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Philadelphia College of Osteopathic Medicine

Department of Psychology

An Exploration of the Relationship Between Personality Traits and
Cognitive Functioning in Neuropsychological Outpatients in Community
Based Treatment

By Stacey Rivenburg

Submitted in Partial Fulfillment of the Requirements of the Degree of

Doctor of Psychology

**PHILADELPHIA COLLEGE OF OSTEOPATHIC MEDICINE
DEPARTMENT OF PSYCHOLOGY**

Dissertation Approval

This is to certify that the thesis presented to us by Stacey Rivenburg on the 5th day of May, 2011, in partial fulfillment of the requirements for the degree of Doctor of Psychology, has been examined and is acceptable in both scholarship and literary quality.

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ABSTRACT

This study examined whether behavioral disturbances in obsessive compulsive personality disorder and borderline personality disorder were related to executive functioning. An archival database was used; this consisted of 104 subjects who had been given the Millon Clinical Multiaxial Inventory-III (MCMI-III) and the Wisconsin Card Sorting Test (WCST) at a local neuropsychology practice. Comparisons in executive functioning abilities were made between groups of subjects identified as reporting obsessive compulsive personality disorder traits or borderline personality disorder traits, and also between groups of subjects identified as reporting both obsessive compulsive personality traits and borderline personality traits. Findings concluded that a relationship does not exist between personality traits and executive functioning. Although the study's findings revealed no statistically significant results, the study generated significant discussion points pertinent to future research.

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Chapter 1

Introduction

Statement of the Problem

Personality disorders have been referred to as a disturbance in character that involves the emotional, cognitive, and interpersonal manner in which people relate themselves to the world (National Institute of Mental Health, 2010). According to statistics provided by the National Institute of Mental Health (2010), approximately 9% of adults in the United States suffer from a personality disorder. Furthermore, rates of adults suffering from borderline personality disorder were estimated at 1.6% (National Institute of Mental Health, 2010). It is estimated that obsessive compulsive personality disorder occurs in approximately 1% of the adult population in the United States, although rates of 3-10% have been reported among psychiatric outpatients (Encyclopedia of Mental Health Disorders, 2010). Mental health professionals agree that in most cases treatment will be necessary so that the disorders do not significantly interfere with daily adaptive functioning. However, the types of interventions that should be used to treat these disorders continue to be a matter of debate (Dingfelder, 2004).

The neuropsychology of Axis I disorders has been researched significantly (Carson, Butcher, & Mineka, 2000; Dunai et al., 2010, Mittal et al., 2010; Cavedini et al., 2010). However, literature is just beginning to focus on the neuropsychology of personality dysfunction. Personality disorders can have an impact on the symptoms, severity, and pattern of Axis I disorders. Furthermore, dysfunctional or bizarre beliefs or mind-sets often associated with personality disorders can also influence the process of

psychotherapy, especially in regard to engagement and adherence during the therapeutic process (Carson, Butcher, & Mineka, 2000; Skodol & Gunderson, 2009; McMurrin, Huband, & Overton, 2010). Therefore, enhancing the understanding of the neuropsychology of personality disorders might have significant clinical implications for improving the efficacy of interventions for treating individuals diagnosed with personality disorders or who are exhibiting features of personality disorders.

There is a paucity of empirical research examining the neurocognitive functioning of patients diagnosed with personality disorders. A significant amount of literature has focused on the psychological and environmental attributes of personality disorders. Nevertheless, advances in neurosciences have shown that personality disturbances might be related to forms of organic brain pathology. These disturbances might have a negative impact on the functional capabilities of the fronto-subcortical circuits, because higher order cognitive processes and personality features share related neural areas in the prefrontal cortex (Bergavall, Nilsson, & Hansen, 2003). Although our understanding of the complex interaction between functions of the mind and structures in the brain continues to improve, the impact of these interactions on behavioral functioning continues to remain unclear.

The minimal research that has pursued the relationship between cognitive functioning and specific personality disorders has shown significant cognitive deficits in patients diagnosed with borderline personality disorder (BPD) (Burgess, 1992; Dinn et al., 2004; Judd & Ruff, 1993), suggesting brain circuitry disturbance as a contributing factor in presentation of symptoms. Research has also examined the neuropsychology of obsessive compulsive disorder (OCD), an Axis I anxiety disorder, implicating deficits in

executive functioning (higher order cognitive functioning taking place in the frontal lobes of the brain) (Wu, Clark, & Watson, 2006). Despite the efforts that research has made to determine the neuropsychological underpinnings of OCD, the relationship between cognitive functioning and obsessive compulsive personality disorder (OCPD) has not been examined. Substantial debate exists regarding the extent of the overlap between OCD and OCPD, despite their comparable diagnostic description (Wu, Clark, & Watson, 2006).

Purpose of the Present Study

Although our comprehension of the complex relationship between structures of the brain and the role of the mind continues to be enhanced, few studies have linked this knowledge to psychiatric disorders, such as BPD and OCPD. Therefore it continues to remain unknown whether or not the behavioral instability that tends to accompany psychiatric disorders, such as BPD and OCPD, may be impacted by the occurrence of neurocognitive impairments. Considering the significant impact that personality disorders or the features of personality disorders can have on the course of Axis I disorders, it is apparent that there is a need for effective treatment of these symptoms. The types of interventions that should be utilized to manage these symptoms continue to be debated, because patients with personality disorder symptoms can be difficult to engage in treatment and often do not adhere to treatment recommendations (Carson, Butcher, & Mineka, 2000; McMurren, Huband & Overton, 2010).

In an attempt to investigate the clinical connection further, this study intends to examine the relationship between patients with features of BPD and OCPD and

neurocognitive deficits in the domain of executive functioning. The current study utilized an archival database consisting of a self-report personality scale and a neuropsychological test assessing executive functioning. The term executive function has been defined as a set of cognitive abilities that enables people to initiate and stop actions, to monitor and adapt behavior as needed, and to plan for future behavior when given a novel task or situation (Lezak, Howieson, & Loring 2004). When studying ADHD in children, Hale et al. (2009) described executive functioning as the ability to plan, monitor, organize, evaluate, and change behavior. McCloskey (2011) conceptualizes executive functioning as “a team of conductors and co-conductors of mental functioning.” He utilizes a holarchical model to portray the functions of executive functioning appropriately. In a holarchical model development progresses across levels and higher levels can be engaged before development at a lower level is mastered. McCloskey (2011) has identified the following independent developmental lines of executive functioning: self-activation, self-regulation, self-realization, self-determination, self-generation, and self-integration. These developmental lines enable people to transition from a non waking to a waking state of mind, regulate emotion, cognition, and action, and engage in analysis of self and long term planning and goal setting. Many of the abilities associated with effective executive functioning appear to be abilities that would make it possible for patients to participate and to remain actively engaged in therapy. Increasing the knowledge of the executive functioning of patients diagnosed with personality disorders or patients exhibiting features of personality disorders might assist clinicians in determining the most effective form of treatment or interventions for these patients.

The following literature review was developed to provide an overview of OCPD and BPD in regard to its psychiatric conceptualization throughout history, *DSM* classification, clinical implications, prevalence, etiology, and treatment. A review of behavioral neurology and the minimal amount of research that exists in regard to the neuropsychology of OCPD and BPD is presented, and is followed by the hypotheses, which are explored in this study with the intent to examine the possible relationship between executive functioning and personality features.

