the community in the mid-1990s, and are assessed yearly for change in Axis I and Axis II symptoms, as well as significant life events.

Pagano et al. (2004) used data from the CLPS project to explore the relationship between life events and course of illness in personality disorders. Their results indicated that individuals with BPD had more total negative life events than any other diagnostic category (which included obsessive-compulsive, schizotypal, and avoidant personality disorders). These life events tended to be interpersonal in nature (e.g., changes in friendships, starting new relationships, breaking up with significant others).

McGlashan et al. (2005) conducted a longitudinal study detailing the course of BPD in terms of the stability of criteria over time. Using data from the CLPS sample, the authors assessed the prevalence of personality disorder criteria at baseline, and then at 1- and 2-year points. In subjects with BPD, the most frequently endorsed criteria at baseline were those of affective instability, intense anger, and impulsive behavior. Identity disturbance, fears of abandonment, and self-injury were the least prevalent, though all were present at a rate of 60%. While the prevalence of all criteria decreased by 25-30% at the two year evaluation, the ranking of criteria were exactly the same at baseline and at two years. No subject experienced complete remission of symptoms.

Co-morbidity. BPD is often comorbid with a range of DSM-IV disorders, though some literature suggests that it is difficult to demonstrate that these disorders are not simply transient features of BPD (Gunderson, 2001). Most patients with BPD meet criteria for depressive disorders, specifically major depressive disorder and dysthymia (Gunderson, 2001). Furthermore, the similarity between borderline personality disorder and bipolar II disorder ("cyclothymic personality") is widely noted (Gunderson, 2001; Gunderson, et al., 2006; Trull & Durett, 2003).

Gunderson et al. (2006), reporting on a sample of 433 participants from the CLPS sample, described the rates of co-occurrence of BPD and bipolar disorder, as well as the relationship between co-occurrence and longitudinal measures of mental health. Rating diagnostic criteria with the SCID-I (First, et al., 2002) and the Diagnostic Interview for Personality Disorders (DIPD; Zanarini, Frankenburg, Sickel, & Yong, 1996), researchers found that 19.4% of participants with BPD met criteria for bipolar disorder. However, over a four-year course, only 8.2% of participants with BPD were newly diagnosed with bipolar disorder, whereas patients with other Axis II disorders were newly diagnosed with bipolar disorder at a rate of 10%. These findings support the association between BPD and bipolar disorder, but do not support the assumption that people with BPD are more likely than others in the Axis II continuum to be diagnosed with borderline personality disorder.

Post-traumatic stress disorder (PTSD) is also frequently comorbid with BPD. It is estimated at a rate of 40% by Gunderson et al. (2006), and at similarly high rates in other literature. Gunderson (2001) suggested that individuals with BPD have fewer resources for dealing with traumatic events. Axelrod, Morgan, & Southwick (2005) conducted a study intended to address this concept; they investigated the relationship of PTSD symptomatology to

pre- and post-combat BPD criteria endorsement in 94 National Guard reservists. Contrary to most studies of BPD, this sample consisted mainly of men (73% of participants). The authors administered a series of three self-report measures pertaining to various points before and after soldiers' active duty in the Gulf War.

The first self-report measure was a Desert Storm Trauma Questionnaire, which was completed one month after the soldiers' return from the Gulf. This measure was designed to obtain information about soldiers' exposure to traumatic events while overseas. The second was a PTSD symptom scale, completed one month after their return, and again at 6 months post-return. The third was a Personality Diagnostic Questionnaire, responses to which were to focus on two time periods: 6 months before deployment, and 6 months after return. Results supported the hypothesis that prewar BPD symptomatology predicted variability in PTSD symptoms, even when degree of exposure to traumatic events was accounted for.

Haller and Miles (2004), using a sample of 228 women from a federally-funded perinatal drug abuse treatment program, conducted a study of personality disorder and childhood abuse in the context of drug dependency. Within the sample, 50% reported emotional abuse, 42% reported physical abuse, and 42% reported sexual abuse. The Millon Clinical Multiaxial Inventory (MCMI-2) was used to assess each subject for personality disorders and disturbances. Their results indicated that while 27% of the sample met criteria for BPD, no specific association was found between type of abuse and BPD.

## Gender Bias in BPD Criteria

In this section, studies related to gender bias in BPD will be reviewed. These studies detail the relationship of gender to co-morbidity in BPD, as well as overall gender bias associated with individual diagnostic criteria for BPD.

Johnson et al. (2003) investigated the relationships between diagnostic criteria for BPD, comorbidity, and gender in the CLPS sample of 668 subjects. They found that women with BPD were more likely to have co-occurring diagnoses of PTSD, while men with BPD were more likely to have substance use disorders, and were also more likely to meet additional criteria for schizotypal, narcissistic, and antisocial personality disorders. Further, a significant difference was found in which women were more likely than men to endorse the criterion for identity disturbance. No significant differences were found between men and women in terms of abuse history. These findings suggest that the cognitive and emotional dysregulation associated with BPD may affect behavior differently in men and women.

A similar conclusion can be drawn from a study conducted by Boggs et al. (2005), using the database of 668 subjects from CLPS (64% of whom were female). This study focused on gender bias in diagnostic criteria for borderline, schizotypal, avoidant, and obsessive-compulsive personality disorders. The authors divided the sample by diagnosis and level of functioning, and then used slope/intercept analysis to determine whether this revealed patterns of gender bias. The main finding of this study was that in women with BPD, Global Assessment of Functioning scores were poor predictors of symptom severity. In other words, a woman with a number of severe symptoms was likely to be functioning at a higher level than a man with the same symptom picture.

A 2007 study conducted by Jane, Oltmanns, South, and Turkheimer produced similar results in a sample of 599 individuals participating in a larger study on the validity of assessment materials in the diagnosis of personality disorders. The sample contained two subgroups: 433 individuals recruited from an Air Force training cohort, and 166 college students. The Structured Interview for DSM-IV Personality (SIDP-IV, Pfohl, Blum, & Zimmerman, 1997) was

administered to all subjects. Further, all subjects completed self-reports: the Multi-Source Assessment of Personality Pathology (Oltmanns & Turkheimer, 2006) and the Schedule for Nonadaptive and Adaptive Personality (Clark, 1993, in Jane et al., 2007). While there were criteria that, when endorsed, were found to differentially predict level of pathology in men and women, the criteria were for disorders other than BPD (i.e., paranoid personality disorder, antisocial personality disorder, and schizoid personality disorder). The authors concluded that there was no indication of gender-biased criteria in BPD.

Eubanks-Carter and Goldfried (2006) conducted a study in which gender bias was explored in the context of homosexual versus heterosexual patients. One hundred forty-one psychologists were asked to review a hypothetical case in which the patient presented symptoms that could be construed as a sexual identity crisis or as BPD. They found that psychologists were significantly more likely to diagnose BPD in a man they perceived to be gay. Specifically, given the same case information except for differences in sexual orientation, psychologists diagnosed BPD in 61% of homosexual men but only 36% of heterosexual men.

## Common Treatments for BPD

This section will detail studies related to the treatment of BPD, categorized in terms of the main types of treatment available for the disorder. The discussion will begin with a focus on psychoanalytic treatment outcomes, followed by cognitive-behavioral and dialectical behavior treatment and mentalization-based treatment.

Psychoanalytic treatment. A number of studies have been conducted which explore the efficacy of psychoanalysis for individuals with BPD. While treatment modalities vary within the purview of psychoanalysis, results of studies on BPD and psychoanalysis have been encouraging.

The Menninger Project was designed to determine the efficacy of psychoanalysis versus supportive psychotherapy with troubled populations (Bateman & Fonagy, 2004a). Two groups were treated, both comprised of people who met criteria for BPD. One group was given psychoanalytic treatment, and the other was given treatment that would be considered supportive psychotherapy. While results indicated that 46% of psychoanalytic cases and 54% of psychotherapeutic cases had "moderately good" outcomes, a trend was observed that favored psychotherapy, not psychoanalysis, for patients with relatively low ego-strength. This finding resulted in the approach called "psychodynamically guided hospitalization." Overall, the finding was that "supportive-expressive" therapy, along with periods of hospitalization and a network of social support, was the best approach for the borderline group (Bateman & Fonagy, 2004a).

Stevenson, Meares, and D'Angelo (2005) and Meares et al. (1999; in (Bateman & Fonagy, 2004b) conducted a study in which psychoanalysts treated 48 borderline patients twice weekly for a year; the focus was on the psychology of the self. Of the 30 subjects who completed the treatment, 30% no longer met criteria for BPD at the end of the treatment. Furthermore, these changes were sustained at a 12-month follow-up, calling into question the belief that personality is unchangeable through psychotherapy.

In a randomized controlled trial, Levy, Meehan, et al. (2006) studied psychoanalytic psychotherapy of individuals with BPD. The sample consisted of 90 adults (84 of whom were female) referred from the community. The three groups received a highly structured form of psychoanalytic treatment (transference-focused psychotherapy), supportive psychotherapy, or dialectical behavior therapy (DBT). Subjects were assessed for degree of attachment as well as narrative coherence (which can be described as an internal working model of most social interactions, accompanied by an ability to make inferences about others' internal states).

Correlations indicated that the group receiving transference-focused psychotherapy showed the greatest degree of attachment security with their therapists, as well as the greatest degree of narrative cohesion.

Mentalization-based treatment. In his theory of mentalization, Fonagy and Target (1998) suggested that children develop a sense of self when they are aware of their own mental states being observed by others (when they are being "mentalized about"). This process alerts the child to the idea that he has an "agentive" mind; in other words, he is a separate agent from those around him and he experiences different mental states than they do. Like Linehan's invalidating environment, Fonagy and Target suggested that when children's mind states are not mirrored, BPD is likely to develop.

Mentalization-based therapy (MBT) is a structured psychoanalytic psychotherapy designed to provide an environment in which the patient is "mentalized about" in a safe, structured setting. The theory behind this approach is that when provided this opportunity, patients will recover the mentalizing ability that did not develop in early childhood. Thus, the focus in MBT is less on behavioral changes than on developing the capacity for this basic, crucial type of functioning (Bateman & Fonagy, 2004a).

Similar results were found by Bateman and Fonagy (1999) in their study of mentalization-based, psychoanalytically-oriented treatment in a partial hospital setting. Nineteen patients with BPD were treated with a combination of individual psychoanalytic psychotherapy and group psychoanalytic psychotherapy in addition to standard partial hospital treatment (community meetings, psychopharmacology consult, and individual meetings with a case manager). The 19 patients in the experimental group were compared with 19 patients with BPD who were treated with "standard psychiatric care." Standard psychiatric care consisted of

inpatient admission when necessary (this became necessary for 90% of participants in this group), partial hospitalization in which treatment was focused on problem-solving, and outpatient and community follow-up. Significant differences were found between the treatment and the control groups on several measures. The Center for Epidemiological Studies Depression Scale scores as self-reported degrees of state and trait anxiety decreased significantly in the treatment group but remained the same in the control group. Treatment group members had a large reduction in suicide attempts after psychotherapeutic treatment; suicidality and suicidal behavior remained stable in the control group. Control group members had far longer hospital stays than treatment group members in the last six months of follow-up, which suggests that BPD symptomatology was not appreciably reduced in the control group.

Bateman and Fonagy (2001) published follow-up results to this study, in which it was found that at 18 and 36 months post-treatment, the group that had received mentalization-based psychoanalytic partial hospitalization continued to function better than the group that received standard partial hospital treatment. The group that received mentalization-based treatment had significantly lower levels of depression and anxiety, and showed significantly improved social adjustment compared to the control group.

Cognitive-behavioral therapy. Cognitive-Behavioral Therapy (CBT; Beck et al., 1990) is a treatment modality designed to address maladaptive pattern of thinking and behaving in order to improve the functioning of the individual. In a study of CBT with people with BPD, Evans et al. (1999; in Bateman & Fonagy, 2004) provided manual-assisted cognitive therapy (MACT) to people with BPD, and contrasted the outcomes to those resulting from treatment as usual (TAU; usually supportive psychotherapy). Significant differences were found favoring MACT for

reduction of suicide acts and depressive symptoms. It was also found that MACT was generally more cost-effective than TAU.

Dialectical behavior therapy. Dialectical behavior therapy (DBT) was conceived by Marsha Linehan (1987), herself a cognitive-behavioral therapist. DBT is a highly structured, manual-based treatment involving weekly therapy, groups, and telephone contact. Groups are based in four subject areas: mindfulness (i.e., nonjudgmental awareness, taken from the Buddhist tradition), emotion regulation, distress tolerance, and interpersonal effectiveness. Patients learn how to engage in different types of social interactions, as well as how to monitor and manage their emotions. DBT is lauded as the most effective available treatment for BPD (Nee & Farman, 2005).

Linehan, Heard, and Armstrong (1993) conducted a randomized controlled trial to evaluate functioning in 39 women a year after receiving DBT versus treatment as usual (TAU). Eighteen months post-treatment, the DBT group had significantly fewer episodes of self-harm than the group that received TAU. However, this comparison became non-significant after 24 months post-treatment. Other differences seemed to contradict this result: at 18 months, there was no significant difference between the groups in terms of number of hospitalizations; a significant result was found at 24 months post-treatment (the DBT group had fewer hospitalizations than the TAU group). Overall, gains were maintained by the DBT group in the areas of reduced anger, self-rated social adjustment, and interviewer-rated social adjustment.

Linehan et al. (2006), in an effort to enhance the power of her analyses on the effectiveness of DBT, conducted a larger, two-year randomized controlled trial of DBT versus outpatient treatment by experts. One hundred and one participants were obtained through clinical referral, and assigned randomly to a treatment provider. These providers offered DBT or

treatment as usual (TAU). Variables such as therapist accessibility, experience, allegiance, sex, and institutional prestige were controlled for in therapist assignment. The authors found that compared to subjects receiving TAU, subjects who received DBT were significantly less likely to attempt suicide, drop out of treatment, or visit the emergency room for psychiatric reasons. They also were less likely to undergo inpatient psychiatric hospitalization.

Feminist treatment. Very little has been written in the empirical literature regarding outcomes of feminist treatment for BPD. This dearth of empirical literature is probably due to the avoidance of diagnostic labels on the part of the feminist treatment community, as well as the deemphasis on empiricism as the only path to knowledge. However, the Chrysalis Program, which is a feminist treatment community for women diagnosed with personality disorders, reported significantly fewer inpatient hospitalizations for its members at one year post-discharge (Rivera, 2002).

In summary, all of the treatments listed here are those that have been credited with helping BPD sufferers reduce symptomatology and improve relationships. A wide array of studies have compared the various treatments for BPD (e.g., Bateman & Fonagy, 1999; Bateman & Fonagy, 2001; Bateman & Fonagy 2004a; Levy, Clarkin, Yeomans, Scott, Wasserman & Kernberg, 2006; Linehan, Heard, & Armstrong, 1993; Nee & Farman, 2005). However, these studies have missed the connection between different treatments for BPD and their potential ability to address the neuropsychological underpinnings of BPD.

Neuropsychology and Mental Health

A number of studies have been conducted which investigate the relationship between neuropsychological functioning and mental health (e.g., Burgess, 1990; Cornelius, Soloff, George, & Schulz, 1989; Dowson, et al., 2004; Jelinek, et al., 2006; Legris & van Reekum, 2005;

Reardon, 1995; Rourke & Fuerst, 1991; Rourke, Young, & Leenaars, 1989; Swirsky-Sacchetti, et al., 1993; Wasserstein, 2000).

Neuropsychology and treatment outcome. For each neuropsychological assessment completed, it is necessary to obtain a measure of overall intelligence in order to assess relative strengths and weaknesses in a client. Very often, a measure from the Wechsler series of IQ tests is used to meet this requirement. The classic adult measure of intelligence is the Wechsler Adult Intelligence Scale-III (WAIS-III; Wechsler, 1997) and the classic measure of child intelligence is the Wechsler Intelligence Scale for Children – Fourth Edition (WISC-IV; Wechsler, 2003). The WISC-III is comprised of 14 subtests, each designed to measure different aspects of functioning. Reliability for the WAIS-III and WISC-IV is between .89 and .97 for all subtests and scales. Criterion-related and construct validity for the WAIS-III and WISC-IV are demonstrated by their convergence with similar IQ measures, school grades, and tests of achievement such as the Wechsler Individual Achievement Test (Wechsler, 2001). Some evidence indicates that scores on the Wechsler series of IQ tests are predictive of treatment outcome in non-BPD participants. The pertinent findings are detailed below.

Minnick (1973) conducted a study of treatment outcome predictors in 42 male inpatients at a Veterans Administration Hospital. Twenty-seven subjects were suffering from psychotic illness; the remaining 15 were suffering from anxiety and depressive disorders. Results indicated that in the larger sample, higher WAIS-R IQ predicted better prognosis at discharge. This result was not different between subjects with psychosis and those without, despite the fact that studies often find significantly lower IQ in subjects who are actively psychotic (Carlsson, Nyman, Ganse, & Cullberg, 2006).

Carlsson et al. (2006) conducted a longitudinal study of neuropsychological predictors of long-term treatment gains in a Swedish hospital system. Their sample consisted of 128 subjects with first-episode psychosis, divided into groups according to diagnosis (49 subjects were diagnosed with schizophrenia syndromes, while 79 were diagnosed with non-schizophrenia psychotic illness). These mentally ill subjects were compared to 30 healthy control subjects. Subjects were administered the WAIS-R; and Global Assessment of Functioning (GAF) was rated at intake, and at 1- and 3-year follow-up. Results indicated that subjects with all psychotic illnesses performed significantly less well on the WAIS. In regard to subtests, subjects with psychotic illness scored significantly lower than controls on all but the Information subtest. WAIS-R results were not a predictor of 1-year GAF, but they were a positive predictor of 3-year GAF. Minor differences were found between the Verbal and Performance scores, in that the Performance IQ was a slightly better predictor of 3-year outcome than the Verbal IQ.

Wild and Gur (2008) found that poorer verbal memory significantly predicted poorer treatment outcome in individuals with post-traumatic stress disorder. Specifically, it was hypothesized that poorer verbal skills seemed to diminish the effectiveness of CBT for post-traumatic stress disorder.

Haaga, DeRubeis, Stewart, and Beck (1991) investigated a cohort of 106 adult outpatients in cognitive-behavioral treatment who were administered the WAIS-R. Overall WAIS results were correlated with depressive symptoms only at the end of treatment, which was contrary to the predicted direction of the relationship. In short, patients who performed better on IQ tests fared worse in cognitive therapy.

Leber, Parsons, and Nichols (1985) identified a significant relationship between neuropsychological variables and persistent alcohol abuse. Specifically, men who did more

poorly on the WAIS tended to be identified as having "poor progress" by clinicians who were blind to WAIS data.

Overall, the studies detailed above indicate a pattern in which IQ, as measured by the Wechsler scales (e.g., WAIS-III), predicts treatment outcome in mentally ill patients. This connection appears to be present in a number of areas of functioning, including depression, psychosis, and alcoholism. In one study (Carlsson et al., 2006), Performance (or nonverbal) IQ was the best predictor of treatment outcome in psychiatric inpatients. However, another study (Wild & Gur, 2008) identified verbal IQ as the best predictor of treatment outcome in women with trauma histories.

IQ and social functioning. Several studies have explored the relationships between IQ scores, particularly scores on the Picture Arrangement (PA) and Comprehension subtests, and social functioning. Beebe, Pfiffner, & McBurnett (2000) conducted a study to evaluate the common assumption that the PA and Comprehension subtests of the WISC-III were evaluative of social functioning. In a larger study of 172 children aged 6-11 (142 diagnosed with ADHD, and 30 control subjects), authors administered the WISC-III, along with the BASC (TRS-C and PRS-C; Reynolds & Kamphaus, 1992). Children with ADHD had significantly lower WISC-III scores than control subjects, and displayed behavioral and emotional problems to a significantly greater degree. In the combined sample, scores from the Comprehension subtest were positively, significantly related to parent and teacher reports of conduct problems, leadership skills, and popularity, and teacher reports of adaptability and social skills. However, when controlled for general intelligence (in a partial correlation), all but three of these reported areas of functioning (conduct problems, leadership, and adaptability) became non-significant. After controlling for general intelligence, higher Comprehension scores were still related to fewer parent-reported

conduct problems and better teacher-reported adaptability and leadership skills. PA scores were significantly related to teacher reported conduct problems, social skills, and leadership, but when controlled for intelligence, these areas of functioning became non-significant. The authors concluded that there was partial support for a relationship between the Comprehension subtest and social skills, but that there was no support for a similar relationship with PA.

Reiff and Gerber (1990) conducted a study of elementary school children with learning disabilities in which they sought to investigate relationships between scores on cognitive measures and nonverbal social perception. Subjects in the study included 22 boys and 10 girls from fourth and fifth grades, ranging in age from 9 to 12. All subjects had received services for learning disabilities in the 3 years surrounding the study. Measures included the PA, Comprehension, and Digit Span subtests of the WISC-R (Wechsler, 1974) as well as the PONS (Profile of Nonverbal Sensitivity; Rosenthal et al., 1979). The PONS is a measure that was designed to identify participants' abilities to read facial and voice cues, and to infer the correct meaning from them. The measure involves showing subjects 2-minute videotaped segments in which affect is expressed using different modalities: visual, auditory, or combined. Study participants are given two choices as to what affect is being portrayed in the scene. Results indicate the presence or absence of brain-based difficulties in social functioning.

A stepwise multiple regression analysis was performed to determine the predictive power of each variable (age, PA, Comprehension, Digit Span) on the PONS. The results of this analysis indicated that PA was the strongest predictor, followed by the Comprehension subtest. The authors of the study suggested that these results supported the power of PA and Comprehension to predict children's abilities to infer social meaning.

Sipps, Berry, and Lynch (1987) conducted a study in which scores from the PA and Comprehension subtests of the WAIS-R (Wechsler, 1981) were compared with scaled scores on the California Psychological Inventory (CPI; Gough, 1987), a self-report measure of personality and behavior. The California Psychological Inventory was designed in a manner that was similar to the structure of the Minnesota Multiphasic Personality Inventory (MMPI; Butcher, Dahlstrom,

Graham, Tellegen, & Kaemmer, 1989). However, rather than focusing on clinical concepts of mental health and illness, the creators of the CPI focused on "folk concepts" that are commonly used to describe people in non-clinical settings. Eighty-four subjects were recruited; these subjects were a blend of college students and community members. Fifty-two of the subjects were women, and 32 were men. The regression analyses conducted by the authors revealed that the Capacity for Status and the Flexibility subscales of the CPI were significant predictors of both PA and Comprehension. Further, Comprehension was predicted by Communality and Responsibility, while PA was predicted by Femininity. The authors concluded that PA and Comprehension may be measures of social intelligence because of their ability to predict positive social "folk concept" behaviors.

In summary, the studies detailed in this section revealed positive relationships between IQ as measured by Wechsler scales, and positive social behavior. In particular, Picture Arrangement and Comprehension subtests were the strongest predictors of positive social behavior. The researchers who conducted these studies inferred that PA and Comprehension were subtests that may measure social functioning in the general population.

# *Neuropsychology and BPD*

A number of researchers have studied the neuropsychology of BPD, and the results support a brain basis for the disorder. Literature that is focused on IQ scores (especially subtest

scores on PA and Comprehension) is detailed in this section, followed by a discussion of findings regarding BPD and other neuropsychological tests.

IQ and BPD. Swirsky-Sacchetti et al. (1993) compared 10 female outpatients with BPD to 10 healthy control subjects on a number of neuropsychological measures. On the WAIS-R (Wechsler, 1981, in Swirsky-Sacchetti et al., 1993), women with BPD scored significantly lower on Picture Arrangement, but there were no significant differences on any other subtests. In terms of IQ scores, women with BPD scored significantly lower on verbal, performance, and full-scale IQ. Several other neuropsychological instruments were administered to assess motor sequencing, memory, language skills, visuo-perceptual functioning, and response inhibition, A number of significant differences were found between the two groups: the borderline group scored significantly lower than controls on the Luria Motor Skills Test (Golden, 1979), the Wechsler Figural Memory Test (including delayed recall, Russell, 1988), the Rey-Osterrieth Complex Figure (Meyers & Meyers, 1995); and the Stroop Color-Word Test (Golden, 1978). These differences imply that there may be functional differences between people with BPD and those without in terms of motor skills, memory, spatial cognition, and response inhibition.

Andrulonis, Glueck, Stroebel, and Vogel (1982) conducted a study of 106 psychiatric inpatients with BPD, in which they collected histories of brain injury and learning disability. They found that a developmental history of seizures, learning disabilities, head trauma, and attention deficit disorder predicted BPD in a subgroup of individuals.

Mandes and Kellin (1993) studied differences in WAIS-R results between male and female patients with BPD. In a group of 79 men and 40 women recruited after referral for social services, symptomatology data were collected and the WAIS-R was administered. In women, PA scores were correlated significantly with BPD symptomatology. In men, Comprehension was

correlated significantly with BPD symptomatology. However, in the combined sample, there was no correlation between subtest scores and BPD symptoms.

Legris and van Reekum (2005) conducted a review of the literature regarding the neuropsychology of BPD. In 65 % of the 17 studies reviewed, the authors found that individuals with BPD scored lower than controls on measures of nonverbal processing, categorized by the authors as the Rey-Osterrieth Complex Figure (Copy; Meyers & Meyers, 1995), Corsi (Kessels, van Zandvoort, Postma, Kappelle, & deHaan, 2000), the Group Embedded Figures Test (Witkin, Oltman, Raskin, & Karp, 1971), Block Design, Digit Symbol, and Picture Arrangement tests (Wechsler, 1997).

Hymowitz et al. (1983) studied the WAIS and Rorschach results of 20 male and 28 female psychiatric inpatients. The purpose of the study was to determine the degree to which these tests discriminated between individuals BPD and psychotic disorders. Psychotic subjects showed significantly lower WAIS results on Similarities and on Picture Completion. The difference between the Vocabulary and Picture Completion subtests, combined with the difference between Performance IQ and Verbal IQ, and the Picture Completion score, accounted for 50% of the variance in symptomatology.

Among the studies detailed above, the Picture Arrangement subtest of the WAIS was the most frequently identified as yielding lower scores for people with BPD than for those without. Thus, the Picture Arrangement subtest appears to demand a type of functioning that is particularly difficult for people with BPD, especially women. Because of these results, the PA subtest is an area of interest for the present study.

BPD and Overall Neuropsychological Functioning

Three broad areas of functioning are implicated in neuropsychological studies of BPD: executive functions, memory, and nonverbal processing. Each is relevant to the symptomatology of BPD, and these associations will be discussed in detail. It is important to note that these areas overlap; for example, executive functions (such as attention) are a necessary precursor to memory, in that one must attend to that which one wishes to remember. Neuropsychological processes are better viewed as an interactive network rather than a series of monolithic areas of study. In this discussion, however, findings will be categorized according to the area of closest relevance.

Executive functions. Executive functions (EF) describe a broad area of processing involving insight, initiation, planning, and control of thought and behavior (Legris & van Reekum, 2005). They are associated with the prefrontal cortex. Attentional processes are often discussed in conjunction with executive functions; in this chapter, they will be referred to as a subset of executive functions.

Legris and van Reekum (2006) found that 86% of studies indicate EF impairment in BPD. Specifically, performance on Digit Symbol Coding, Trails, Wisconsin Card Sorting Test (a test of developing abstractions, shifting and maintaining cognitive set, and perseveration and learning efficiency), and Stroop Color-Word tests (a test of response inhibition) were all negatively associated with BPD. Broad areas of EF, such as decision-making and planning, were negatively affected as well.

Swirsky-Sacchetti et al (1993), in a study of the neuropsychology of BPD, matched a group of 10 female subjects with BPD to 10 female age- and education-matched control subjects and studied a number of domains of neuropsychological functioning. As part of their study, they

administered the Stroop Color-Word Test to both groups, and found that participants with BPD scored significantly lower on the Stroop Color-Word Test than control subjects. They attributed this result to subtle frontal lobe deficits in BPD sufferers. Further, the authors discussed the connection between difficulty on the Stroop Color-Word test and problems in social functioning, including intolerance of ambiguity, a frequent clinical observation in clients with BPD.

Dowson et al. (2004) compared 19 subjects with BPD and 19 subjects with Attention-Deficit Hyperactivity Disorder (ADHD) on a measure of spatial working memory (a computerized decision-making task). While his results indicated that the ADHD group demonstrated greater spatial working memory impairment than the BPD group, he did note that the subjects with BPD took longer to make decisions, possibly indicating an overall deficit in planning and decision-making.

Posner et al. (2002) investigated the functioning of attentional networks in 39 male and female subjects with BPD, and compared them to 22 "temperament-matched controls," matched in terms of negative affect and "effortful control," as indicated by the Adult Temperament Questionnaire. Both the BPD group and the control group were compared to "normals," who were not diagnosed with a personality disorder, and did not match the BPD group in terms of temperament. A computer-based attentional task was administered in which patients had to give specific responses to different types of cues. Attentional functioning was divided into four main sub-areas: alerting (responding to warning signs that a cue was coming), orienting (a spatial marker was given to assist the viewer in identifying cues), conflict (incongruous material was presented) and response time (time to give specific response). Posner's group found that there was an attentional deficit in subjects with BPD that was different from that of temperament-matched controls. Subjects with BPD demonstrated the longest reaction time when conditions

included conflict, possibly suggesting a greater vulnerability to cognitive functioning when negative affect is present.

Overall, studies of executive functioning in participants with BPD indicate that attention and executive control are areas of difficulty for BPD sufferers. In particular, participants with BPD appeared to struggle more to maintain their attention and executive control under conflict conditions or when negative affect interferes with cognition. Executive dysfunction is commonly represented in impulsive, disinhibited behaviors, and it is notable that impulsivity is a criterion for BPD. The use of the Stroop Color-Word test in the present study was intended to address the frequent findings of poorer attentional control in participants with BPD.

Nonverbal cognition. While some found that overall IQ was impaired in subjects with BPD, ways of accounting for these findings differed. Generally, performance IQ was more negatively affected than verbal IQ in BPD, which Legris and van Reekum attribute to a nonverbal cognitive impairment in BPD. Indeed, about 65% of the studies reviewed by Legris and van Reekum indicated that people with BPD were impaired on measures of nonverbal functioning, such as the Rey-Osterrieth Complex Figure, in addition to the PA scores mentioned earlier.

Furthermore, brain areas that are most pertinent to nonverbal processing (i.e., the right parietal cortex) were found by Irle et al. (2004) to be reduced by 11% in subjects with BPD. Irle suggested that BPD is a deficit of the right hemisphere that is neurodevelopmental in nature (Legris & van Reekum, 2006).

Segal et al. (1993) and Swirsky-Sacchetti et al. (1993) found that subjects with BPD scored significantly lower on the Picture Arrangement subtest of the WAIS when compared with healthy controls. Furthermore, Segal et al. (1993) asked subjects with BPD to tell stories related

to their Picture Arrangement responses. They then coded these stories using a scheme designed to identify the level of object relations at which the subject was functioning. Data from this study indicated that the degree of BPD symptomatology was associated with the level of object relations functioning, and that in general, subjects with BPD told less plausible stories, with fewer inferences based on the visual component offered by the cards. In addition, BPD symptomatology was associated with a lesser degree of psychosocial complexity on TAT responses.