Chapter 2

Review of the Literature

Historical Conceptualization of OCPD

The conceptualization of OCPD can be traced back to the theories of Sigmund Freud in the early 1900's. Freud hypothesized that the tendency to obsess and ruminate was a defense mechanism that was developed to manage unacceptable feelings of sexuality and hostility" (Skodol & Gunderson, 2009). He believed that patients with OCPD demonstrated peculiar behaviors in regard to orderliness, parsimony, and obstinacy. He further described it as a neurosis related to adjusting to the anal phase in psychosexual development. During this phase, frustration, anxiety, and conflict related to elimination and retention and toilet training was thought to exacerbate compulsivity in those who were "stuck" in this phase of development. The distinction between Obsessive Compulsive Disorder (OCD) and OCPD was also made clear by Freud at this time. He termed OCD as a "symptomatic neurosis" and OCPD as a "character neurosis" (Skodol & Gunderson, 2009). Literature began describing OCPD as an "anal character", which combined the character and the neurosis components of the disorder. The term also recognized Freud's belief that the development of OCPD begins in the anal phase (Skodol & Gunderson, 2009). The characteristics of the demands made by parents during this phase of development were thought to range from impatient to repressive to punitive, leaving the child with feelings of defiance and fearful obedience (Meissner, 2000).

The underlying need to tolerate rules or standards or be embarrassed or disciplined was thought to be a result of the ambivalence that developed between

controlling and maintaining or forcing out and destroying during this anal phase of sexual development. The over-controlled responses of the parents when the child did something inappropriate likely set the stage for the need for well-defined rules and a rigid concept between right and wrong behavior (Pfohl & Blum, 1995). It was also suggested that the parent/child interaction often resulted in the parent's focusing attention on what was wrong as opposed to what was right. As a result, the obedience versus defiance would produce a need to control or inhibit unacceptable behaviors. Therefore the tendency to regress to this stage would encapsulate anal characteristics such as orderliness, inflexibility, neatness, frugality, and an aspiration to gain control (Millon, 1981).

Obsessive-compulsive personality traits were conceptualized under the characteristics of OCD until the mid-twentieth century, when it was suggested that obsessions did not always exist in people with OCPD characteristics. Theodore Millon (1981) renamed OCPD, calling it "conforming" personality. He put forward a biopsychosocial model that included features of social learning in his description of one's "interpersonal experience", creating, potentially, an environment for the conflict between external compliance and internal disobedience. In order to conform and comply with parental and/or social values, the child would learn to utilize coping mechanisms such as repression, therefore sacrificing autonomy and independence. The learned conformity would allow the individual to maintain and control feelings and impulses such as anger, defiance, and opposition, which are deemed unacceptable. When taken to an extreme, the ambivalent discord would have an impact on an individual's interpersonal relationships, leaving an individual with a sense of inadequacy and inability to maintain control. Therefore the individual would be fearful that the unacceptable impulses would break

through the learned defenses, thereby revealing his or her true self, which might result in punishment. Chronic anxiety would develop from needing to maintain an acceptable impression on others. The individual would constrict his or her emotions and be distant from others to protect the acceptable impression (Millon, 1996).

The *DSM-I* (APA, 1952) described compulsive characteristics as an adolescent pattern of behavior or as reverting from a mature state of functioning as a result of stress. OCPD was initially differentiated from OCD in the *DSM-II* (APA, 1968). An individual diagnosed with OCPD was defined as someone who is exceedingly conscientious and reticent, as well as an inflexible workaholic. Emotional and cognitive constrictions were first added to the criteria in the *DSM-III* (APA, 1980). The diagnostic criteria for OCPD included a self-image based on behavioral rigidity, industriousness and dependability, and rigid compliance to social standards. *The DSM-III-R* (APA, 1987) added four more criteria: moral rigidity, miserliness, preoccupation with details, and hoarding.

Current Conceptualization of OCPD

In the current revision of the *DSM*, OCPD is described as “a pervasive pattern of preoccupation with perfectionism, orderliness, and mental and interpersonal control while sacrificing efficiency, flexibility, and openness” (APA, 2000, p. 729). The disorder must be present from early adulthood and symptoms must persist in a wide array of settings such as home, work, and/or school. The *DSM-IV-TR* (2000) requires that at least four of the eight diagnostic criteria must be met for a diagnosis of the disorder. The criteria include: (a) a preoccupation with orderliness to the point that the purpose of the activity is forgotten, (b) a preoccupation with perfectionism that prevents the completion of tasks,

(c) an excessive devotion to work while sacrificing social and leisure activities, (d) an inflexibility in ethics, values, and morals, (e) an inability to throw away objects that do not hold sentimental worth, (f) an inability to delegate tasks to others unless they are assured that others will complete the tasks their way, (g) hoarding money for possible future calamities, and (h) stubbornness and rigidity.

People diagnosed with OCPD experience anxiety surrounding the unknown or being unprepared, which forces them to take a constricted approach to life. These individuals display an intense need for control; this impacts their thoughts, behavior, and emotions. A significant amount of energy is devoted to creating and maintaining control by developing and abiding by schedules and rules, therefore being excessively prepared. People diagnosed with OCPD plan ahead and do not take risks, because the potential for unknown circumstances is increased (Koran, 1999). The overt presentation of people diagnosed with OCPD is tense, industrious, and serious. They may be viewed by others as rigid and lacking in imagination. When faced with unexpected circumstances or views of others that are different from their own, people with OCPD tend to become extremely rigid and stubborn (Maxmen & Ward, 1999).

Regarding interpersonal relationships, those with OCPD hold high expectations for themselves as well as others. They seek approval from those who are viewed in a favorable light and tend to be arrogant toward those of lesser status. They fear disappointment and dissatisfaction and become anxious when they are uncertain of their position. Those with OCPD expect those of lesser stature to conform to their method of completing tasks and will quickly state their disapproval with those who disagree with their methods or fail to adhere to their method of completing tasks (Millon, 1981).

Many traits displayed by someone with OCPD are desirable from a western social perspective. Striving for a perfect performance is often reinforced and rewarded. However, depending on the environment, these traits might be an asset or a hindrance. For example, compulsive traits might help a student earn top scores on tests or hold back a student whose need to be perfect leads to procrastination. Viewing personality traits on a continuum can demonstrate how compulsive traits may reach a point at which they can go from adaptive to maladaptive (Widiger & Sanderson, 1995). The line tends to be drawn when the traits inhibit the individual from engaging in a productive and worthwhile life, seasoned with occupational success or interpersonal satisfaction (Groth-Marnat, 1999).

When subjective distress or functional impairment exists, a disorder is most likely present and can be displayed in many different ways. Those diagnosed with OCPD tend to work hard at keeping their lives simple and organized, because complication often leads to decision making. When an individual does not feel fully prepared or informed, it can lead to indecisiveness. The uncertainties will most likely lead to procrastination, because making a decision might be painful and/or time consuming to those with OCPD (Carson et al., 2000). In the interpersonal realm, the inability to be spontaneous, finding fault in others, and emotional constriction can lead to dissonance. The preoccupation with the inability to obtain perfection can lead to ongoing disappointment and inadequacy, which can result in low self-worth and depression (Maxmen & Ward, 1999).

From a cognitive perspective, the inflexibility in thinking can result in rigid rule making and an inability to respond to a situation with flexibility. This method of thinking can result in a hindrance in the social and occupational sphere. Those with OCPD often

harbor cognitive distortions, such as catastrophizing, dichotomous thinking, and magnification (Bailey, 1998) Behaviors can become automatic and habitual when an individual struggles to think “outside of the box” and to experiment with alternative approaches to thinking. The habitual and automatic behavior makes it possible for those with OCPD to avoid anxiety, which results in a deeply ingrained coping style. This coping style deprives individuals of the opportunity to adjust to different contingencies, which results in a restricted ability to adapt when faced with stress (Pfohl & Blum, 1995).

Prevalence of OCPD

Research in the epidemiology of OCPD is limited, making it difficult to determine the population that is affected by OCPD. It is believed that OCPD occurs in males twice as often as in females. However, *DSM-III* diagnostic criteria were employed in many of the studies that sought to determine the population affected by the disorder. The *DSM-IV-TR* reports the prevalence of OCPD as unknown; however, reports from studies suggest rates of 1% in community samples and about 3-10% among individuals accessing services in mental health clinics (APA, 2000).