Niederhofer (2004) conducted a study of handedness and brain laterality in subjects with BPD, and found that subjects with BPD tended to be inconsistent in their proximal and distal hand dominance. They were more likely to use the left hand for distal, complex tasks (such as touching and grasping food and objects), and the right hand for proximal, simple tasks (such as touching the face.) This inconsistency in hand dominance, suggested Niederhofer, supports the idea of deficits in right-brain functioning in BPD. A right-brain deficit would be demonstrated in scores on nonverbal subtests of the WAIS-III, namely the Picture Arrangement subtest used in the present study.

*Implications of neuropsychological data*. The previous section presented neuropsychological data related to the functioning of individuals with BPD. Findings suggested that subjects with BPD demonstrated impaired functioning in a number of areas, most notably executive functions, memory, and right-hemisphere, or nonverbal functioning.

These impairments share characteristics with a number of other diagnostic groups. Impairments in right-sided functioning are shared by individuals with various disorders in social learning (e.g., nonverbal learning disability; Edgin & Pennington, 2005; Forrest, 2004; Palombo, 1996). In fact, one of the primary diagnostic criteria for nonverbal learning disability (NLD) is a

significant split favoring verbal over perceptual IQ. Perceptual IQ scores are associated with general social cognition and social skills (Reiff & Gerber, 1990; Wasserstein, 2000). Individuals with nonverbal learning disability are impaired in these areas; they typically have difficulty interpreting social cues, inferring the correct meaning from euphemisms, jokes, and expressions, and generally struggle to function socially (Casey, Rourke, & Picard, 1991; Rourke, et al., 1989). Furthermore, individuals who have low perceptual IQ scores relative to verbal IQ scores are at risk for greater depression, anxiety, and suicidality than their peers (Wasserstein, 2000). When viewed in this light, it is plausible that deficits in nonverbal functioning have the same effect on overall functioning in borderline subjects as in subjects with NLD. While the disorders are certainly different in symptomatology, they may both reflect fundamental deficits in social cognition.

Layden, Newman, Freeman, and Morse (1993) provided support for the right-sided theory of BPD. The group built their study upon evidence that people with BPD demonstrated impaired facial emotion recognition. They recruited 43 adults with BPD and 26 control subjects without BPD from outpatient mental health clinics, as well as the community, and they administered the Bell-Lysaker Emotion Recognition Test, the Ekman Facial Emotion Recognition Test, the Prosodic Emotion Recognition Test, the Affect Battery-Revised, the Benton Facial Recognition Test – Long Form, nonsocial neurocognitive tests of reaction time, and the BDHI (a measure of interpersonal antagonism). Individuals with BPD showed significantly lower accuracy than the control group in terms of integrated facial emotion recognition (emotion recognition within the context of a ten-second vignette), and facial feature recognition. There was no significant difference between subjects with BPD and control subjects on measures of isolated facial expression or vocal emotions. Deficits in processing of integrated

facial emotions were associated with increased hostility, particularly suspiciousness and assaultiveness. The authors concluded that there were most likely subtle deficits in the processing of interpersonal cues (specifically facial expressions) among the BPD group.

Treatment implications. The studies reviewed in this chapter detail a number of differences between people with BPD and those without in terms of cognitive functioning. Most prominent are the studies that indicate lower scores on the PA and Cognition subtests of the WAIS may predict deficits in social functioning.

Further, a number of neuropsychological studies of BPD identify a pattern in which BPD sufferers score lower on the PA subtest of the WAIS. While BPD sufferers certainly endure a great deal of emotional pain, they are placed on Axis II of the diagnostic spectrum because of deficits in social functioning. Because the PA subtest has been associated with nonverbal functioning in a number of studies (e.g., Beebe et al., 2000; Segal et al., 1993), it is interesting to note that it appears to be a difficult test for a population whose trademark is relationship difficulties. The score on the PA subtest, however, is indicative of more than just relationship problems. It is indicative of an invisible problem in brain functioning that gives rise to relationship problems.

In addition to the pattern in which PA subtest scores are lower in BPD sufferers than in control subjects, other score differences have been associated with BPD. Specifically, a deficit in attention and executive functions has been identified in participants with BPD. The Stroop Color-Word Test is the neuropsychological measure most frequently associated with BPD, in that participants with BPD have tended to score lower on the Stroop than non-BPD control subjects. This finding is consistent with another major problem in BPD symptomatology: that of impulsivity. The tendency to act without adequate inhibition, and consequently to act in

regrettable ways, is measured by the Stroop Color-Word Test. Thus, the Stroop is a useful measure to administer to participants with BPD.

While it is encouraging to have neuropsychological data to accompany the subjective clinical experience of treating BPD, it is not enough. Diagnosis is only valuable if it points the way to appropriate treatment, and these neuropsychological data have the potential to inform treatment of BPD.

Essentially, neuropsychology is providing validation for the theoretical foundation that underpins the BPD diagnosis. The usefulness of neuropsychological tests to pick up these underlying deficits cannot be overstated. If clinicians and theorists can identify the deficits that give rise to phenotypic BPD behaviors, then treatments for BPD can be tailored as effectively as possible for those who struggle with it.

At the present time, there is no direct connection made in the literature between cognitive deficits in BPD and treatments that would be suited to these types of neuropsychological profiles. However, given that people with BPD tend to score lower on neuropsychological tests associated with social functioning, it is little wonder that the most successful treatments for BPD place emphasis on social functions like perspective-taking (e.g., mentalization), attachment (e.g., psychodynamic psychotherapy), and interpersonal skills training (e.g., DBT).

Because neuropsychology is just beginning to identify associations between subtle cognitive deficits and specialized treatment, there is very little literature detailing the type of treatment that is successful for individuals with poor nonverbal functioning.

Summary and Conclusions

In this chapter, perspectives on BPD were presented according to theoretical orientation.

Data were provided to describe comorbidity with other psychiatric disorders. Treatment

approaches to BPD were detailed, including psychoanalysis, cognitive-behavioral therapy, dialectical behavioral therapy, mentalization-based treatment, and psychotropic medication. A biological basis for BPD was proposed. Neuropsychological studies detailing areas of impaired functioning were described. Based on these findings, associations were made between the neuropsychology of BPD and the social impairment demonstrated in subjects with BPD.

## CHAPTER THREE

## METHODOLOGY

This chapter outlines the details of the study undertaken. The following sections are presented: purpose of the study, major research questions and hypotheses, sample population, instrumentation, data collection procedures, research design, data analysis, research design limitations, and chapter summary.

*Purpose of the Study* 

This study was designed to explore the relationship between social cognition as expressed by scores on the Picture Arrangement subtest of the WAIS-III (Wechsler, 1997a), response inhibition as expressed by scores on the Stroop Color-Word Test (Golden, 1978), and treatment outcome in individuals with BPD, who were being treated in a cognitive-behavioral partial hospital program. As such, a descriptive study design was used to identify the predictive value of the independent variables (scores on the Picture Arrangement and Stroop Color-Word Test) on the dependent variables (scores on the outcome measures: Center for Epidemiological Studies Depression Scale, Behavioral Symptom and Identification Scale, and the Global Assessment of Functioning score).

## **Participants**

Sample population. Participants for this study were recruited from a cognitive behavioral therapy based partial hospital program (PHP) at McLean Hospital in Belmont, Massachusetts in 2009. These participants were also participating in a larger study, designed to investigate the efficacy of this PHP.

The criteria for participating in this study were as follows: participants were required to complete a course of treatment (defined as a stay of a week or longer) at the PHP, and

participants who met criteria for drug or alcohol dependence at the time of participation in the study were not included. Participants were required to read and sign documentation detailing informed consent. Further, participants were queried as to a history of traumatic brain injury or other significant insults that could affect cognition, and any participant who was compromised in this way was not included.

For this study, 25 participants with BPD were recruited. These patients were naïve to cognitive-behavioral treatment. Diagnostic measures (clinician diagnosis and the BPD section of the SCID-II) were administered to obtain reliable diagnoses.

All subjects were queried regarding history of head trauma and/or major neuropsychiatric insults (anoxia, brain surgeries, ECT, active dependence on substances). There were no prospective participants who reported head trauma or neuropsychiatric insults; thus, no participants were discontinued on this basis.

*Primary investigator*. The Primary Investigator for this study (C.M.) is a 5<sup>th</sup>-year doctoral student with 2 years of experience as a clinical trainee at the Partial Hospital, and 2.5 years of experience conducting cognitive assessments. The Primary Investigator was responsible for maintaining IRB approval, disseminating the details of the study to the PHP staff, administering the neuropsychological measures, and maintaining the database for the present study.

Other investigators. A larger outcome study was being conducted at the Partial Hospital, from which some data for the present study was obtained. Key personnel include the Primary Investigator and Co-Investigator for the larger outcomes study, as well as their research assistant. These professionals maintained the IRB approval for the outcome study and provided measures to Partial Hospital staff for use in the study. They also organized the administration of the larger study measures (i.e., self-report outcome measures) to study participants.

Additional investigators included the psychology interns who conducted the Borderline Personality Disorder screens with participants in this study. These investigators alerted the Primary Investigator to any BPD screens that resulted in a diagnosis of BPD, so that those who had received the diagnosis could be invited to participate in the present study.

Other partial hospital staff. Clinicians at the Partial Hospital act as Clinical Team Managers for all patients, and provided intake and discharge diagnoses and GAFs for all subjects. Bachelor-level staff members at the Partial Hospital have the primary function of maintaining smooth operations throughout the milieu. These staff members include psychiatric nurses and bachelor-level mental health counselors, who provide milieu orientation to new patients and hand out and collect intake and discharge study measures. Further, there is a Staff Administrative Assistant who stores and organizes patient information (such as intake and discharge summaries) for use in ongoing research projects at the PHP.

The Behavioral Health Partial Hospital Program ("PHP") is a treatment facility that is on the grounds of McLean Hospital. The PHP accepts patients from the community, from inpatient and residential units, and from drug and alcohol treatment facilities. Referrals to the PHP are generally made by social workers, either within the McLean system or outside it, who are coordinating the care of these patients and who believe that PHP treatment is indicated. Length of stay averages two weeks.

The theoretical orientation that guides treatment at the PHP is cognitive-behavioral therapy (Beck, Freeman, and Davis, 1990). Clients suffer from a range of Axis I disorders, including major depressive disorder, bipolar disorder, schizophrenia, posttraumatic stress disorder, generalized anxiety disorder, and schizoaffective disorder. Approximately 60% of the

population of the PHP, however, have co-occurring Axis II disorders, most often BPD.

Dialectical behavior therapy (Linehan, 1987) has been shown to be a particularly effective form of CBT for patients with BPD. As such, DBT-themed groups such as Mindfulness and Interpersonal Effectiveness are woven into the available groups at the PHP. Thus, the overall theme of the treatment at the PHP is that of CBT, influenced by DBT.

The PHP is a day program that consists primarily of 50-minute CBT- and DBT-focused psychotherapy groups. Groups begin at 9AM and end at 3PM, with an hour-long break for lunch. Patients are expected to be in attendance at groups unless they are in a meeting with an individual clinician. Most groups are didactic in nature, in that the group leader presents information for patients to use in their treatment. Sample groups are described below.

Groups in the PHP. Behavioral Scheduling is a group in which patients are taught how to build structure into their daily lives. Patients are asked to identify "mastery events" that make them feel a sense of accomplishment (such as paying bills) or "pleasurable events" that add joy to their days (such as going to the movies with a friend). Patients are also instructed on "sleep hygiene," which is a means of preparing for optimal sleep by reducing stimulation 1-2 hours before bedtime.

Mood Monitoring is a group in which patients are taught how to fill out a grid (a "mood monitor") detailing events associated with mood changes. Mood Monitoring is intended to help patients identify and change the "automatic thoughts" that are associated with mood changes.

Self Group is a meeting in which patients learn about the ways in which repressed emotions lead to difficulties with identity, and, in turn, may predispose them to dissociative episodes and/or relationship impairment and self-harm.

Clinicians in the PHP. Patients meet with several types of clinicians during their stays at the Partial Hospital. These professionals are listed below.

A psychiatrist is present for medication adjustments and/or medication maintenance.

Psychiatrists meet with clients as needed, usually for 15-30 minutes, 2-3 times per week.

Psychiatrists work closely with all other team members in order to provide medically relevant input that may guide clinical decision-making.

A Clinical Team Manager (CTM) is assigned to each patient. A CTM is a licensed clinical social worker or psychologist whose role is to coordinate the group choices, insurance coverage, and overall treatment of the patient. CTMs provide intake and discharge diagnoses and GAFs. CTMs meet with clients as needed, usually for 30-50 minutes, 2-3 times per week.

A Consultation Liaison (CL) is also assigned to each patient. CLs are trainees (usually a practicum student or intern) who meet with patients several times per week to review progress in groups and explain any CBT concepts that are difficult to implement. The CL meets with clients a minimum of 30 minutes, 2 times per week.

A Vocational Counselor is assigned as necessary. This individual helps clients to prepare for re-entry into the working world and assesses their general functioning to determine whether they can return to work. The Vocational Counselor may not meet with clients at all, unless the need is indicated by the CTM. If the Vocational Counselor is assigned to a client, he will meet with the client for 30 minutes, 1-2 times per week.

An Occupational Therapist is also assigned on an as-needed basis. This individual conducts occupational assessments and provides assistance to clients who have lost mental or physical functioning as a result of their mental illness. Her job is to help clients recover this mental or physical functioning that will help them to maintain their quality of life. The

Occupational Therapist may not meet with clients, unless the need indicated by the CTM. If the Occupational Therapist is assigned to a client, she will meet with the client for 30 minutes, 1-2 times per week.

All of these meetings take place within the Recreation Building of the PHP, during the hours of operation. Patients may see other professionals at the hospital during this time, if it is previously agreed upon with their CTMs.

### Measures

Instruments discussed in this section are grouped into two categories: those which were administered as part of the larger outcome study at the PHP, and those which were used only for the present study. All measures were conducted in a private office at the Partial Hospital, to minimize possible interruptions.

For the larger study, the measures included a demographics form, the Behavior and Symptom Identification Scale (BASIS-24) and its subscales, the Center for Epidemiological Studies Depression Scale, and the Global Assessment of Functioning Scale.

For the present study only, the measures included the Structured Clinical Interview for DSM-IV Disorders, Axis II (SCID-II), borderline personality disorder criteria; selected subtests of the Wechsler Adult Intelligence Scale, Third Edition (WAIS-III), including Matrix Reasoning, Vocabulary, and Picture Arrangement subtests; and the Stroop Color-Word Test. These measures were added by the Primary Investigator and were only administered to participants in the present study.

Larger study measures. Several instruments were administered upon intake and discharge as part of a larger ongoing study on the efficacy of treatment at the PHP. Patients at the PHP offered their participation in this larger study voluntarily and were not compensated. These

measures were administered on the first morning of treatment and on the last afternoon of treatment (excepting the Demographics Form, which was only administered upon intake on the first morning of treatment). These measures are described below.

BASIS-24. This measure is part of the larger outcome study being conducted at the PHP. The BASIS-24 Mental Health Survey (Eisen, 2001). The BASIS-24 is a 24-item survey of established reliability and validity, designed for use in psychiatric treatment. A sample of over 2000 English-speaking inpatients and over 3000 English-speaking outpatients was used to test validity and reliability of the various subscales and scoring of the BASIS-24. Standardized internal consistency was above .70 for all subscales. The BASIS-24 does not offer diagnostic information, thus, it can be used with many different patient populations being treated with different theoretical orientations. All items are administered on a 5-point scale, written at a 5<sup>th</sup> grade reading level to enhance usability by a range of populations. These 5-point scales are rated in two ways: in terms of the level of difficulty experienced (no difficulty...extreme difficulty) or frequency (none of the time...all of the time). Respondents are asked to rate these items in terms of the past week of functioning. An example item is: "During the past week, how much of the time did you feel sad or depressed?"