Etiology of OCPD

Various theories have been proposed regarding the etiology of OCPD. The psychoanalytic theory focuses on being “stuck” in a crucial psychosexual development stage and caused by overbearing parents. According to cognitive-behavioral theories, personality disorders are thought to stem from dysfunctional core beliefs about the self, others, and the world. These beliefs are developed from one’s experience. For example, those with OCPD view the world as a threatening place of uncertainty and the only way

to gain a sense of security is to master complete control over oneself and the environment. Dichotomous thinking and catastrophizing are cognitive distortions typically seen in those with OCPD. The underlying motivations of those with OCPD are the principles of “must” and “should” (Bailey, 1998). Shades of gray do not exist for those with OCPD and they believe that potential errors will result in unalterable consequences. They often take an extreme level of personal responsibility (i.e. I must do this right) and have extreme expectations of others as well (i.e. people should always follow the rules). Behavior in these individuals becomes rigid, conforming, and perfectionistic as a result of these distorted cognitive schemas (Beck & Freeman, 1990).

It has also been hypothesized that compulsive traits result from learned behavior from being raised in an excessively rigid environment characterized by over-controlling parents (Millon & Davis, 1996). The environment results in constant negative reinforcement in which the child learns what not to do in order to receive a reward that is paired with modeling by the parents. As a result, the child does not develop a sense of autonomy or self-competence. Despite the lack of research focused on determining the causal pathway of OCPD, it seems that psychological, environmental, and biological factors play a role. Recent literature has begun to focus attention on the potential biological involvement. It has been hypothesized that OCPD has a genetic component; this is based on OCD studies in which OCD probands (i.e. first affected family member who seeks medical attention for a disorder) implied shared heritability (Nestadt et al., 2000) and a finding that higher rates of OCPD may be found in family members of OCD patients than in controls (Samuels et al., 2000). When the Structured Clinical Interview for *DSM-III-R* Axis II (SCID-II) was used in a twin study, Torgersen et al. (1998) found a

heritability rate of 0.78 for OCPD, although environmental effects could not be discerned. It has also been suggested that a higher than expected frequency of OCPD in first degree relatives of OCD probands may suggest an OCD-OCPD subtype rather than a genetically-based personality style (Coles, Pinto, Mancebo, Rasmussen & Eisen, 2008; Eisen et al., 2006). It seems that further exploration of the potentially shared genetic influences of these disorders is necessary.

Treatment of OCPD

Literature that supports CBT treatment has stemmed mainly from case reports and uncontrolled clinical studies (Beck, 1998; Pretzer, 1998). Interventions in CBT focus on modifying the individual's cognitive distortions in an attempt to develop alternative and more adaptable strategies. The rigidity and perfectionism are also challenged, utilizing time-management and problem-solving skills, thought stopping, relaxation training, and desensitization (Beck, Freeman, & Davis, 2004).

Barber, Morse, Krakauer, Chittams, & Crits-Christoph (1997) reported an 85% remittance rate for 14 patients after one year of psychodynamic therapy. The psychodynamic treatment for OCPD supports working through repressed emotions in hopes of learning to make a distinction between their own desires and the desires of others. Free association, dream interpretation, and exploration of the transference relationship may be used in this form of treatment (Millon & Davis, 1996). Treatment goals generally gravitate toward discussing early experiences that may have impacted the development of the disorder, strengthening coping strategies, increasing self-efficacy, empathy, and interpersonal skills, and challenging internalized rigidity, rules, and

perfectionism as a means of increasing tolerance of new situations. Furthermore, positive treatment indicators include goal-directedness, persistence, and conscientiousness (Millon & Davis, 1996).

Historical Conceptualization of BPD

The conceptualization of Borderline Personality Disorder (BPD) can be traced back to the 1930's when Adolph Stern realized that a significant number of his patients did not fit the mold of the psychoanalytical framework of the time that emphasized a stringent separation between neuroses and psychoses (Gunderson, 2001). Stern observed that a unique trait in this patient population was the lack of "spontaneous maternal affection" in childhood. He further felt that these patients suffered from "affect hunger," synonymous with being hungry in a physical sense when food is not made available (Stone, 1986). As a result of this "affective malnutrition," the patients failed to acquire an internal sense of confidence in regard to adaptive functioning, making it difficult for these patients to withstand environmental stressors. Alternatively, Stern discovered that these patients were ruled by impulses that were characterized by narcissism, which he noticed in the following behaviors: a propensity to respond to circumstances in an "all or nothing" fashion, feelings of inadequacy and depression associated with self-harm that tended to be lingering, and the tendency to respond to alleged dangers with a "paralysis" of will as opposed to the triggering of a "fight or flight" response (Stone, 1986). Another contribution to the understanding of this group was made in 1953 by Robert Knight. He observed additional impairments in ego functioning, such as the incapacity to repress primitive instincts and the failure to plan in a realistic manner (Gabbard, 2000).

Assimilating these clinical observations with object relations theory, Otto Kernberg (1992) posited that the basic components of any personality involved the interaction of “self” relating to “other” as the result of the effect of a dominant affect. Kernberg (1992) described three levels of personality organization based on a schema of severity, which include neurotic, borderline, and psychotic levels of personality composition. Borderline pathology was described as having primitive defenses, temporarily failed reality testing when experiencing stress, and weak or futile identity formation. This definition posed a problem because it lacked a satisfactory specificity; large numbers of patients, such as bulimics, sociopaths, and alcoholics could be placed in the middle ground between neurosis and psychosis (Stone, 1990).

In 1975, an improved set of criteria for BPD was created by Gunderson and Singer, which added more specific diagnosing criteria than had been found in previous models (Stone, 1990). This set was derived from the statistically significant descriptive characteristics of the borderline syndrome, such as calculating suicide efforts, self-mutilation, demandingness, fear of abandonment, and treatment regressions. The syndrome was included in the DSM-III in 1980 as a psychiatric disorder, which solidified Gunderson and Singer’s conceptualization of borderline syndrome (Gunderson, 2001).

Current Conceptualization of BPD

Currently, borderline personality disorder is described in the *DSM-IV-TR* (2000) as “a pervasive pattern of instability of interpersonal relationships, self-image, and

affects, and marked by impulsivity (APA, 2000, p. 710). The disorder must be present from early adulthood and symptoms must persist in a wide array of settings, such as home, work, and/or school. The *DSM-IV-TR* (2000) requires that at least five of the nine diagnostic criteria must be met for a diagnosis of the disorder. The criteria include: 1) “frantic efforts to avoid real or imagined abandonment, 2) a pattern of unstable and intense relationships characterized by alternating between extremes of idealization and devaluation, 3) identity disturbance marked by persistent, unstable self-image or sense of self, 4) impulsivity in at least two areas that are potentially self-damaging, 5) recurrent suicidal behavior, gestures, or threats, or self-mutilating behavior, 6) affective instability due to a marked reactivity of mood, 7) chronic feelings of emptiness, 8) inappropriate, intense anger or difficulty controlling anger, 9) transient, stress-related paranoid ideation or severe dissociative symptoms” (APA, 2000, p. 710).

Individuals diagnosed with BPD often report that they do not have a sense of self, feel empty at times, and do not have an understanding of who they are. Those with BPD are often engaged in relationships that are intense and are rife with conflict, and composed of significant difficulties. Despite the turmoil experienced in these relationships, individuals with BPD typically find it very difficult to let go of relationships. They often engage in frantic efforts to keep the significant people in their lives from leaving them (Linehan & Dexter-Mazza, 2008).

Individuals with BPD have a tendency to direct harmful behaviors toward themselves. Attempts to mutilate, injure, or kill themselves are quite common among those with BPD; there have also been successful suicide attempts. Brief forms of thought and sensory regulation, such as dissociation, delusions, and depersonalization are quite

common among individuals with BPD. These nonpsychotic forms of dysregulation often occur during stressful situations and then cease when the stress has subsided (Linehan & Dexter-Mazza, 2008). Additionally, feelings of boredom and emptiness that individuals with BPD experience might lead them to engage in risky behaviors, such as gambling, acting out sexually, abusing drugs, or instigating fights (Maxmen & Ward, 1999).

Prevalence of BPD

It is believed that BPD occurs twice as many times in women as it does in men (Maxmen & Ward, 1999). The *DSM-IV-TR* reports the estimated prevalence of BPD to be about 2% of the general population; 10% in individuals seen in outpatient clinics, and about 20% among psychiatric inpatients. Among clinical populations with personality disorders, the prevalence ranges from 30% to 60%. The common pattern for individuals diagnosed with BPD is one of long-lasting instability in early adulthood. During their 30's and 40's, many of these individuals obtain greater stability in their relationships and occupational functioning (APA, 2000).

Etiology of BPD

Various theories have also been proposed regarding the etiology of BPD. Kernberg's (1975) psychoanalytic approach to explaining the disorder attributes the symptoms to the "dissociation of ego-states." According to Kernberg (1975), the ego states become "dissociated" when affected by primitive defenses, such as splitting, projection, and denial. When individuals with BPD experience inner stress, they become involved in the splitting process in an effort to organize internal and external experiences. The splitting process leaves these individuals unable to assimilate good and bad in regard

to self-object images (Kernberg, 1975). Masterson (1981) adds to the psychoanalytic theory by incorporating developmental theory and the concept of “split object- relations unit.” According to Masterson (1981), during the child’s development of self, it is important for the child to preserve the new experiences of being separate and obtaining autonomy and to continue to receive periodic re-attachment to the mother. However, parental inconsistency at this time can lead to abandonment and depression, which Masterson feels are fundamental to borderline psychopathology (Masterson, 1981).

As discussed previously , cognitive-behavioral theories suggest that personality disorders stem from dysfunctional core beliefs about the self, others, and the world. These beliefs are developed from one’s experience. Individuals with BPD view of self is one of being vulnerable to rejection, betrayal, and domination, deprived of required emotional support, powerless, out of control, defective, and unlovable. Their view of others ranges from idealization, viewing others as valuable, loving, and perfect, to devaluation, viewing others as controlling, betraying, and abandoning. A few of their main beliefs are: “I can’t cope on my own, the worst possible thing would be to be abandoned, and I deserve to be punished.” In an attempt to cope with these beliefs, these individuals might threaten those that indicate a possible rejection, or might alleviate tension through self-mutilation or self-destructive behavior, or attempt suicide as an escape (Beck, Freeman, & Davis, 2004).

It also appears that a general agreement exists among opposing theories that abuse in childhood is prevalent among individuals with BPD. The majority of individuals with BPD seem to have endured physical punishments, emotional abuse, or sexual abuse from parents. If the perpetrator was not a parent, it is likely that the parent did not protect the

child from the abuse or help the child process the abuse. Patients have reported that their parents blamed or punished them for the abuse (Beck, Freeman, & Davis, 2004).

It is important to note that these theories have focused on the role of psychological factors but have not explored the neurological or neurobiological models of BPD. More recently, neurobiological models of BPD are beginning to emerge. This present study concentrates on these emerging theories.

Treatment of BPD

The effectiveness of psychotherapy to treat BPD yields mixed results in the literature. Traditional psychodynamic approaches did not appear to result in a decline of suicide risk. Approximately 10% of the individuals died during treatment or within 15 years following treatment as a result of suicide (Paris, 1993). This percentage is comparable with the suicide risk in individuals with BPD who are not receiving treatment (Adams, Bernat, & Luscher, 2001).

Linehan et al. (1991) found that one year of dialectical behavior therapy (DBT) was better than treatment as usual for parasuicidal patients, those who make suicide attempts or gestures with no actual intention to die, with BPD in three areas: number of individuals who remained in treatment (83% vs. 62%), median days of hospitalization (17 vs. 51), and the number of individuals who continued to be parasuicidal during the final 3 months of treatment (36% vs. 62%). Despite these findings, subjective reports of depression, no reason for living, hopelessness, and suicidal ideation did not indicate that DBT was more helpful to these individuals than treatment as usual (Linehan et al., 1991).

In regard to cognitive-behavioral therapy as a form of treatment, Brown et al., (2004) reported significant decreases in hopelessness, depression, dysfunctional beliefs, and suicide ideation after one year of cognitive-behavioral therapy for individuals with BPD. In conclusion, modernized versions of cognitive-behavioral therapy customized to addressing the difficulties presented by BPD appear to have increased the efficacy of psychological treatment of BPD (Beck, Freeman, & Davis, 2004).

Overview of Behavioral Neurology

As the 2000's approached, many researchers began to show an interest in the behavioral costs of brain impairment shortly after the "decade of the brain" that occurred in the 1990's. The new focus on behavioral consequences and brain dysfunction revolutionized the fields of neurology and psychiatry through the development of a new interdisciplinary field; it became known by the terms behavioral neurology or neuropsychiatry (Cummings & Trimble, 2002). Many disorders, such as schizophrenia, major depression, and antisocial personality disorder, which were thought to be exclusively psychogenic, are now thought to have a robust neurobiological foundation (Chance, Esiri, & Crow, 2003; Franke, Gansicke, Schmitz, Falkai, & Maier, 1999; Gruezelier, Hardman, Wild, & Zaman, 1999; Gruezelier, Wilson, & Richardson, 1999; Raine et al., 2004; Walterfang & Velakoulis, 2005; Yang et al., 2005).

Borderline personality disorder and obsessive compulsive personality disorder are beginning to be seen as neurodevelopmental disorders that are expressed as genetic and temperamental susceptibilities interrelated with early and late-occurring environmental stressors (Cicchetti & Walker, 2003; Fineberg et al., 2007). As part of an understanding

how this multifaceted relationship may develop in BPD and OCPD, some considerations involving the general physiology and neuroanatomy of the brain are discussed in the following sections.

Basic Concepts of Behavioral Neurology

At its most basic level, neuronal communication made possible by neurotransmitters is responsible for the intricate processes by which brain activity takes place. Neurons communicate with one another at the junction between nerve cells, known as the synaptic cleft, through neurotransmitters. The neurotransmitters bind to receptor sites which results in an ion change. This ion change modifies the membrane potential of the neuron, which either increases or decreases the chance of further impulse conduction under similar circumstances in the future. This process reveals changes that take place in the local connections between neurons at the level of the synapse and is known as synaptic plasticity. As a result of this process, the well-designed connections of the brain progress as groups of neurons form focused arrays. These arrays become organized into distinct networks which transport messages to different areas of the brain. Each part of the brain performs a particular function and then shares the information with other parts of the brain to form more intricate functions. As connections in the brain are established and functional circuits are formed, networks with precise intentions consist of emotions, thoughts, and behavior, which can be described as our psychological abilities (Pincus & Tucker, 2003).

Frontal Lobes

The frontal lobes are located in the area of the cerebral cortex defined by the central sulcus caudally and the lateral sulcus in each hemisphere (Paxinos & Mai, 2004). Three functional regions can be identified on the lateral surface of the cortex, which include motor, premotor, and prefrontal areas. Additionally, a fourth functional area identified as the paralimbic region is also located in the medial section of the frontal lobe (Miller & Cummings, 1999). The primary and premotor areas receive information from the prefrontal cortex, the thalamus, and the basal ganglia. These motor areas incorporate multifaceted sensory-perceptual information with decision making possibilities in order to intercede motor planning, coordination with sensory-perceptual systems, and programmed execution of movement (Bogousslavsky & Cummings, 2000). The prefrontal area of the frontal lobe can be separated into three evident sections: the dorsolateral prefrontal cortex, the orbitofrontal cortex, and the medial frontal cortex (Miller & Cummings, 1999).

The dorsolateral prefrontal cortex mediates a wide array of higher order executive duties related to organization and cognitive execution of plans, coordination of attentional abilities, working memory, goal-directed accomplishments, and the ability to understand and relate to others. The orbitofrontal prefrontal cortex is an area of high convergence between sensory-perceptual and emotional-related processing. It is thought to mediate personality functioning, autonomic processing, and disinhibition, because it has widespread connections with the limbic system and dorsolateral prefrontal cortex (Bogousslavsky & Cummings, 2000).