The BASIS-24 takes five to fifteen minutes to complete and is a self-report measure that can also be administered as a structured interview. For the purposes of this study, the BASIS-24 is administered as a structured interview.

Scores for the BASIS-24 are computed using a weighted algorithm. The BASIS-24 yields overall outcome scores, as well as scores in several different areas: Depression and Functioning (6 items), Interpersonal Relationships (5 items), Psychotic Symptoms (4 items), Substance Abuse

(4 items), Emotional Lability (3 items), and Self-Harm (2 items). Each item, scale, and overall score ranges from 0-4, with 4 indicating greater symptom severity/poorer functioning.

The Center for Epidemiological Studies Depression Scale. The Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977) is a measure of established validity and reliability that is widely used in both research and clinical settings. The reliability of the CES-D is consistently above .80 and the validity has been measured using other popular measures of depression (e.g., the Beck Depression Inventory; Shean & Baldwin, 2008). The CES-D is a 20-item measure that addresses features of depression within the past week of the respondent's life on a 4-point Likert scale. Items on the CES-D are rated as follows:

- 0 =Rarely or none of the time (less than 1 day)
- 1 =Some or a little of the time (1-2 days)
- 2 = Occasionally or a moderate amount of time (3-4 days)
- 3 = Most or all of the time (5-7 days)

The CES-D score is the sum of the 20 item weights, with a possible range from 0-60. A score of 16 or more is considered to be depressed.

Global Assessment of Functioning (GAF). Global Assessment of Functioning (GAF) is a necessary part of any multiaxial DSM-IV-TR diagnosis (APA, 2000). It is entered on Axis V. GAF is assigned by social workers, psychologists, and psychiatrists whenever a diagnosis is made. For the purposes of this study, it is obtained through intake and discharge summaries completed by the patient's CTM, or Clinical Team Manager (see description above).

In terms of reliability, GAF scores have demonstrated interrater reliability with agreement over .80 (Jones, Thornicroft, Coffey, & Dunn, 1995; Soderberg, Tungstrom,& Armelius, 2005). Further, concurrent validity has been shown in studies comparing GAF ratings

with other ratings of functioning and symptomatology, such as the Scale for the Assessment of Positive Symptoms, the Scale for the Assessment of Negative Symptoms, and the Social Behavior Schedule (e.g., Startup, Jackson, & Bendix, 2002).

GAF is a score on a scale of 0-100 which depicts a patient's level of occupational, social, and psychological functioning. A guide is provided in the DSM-IV-TR to assist in the assignment of GAF scores by clinicians. Examples from the DSM-IV-TR include:

- GAF of 91-100: Superior functioning in a wide range of activities, life's problems never seem to get out of hand, is sought out by others because of his or her many positive qualities. No symptoms.
- GAF of 71-80: Some mild symptoms (*e.g.*, depressed mood and mild insomnia) OR some difficulty in social, occupational, or school functioning (*e.g.*, occasional truancy, or theft within the household), but generally functioning pretty well, has some meaningful interpersonal relationships.
- GAF of 61-70: Some mild symptoms OR some difficulty in social, occupational, or school functioning, but generally functioning pretty well, has some meaningful interpersonal relationships.
- GAF of 41-50: Serious symptoms (*e.g.*, suicidal ideation, severe obsessional rituals, frequent shoplifting) OR any serious impairment in social, occupational, or school functioning (*e.g.*, no friends, unable to keep a job).
- GAF of 21-30: Behavior is considerably influenced by delusions or hallucinations OR serious impairment, in communication or judgment (e.g., sometimes incoherent, acts grossly inappropriately, suicidal preoccupation) OR inability to function in almost all areas (e.g., stays in bed all day, no job, home, or friends).

*Measures Specific to the Present Study* 

Four additional measures were specific to the present study and will be administered only to the 20 participants involved. These measures were administered on the first or second day of treatment, and they will include:

Structured Clinical Interview for DSM-IV-TR Axis II Disorders. This measure will be included only in the present study. The Borderline Personality Disorder section of the Structured Clinical Interview for DSM-IV-TR Axis II Disorders (SCID-II, First et al., 2002) was administered to further establish the diagnosis of Borderline Personality Disorder. The SCID-II is a valid and reliable instrument, evaluated for validity and reliability using various methods and populations (e.g., Driessen & Arntz, 1998; Fogelson Neuchterlein, Asarnow, Subotnik, & Talovic, 1991; Maffei, Fossati, Agostoni, Barraco, Bagnato, Deborah, et al., 1997; Weiss, Najavits, Muenz, & Hufford, 1995). Interrater reliability for the SCID-II has been found to be above .80 using kappa and intra-class correlation analyses. The SCID-II contains questions pertaining to each of the twelve Personality Disorder diagnoses on Axis II of the DSM-IV-TR (APA, 2000). It is administered as a semi-structured clinical interview. This version of administration is helpful for the accurate diagnosis of BPD, as many patients tend to "overendorse" diagnostic criteria without understanding the frequency and duration of personality disorder symptoms necessary for diagnosis. Thus, in administering the SCID-II, the subject is asked to refer to their typical, everyday personality over the past several years. Questions for the BPD Screen of the SCID-II pertain to the symptoms of BPD as listed by the DSM-IV-TR. Those administering the SCID-II are encouraged to probe respondents to determine the frequency and severity of each symptom. For example, when asked, "In the last several years, have you deliberately cut, scratched, or burned yourself?" the subject might misinterpret the question to

mean that she is being asked whether she has picked at her skin or scratched at a rash. If she answers "yes," it is the interviewer's responsibility to ask for an example of such behavior and determine whether it constitutes pathological, deliberate self-harm.

For each question, the answer is rated "absent" (score =0), "present, but of uncertain clinical significance" (score=1), and "present" (score=2). The BPD diagnosis is warranted only when five or more symptoms are rated at a 2. Those who do not meet full criteria for BPD will not be included in the study.

The Wechsler Adult Intelligence Scale, Third Edition (WAIS-III). The Wechsler Adult Intelligence Scale is a general test of intelligence or IQ (Wechsler, 1997b). The reliability for the WAIS-III Full-Scale IQ is .97, and the subscales (Verbal and Performance IQ) yield reliability coefficients above 93 (Wechsler, 1997b).

The WAIS, like other Wechsler tests (e.g., the WPPSI-II, the WISC-IV, and the WIAT-II), is administered in a standardized, scripted format. It is comprised of 14 subtests, each of which are intended to measure a different aspect of cognitive functioning. Raw scores for these subtests yield standard scores that are based on a large national sample of adults, broken down into nine different age groups ranging from 16 to 74 years of age. These standard scores have a mean of 10 and a standard deviation of 3. Standard scores are then used to obtain Verbal IQ, Performance IQ, and Full-Scale IQ scores, which have a mean of 100 and a standard deviation of 15.

For the purposes of this study, the WAIS-III was used in two ways. First, to obtain a quick estimate of IQ for participant inclusion, a valid short form of the WAIS-III was administered, consisting of the Vocabulary and Matrix Reasoning subtests. Estimated IQ scores were derived according to the method identified by Ringe et al. (2002). Scoring was conducted

by finding standard scores for the Vocabulary and Matrix Reasoning subtests, summing those scores, and then matching estimated IQ and percentile from a list of corresponding raw sums. Second, as part of the study itself, the Picture Arrangement subtest was administered.

The Vocabulary subtest is considered to be a measure of general vocabulary.

It consists of 21 questions, the answers to which are rated 0, 1, or 2. The first several questions relate to everyday items, e.g., "What is a duck?" As the questions continue, they become progressively more abstract in nature, e.g., "What is forgiveness?" (Note: while the above questions are close in nature to WAIS questions, they are not actually derived from the test. This change is made in order to preserve test security.) Answers are rated at 0 (representing an incorrect answer), 1 (representing an answer that contains some accuracy but does not completely address the demands of the question), and 2 (representing an answer that shows a holistic understanding of both the demands of the question and the meaning of the item). Testing is discontinued after four scores of zero. Scoring is made simpler through the provision of a comprehensive list of possible answers and their corresponding scores, provided in the WAIS/WASI testing manual. A raw score is obtained by finding the sum of the scores obtained on all items. This raw score is then converted to a standard score as described above.

Matrix Reasoning is a 24-item subtest which is considered to measure nonverbal functioning and inductive reasoning (Wechsler, 1999). On the Matrix Reasoning subtest, the subject is provided with cards containing matrices with missing elements. The subject is also provided with a multiple-choice list of designs, and is asked to choose the item that best fits the missing area. These matrices become progressively more complex as the test continues. Testing is discontinued after five incorrect answers. Items are scored incorrect (score =0) or correct

(score = 1). These scores are summed to yield a raw score, which is then converted to a standard score as described above.

The Picture Arrangement (PA) subtest of the WAIS provides information on nonverbal reasoning with a particular emphasis on social comprehension (as described in Chapter 2). Items on the PA subtest are presented in the form of cards depicting steps of a social interaction (e.g., making a purchase at a store). These cards are presented to the examinee in incorrect order, so that the social story does not make sense. The examinee is instructed to "put the cards in order so that they tell a story." The examinee is given a limited amount of time to rearrange the cards.

The PA subtest yields scores of 0 or 2 for some items, and scores of 0, 1, or 2 for some other items. The score of 1 is provided in the case of items for which the cards could be arranged in different ways. However, a score of 1 indicates that while the arrangement of the cards tells a story, it is not as coherent as an arrangement that would yield a score of 2. The PA subtest is discontinued after 5 incorrect scores. A raw score is found by summing the item scores, and the raw score is then converted to a standard score as described above.

The Stroop Color-Word Test. This measure will be included only in the present study. The Stroop Color-Word Test is intended to measure a phenomenon called the the "Stroop Effect," that is, the degree to which the examinee can direct his or her attention under an interference condition. The Stroop Color-Word Test is extensively used in research with psychiatric populations and has been shown to have a test-retest reliability of .84 to .86 (Siegrist, 1997). Further, concurrent validity has been established between the Stroop Color-Word Test and other tests of executive functioning (Stokholm, Vogel, Gade, & Waldemar, 2005).

The test consists of three cards: one with color words (e.g., blue, red, yellow) printed in black ink; one with X's printed in colored ink, and one with color words printed in mismatched colored ink (e.g., the word "blue" printed in yellow ink; Stroop, 1935).

The Stroop Color-Word Test takes five minutes to administer. Cards contain matrices of 10 by 10 items. The subjects are given 45 seconds to read down the rows, identifying the printed word (as depicted on the first card) or the color of the letter or word printed (as depicted on the second and third cards). If they finish a card within 45 seconds, they are instructed to begin again at the upper left-hand corner of the page. If they name an item incorrectly, the tester says "No"; the examinee is then instructed to correct the error and continue without stopping. At the end of the 45-second time limit, the tester instructs them to stop.

For the third card, on which the color words are printed in mismatching colors, the examinee is provided with sample items to ensure that they understand that they should state the color of each word, instead of reading each word.

The Stroop Test yields three T-scores: the Word score (corresponding to Card 1), the Color score (corresponding to Card 2), and the Color-Word score (corresponding to Card 3). It is necessary to administer all three tests in order to prime the subject for the Color-Word Test; however, only the Color-Word T-score (which is indicative of the Stroop Effect) is of interest for this study.

#### Procedure

The 25 participants in this study were recruited from a larger (n=250) outcomes study being conducted at McLean Hospital's Behavioral Health Partial Hospital Program in Belmont, Massachusetts. The larger study is titled, "Establishing the Psychometrics of the BHP Hopelessness Scale." The investigator obtained approval for this study from the Institutional

Review Boards (IRBs) of McLean Hospital and Northeastern University (Appendices x and y, respectively).

Recruitment and informed consent. The recruitment procedures began with participants' recruitment by a research assistant into the outcomes study on their first day of treatment. After an initial orientation and tour by a Mental Health Specialist (MHS), patients are directed to a group room where the larger outcomes study takes place. The research assistant then describes the research project in detail and offers patients an opportunity to participate. If patients chose to participate, they were each given consent forms (see Appendix C) and asked to sign to indicate consent. Copies of signed consent forms were made and returned to participants for their records.

Once consent was obtained, participants were assigned code numbers. For each participant, his or her name was listed alongside his or her code number in a binder, which is kept in a locked file cabinet in a separate room from study data. Each participant's code number was listed on each questionnaire associated with the outcomes study, and questionnaires were kept in numbered folders.

Data collection procedures. In this section, a summary of the data collection process for the present study will be provided. Additionally, information will be included regarding the measures involved in the data collection. Lastly, coding and inter-rater reliability procedures will be described.

Data for the present study were collected from participants who were recruited at the McLean Hospital Behavioral Health Partial Program (BHPP) in Belmont, Massachusetts.

Participants were recruited once they were consented to participate in a larger (n=250) study being conducted at the BHP, entitled "Establishing the Psychometrics of the BHP Hopelessness Scale."

On the first day of treatment, all patients at the BHP were offered the opportunity to participate in the aforementioned psychometrics study. As part of their participation in the larger study, all participants completed a 20-item Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977) and a 24-item Behavior and Symptom Identification Scale (BASIS-24; Eisen, 2001), administered by a bachelor's-level research assistant. They were also assigned a DSM-IV Global Assessment of Functioning Score (GAF (American Psychological Association, (Association, 2000) by their Clinical Team Managers (CTMs), who were either licensed clinical social workers or licensed psychologists.

During the first day of treatment, CTMs conduct a detailed intake interview with all patients. For some patients at the BHP, this interview yields diagnostic information that may indicate the presence of Borderline Personality Disorder (BPD). In cases such as these, CTMs request that further diagnostic screening be completed to identify cases where BPD is present. Interns are assigned this screening task, for which they use the Structured Clinical Interview for DSM-IV Disorders-II (SCID-II, First, et al., 2002), a semistructured interview measure that takes approximately 15 minutes to administer.

The SCID-II is typically administered during the patient's first two days of treatment. For the purposes of the present study, the SCID-II results were used to determine whether patients met inclusion criteria (meeting diagnosis of BPD) for participation.

The author was notified of all SCID-II screens being conducted at the BHP for the duration of the present study. If results from the SCID-II indicated that the patient met diagnostic criteria for BPD, and the patient was already a participant in the larger psychometrics study (i.e., the CES-D and BASIS-24 were administered on Day 1 of treatment), the patient was considered eligible to participate in the present study.

Patients eligible to participate in the present study were approached by the author, briefed on the present study in private, and offered a chance to participate. The author approached 32 patients for participation in the study. Of the 32 individuals approached, four opted not to participate, one was determined to have active marijuana abuse during data collection (and was thus ineligible for this study), and two were hospitalized in a locked unit for increased symptom severity before they could complete the study measures.

Neuropsychological measures (WAIS-II; Wechsler, 1997) and the Stroop Color-Word Test (Golden, 1978) for the present study were administered during treatment by the author in a private room at the BHP, to maximize privacy and minimize distraction.

On the final day of treatment, participants were approached by the psychometrics study's research assistant and administered the CES-D. The BASIS-24 was administered by the participant's CTM, copies of which were retrieved and scored by the research assistant. Finally, the CTM assigned a discharge GAF to each participant, which was obtained and entered into the database by the research assistant.

Development of the database. Results from intake and outcome data, as well as GAF scores and neuropsychological scores, were stored in the central database associated with the larger study. For the purposes of data analysis, the cases from the present study were then copied into a smaller database stored in the same computer.

Personal identification (e.g., name, birthdate, social security number) was never on the same document as subject identification numbers, except in a research notebook that was kept in a locked drawer at the Partial Hospital Program, in a room that is separate from the locked room in which study data are stored. Demographic Sample Information

In this section, the present sample will be described. The total sample by age and educational level will be presented along with measures of central tendency.

Sample demographics. Demographic information regarding the sample for this study including participants' mean ages in years, as well as educational level in frequencies and percentiles, are presented in Table 1.