The medial frontal cortex can be divided into the superior and inferior mesial frontal cortices. The superior section contains the supplementary motor area and the

anterior cingulate gyrus, which are thought to be involved in the motivation, initiation, and expression of behavior combined with emotion. The inferior section is thought to be related to emotional processing; however, it is not understood as well as the superior section (Cummings & Trimble, 2002).

The frontal lobes share reciprocal pathways with the parietal, temporal and occipital lobes and receive higher level auditory, somatosensory, and visual information, allowing the highest order level of integrative information processing to take place. As a result of the higher order processing, the frontal lobes are the site of environmental and emotional synthesis which regulates adaptive behavioral functioning (Cummings & Trimble, 2002).

Basal Ganglia

The basal ganglia are known as a large group of subcortical structures which include the caudate nucleus, substantia nigra, subthalamic nucleus, putamen, and globus pallidus. These subcortical structures have profuse and reciprocal connections throughout the brain through a series of purposeful modules involving sensorimotor, associative, midbrain, and limbic areas. These structures have also been recognized as the site for the selection, alteration, and incorporation of a wide array of behaviors (Bogousslavsky & Cummings, 2000).

The basal ganglia work as a filter that controls the expression of mood, motor, and cognitive behavior through excitatory or inhibitory methods. As a result of their location in the brain, the basal ganglia are able to connect subjective drive states, such as mood, motivation and needs with the objective environment, enabling the structures to influence

the expression of descriptive behaviors. The basal ganglia are able to assert their influence through their participation in the frontal-subcortical circuits, which connect specific frontal regions with the basal ganglia and thalamus (Bogousslavsky & Cummings, 2000).

Fronto-subcortical Circuits

The notion of five segregated but parallel circuits that run vertically outward from the frontal lobes, through the temporal lobes and the limbic system and other various structures of the brain, and then back to the frontal lobes was first posited by Alexander, DeLong, and Strick in 1986. Initially, it was believed that these circuits formed independent functional units connecting the frontal lobes with subcortical structures (Miller & Cummings, 1999); however, several authors now believe that exchanges might take place between, as well as within, the circuits (Tebartz van Elst et al., 2003). Two of the subcortical circuits modulate motor activity in humans and originate from the supplementary motor area and frontal eye lid. These circuits are referred to as the motor circuit and the oculomotor circuit (Tekin & Cummings, 2002). Three of the five circuits are pertinent to the present study and will, therefore, be discussed: they are the dorsolateral, orbitofrontal, and anterior cingulate circuits because these circuits are concerned with the regulation of behavior (Mega & Cummings, 1994).

The dorsolateral prefrontal circuit. This circuit is accountable for processing multimodal information throughout numerous cortical areas. The integrated data is then utilized to control the implementation of goal-directed behaviors (Bogousslavsky & Cummings, 2000). Examples of cognitive processes that utilize this circuit are as follows:

comprehending new information efficiently, solving complex problems, shifting and maintaining behavioral sets without errors, solving complex problems, and planning and monitoring of behavior (Feinberg & Farah, 2003). This circuit is also responsible for providing individuals with the ability to switch cognitive sets or behaviors in response to changing stimuli, as opposed to perseverating or feeling compelled to repeat a behavior unconsciously and incessantly (Miller & Cummings, 1999).

The orbitofrontal circuit. This circuit is related to the regulation of behavior by equalizing changes that occur internally and by reproducing the ongoing incorporation of emotional tone, integration of mood, and memory systems (Miller & Cummings, 1999). When the circuit fails to function properly and becomes hypo-active, affect and arousal are often disrupted, which may lead to blunted emotional attentiveness, impaired goal-directed actions, irritability, insensitivity, and impulsivity (Barrash, Tranel, & Anderson, 2000; Blair & Cipolotti, 2000; Bogousslavsky & Cummings, 2000; Miller & Cummings, 1999). When this circuit becomes hyper-active, increased inhibition involving behaviors consistent with obsessive-compulsive spectrum disorders might be observed (Bogousslavsky & Cummings, 2000).

The anterior cingulate circuit. This circuit is responsible for mediating the focus of attention and awareness to specific environmental stimuli, based on the power of its expressive laden stimulus significance or relevance (Paxinos & Mai, 2004). When this circuit is not functioning properly, lack of alertness, relative to prolonged attention, apathy, lack of will, and slowness in mental processing can be observed (Bogousslavsky & Cummings, 2000). This circuit can be viewed as an internally determined foundation

of motivation that provokes a certain behavioral response to a given stimulus in the environment (Miller & Cummings, 1999).

Neuroanatomical and Neuropsychological Considerations in OCD/OC PD

Structural neuroimaging studies of those diagnosed with OCD has revealed abnormal striatal volumes and enlarged basal ganglia, enlarged prefrontal cortex, corpus callosum, and thalamus, a decreased amygdala and orbitofrontal cortex, and decreased white matter (Pujol et al., 2004). Functional neuroimaging has revealed hyperactivity in the caudate nucleus, thalamus, and anterior cingulated gyrus, as well as the orbitofrontal cortex (Breiter & Rauch, 1996; Chamberlain, Blackwell, Fineberg, Robbins, & Sahakian, 2005; Saxena & Rauch, 2000). These findings would suggest that the frontal cortex and subcortical structures are involved in the physiology of OCD, as well as abnormalities located in the frontal-striatal circuitry (Kuelz, Hohagen, & Voderholzer, 2004; van den Heuvel et al., 2005). A parallel pathway is contained within this neural circuit (Alexander, DeLong, & Strick, 1986) which, it has been hypothesized, acts to mediate features of behavior which make it challenging to inhibit repetitive behavior or repress intrusive thoughts (Graybiel & Rauch, 2000). Therefore, the repetition observed in OCD may be the consequence of an imbalance in which the thalamus becomes “disinhibited” ; this is similar to what takes place in neurological disorders such as Parkinson’s and Huntington’s disease (Carona & Basso, 2005).

Executive functioning has proven to be the steadiest area of impairment thus far, even though a clear neuropsychological profile of OCD has not yet been defined (Bannon et al., 2002; Greisberg & McKay, 2003). The deficits found in executive functioning

seem primarily to affect set-shifting (switching attention from one aspect to another within a task, as required by varying contingencies), planning capabilities, organizational skills, and response inhibition (Cavedini et al., 2002; Hartston & Swerdlow, 1999). Furthermore, several studies focusing on cognitive inflexibility and set-shifting through performance on measures such as the Wisconsin Card Sort Test (WCST) and Trails B support the hypothesis of poor performance on these tasks (Whitney, Fastenau, Evans, Lysaker, 2004; Sanz, Molina, Calcedo, Martin-Loeches, & Rubia, 2001; Lucey, et al., 1997).

The neuropsychological profile of OCPD has received far less attention than that of OCD. Gallagher, South, and Oltmanns (2003) studied the attentional coping style in obsessive-compulsive disorder in a student sample and found some evidence of a higher degree of information-seeking behaviors in individuals with OCPD, which revealed a difficulty in enduring the unknown. Dinn, Harris, Ayciciegi, Greene, and Andover (2002) investigated the difference between positive and negative schizotypy in a non-clinical sample and revealed an association between negative schizotypy and obsessive-compulsive traits, along with slight impairments on neuropsychological measures of executive functioning. The limited amount of research in this area delineates the need for additional exploratory research in regard to neuropsychological considerations of OCPD.

Neuroanatomical Considerations in BPD

A significant amount of neuroimaging literature exists in order to support a neurobiological basis for BPD. Neurochemical and functional studies have revealed the

occurrence of abnormalities in prefrontal and limbic regions of individuals with BPD, when compared with controls.