Table 1

Total sample by age and educational level

Educational Level									
	High	Some	College	Some	Graduate	Total			
	School	College	Degree	Graduate	Degree				
	Degree/GED			Work					
Ages 18-20	1 (4%)	3 (12%)	0 (0%)	0 (0%)	0 (0%)	4 (16%)			
Ages 21-30	2 (8%)	6 (24%)	1 (4%)	1 (4%)	3 (12%)	13 (52%)			
Ages 31-40	0 (0%)	0 (0%)	1 (4%)	2 (8%)	1 (4%)	4 (16%)			
Ages 41-48	1 (4%)	1 (4%)	0 (0%)	0 (0%)	2 (8%)	4 (16%)			
Total	4 (16%)	10 (40%)	2 (8%)	3 (12%)	6 (24%)	25 (100%)			
(M = 28.64)									

*Note: M=Mean* 

There were a total of 25 women ranging in age from 18 years to 48 years, with a mean age of 28.64 years (SD= 9.16). The age distribution was skewed toward younger participants, which may reflect the tendency of women with BPD to experience remission of symptoms in later life (Zanarini, Frankenburg, Hennen, Reich, & Silk, 2006).

Of the total 25 participants, 23 (92% were Caucasian), 1 (4%) was multiracial, and 1 (4%) chose not to report her ethnic heritage. The United States Census Bureau information from

2000 indicated the general population in this geographic area was as follows: 87% Caucasian, 6% African American, 4% Asian American, 2.5% Hispanic, and 0% Pacific Islander (United States Census Bureau, 2000). The study sample appeared to be skewed toward Caucasian participants, with fewer participants of color than would be representative of the local area.

Of the 25 participants in this study, 4 (16%) had a high school degree, 10 (40%) had completed some college work, 2 (8%) had a college degree, 3 (8%) had completed some graduate work, and 6 (24%) had obtained a Master's degree or a doctorate. Overall, the sample was relatively educated and upwardly mobile, with 11 participants having completed a college degree or higher.

# *Inter-Rater Reliability*

To establish inter-rater agreement of the WAIS-II and Stroop scoring, 25% of the WAIS-II and Stroop protocols were re-coded by a 5<sup>th</sup> year doctoral student in clinical psychology. The doctoral student who completed the re-coding was trained on these measures during a year of practicum training at Southern Methodist University in Dallas, Texas. The reliability (i.e. Cronbach's Alpha) between the primary investigator and doctoral student for scoring the WAIS-II and Stroop measures was determined to be .998.

Missing data. Partial data were missing from several participants' intake and outcome measures, due to participants' errors in completing questionnaires. The amount of data missing from the overall database was identified as 12% of the data set. The rationale for the treatment of missing data was that although data imputation would reduce the variability of intake and outcome variables, it was not practical to lose variability in the predictor variables through listwise deletion. Thus, SPSS was used to replace missing variables through mean substitution.

Summary of the Intake Data

This section will provide a summary of the data collected from participants at intake. A description about scoring intake measures will be included, as well as a listing of all scores for intake measures. Lastly, measures of central tendency for intake scores will be listed.

On the first day of treatment, all participants were administered the CES-D, a 2-item, self-report measure of depression which takes about 8 minutes to complete. The CES-D yields one score of overall depression, with a minimum score of 0 maximum score of 60. Higher scores on the CES-D indicate higher levels of distress.

Participants were also administered the BASIS-24, a 24-item self-report measure of functioning, which takes about 10 minutes to complete. The BASIS-24 yields an overall score as well as six subscale scores (Depression and Functioning, Interpersonal Relationships, Psychosis, Substance Abuse, Emotional Lability, and Self-Harm). All BASIS-24 scores range from 0-4, with higher scores indicating greater difficulty with functioning.

Participants were assigned GAF scores by their CTMs on the first day of treatment. GAF scores range from 0-100, with higher scores indicating better levels of functioning.

Analyses

A series of analyses were conducted using SPSS version 10.0 (SPSS, 1999) to investigate relationships between PA and Comprehension scores and the outcome measures of treatment.

Descriptive analyses. Descriptive statistics were calculated to describe the characteristics of each data set. Measures of central tendency (mean, median, mode, and standard deviation) are presented on the ages and educational levels of all subjects, and estimated intelligence and percentiles are presented. Measures of central tendency were calculated to describe the score sets

on the Picture Arrangement subtest and the Stroop Color-Word Test. These results are presented in tables.

Descriptive statistics were calculated to determine the same characteristics of the outcome variables. Gain scores were computed, and measures of central tendency were computed for these gain scores for the group. T-tests were conducted to determine whether scores on outcome measures were significantly different between entering and leaving the Partial Hospital. These results are presented in tables.

Predictor analyses. Multiple linear regression analyses were conducted to answer the research questions regarding the power of the PA and Stroop tests to predict treatment outcome as defined by gain scores on the CES-D, BASIS-32 and its subscales, and GAF, when controlling for intelligence. The analyses were constructed to correspond with the hypotheses, first controlling for intelligence through the hierarchical regression process, then testing the comparative fit of Picture Arrangement and Stroop scores in the model through stepwise regression. Research questions and hypotheses are detailed again below.

Research Question #1 Do scores on the Picture Arrangement subtest of the WAIS or the Stroop Color-Word Test positively predict treatment outcome in women with BPD as determined by the CES-D, the BASIS 24, and GAF scores?

<u>Hypothesis #1</u>: Based on the documented relationships between borderline symptomatology, social cognition, and response inhibition, it is hypothesized that both Picture Arrangement and Stroop scores will be predictors of treatment outcome in women with BPD as determined by the CES-D, the BASIS-24, and GAF scores.

Research Question #2: Which is a stronger predictor of treatment outcome in women with BPD: the Picture Arrangement subtest of the WAIS, or the Stroop Color-Word Test?

Hypothesis #2: Based on the more frequent and robust findings regarding the relationship between social cognition and treatment outcome, it is hypothesized that scores from the Picture Arrangement subtest will be a stronger predictor of treatment outcome in women with BPD than scores from the Stroop Color-Word Test.

# Chapter Summary

This chapter described the research instrumentation, the participants, and the expected demographics of the participant group. It also described the methods and statistical procedures used in this study. The chapter concluded with a description of the inter-rater reliability procedures used, and the research questions and hypotheses were re-stated.

## CHAPTER FOUR

## **RESULTS**

In this chapter a review of results will be presented. First, raw scores, means, and standard deviations of the assessments are summarized. The next section presents the statistical analyses to address the research questions. The final section presents post-hoc analyses conducted to further explore study findings.

# Summary of Intake Measures

Self-report measures pertaining to depressive symptomatology and level of functioning for the present study were administered on the first day of treatment at the PHP. Table 2 presents the scores for all intake measures: The Center for Epidemiological Studies Depression Scale (CES-D), the Behavioral and Symptom Identification Scale (BASIS-24), the subscales for the BASIS-24 (Depression and Functioning, Relationships, Psychosis, Substance abuse, Emotional Lability, and Self-Harm) and Global Assessment of Functioning (GAF) scores for each participant.

Table 2

Scores for intake measures: CES-D, BASIS-24, and GAF with Means and Standard Deviations by Score (N=25)

Subject	CES-D	BAS	D/F	Rels	Psyc	S/A	E/L	S/H	GAF
ID#	Score								
1	38	1.78	2.57	1.90	0.00	0.00	1.22	1.58	40.00
2	36	2.45	3.36	1.59	2.45	0.70	3.11	0.00	45.00
3	43	2.69	3.43	2.51	0.76	0.68	3.00	2.00	50.00
4	38	2.72	3.30	1.61	2.28	1.94	3.89	1.75	50.00
5	32	1.66	1.78	2.26	0.59	0.00	2.45	0.58	45.00
6	18	1.14	1.57	0.34	0.00	0.00	2.06	0.42	45.00

Subject	CES-D	BAS	D/F	Rels	Psyc	S/A	E/L	S/H	GAF
ID#	Score								
7	35	1.93	2.26	2.18	1.05	0.39	1.89	1.58	40.00
8	40	2.25	3.33	2.12	0.30	0.00	2.78	0.58	40.00
9	55	3.01	4.00	4.00	0.00	2.30	3.00	0.42	50.00
10	50	2.59	3.86	2.31	0.00	0.00	2.11	1.62	40.00
11	37	2.17	3.04	0.65	0.00	0.00	3.00	1.83	41.00
12	56	2.72	3.65	3.90	0.00	0.68	3.28	1.00	41.00
13	42	2.37	3.14	2.49	0.30	0.34	2.61	1.58	50.00
14	29	1.91	2.17	0.72	0.59	1.96	2.39	2.33	40.00
15	48	2.00	2.43	1.63	0.00	1.02	1.50	2.58	40.00
16	45	1.72	2.03	1.27	0.00	0.00	2.39	2.58	45.00
17	51	2.40	3.18	2.19	0.00	0.57	3.06	2.00	57.00
18	45	2.31	3.18	1.47	0.00	0.84	2.45	4.00	40.00
19	51	2.54	3.42	1.43	0.27	0.00	4.00	0.84	40.00
20	37	2.60	3.00	3.49	0.59	1.02	3.72	0.42	51.00
21	50	2.78	3.45	2.08	0.59	2.37	3.72	1.00	40.00
22	42	2.57	3.43	2.54	1.82	1.72	2.34	1.58	40.00
23	28	1.90	3.21	1.10	0.46	0.00	2.89	1.00	40.00
24	33	2.23	2.59	0.96	0.51	0.74	2.75	0.99	40.00
25	40	2.41	3.08	3.24	0.59	0.68	2.11	0.58	40.00
M	40.76	2.27	2.98	2.00	0.53	0.72	2.71	1.39	43.60
SD	9.06	0.43	0.64	0.96	0.70	0.77	0.71	0.90	4.95

Note: BAS = overall BASIS-24 score, D/F = BASIS-24 Depression and Functioning Score, Rels = BASIS-24 Relationships Score, Psyc = BASIS-24 Psychosis Score, S/A = BASIS 24 Substance Abuse Score, E/L = BASIS 24 Emotional Lability Score, S/H = BASIS-24 Self-Harm Score, GAF = DSM-IV-TR Global Assessment of Functioning Score.

The mean score of the CES-D at intake was 40.76 (out of a possible 60) with a standard deviation of 10. This result suggests a relatively high level of depression upon entry to the BHP, and is consistent with the findings of Radloff (1977) when developing the CES-D scale. Upon

administering the CES-D to patients entering psychiatric treatment, he found a mean score of 39.11.

The mean overall score of the BASIS-24 at intake was 2.27 (out of a possible 4, with higher scores indicating greater difficulty in functioning), with a standard deviation of 0.43. BASIS-24 subscales showed that levels of difficulty varied among areas of functioning. The greatest difficulty for participants at intake appeared to be in the areas of Depression and Functioning (M = 2.98, SD=0.64), and Emotional Lability (M = 2.71, SD=0.71). These findings are consistent with symptoms of BPD, which include affective instability and chronic feelings of emptiness. However, some scores associated with symptoms of BPD were less elevated at intake, such as Substance Abuse (M = 0.72, SD=0.77) and Self-Harm (M = 1.39, SD = 0.90). It is unclear why these participants were not as symptomatic in all areas of BPD as might be expected.

Global Assessment of Functioning (GAF) scores had a mean of 43.60, and a standard deviation of 4.95. In the DSM-IV-TR, GAF scores between 40 and 50 indicate "serious symptoms (e.g., suicidal ideation, severe obsessional rituals, frequent shoplifting) OR any serious impairment in social, occupational, or school functioning (e.g., no friends, unable to keep a job) (APA, 2000). However, there was not as much variability in GAF scores as expected for these participants. During data collection, it appeared that the case managers (CTMs) who assigned the GAF scores tended to use only one or two of the available ranges, possibly to simplify paperwork. Thus, the GAF scores for this study should be interpreted with caution.

# Summary of Discharge Measures

On the last day of treatment at the PHP, the self-report measures administered at intake were completed by participants for a second time. Table 3 details the scores obtained by participants on these self-report measures.

Table 3

Scores for discharge measures: CES-D, BASIS-24, and GAF with Means and Standard

Deviations by Score

Subject	CES-D	BASIS	D/F	Rels	Psyc	S/A	E/L	S/H	GAF
ID#	Score	0.11							
1	16	1.05	1.23	1.20	0.00	0.00	0.00	1.58	60
2	29	1.44	1.61	1.41	0.32	0.00	0.10	-0.25	50
3	39	0.59	1.32	1.08	0.00	0.00	0.00	2.00	55
4	25	1.37	1.49	1.46	0.38	0.00	0.22	1.33	60
5	15	0.81	1.43	0.92	0.00	0.00	0.00	0.16	50
6	5	0.81	1.35	1.15	0.14	0.00	0.11	0.42	52
7	23	1.29	1.77	1.37	0.21	0.00	0.00	1.16	55
8	22	1.33	1.34	1.47	0.00	0.00	0.00	0.16	55
9	25	1.44	1.61	1.41	0.32	0.00	0.10	0.17	50
10	27	1.44	1.61	1.41	0.32	0.00	0.10	1.37	35
11	27	1.44	1.61	1.41	0.32	0.00	0.10	1.57	55
12	41	2.31	1.88	2.25	0.10	0.00	0.00	1.00	55
13	46	1.95	1.78	1.37	0.24	0.00	0.11	1.16	60
14	13	1.48	2.37	1.04	1.98	0.00	0.22	1.49	55
15	27	1.40	2.03	1.53	0.48	0.00	0.22	2.58	55
16	19	0.77	1.49	0.65	0.10	0.00	0.00	2.58	49
17	35	1.57	1.84	1.58	0.21	0.00	0.00	2.00	48
18	29	1.42	1.41	1.58	0.24	0.00	0.11	4.00	55
19	27	1.42	1.41	1.58	0.24	0.00	0.11	0.84	40
20	16	1.44	1.61	1.41	0.32	0.00	0.10	0.17	70
21	27	1.40	1.51	0.76	0.54	0.00	0.44	0.58	55

Subject ID#	CES-D Score	BASIS Score	D/F Score	Rels Score	Psyc Score	S/A Score	E/L Score	S/H Score	GAF
22	42	2.50	1.76	2.45	0.35	0.00	0.11	0.75	55
23	50	2.54	2.02	1.97	0.21	0.00	0.00	0.16	35
24	24	1.39	1.32	1.69	0.27	0.00	0.22	0.99	55
25	27	1.44	1.61	1.41	0.32	0.00	0.10	0.33	35
M	27.04	1.44	1.62	1.42	0.30	0.00	0.10	1.13	51.96
SD	10.64	0.48	0.27	0.40	0.38	0.00	0.11	0.98	8.32

Note: BAS = overall BASIS-24 score, D/F = BASIS-24 Depression and Functioning Score, Rels = BASIS-24 Relationships Score, Psyc = BASIS-24 Psychosis Score, S/A = BASIS 24 Substance Abuse Score, E/L = BASIS 24 Emotional Lability Score, S/H = BASIS-24 Self-Harm Score, GAF = DSM-IV-TR Global Assessment of Functioning Score.

The mean CES-D score at discharge was 27.04, with a standard deviation of 10.64. This result is consistent with Radloff's 1977 findings regarding CES-D administration after 1 and 2 weeks of treatment: mean CES-D scores were 29.29 and 20.91, respectively.

The mean overall BASIS-24 score at discharge was 1.44, with a standard deviation of 0.48. At the point of discharge, the highest areas of difficulty as measured by BASIS-24 subscales were Depression and Functioning (M = 1.62, SD=0.27), as well as Relationships (M = 1.42, SD = 0.27).

The mean GAF score at discharge was 51.96, with a standard deviation of 8.32.

Discharge GAF scores showed greater variability than those assigned at intake.