Currently, four magnetic resonance imaging (MRI) studies yielded structural abnormalities in the prefrontal cortex and/or temporal lobes of individuals with BPD (Driessen et al., 2000; Lyoo, Han, & Cho, 1998; Schmahl et al., 2003; Tebartz van Elst et al., 2003). In two of the studies, volumetric analyses yielded the following findings: an 8% smaller amygdala when compared with controls; 16% smaller bilateral hippocampal volumes in women with BPD (Driessen et al., 2000); 25% reduction of bilateral amygdala volume; 21% reduction of bilateral hippocampal volume; 24% reduction of the left orbitofrontal cortex, and a 26% reduction of the right anterior cingulate cortex, with an absence of significant differences between total brain volumes of individuals with BPD, when compared with controls (Tebartz van Elst et al., 2003). Tebartz van Elst et al. (2003) completed the only magnetic resonance spectroscopy (MRS) study of BPD individuals and obtained results that yielded subtle prefrontal neuropathology related to reduced N-acetylaspartate (NAA) concentrations in the dorsolateral prefrontal cortex.

The three EEG studies that have been performed with BPD individuals have found abnormalities (Cowdry, Pickar, & Davies, 1985-86; Ogiso et al., 1993; Snyder & Pitts, 1984). PET studies have also found abnormalities in BPD individuals, when compared with controls. For example, Soloff et al. (2003) revealed that BPD patients were hypo-responsive to serotonin stimulation in prefrontal and temporal regions, and De la Fuente et al. (1997) found prefrontal and premotor hypometabolism with anterior cingulate, thalamic, and caudate nuclei hypoactivity.

As both functional and structural data have uncovered abnormalities in individuals with BPD, it seems that these neuroimaging studies offer a convincing empirical foundation for developing a neurobiological model of BPD. Nevertheless, it continues to remain unclear how this data can be utilized in a clinical setting to make meaningful treatment decisions when working with individuals with BPD. It seems that a better understanding of the information processing irregularities that might be mediating the behavioral disturbances related to BPD is a necessary first step.

Neuropsychological Considerations in BPD

The neuroimaging data discussed in the previous section suggest that functional abnormalities appear to be present in the frontal and temporal lobes of individuals with BPD. These findings suggest the presence of information processing abnormalities in the areas of memory, visual spatial skills, attention, and executive functioning. Several studies have been conducted with BPD individuals, utilizing traditional neuropsychological measures. A discussion of the impaired performances on a variety of measures in each domain is beyond the scope of this study. However, the results from the measures of executive functioning are pertinent to this study and, therefore, will be discussed.

Many studies have revealed impairments in executive functioning among individuals diagnosed with BPD, compared with controls, when they have been administered Trails B (Swirsky-Sacchetti et al., 1993; Carpenter and Grossberg, 1993; Van Reekum et al., 1996; Sprock et al., 2000; Dinn et al., 2004; Monarch et al., 2004;). However, one study did not find differences in executive functioning abilities in

individuals diagnosed with BPD when administered Trails B (Travers & King, 2005). It appears that the executive functioning deficits in individuals with BPD continues to be controversial, because dissimilar findings have been reported by various studies.

Chapter 3: Overview of the Study/Hypotheses

The proposed study will test nine main hypotheses designed to determine the relationship between executive functioning and compulsive personality traits and borderline personality traits, using an archival data base of outpatient neuropsychological assessments conducted at a local neuropsychological practice. The Compulsive Scale (Scale 7) of the Millon Clinical Multiaxial Inventory-III (MCMI-III) was utilized to operationalize compulsive personality traits, and the Borderline Scale (Scale C) of the MCMI-III was utilized to operationalize borderline personality traits. The Wisconsin Card Sorting Test (WCST) was utilized to operationalize aspects of executive functioning. This test requires strategic planning and organized searching while using environmental feedback to shift cognitive sets. The WCST requires each participant to direct behavior towards achieving a goal while regulating impulsive responding. Additionally, the WCST requires each participant to develop and maintain a suitable problem-solving approach across inconsistent stimulus conditions in order to achieve a future goal (Heaton et al., 1993).

When executive functioning in individuals with obsessive-compulsive personality traits and borderline personality traits has been studied in the past, the data have been taken from a variety of medical or psychiatric treatment settings, and smaller sample sizes were utilized. Furthermore, previous studies did not analyze the relationship between executive functioning and an elevation both in obsessive-compulsive personality traits and in borderline personality traits (La Sasso, 2007; Carroll, 2007). Therefore, this study aims to add to the body of knowledge already developed from previous studies in this area.

Based on the literature indicating that executive functioning skills might be compromised in individuals with obsessive-compulsive personality traits and borderline personality traits, the following hypotheses were proposed:

Hypothesis 1: Those participants scoring 85 or higher on the compulsive scale of the MCMI-III will score significantly lower on the WCST, compared with those scoring less than 85 on the MCMI-III scale. The ranges of scores were chosen because a score of 85 or higher indicates “pathology pervasive enough to be called a *personality disorder*” (Millon, Davis, & Millon, 1997, p.130).

Hypothesis 2: Those participants scoring between 75 and 84 on the compulsive scale of the MCMI-III will score significantly lower on the WCST than those who score less than 75 on the MCMI-III scale. The ranges of scores were chosen because scores between 75 and 84 indicate a “presence of clinically significant *personality traits*” and scores less than 75 are considered not to be elevated (Millon, Davis, & Millon, 1997, p.130).

Hypothesis 3: Those participants scoring less than 75 on the compulsive personality scale of the MCMI-III will score significantly higher on the WCST than those who score 75 or higher on the MCMI-III scale. The ranges of scores were chosen because a score 75 or higher indicates “the presence of clinically significant *personality traits*” (Millon, Davis, & Millon, 1997, p.130).

Hypothesis 4: Those participants scoring 85 or higher on the borderline scale of the MCMI-III will score significantly lower on the WCST than those who score less than 85 on the MCMI-III scale. The ranges of scores were chosen because a score 85 or higher

indicates “pathology pervasive enough to be called a *personality disorder*” (Millon, Davis, & Millon, 1997, p.130).

Hypothesis 5: Those participants scoring between 75 and 84 on the borderline scale of the MCMI-III will score significantly lower on the WCST than those who score less than 75 on the MCMI-III scale. The ranges of scores were chosen because scores between 75 and 84 indicate a “presence of clinically significant *personality traits*” and scores less than 75 are considered not to be elevated (Millon, Davis, & Millon, 1997, p.130).

Hypothesis 6: Those participants scoring less than 75 on the borderline scale of the MCMI-III will score significantly higher on the WCST than those who score 75 or higher on the MCMI-III scale. The ranges of scores were chosen because a score 75 or higher indicates “the presence of clinically significant *personality traits*” (Millon, Davis, & Millon, 1997, p.130).

Hypothesis 7: Those participants scoring 85 or higher on the borderline scale and the compulsive personality scale will score significantly lower on the WCST than those who score lower than 85 on both scales of the MCMI-III. The ranges of scores were chosen because a score of 85 or higher indicates “pathology pervasive enough to be called a *personality disorder*” (Millon, Davis, & Millon, 1997, p.130).

Hypothesis 8: Those participants scoring between 75 and 84 on the borderline scale and compulsive scale of the MCMI-III will score significantly lower on the WCST than those who score lower than 75 on both scales of the MCMI-III. The ranges of scores were chosen because scores between 75 and 84 indicate a “presence of clinically

significant *personality traits*” and scores less than 75 are considered not to be elevated (Millon, Davis, & Millon, 1997, p.130).

Hypothesis 9: Those participants scoring lower than 75 on the borderline scale and the compulsive scale on the MCMI-III will score significantly higher on the WCST than those who score 75 or higher on both scales of the MCMI-III. The ranges of scores were chosen because a score 75 or higher indicates “the presence of clinically significant *personality traits*” (Millon, Davis, & Millon, 1997, p.130).