Change Scores

The measures used in this study varied as to the significance of higher or lower scores. Specifically, a higher score on the CES-D or the BASIS-24 and its subscales indicated more symptomatology, whereas a higher GAF score indicated lower symptomatology. To obtain gain scores to be used as independent variables, Time 1 scores for all measures were subtracted from Time 2 scores (results are shown in Table 4). Paired-samples T-tests were conducted to

determine the statistical significance of the differences between intake and discharge measures. Table 4 presents the results of these T-tests, including the differences between each mean, the t-value and its degrees of freedom, and the p-value.

Table 4

Intake Mean, Discharge Mean, and Paired-samples T-tests for Intake and Outcome Measures:

CES-D, BASIS-24, and GAF

	Intake	Discharge				
Measure	Mean	Mean	Change	T	df	p
CES-D	40.76	27.04	-13.69	6.27**	24	.00
BASIS-24	2.27	1.44	-0.83	7.9**	24	.00
D/F	2.98	1.62	-1.36	9.83**	24	.00
Rels	2.00	1.42	-0.58	3.05*	24	.01
Psyc	0.53	0.30	-0.22	1.47	24	.16
S/A	0.72	0.00	-0.72	4.64**	24	.00
E/L	2.71	0.10	-2.61	18.96**	24	.00
S/H	1.39	1.13	-0.26	4.73**	24	.00
GAF	43.60	51.96	+8.36	4.97**	24	.00

Note: BAS = overall BASIS-24 score, D/F = BASIS-24 Depression and Functioning Score, Rels = BASIS-24 Relationships Score, Psyc = BASIS-24 Psychosis Score, S/A = BASIS 24 Substance Abuse Score, E/L = BASIS 24 Emotional Lability Score, S/H = BASIS-24 Self-Harm Score, GAF = DSM-IV-TR Global Assessment of Functioning Score. \*p<.05. \*\*p<.01.

Results of paired-samples t-tests indicate that for most measures, participants' symptoms decreased and functioning improved to a statistically significant degree between intake and discharge. Specifically, participants reported significantly less depression (t = 6.27, p = .00),

improved overall functioning (t = 7.9, p = .00), less impact of depression on functioning (t = 9.83, p = .00), better functioning in relationships (t = 3.05, p = .01), less substance abuse (t = 4.64, p = .00), less emotional lability (t = 18.96, p = .00), and less self-harm (t = 4.73, p = .00). Additionally, mean GAF score was significantly different between intake and discharge (t = 4.97, p = .00). The only score that was not significantly different between intake and discharge was the Psychoticism subscale of the BASIS-24. This finding makes sense in light of the fact that frank psychosis is not a symptom of BPD; thus, the psychosis subscale would not be elevated before or after treatment.

## *Intelligence Testing*

Tests designed to obtain an estimate of IQ were included in this study in order to provide a control variable in regression analyses. In this section, results from IQ estimation procedures are provided.

The Vocabulary and Matrix Reasoning subtests of the WAIS-II were used to obtain a basic measure of intelligence on each participant. IQ was estimated from these scores using the method identified by Ringe et al. (2002), in which standard subtest scores are summed, and the sum is compared to a table of validated corresponding estimated IQ scores.

Table 5 presents results of the WAIS-II short form, including scores from the Vocabulary and Matrix Reasoning subtests, estimated Intelligence Quotients, and percentiles.

Table 5

Results of WAIS-II Short Form, Means, and Standard Deviations

Subject #	Vocab	Matrix	Est IQ	Percentile
1	10	13	102	55
2	12	13	107	68
3	11	11	99	47
4	14	14	114	84
5	8	10	89	23
6	8	12	94	34
7	11	14	107	68
8	16	18	130	98
9	11	8	92	30
10	7	10	86	16
11	8	14	99	47
12	10	8	89	23
13	7	8	81	10
14	18	14	124	95
15	18	15	127	96
16	13	11	104	61
17	16	12	114	82
18	15	14	117	87
19	15	15	119	90
20	17	10	112	79
21	7	11	89	23
22	17	7	104	39
23	15	10	109	73
24	13	13	109	73
25	9	11	94	34
Mean	12.24	11.84	104.44	57.40
SD	3.70	2.66	13.31	28.07

Note: Vocab = Vocabulary Subtest, MR = Matrix Reasoning Subtest, Est IQ = Estimated Intelligence Quotient.

Subtest scores from the WAIS-II provide information on discrete skills (in the case of this study, general vocabulary/verbal conceptualization and nonverbal reasoning). Subtest raw scores are converted to scaled scores with a mean of 10 and a standard deviation of 3. Results indicate that mean Vocabulary subtest score in the study sample was 12.24, with a standard deviation of 3.70. The mean Matrix Reasoning subtest score was slightly lower (M = 11.84, SD = 2.66). Both mean scores were slightly higher than the expected mean of 10 for WAIS-II subtest scores.

The Vocabulary and Matrix Reasoning subtests were used to estimate Full-Scale IQ for each participant. To estimate Full-Scale IQ, scaled subtest scores for Vocabulary and Matrix Reasoning were summed, from which scaled Full-Scale IQ's were derived. Full-Scale IQ's on the WAIS-II have a mean of 100 and a standard deviation of 15.

The mean estimated IQ in the present sample was 104.44, with a standard deviation of 13.31, and a mean percentile of 57.40 (SD = 28.07). The mean sample IQ was roughly comparable to the expected mean of 100 and standard deviation of 15. Overall, the sample was one of average intelligence.

# Neuropsychological Predictors

In addition to the 2-subtest WAIS-II estimate of IQ, the Picture Arrangement subtest of the WAIS-II was administered to each subject to obtain a brief measure of social cognition. For a brief measure of response inhibition, the Stroop Color-Word test was also administered.

Table 6 presents results for the Picture Arrangement subtest and the Stroop Color-Word Test.

Table 6

Picture Arrangement and Stroop Color-Word Test Results, Means, and Standard Deviations

Subject #	PA	Stroop
1	10	52
2	11	52
3	13	56
4	13	51
5	15	43
6	11	43
7	7	50
8	12	49
9	5	49
10	7	42
11	9	39
12	9	49
13	10	52
14	12	60
15	7	49
16	10	41
17	10	47
18	8	41
19	10	46
20	7	20
21	6	54
22	5	38
23	15	41
24	12	38
25	9	51
Mean	9.72	46.12
SD	2.81	7.99

Note: PA = Picture Arrangement subtest score, Stroop = Stroop Color-Word Test score.

The mean Picture Arrangement score for this sample was 9.72, with a standard deviation of 2.81. Of the three WAIS-II subtests administered for the present study, the mean Picture Arrangement score was lowest. This result is consistent with other studies in which participants with BPD scored lower on Picture Arrangement than on any other subtest (e.g., (Swirsky-Sacchetti, et al., 1993).

The Stroop Color-Word Test yields T-scores with a mean of 50 and a standard deviation of 10. For this sample, the mean Stroop Color-Word Test score was 46.12, with a standard deviation of 7.99. Although the mean score is slightly lower than the expected average, there was little variability in the score set for this variable. This result is inconsistent with other studies, in which participants with BPD demonstrated large deficits on the Stroop Color-Word Test (Besteiro-Gonzalez, Lemos-Giraldez, & Muniz, 2004; Sprock, Rader, Kendall, & Yoder, 2000).

Limitations to the Picture Arrangement subtest results. The Picture Arrangement subtest contains sets of cards that must be rearranged to tell a story that makes sense. However, it appears that the test's designers did not anticipate the effect of the cards' pictures on participants. Several of the Picture Arrangement items involved arranging cards into stories that were upsetting to participants. Namely, one set of cards pictured an escaped prisoner happening upon a woman swimming naked, and stealing the clothes she'd left at the shore. Another set pictured a man buying the upper half of a mannequin, then attempting to appear as if he is on a date with a real woman. These types of images were observed to have a dysregulating effect on participants. Distress when viewing such images is understandable, especially in light of frequent findings pertaining to sexual abuse as a risk factor for BPD. Participants in this study frequently commented that the cards presented were "creepy," "crazy," or "gross." Notably, one woman with a history of sexual abuse could not complete several items because they were too upsetting.

Although well-designed studies indicate that patients with BPD score lower on Picture Arrangement than on other tests, the upsetting nature of the items on the Picture Arrangement test might be a confound that affects the ability of the test to measure social cognition.

Testing the Hypotheses of the Study

In this section, the study hypotheses will be presented. Statistical procedures used to test the hypotheses of the study will be described, and results of these statistical analyses will be listed.

Multiple, forced entry linear regression analyses were used to test the predictive value of neuropsychological tests on treatment outcome measures. In all regression equations, estimated IQ was entered as a hierarchical variable to control for the effect of intelligence. Stroop Color-Word Test and Picture Arrangement scores were entered as the independent variables.

Table 7 lists the nine hierarchical linear regression equations used for this study, along with F values, B and Standard Error of B,  $\beta$  values, and p-values. All regression equations were constructed to control for IQ. Inclusion was set at < .05 and exclusion was set at > .10. Thus, in Table 7, the models of best fit are shown, and predictors that did not improve the model are excluded.

<u>Hypothesis #1</u>: Based on the documented relationships between borderline symptomatology, social cognition, and response inhibition, it is hypothesized that both Picture Arrangement and Stroop scores will be predictors of treatment outcome in women with BPD as determined by the CES-D, the BASIS-24, and GAF scores.

<u>Hypothesis #2</u>: Based on the more frequent and robust findings regarding the relationship between social cognition and treatment outcome, it is hypothesized that scores from the Picture

Arrangement subtest will be a stronger predictor of treatment outcome in women with BPD than scores from the Stroop Color-Word Test.

Table 7

Results of multiple linear regression, B, Standard Error of B,  $\beta$ , F, and p-values.

Outcome variable	В	SE (B)	β	F	p
Predictor variable					
CESD change				2.82	.081
Picture Arrangement	-1.75	.74	45		.029*
BASIS-24 change				1.43	.708
BASIS-24 D/F change				.86	.364
BASIS-24 Rels change				5.27	.031*
BASIS-24 Psyc change				.03	.860
BASIS-24 S/A change				3.46	.035*
Picture Arrangement	13	.05	47		.017*
Stroop	.05	.02	.39		.039*
BASIS-24 E/L change				.30	.866
BASIS-24 S/H change				.16	.213
GAF change				1.23	.280

<sup>\*</sup> p<.05

Note: D/F = BASIS-24 Depression and Functioning Score, Rels = BASIS-24 Relationships Score, Psyc = BASIS-24 Psychosis Score, S/A = BASIS 24 Substance Abuse Score, E/L = BASIS 24 Emotional Lability Score, S/H = BASIS-24 Self-Harm Score, GAF = DSM-IV-TR Global Assessment of Functioning Score.

Testing Hypothesis #1: Predictor Analyses.

The total set of dependent variables (outcome variables) included change in CES-D scores, change in GAF, change in BASIS-24 overall scores, and change in all BASIS-24

subscales: Depression, Relationships, Psychosis, Substance Abuse, Emotional Lability, and Self-Harm.

Significant results and trends. A predictive trend was found when CES-D gain scores were regressed on Stroop Color-Word and Picture Arrangement scores, in which neuropsychological variables appeared to predict 20% of the variance in CES-D gain scores (see Table 7 for p-values). Additionally, neuropsychological scores were significant predictors of Substance Abuse change (p = .04).

Non-significant results. Results indicated that neuropsychological scores did not predict positive change in overall BASIS-24 scores (p=.71), BASIS-24 Depression and Functioning scores (p=.36), BASIS-24 Self-Harm (p=.86), BASIS-24, Emotional Lability (p=.86), BASIS-24 Psychosis (p=.75), and GAF (p=.28)

Testing Hypothesis #2: Relative Strength of Predictors.

Of the two neuropsychological predictors, Picture Arrangement was the only variable that significantly predicted change in CES-D (p = .03). However, the trend that was found in this equation was not in the expected direction, namely, higher Picture Arrangement scores actually tended to predict less improvement in depression between intake and discharge.

Greater variance in BASIS-24 Substance Abuse gain scores was accounted for by Picture Arrangement scores though both were statistically significant contributors to the prediction (p = .02, p = .04, respectively). As with previous analyses, the inverse relationship between Picture Arrangement scores and BASIS-24 Substance Abuse Scores was unexpected, but the expected relationship was found between Stroop Color-Word scores and Substance Abuse gain scores.

Summary of Findings

In this section, a summary of findings for the two research questions will be presented.

The summary will include the most important results that contribute to the current literature.

Stroop Color-Word and Picture Arrangement Scores as Predictors. The results of multiple linear regression analyses revealed the following results when Stroop Color-Word and Picture Arrangement (PA) scores were tested as predictors for treatment outcomes, while controlling for IQ. First, PA significantly predicted change in depression symptomatology from intake to discharge. Second, PA and Stroop Color-Word significantly predicted change in substance abuse symptomatology between intake and discharge.

Notably, in all trends and significant findings, the relationship of the Picture Arrangement score to gain scores in outcome variables was the reverse of what was hypothesized. In other words, lower PA scores tended to predict more positive change in all outcome variables. In contrast, the relationship of Stroop Color-Word scores to outcome variables, when a trend or significant finding was identified, was as hypothesized. Stroop Color-Word scores tended to predict greater improvement on outcome variables.

Stroop Color-Word and PA were not predictors of change in Global Assessment of Functioning or overall BASIS-24 scores, or gain scores for the following BASIS-24 subscales: Depression and Functioning, Relationships, Self-Harm, Emotional Lability, or Psychosis.

Predictive Value of Stroop Color-Word versus Picture Arrangement. Multiple linear regressions with a stepwise entry method were used to ascertain the relative strength of Stroop Color-Word and Picture Arrangement scores to predict changes in outcome variables.

With regard to changes in CES-D scores, PA was the only predictor that achieved significance in the regression equation; Stroop Color-Word was not a significant predictor. For

BASIS-24 Substance Abuse scores, both were significant predictors, but Picture Arrangement was a stronger predictor than Stroop. Based on these two findings, it can be concluded that the Picture Arrangement test is a stronger predictor of treatment outcome than Stroop Color-Word Scores, though it is worth repeating that *lower* PA scores tended to predict more positive change from intake to discharge. In other words, those with better social cognition improved less in the area of substance abuse during treatment, while those with better attentional control improved more in the area of substance abuse during treatment.

# Post-hoc analyses

Post-hoc multiple linear regression analyses was undertaken to further investigate predictive relationships between neuropsychological variables and outcome scores. Table 8 shows results of these analyses.

Table 8

Post-hoc hierarchical linear regressions

Outcome variable	В	SE (B)	β	F	P
Predictor variable					
CES-D Time 1				4.63	.021*
Picture Arrangement	-19	.59	53		.007*
CES-D Time 2				.72	.406
BASIS-24 S/A Time 1				3.46	.035*
Picture Arrangement	13	.05	47		.017*
Stroop	.05	.02	.39		.039*

Note: BASIS-24 Rels = BASIS-24 Relationships Score, BASIS-24 SA = BASIS-24 Substance Abuse Score.

Note: Regression analyses could not be computed for BASIS-24 Substance Abuse Time 2 scores because there was inadequate variability.

Since a trend was found in which Picture Arrangement and Stroop Color-Word scores tended to predict change in CES-D scores from intake to discharge, a further analysis was conducted with the intake and discharge CES-D scores as dependent variables.

The regression analyses were constructed in a similar manner to those included in planned analyses: a hierarchical entry method was used to control for the variance associated with IQ, and then stepwise entry was used to determine which independent variable best fit the analysis.

Results of post-hoc regression analyses indicated that Picture Arrangement scores significantly predicted 29% of the variance of CES-D scores at intake (p = .02). The relationship between Stroop and CES-D intake scores was nonsignificant. Again, the direction of the prediction is notable: higher Picture Arrangement scores predicted less depression at intake. Patients with better social cognition (as measured by the PA subtest) tended to be less depressed when they arrived at the PHP. At discharge, however, the relationship between neuropsychological scores and CES-D was no longer significant (p = .40); in other words, a patient's score on the PA subtest did not predict their level of depression at discharge.