Chapter 4: Methodology

Research Plan

Because this dissertation was an exploratory study being conducted for the purpose of analyzing the relationship between borderline personality traits and compulsive personality traits and neuropsychological performance on a measure of executive functioning, the data were subjected to correlational analysis.

Design and Design Justification

The present study utilized archival data consisting of psychodiagnostic and neuropsychological assessment records generated at a local neuropsychological outpatient practice. The dataset for this study was developed to understand, further, the relationship between executive functioning and psychodiagnostic assessment measures in a sample of outpatients.

Participants

Participants consisted of 104 patients at a local neuropsychology outpatient practice, referred after experiencing cognitive disruptions resulting from traumatic brain injury, stroke, multiple sclerosis, and Parkinson's disease. Participants were selected from existing archival patient data files located within a private psychological practice in Mechanicsburg, Pennsylvania. Each file represented an individual patient who took part in an assessment battery with the purpose of assessing his or her current level of neurocognitive functioning.

Inclusion and Exclusion Criteria

Participants were required to be 18 years of age and to complete the core neuropsychological instruments and personality assessments. Participants who were not 18 years of age and who did not complete the core neuropsychological instruments and personality assessments were excluded. Additionally, invalid protocols were also excluded from the database.

Recruitment

The data utilized were derived from an archival database located within a private psychological practice in Mechanicsburg, PA. The participants were originally recruited by way of self-referral, physical therapists, family members, psychiatrists, physiatrists, primary care physicians, neurologists, attorneys, and schools.

Plan for Informed Consent Procedures

Permission to use the archival data was granted from a neuropsychologist at a local neuropsychologist practice. Patients were given, and subsequently signed, an informed consent to evaluation and treatment before they were administered the neuropsychological battery.

Measure of Executive Function

The Wisconsin Card Sorting Test (WCST; Heaton, et al., 1993) has been described as a measure of executive function. Participants need to utilize planning abilities, develop strategies to search in an organized manner, engage in goal directed behavior, revise impulsive responses, and change cognitive sets based on environmental

feedback. The test consists of 128 response cards that include figures varying in color, number, and shape, which are placed before the participant. The participant is then given a deck of 64 cards and instructed to match each card with one of the key cards. The participant decides how to match each card and creates piles under each key card (Heaton et al., 1993).

The examiner informs the participant whether or not the matching method was correct or incorrect. After the participant correctly matches 10 cards, the sorting rule changes (category order is by color, shape, and number). The task is accomplished when the participant has completed six correct categories or when both decks have been utilized. The total number and total percentages of errors, perseverative responses, and conceptual level responses are provided, as well as scores for the number of categories completed, trials to complete the first category, and failure to maintain a set. Research has shown that the test has good interscorer and intrascorer reliability, .93 and .96 respectively, as well as concurrent validity in regard to executive functioning. When a neuropsychological test battery and a measure of Piagetian formal operational reasoning ability was administered to a sample of 58 undergraduate students, the perseverative errors score from the WCST loaded on the factor defined by the measure of Piagetian formal operations after a four factor solution was found to best fit the data (variance accounted for= 70%), demonstrating evidence for concurrent validity (Heaton et al., 1993).

Based on their clinical knowledge, Heaton et al. (1993) have created a classification method for interpreting normative scores. The following groupings of standard-score and T-score values demarcate these suggested, clinically pertinent ranges:

standard scores less than or equal to 54 or T scores less than or equal to 19 are in the severely impaired range; standard scores ranging from 51 to 61 or T scores ranging from 20 to 24 are in the moderately to severely impaired range; standard scores ranging from 62 to 69 or T scores ranging from 25 to 29 are in the moderately impaired category; standard scores ranging from 70 to 76 or T scores ranging from 30 to 34 are in the mildly to moderately impaired category; standard scores ranging from 77 to 84 or T scores ranging from 35 to 39 are in the mildly impaired category; standard scores ranging from 85 to 91 or T scores ranging from 40 to 44 are in the below average category; standard scores ranging from 92 to 106 or T scores ranging from 45 to 54 are in the average range; and standard scores equal to or greater than 107 or T scores equal to or greater than 55 are in the above average range (Heaton et al., 1993).

Measure of Personality Function

The Millon Clinical Multiaxial Inventory- III (MCMI-III, second edition; Millon, Davis, & Millon, 1997) is a standardized, 175 true/false item, self-report inventory for adults 18 and older (with a minimum 8th grade reading level), intended to measure long-standing personality disorders, which are classified as Axis II disorders and Axis I clinical disorders listed in the Diagnostic and Statistical Manual-IV-TR (DSM-IV-TR). The MCMI-III includes scales for each personality disorder listed in the DSM-IV-TR and also scales for Axis I conditions such as somatoform disorder, posttraumatic stress disorder, thought disorder, dysthymia, drug and alcohol dependence, and anxiety disorder. It reflects clinical symptoms as well as enduring personality characteristics. The inventory generates 28 different scales, which consist of four *Modifying Indices*, eleven *Clinical Personality Patterns*, three *Severe Personality Pathology* scales, seven *Clinical*

Syndromes, and three *Severe Syndromes*. Scores on the MCMI-III scales are founded on base rate scores that define cutoff scores in accordance with the prevalence of the trait found in the psychiatric population. The mean base rate for the non-patient population is 35, whereas a score of 75 or higher characterizes a scale as elevated (Ruocco & Swirsky-Sacchetti, 2007). Internal consistency coefficients exceed .8 for 20 of the 26 scales. The highest coefficient (.90) has been found for the Depression scale. Test-retest reliabilities range from .96 for the Somatoform scale to .82 for the Debasement scale (Millon, 1994).

The Compulsive Scale (Scale 7) is one of the 11 Clinical Personality Pattern scales, which includes 17 items. The scale, composed of 25 possible raw score points, consists of eight items worth two points each (representing essential traits corresponding to *DSM-IV-TR* diagnostic criteria), and nine items worth one point each (representing related traits with a lesser correlation) (Millon, 1994). Individuals with elevations on this scale are conscientious, disciplined, righteous, and meticulous. They tend to adhere to social norms and control their emotions. These individuals can be demanding, perfectionistic, and often have rules and methods that are preset. Individuals with an elevation on this scale often describe themselves as reliable, punctual, and dependable. Adapting to changes and to work situations that require unprompted responses is difficult for these individuals. These individuals often have experienced a great deal of achievement and do not report psychiatric disturbances. Individuals with elevations on the Compulsive scale may present to therapy with problems related to anxiety that typically stem from excessive changes in their lives or from the need to make important decisions. Providing these individuals with support and anxiety reduction techniques are typical interventions (Groth-Marnat, 2003).

The Borderline Scale (Scale C) was designed to assess the amount to which a pervasive pattern of instability in mood, interpersonal relationships, and self-image may be present (Choca, 2004). This scale comprises 25 possible raw score points consisting of nine items, each worth two points (representing essential traits corresponding to *DSM-IV-TR* diagnostic criteria), and seven items worth one point each (representing related traits with a lesser correlation) (Millon, 1994). Individuals with an elevated Borderline Scale typically have recurrent episodes of depression, mood swings, and generalized anxiety. These individuals have relationships that are characterized by uncertainty, intensity, and indecision. Individuals with an elevated Borderline Scale typically react strongly to fears of abandonment, even though they often provoke rejection. They tend to have an inadequately defined sense of self and when confronted with stress, they might have transient episodes of psychosis. These individuals usually describe themselves as petulant, anxious, intolerant, and depressed. In treatment, the initial efforts are focused on developing rapport so that stabilizing their unpredictable behavior and affect can be addressed (Groth-Marnat, 2003).

Procedure of Evaluation

Participants were administered a battery of neuropsychological and psychological tests. The personality inventories and neuropsychological tests were administered by a licensed psychologist in the Commonwealth of Pennsylvania and by a psychometrician in a clinical setting, using standardized instructions, as outlined in the respective manuals

Procedure of the Study

Participants were administered a standardized battery of neuropsychological and psychological tests in a clinical setting. Assessment scores from the core battery of the neuropsychological evaluation are in electronic format. The identifying information of the participants has been erased.