To further explore the significant relationship between neuropsychological variables and change in BASIS-24 Substance Abuse scores, a multiple forced entry regression analyses were conducted with BASIS-24 Substance Abuse scores at intake as the dependent variable. Results indicated that neuropsychological variables significantly predicted 24% of the variance in BASIS-24 Substance Abuse scores at intake (p = .04). Both Picture Arrangement (p = .02) and Stroop (p = .04) were significant predictors, though Picture Arrangement was a stronger predictor than Stroop (see Table 8). For these results, higher Picture Arrangement and Stroop scores predicted less difficulty with substance abuse in the week preceding intake.

A regression equation could not be computed with Substance Abuse scores at discharge, because there was inadequate variability in the scores.

In sum, post-hoc analyses indicated several interesting prediction effects or trends in the data. First, Picture Arrangement, but not Stroop Color-Word, significantly predicted level of depression (as measured by the CES-D) at intake. No relationship was found at discharge. Second, a trend was found in which Picture Arrangement, but not Stroop Color-Word, tended to predict level of difficulty with relationships (as measured by the BASIS-24 Relationships scale) at intake. Again, no relationship was found at discharge. Third, both Picture Arrangement and Stroop Color-Word predicted level of substance abuse in the week preceding intake. These findings have clinical implications, in that social reasoning (as measured by the Picture Arrangement score) appears to predict level of functioning in several areas before treatment. Additionally it appears that neuropsychological scores do not predict level of functioning at discharge. Thus, cognitive-behavioral treatment may be effective in accounting for the brain-based factors that interfere with functioning.

#### Conclusion

This chapter began with a discussion of the study in the context of the environment in which participants were recruited, and the larger outcomes study procedures that yielded part of the present study data. Summaries of the intake and discharge data were provided. Gain scores and results of *t*-tests were presented to indicate changes in symptomatology and functioning between intake and discharge. Estimated IQ scores were presented, along with measures of central tendency. Following the presentation of study data, the hypotheses of the study were tested and results were discussed. A summary of findings was presented, and the chapter concluded with results of post-hoc analyses.

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## CHAPTER FIVE

#### **DISCUSSION**

The present study was undertaken to explicate connections between demonstrated cognitive difficulties in BPD (i.e., social cognition and response inhibition) and gains made in cognitive-behavioral partial hospital treatment. In the present study of 25 women with BPD, two neuropsychological variables, the Picture Arrangement (PA) subtest of the WAIS-III and the Stroop Color-Word Test (Stroop), were examined as predictors of treatment outcome (as measured by changes in depressive symptomatology, overall functioning, relationships, psychosis, substance abuse, emotional lability, and self-harm).

The findings indicated that relationships between cognition and treatment outcomes were different from predictor to predictor. Higher social cognition scores predicted less change in depression and substance abuse between intake and discharge, and higher social cognition predicted less depression at intake. The relationship between social cognition and depression was no longer significant at discharge. These results suggest that higher social cognition may serve as a buffer to depression, but that less depression at intake is associated with less change in treatment. The results may also suggest an equifinality model of BPD in treatment, one in which patients with poor social cognition and depression or substance abuse problems appear to be "catching up" to patients with better social cognition by the end of treatment. In other words, both groups are improving in cognitive-behavioral treatment despite differences in neuropsychological functioning at the beginning of treatment. Since cognitive-behavioral treatment addresses problems in thinking, perhaps it helps patients with poor social cognition to "work around" their differences and function better by the end of treatment. The findings in this

study will be useful in helping clinicians to match level of severity at intake to treatment priorities and length of stay.

Three major results will be discussed in this chapter. First, results of planned analyses indicated that when controlling for IQ, social cognition scores inversely predicted reduction in depressive symptomatology and reduction in substance abuse behavioral between intake and discharge. Results of post-hoc analyses indicated significant relationships between neuropsychological scores and symptom severity at intake, but these relationships were no longer significant at discharge. Second, response inhibition scores significantly predicted reduction in substance abuse behaviors between intake and discharge. Third, social cognition scores were a better predictor than response inhibition scores in all analyses. These three results will be discussed in detail below. Following the discussion of the results, implications for clinical treatment will be presented, as well as limitations to the study and future directions.

Social Cognition and Treatment Outcome.

The present study found that when controlling for IQ, lower social cognition scores predicted greater change in depressive symptomatology from intake to discharge. Similarly, lower social cognition scores predicted greater change in substance abuse behavior from intake to discharge. Significant relationships were found between neuropsychological scores and symptom severity at intake, but these relationships were no longer significant at the time of discharge.

The literature on neuropsychological functioning and treatment outcome is limited, and has shown inconsistent results to date. What is available is not specifically focused on patients with BPD or social cognition, but on other clinical populations and general neuropsychological deficits. Several studies presented here showed results that are relevant to the present study.

Glick and Sternberg (1969), researching an adult inpatient population, identified nonverbal intelligence as a major factor in predicting treatment outcome. They conducted intelligence testing on 75 inpatients, who were independently rated "improved" or "not improved." They concluded that nonverbal intelligence significantly differentiated the two outcome groups.

The present study extends the findings by Glick and Sternberg (1969) by showing a relationship between nonverbal functioning (although far more specific to social cognition, in the form of the Picture Arrangement subtest) and treatment outcome. However, as mentioned earlier, the present study finds an inverse relationship between social cognition and treatment outcome, whereas Glick and Steinberg found a positive relationship.

One reason for the discrepancy between these findings may be the psychodynamic treatment received by hospital inpatients in 1969 versus the cognitive-behavioral treatment received by participants in the present study. In the PHP, cognitive-behavioral treatment is used along with dialectical behavior therapy techniques to meet the needs of patients with BPD. Cognitive-behavioral and dialectical behavior treatment may have a more direct, targeted effect on demonstrated functioning deficits than psychodynamic treatment, thus changing the relationship between neuropsychology and treatment outcome. Specifically, if Glick and Sternberg's participants entered a psychodynamically-oriented inpatient unit with poor nonverbal cognition, their clinicians probably did not provide them with specific instructions as to how to improve their nonverbal functioning.

In cognitive-behavioral and dialectical behavior treatment, clinicians are far more directive and goal-oriented, which may have driven the participants in the present study to improve despite social cognitive deficits. This directive, goal-oriented approach can be

illustrated using the format of a typical group in the PHP. For example, in an individual CBT session, a client who had an argument with her boyfriend might be coached in several areas: first, how to engage in self-soothing behavior by distracting herself in a way that does not involve self harm; second, how to interpret her boyfriend's point of view based on a re-assessment of the context in which the argument took place, and third, how to get her point across without damaging the relationship. The client might then be instructed on how to cognitively "reframe" her beliefs about her self-efficacy in relationships, so that she can experience less of the distress that comes from negative self-talk.

If DBT is used in the individual treatment session, the same client might be asked to present a "diary card" of thoughts, feelings, behaviors, and skills practiced over the last week.

Upon review of the diary card, it may become clear that the fight with her boyfriend coincided with poor nutrition, poor sleep, or lack of emotion regulation skills practice. Since DBT is aimed at helping clients to focus on skills that help them achieve better relationships, the therapist may focus on coaching the client to practice specific DBT skills for daily use.

All of these approaches are outlined specifically at the beginning and end of treatment, so that the client can be aware of what has taken place. When compared to psychodynamic or relational treatment, in which the therapist is far less explicit about the process of therapy and the client must infer what is taking place in treatment, it is not difficult to see how cognitive-behavioral treatment and dialectical behavior therapy might be effective for clients with social-cognitive deficits.

Minnick (1973), investigating an inpatient group with psychotic symptoms at a Veterans Administration Hospital, found that higher Performance IQ predicted better prognosis at discharge. Carlsson et al. (2006) conducted a longitudinal study of neuropsychological predictors

of long-term treatment gains in a Swedish hospital system. WAIS-R results were not a predictor of 1-year GAF, but they were a positive predictor of 3-year GAF. In Carlsson et al.'s study, the Performance IQ was the strongest predictor of 3-year outcome. As with Glick and Steinberg's (1969) study, Minnick's results indicate a positive relationship between nonverbal cognition (in the form of the Performance IQ) and treatment outcome, a relationship that was inverse in the present study.

Although there are shared variables between the present study and the studies carried out by Minnick (1973) and Carlsson (2006), there are some important differences among the three studies. First, Minnick used clinician-identified prognosis as a dependent variable, and higher Performance IQ predicted better prognosis. However, prognosis does not necessarily reflect gains made in treatment. In the present study, higher scores on a subtest of the Performance IQ scale (the PA test) predicted better functioning at intake, which could certainly prompt a clinician to give a better prognosis, regardless of the degree of change during treatment. Second, Carlsson's study used 3-year outcome as a dependent variable, which was not possible in the present study due to time constraints. Thus, it is unclear whether nonverbal cognition in the present sample may positively predict 3-year outcome and mirror Carlsson's results. Finally, the populations being studied in the Minnick study and the Carlsson study were not comprised of women with BPD, as the present study is. Although the studies completed by Minnick (1973) and Carlsson (2006) are not directly equivalent to the present study, it is interesting to note the relationship of nonverbal cognition to treatment outcome in several studies. The present study extends the existing research by describing the relationship between nonverbal cognition and treatment outcome in a specific population, i.e., women with BPD. Further, the present study takes place in a cognitive-behavioral partial hospital program, in which a structured and didactic

approach is used. It is unlikely that such a structured approach was used in the studies detailed by Minnick (1973) and Carlsson (2006).

Leber, Parsons, and Nichols (1985) identified a significant relationship between neuropsychological variables and persistent alcohol abuse. Specifically, men who did more poorly on the WAIS tended to be identified as having "poor progress" by clinicians who were blind to WAIS data. In the present study, women who did more poorly on a WAIS subtest (Picture Arrangement) tended to report more treatment gains in the area of substance abuse from intake to discharge.

Haaga, DeRubeis, Stewart, and Beck (1991) hypothesized that higher full-scale WAIS-R results (i.e., IQ) would predict better treatment outcomes in adult outpatients receiving cognitive therapy. However, findings indicated that the relationship between IQ and treatment outcome was contrary to the expected direction. In other words, more intelligent patients fared worse in cognitive therapy. Results of the present study are not quite congruent with this result. Haaga et al. (1991) described an inverse relationship between IQ and treatment outcome, in which some patients in cognitive-behavioral therapy did not improve. In the present study, the results of the T-scores suggest that participants generally improved. In the present study, higher scores on an IQ subtest predict a smaller amount of improvement, which is a different result from predicting a decline in functioning throughout treatment or no improvement at all.

In the studies detailed above, cognition was treated as a unitary predictor. Full-Scale IQ or Performance IQ, rather than more discrete aspects of neuropsychological functioning, was investigated for its power to predict treatment outcome. One reason for the contradictory evidence found in existing studies may be found in the populations being investigated. Different psychiatric populations have deficits in different cognitive areas. People with psychotic

disorders, for example, have demonstrated deficits in many areas of nonverbal functioning, while depressed outpatients have shown few consistent deficits. IQ scores are based on an assessment of a range of skills, which may have varied considerably in the populations on which previous studies have been based.

For people with BPD, there is some literature detailing specific deficits found in the areas of social cognition and response inhibition. However, there has been no research to date on the impact of these deficits on patients' ability to benefit from treatment. The present study contributes to the body of literature on the relationship between BPD and neuropsychology, but adds a focus on the treatment implications of common neuropsychological deficits. Specifically, the results of the present study suggest that cognitive-behavioral therapy may address the neuropsychological deficits associated with BPD. This ability to address the deficits associated with BPD is due to the focus of CBT and DBT being directive and didactic. In short, CBT and DBT practitioners may directly teach the skills that people with BPD cannot learn from the environment, due to neuropsychological deficits that prevent them from inferring information from nonverbal cues.

Response Inhibition and Substance Abuse

The present study identified Stroop Color-Word test scores as a predictor of low self-reported substance abuse behavior at intake, and a positive predictor of self-reported improvement in substance abuse symptomatology. In other words, patients who had better ability to control their attention were more able to reduce their substance abuse while in treatment. This finding is not surprising in light of the role of attention in substance abuse behavior, which is well-documented (e.g., Dolan, Bechara, & Nathan, 2008; deWit, 2009). Dolan et al. (2008), in a

study of psychiatrically hospitalized adults, found that lower Stroop Color-Word scores were significantly associated with severity of substance abuse behavior.

Results from the present study are incongruent with the findings of Dolan et al. (2008), in that they indicate that lower Stroop Color-Word scores predict greater substance abuse behavior at intake. However, present study results also indicate that higher Stroop Color-Word scores predict greater improvement in self-reported substance abuse symptomatology between intake and discharge. It is unclear how to interpret these findings. Perhaps attentional skills serve a different purpose in borderline psychopathology than expected (e.g., they aggravate substance abuse behavior outside of cognitive-behavioral treatment, but the same skills help patients to make effective use of cognitive-behavioral treatment).

Predictive Value of Stroop versus Picture Arrangement.

Based on existing studies of neuropsychology and BPD (e.g., Swirsky-Sacchetti et al., 1993; Segal et al., 1993; Mandes & Kellin, 1993; Legris & van Reekum, 2005, and Irle et al., 2004), both social cognition and attentional skills (as measured by the Picture Arrangement subtest of the WAIS and the Stroop Color-Word Test) are significantly lower in patients with BPD than in the rest of the population. Although social cognition and attentional skills in BPD sufferers have not been directly compared in the literature, poor social cognition in patients with BPD is more frequently identified as a major problem in BPD. Thus, it was hypothesized in this study that Picture Arrangement scores would be a stronger predictor of treatment outcome than Stroop Color-Word scores.

Results of the present study indicated that indeed, Picture Arrangment scores predicted more aspects of treatment outcome than Stroop scores. Further, when both Picture Arrangement

and Stroop scores were predictors, Picture Arrangement scores accounted for a greater portion of the variance associated with outcome.

Further, each outcome variable had a different relationship to treatment outcome. When Stroop was a predictor for BASIS-24 Substance Abuse change, the relationship was positive (i.e., higher Stroop scores predicted more improvement in substance abuse symptoms). When Picture Arrangement was a predictor for CES-D scores and BASIS-24 substance abuse scores, the relationship was not in the expected direction. In other words, lower Picture Arrangement scores predicted more change from intake to discharge.

In conclusion, results from the present study are twofold: first, that social cognition skills were a stronger predictor of change than Stroop scores, but the relationship went in an unexpected direction. Second, Stroop scores positively predicted change in substance abuse behavior from intake to discharge.

One way to understand these findings is in the relative impact of social cognition and response inhibition on functioning. Specifically, difficulties with social cognition (rather than attentional/response inhibition problems) may be more prevalent in women with BPD, and CBT may effectively address the sequelae of these difficulties. In turn, the impact of social cognition problems may disappear by the end of treatment.

For 70 years, BPD has been viewed in terms of its behavioral manifestations and in terms of reported experiences by BPD sufferers. Existing theory about the etiology and treatment of BPD has been based on these types of clinical observations. In recent years, however, studies on the neuropsychology of BPD have lent credence to the concept that sufferers experience genuine brain-based difficulties. Thus, researchers are just beginning to understand the neuropsychological basis of BPD, with the goal of reducing stigma and designing better

treatments for the disorder. This study contributes to the growing body of neuropsychological literature on BPD by adding a new dimension: that of treatment effect as determined by neuropsychological strengths and weaknesses.

#### *Limitations to the Study*

The present study has some limitations that should be considered when designing future study. Those limitations are addressed in this section, which will present limitations of internal and external validity, and measurement limitations.

Threats to internal validity. Internal validity for the present study was affected mostly by the sample of convenience chosen. Instead of being randomly selected, the present sample was chosen because its participants were already involved in a larger study that was accessible to the author. Therefore, it cannot be assumed that independent variables (i.e., Picture Arrangement and Stroop scores) were the best possible predictors of treatment outcome in participants with BPD.

Second, by agreeing to be in the present study, participants were demonstrating a degree of cognitive flexibility and willingness that is unusual for people with severe BPD symptomatology. Although all participants met full criteria for BPD, they represent a more "willing" cohort than all women with BPD in cognitive-behavioral partial hospitalization. This type of cohort, in connection with their willingness and flexibility, may also have obtained higher Picture Arrangement scores than a truly randomized cohort of women with BPD would.

Finally, it is possible that simply being in a treatment environment brought about treatment gains, rather than treatment itself. Many patients at the BHP report "feeling safe" just because they have somewhere to go between 9 AM and 3 PM every day, rather than reporting that the cognitive-behavioral treatment itself is the curative factor. If so, then neuropsychological

scores would be predictive of participants' response to being in a "holding environment," with peers who can relate to their experiences.

Threats to external validity. External validity for the present study was most impacted by cultural factors. Participants for this study were largely White, educated, and middle-class or affluent. Despite participation by a few women who were nonwhite or not middle class, the group as a whole (and the culture of the hospital) leaves little room for ecologically sound research. Thus, the findings cannot be generalized to the entire population of women with BPD.

Further, the participants in the study were exclusively female. Because of the high prevalence of BPD in women, the study was designed to reflect the experience of the largest group of BPD sufferers. Interestingly, men suffer from BPD as well, though their presentation can be somewhat different and difficult to recognize. It will be important that future studies involve some effort to capture the experience and risk of being a man with BPD.

Lastly, the group of women involved in this study was at a state of severity that will not generalize to the range of BPD sufferers in the mental health community. The level of difficulties experienced by the women in this treatment setting is, by definition, greater than it is for outpatients. It is possible that the same results would not be found for outpatients.

Measurement limitations. As mentioned in the results, there were some potential confounds associated with the PA subtest that were not anticipated. These confounds had to do with the social stories contained in the PA test items. Almost all of the subjects for the present study identified disturbing or confusing images or themes in the PA items. What was interesting about the themes identified by the participants of the present study was that they appeared to be personally threatening to participants, as if they were "reading into" the cards and taking them as personal affronts. For example, one set of items depicted a woman opening a door for another

woman, and then leaving the room. A participant, talking her way through the item, said, "Oh, so she's opening the door for her. But what if she is afraid that this other woman is going to get the job that she wants? I hope that doesn't happen."

Another set of cards depicted a man buying the upper half of a female mannequin and taking it into the back seat of a car, putting his arm around it, and attempting to look as though he was on a date with a real woman. Participants generally responded to this item with alarm and disgust, with one subject saying, "Oh my God. This is so creepy. Who *is* this guy? He can't get a real woman? Well, he's not going to get one that way. Who are these people, making a test like this? And they think *I'm* crazy?"

One of the more disturbing items depicted a man escaping from prison, encountering a woman swimming in a pond, and stealing her clothes so that the police will think he is female.

One BPD sufferer in the study was unable to complete this item because she was triggered into a flashback of a rape that she had endured in college.

It is interesting to note that when administered to a population with BPD, the Picture Arrangement cards appeared to upset participants to the point where their emotions may have affected their performances on the test. Future research should be conducted to explore the effect of the Picture Arrangement items on women with BPD versus participants without BPD, to determine whether the phenomenon observed here is specific to the BPD population.

Summary of Findings

In the present study of 25 women with BPD, two neuropsychological variables were examined as predictors, and relationships between cognition and treatment outcomes were different from predictor to predictor. Higher social cognition scores predicted less change in depression and substance abuse, and higher social cognition predicted less depression at intake.

The relationship between social cognition and depression was no longer significant at discharge.

These results suggest that higher social cognition may serve as a buffer to depression, but that less depression at intake is associated with less change in treatment.

Results may also suggest an equifinality model of BPD in treatment: patients with poor social cognition and depression or substance abuse problems appear to be "catching up" to patients with better social cognition by the end of treatment. Since cognitive-behavioral treatment addresses problems in thinking, perhaps it helps patients with poor social cognition to "work around" their differences and function better by the end of treatment.

Better response inhibition predicted more improvement in substance abuse behavior between intake and discharge. This finding is interpretable in light of the frequent association between the Stroop test, substance use, and impulsivity (e.g., Dolan et al., 2008).

Overall, the findings of the present study do suggest that for women with BPD, better social cognition is associated with less depression at the time of intake into the partial hospital environment. However, the association may mean that less depression remission is possible from intake to discharge. Despite these findings, it does appear that treatment is an intervening variable: cognitive-behavioral treatment teaches patients to use skills that may make up for their preexisting social-cognitive deficits. Furthermore, patients with BPD who have better attentional skills appear to have more success at changing substance abuse-related behavior. Despite the fact that the Stroop Color-Word score predicted no other aspects of treatment outcome, it is important to be aware that impulsivity in BPD is a demonstrated hindrance to improvement in substance abuse.

#### Future Research

The results of the present study are not fully generalizable to the population as a whole, but they do contribute important information that should be further investigated. Based on findings from this study, it is possible to make several suggestions for future research.

First, future researchers should use a larger sample size to replicate present results, in order to enhance generalizability. The present sample size was chosen to keep pace with the current state of neuropsychological research on BPD, but more work needs to be done in order to establish the relationship of deficits in BPD to treatment outcome. If a randomized controlled trial were to be conducted, and if results supported those in the present study, the researchers involved would be able to infer a causal link between the neuropsychological deficits in BPD and difficulties in treatment.

Second, future researchers should attempt to replicate the present findings in inpatient, outpatient or other kinds of treatment settings. If neuropsychological functioning predicts treatment outcome in other settings, there will be more robust evidence to support the hypothesis that patients with borderline personality disorder are at a genuine disadvantage with regard to treatment utilization, especially with less directive and/or didactic treatment models. Specifically, results of the present study indicate that participants with impaired social cognition demonstrated more symptomatology and lower functioning at the beginning of treatment, but by the end of treatment, there was no relationship between social cognition and functioning.

CBT may be partially responsible for these unexpected findings. Cognitive-behavioral therapy is a treatment through which patients with BPD, receive highly directive coaching in order to learn the skills that help them to function better. Thus, whether their social cognition is impaired or intact, it appears that women with BPD can benefit from CBT. It would be useful to

know whether findings like those in this study would be replicated in other treatment modalities or settings, in order to clarify the role of CBT in addressing social cognitive deficits.

Third, it is unclear whether the same results would be found in a different population (such as depressed or psychotic adults). Although there is a good deal of literature indicating that deficits in social cognition and attentional skills are particular problems for patients with BPD, it would be interesting to know whether they predict difficulties with treatment utilization across the board. Similarly, it would be interesting to know whether the directional findings in this study would be replicated in other studies (i.e., whether lower social cognition scores would continue to predict more gains in treatment).

In order to determine the true role of neuropsychological functioning in clients with BPD, a more effective research design would use a larger neuropsychological battery, in order to capture a broader picture of nonverbal functioning in participants. In addition, a better research design would compare different treatment modalities for BPD, again exploring nonverbal functioning and treatment outcome. Results would shed light on the potential for various treatments to address neuropsychological deficits in BPD.

## Clinical Implications

The clinical utility of these findings is multifold. First, women with BPD are often characterized as extremely difficult to treat, and most treatment settings serve no more than one or two borderline clients. As such, clinicians need to be as informed as possible as to the important factors in evaluating and setting treatment goals with these clients. Better social cognition (better understanding of interpersonal nuances, and better insight into one's own psychological needs) predicts less depression at intake, which is helpful in assessing safety and setting priorities with clients at the start. However, it is not safe to assume that better social

cognition at the beginning of treatment means that depression will remit on its own. Clinicians must be informed that even if a client "looks" well, it is still necessary to assess for depressive symptoms on an ongoing basis.

Further, many patients with BPD struggle with substance abuse issues. Clinicians often struggle right along with them, wondering how to tell when clients are most at risk for a relapse. Results of this study indicate that BPD sufferers with poor attentional skills (i.e., frequent interrupting, forgetfulness, difficulty staying on topic) are likely to need a stronger focus on substance abuse prevention skills, and that those who have strong attentional skills may be likely to change more easily. Conversely, patients with strong social cognition are likely to need a strong focus on substance abuse prevention and accountability; as one side effect of good social cognition is the ability to manipulate therapists into believing that no substance abuse is taking place.

Finally, the role of cognitive behavioral therapy for BPD should not be understated. As part of the cognitive behavioral treatment approach, clinicians focus on enhancing the patient's understanding of the social context and their impact upon it. In other words, results of this study suggest that CBT may address the cognitive vulnerabilities that are part of the problem for patients with BPD.

Based on the results of the present study, several changes may be implemented in the cognitive-behavioral partial hospital setting to enhance assessment and treatment for women with BPD. First, it would be useful to assess for social skills and attentional deficits at intake, even if measures are non-standardized. Ideally, the clinician conducting the intake should have an opportunity to comment on the strength of the client's social cognition and attentional skills, as they are demonstrated during the intake interview. Based on the clinician's observation of

these areas of functioning, patients could be assigned to therapy groups that directly teach the skills that are lacking: Interpersonal Effectiveness Group for patients with poor social cognition, for instance, or Mindfulness Group for patients who need help in strengthening their attentional skills.

Second, it would be wise to ensure that treatment for women with BPD is as structured and replicable as possible. This goal is intended to support the repetition and assimilability of social and attentional skills training, which is often provided in a piecemeal fashion by trainees who are unfamiliar with BPD treatment. One way to achieve structured treatment is to use group protocols that are consistent from week to week (e.g., an Interpersonal Skills group should have one or two modules that are taught in a consistent and clear way). Trainees should be informed as to the neuropsychological deficits that may hinder learning for women with BPD, and they should be trained to "check in" with clients to make sure the material is being understood and retained.

The present study has shed light on an important connection that was missing from current literature: that of known deficits in women with BPD and their connection to treatment outcome. The goal of the present study was not only to identify and explicate these missed connections, but to provide information for clinicians as to the importance of looking at cognition when setting treatment goals. Patients with BPD have been much maligned in clinical circles, as their difficulties create confusion and distress for those around them. However, when clinicians are better informed as to how best to serve this population, distress is reduced for both clinician and patient.

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## Appendix A

Summary of Outcome Measures Administered at Intake and Discharge

## Center for Epidemiological Studies Depression Scale (CES-D).

The CES-D is a 20-item, self-report measure in which patients are asked to report on their depressive symptoms. A sample item follows.

The 20 items below refer to how you have felt and acted during the last week.

I was bothered by things that don't usually bother me. (Answers: Rarely, Some or a little,

Occasionally or a moderate amount of the time, Most or all of the time.)

### Reference for the CES-D:

Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*, 1(3), 385-401.

## Behavior and Symptom Identification Scale (BASIS-24).

The BASIS-24 is a 24-item, self-report measure in which patients are asked to report on their functioning. A sample item follows.

In the past week, how often has someone commented on your substance abuse? (Never, Sometimes, Often, Always)

## Reference for the BASIS-24:

Eisen, S. V. (2001). *BASIS-24 (Behavior Symptom and Identification Scale)*. Belmont, MA: McLean Hospital, Department of Mental Health Services Evaluation.

Global Assessment of Functioning (GAF).

The Global Assessment of Functioning score is a clinician-assigned rating, corresponding to the patient's overall level of functioning. A sample rating follows.

GAF of 61-70: Some mild symptoms OR some difficulty in social, occupational, or school functioning, but generally functioning pretty well, has some meaningful interpersonal relationships.

## Reference for the Global Assessment of Functioning:

American Psychological Association (2000). *Diagnostic and statistical manual of mental disorders, 4th ed., text revision*. Washington, D.C.: Author.

Appendix B

Summary of Neuropsychological Measures

WAIS-III:

The WAIS-III is the standard adult measure of IQ. The WAIS-III like other Wechsler tests (e.g., the WPPSI-II, the WISC-IV, and the WIAT-II), is administered in a standardized, scripted format.

For the purposes of the present study, the WAIS-III was used in two ways. First, the Matrix Reasoning and Vocabulary subtests were used as a short form in the method identified by Ringe et al. (2002).

### Short Form Subtests of the WAIS used in the present study:

**Matrix Reasoning** is a 24-item subtest which is considered to measure nonverbal functioning and inductive reasoning (Wechsler, 1999). On the Matrix Reasoning subtest, the subject is provided with cards containing matrices with missing elements. The subject is also provided with a multiple-choice list of designs, and is asked to choose the item that best fits the missing area. These matrices become progressively more complex as the test continues. Testing is discontinued after five incorrect answers. Items are scored incorrect (score =0) or correct (score = 1). These scores are summed to yield a raw score, which is then converted to a standard score as described above.

The **Vocabulary** subtest is considered to be a measure of general vocabulary. It consists of 21 questions, the answers to which are rated 0, 1, or 2. The first several questions relate to everyday items, e.g., "What is a duck?" As the questions continue, they become progressively more abstract in nature, e.g., "What is forgiveness?" Possible answers are provided in the WAIS-III Administration and Scoring Guide. Answers are categorized according to the degree to which

they accurately describe the concept associated with the word. For example, with the sample question "What is a duck?" the answers would be as follows:

2 = a type of bird that quacks and lives by the water

1 = a bird; it quacks; it has webbed feet, a mallard; a drake

0 = a chicken; an animal; it swims

Picture Arrangement subtest used in the present study: The Picture Arrangement (PA) subtest of the WAIS provides information on nonverbal reasoning with a particular emphasis on social comprehension (as described in Chapter 2). Items on the PA subtest are presented in the form of cards depicting steps of a social interaction (e.g., making a purchase at a store). These cards are presented to the examinee in incorrect order, so that the social story does not make sense. The examinee is instructed to "put the cards in order so that they tell a story." The examinee is given a limited amount of time to rearrange the cards. An example item would be one in which the respondent is shown four cards: in the first, a chef is serving a meal; in the second, the chef is buying ingredients for the meal; in the third, the chef is cooking the meal, and in the fourth, restaurant diners are eating the meal. In order to score correctly, the respondent must place the cards in the following order: Card #2, Card #3, Card #1, Card #4.

#### Reference for the WAIS-III:

Wechsler, D. (1997). *Manual for the Wechsler adult intelligence scale* (3<sup>rd</sup> ed). San Antonio, TX: The Psychological Corporation.

The Stroop Color-Word Test:

The Stroop Color-Word Test is intended to measure the degree to which the respondent can override habitual responses (i.e., reading words shown) with cued responses (e.g., describing the colors of the words shown). The Stroop Color-Word Test takes five minutes to administer.

Cards contain matrices of 10 by 10 items. The subjects are given 45 seconds to read down the rows, identifying the printed word (as depicted on the first card) or the color of the letter or word printed (as depicted on the second and third cards). If they finish a card within 45 seconds, they are instructed to begin again at the upper left-hand corner of the page. If they name an item incorrectly, the tester says "No"; the examinee is then instructed to correct the error and continue without stopping. At the end of the 45-second time limit, the tester instructs them to stop.

For the third card, on which the color words are printed in mismatching colors, the examinee is provided with sample items to ensure that they understand that they should state the color of each word, instead of reading each word.

The Stroop Test yields three T-scores: the Word score (corresponding to Card 1), the Color score (corresponding to Card 2), and the Color-Word score (corresponding to Card 3). It is necessary to administer all three tests in order to prime the subject for the Color-Word Test; however, only the Color-Word T-score (which is indicative of the Stroop Effect) is of interest for this study.

Reference for the Stroop Color-Word Test:

Golden, J. (1978). Stroop colour and word test. Chicago: Stoelting.

Appendix C (Informed Consent)

Appendix D(Northeastern University IRB Approval)

Appendix E (McLean Hospital IRB Approval)