Analysis of Risk/Benefit Ratio

Potential harm to the participants does not exist because identifying information is absent from the electronic file. The potential benefit is in obtaining additional information relative to personality disturbances with the hope of developing more effective treatment modalities for these individuals.

Procedures for Maintaining Confidentiality

Confidentiality was maintained through the use of the electronic record, with identifying information purged. The original data files are kept in locked filing cabinets at the private practice in Mechanicsburg, Pennsylvania to ensure that confidentiality is maintained.

Chapter 5

Results

Demographics

The sample consisted of 104 participants: 52 men and 52 women. A summary of the sample's demographic characteristics is provided in Table 1.

Table 1

Sample Demographic

Information

Variable	Mean (SD)	Range
Age, years	44.4 (14.6)	18-69
Education, years	14.2 (2.8)	9-22

Ages ranged from 18 to 69 years, with a mean of 44.4 years (SD=14.6). The number of years of education ranged from 9 to 22, with a mean of 14.2 years (SD= 2.8).

Tests Administered

The tests that were administered consisted of the Wisconsin Card Sorting Test (WCST) and the Millon Clinical Multiaxial Inventory-III (MCMI-III). Perseverate (PSV) scores on the WCST were compared with scores on the Compulsive Scale and Borderline Scale of the MCMI-III. A summary of the sample's scores is provided in Table 2.

Table 2

Tests Administered

Information

Variable	Mean(SD)	Range	% below cut-off
WCST(PSV)	48.5(11.7)	25-80	10%
Compulsive Scale	53.0(21.1)	0-100	84%
Borderline Scale	49.3(26.7)	0-88	81%

WCST T scores ranged from 25-80, with a mean of 48.5(SD=11.7). Compulsive Scale scores ranged from 0-100, with a mean of 53.0 (SD= 21.1). Borderline Scale scores ranged from 0-88, with a mean of 49.3 (SD=21.1). Ten percent of the participants scored in the severely impaired range to the mildly to moderately impaired range of the WCST; these indicated a T score of 29 or lower. Eighty-four percent of the participants scored below the cut-off score of 75 on the Compulsive Scale, indicating an absence of “clinically significant *personality traits* (Millon, Davis, & Millon, 1997, p 130). Eighty-one percent of the participants scored below the cut-off of 75 on the Borderline Scale, indicating an absence of “clinically significant *personality traits* (Millon, Davis, & Millon, 1997, p 130).

Hypotheses and Findings

Hypothesis #1

Hypothesis 1 stated that those participants scoring 85 or higher on the compulsive scale of the MCMI-III will score significantly lower on the WCST, compared with those

scoring less than 85 on the MCMI-III scale. Only seven people scored higher than 85 on the compulsive scale of the MCMI-III, which prevented the author from conducting an Independent Samples T-Test to compare the relationship. Therefore, a Pearson Product Moment Correlation was conducted to compare the relationship between the MCMI-III scores and the perseverative responses on the WCST. The two variables were not highly correlated, $r(102) = .016, p = .874$.

Hypothesis #2

Hypothesis 2 stated that those participants scoring between 75 and 84 on the compulsive scale of the MCMI-III will score significantly lower on the WCST than those who score less than 75 on the MCMI-III scale. An Independent Samples T-Test was conducted to compare the relationship between scores on the compulsive scale of the MCMI-III and perseverative scores on the WCST. There was no statistically significant difference in WCST scores for those scoring between 75 and 84 on the compulsive scale ($M=48.8$ $SD=4.8$) and those scoring less than 75 ($M=49.0$ $SD=12.5$) on the compulsive scale; $t(95) = .066, p = .948$.

Hypothesis #3

Hypothesis 3 stated that those participants scoring less than 75 on the compulsive personality scale of the MCMI-III will score significantly higher on the WCST than those who score 75 or higher on the MCMI-III scale. An Independent Samples T-Test was conducted to compare the relationship between scores on the compulsive scale of the MCMI-III and perseverative scores on the WCST. There was no statistically significant difference in WCST scores for those scoring less than 75 on the compulsive scale ($M=$

49.0 $SD= 12.5$) and those scoring higher than 75 ($M= 46.0$ $SD=6.4$) on the compulsive scale; $t(102) = 1.0, p=.313$.

Hypothesis #4

Hypothesis 4 stated that those participants scoring 85 or higher on the borderline scale of the MCMI-III will score significantly lower on the WCST than those who score less than 85 on the MCMI-III scale. Only three people scored higher than 85 on the borderline scale of the MCMI-III, which prevented the author from conducting an Independent Samples Test to compare the relationship. Therefore, a Pearson Product Moment Correlation was conducted to compare the relationship between the MCMI-III scores and the perseverative responses on the WCST. The variables were not highly correlated, $r(102) = .035, p= .726$.

Hypothesis # 5

Hypothesis 5 stated that those participants scoring between 75 and 84 on the borderline scale of the MCMI-III will score significantly lower on the WCST than those who score less than 75 on the MCMI-III scale. An Independent Samples T-Test was conducted to compare the relationship between scores on the borderline scale of the MCMI-III and perseverative scores on the WCST. There was no statistically significant difference in WCST scores for those scoring between 75 and 84 on the borderline scale ($M=48.1$ $SD=14.9$) and those scoring less than 75 ($M=48.7$ $SD=11.1$) on the borderline scale; $t(99) = .182, p=.856$.

Hypothesis # 6

Hypothesis 6 stated that those participants scoring less than 75 on the borderline scale of the MCMI-III will score significantly higher on the WCST than those who score 75 or higher on the MCMI-III scale. An Independent Samples T-Test conducted to compare the relationship between scores on the borderline scale of the MCMI-III and perseverative scores on the WCST. There was no statistically significant difference in WCST scores for those scoring less than 75 on the borderline scale ($M= 48.7$ $SD= 11.1$) and those scoring higher than 75 ($M= 47.9$ $SD=14.1$) on the borderline scale; $t(102) = .271, p=.787$.

Hypothesis # 7

Hypothesis 7 stated that those participants scoring 85 or higher on the borderline scale and the compulsive personality scale will score significantly lower on the WCST than those who score lower than 85 on both scales of the MCMI-III. An analysis to compare the relationship could not be computed because no one in the sample met the criteria.

Hypothesis # 8

Hypothesis 8 stated that those participants scoring between 75 and 84 on the borderline scale and compulsive scale of the MCMI-III will score significantly lower on the WCST than those who score lower than 75 on both scales of the MCMI-III. An analysis to compare the relationship could not be computed because no one in the sample met the criteria.

Hypothesis #9

Hypothesis 9 stated that those participants scoring lower than 75 on the borderline scale and the compulsive scale on the MCMI-III will score significantly higher on the WCST than those who score 75 or higher on both scales of the MCMI-III. An analysis to compare the relationship could not be computed because no one in the sample met the criteria.

Chapter 6

Discussion

Summary

The purpose of the present study was to determine the relationship between executive functioning and compulsive personality traits and borderline personality traits, using an archival data base of outpatient neuropsychological assessments conducted at a local neuropsychological practice. Each participant was referred to the practice for an evaluation of his or her neuropsychological functioning. A total of 104 participants who met the inclusion criteria, were selected. Participants were divided into groups, based on their score on the Compulsive Scale of the MCMI-III and the Borderline Scale of the MCMI-III. Based on the research literature on OCD and BPD and neuropsychological functioning, it was believed that a relationship would exist between compulsive and borderline traits and executive functioning abilities. The hypotheses predicted that higher scores on the Compulsive Scale and Borderline Scale of the MCMI-III would be associated with poorer performance on the WCST, which measured executive functioning. None of the hypotheses was supported by the data. The dearth of significant numbers of participants with MCMI-III Compulsive and Borderline Scale scores in the clinically significant range made it difficult to examine possible relationships between executive functioning and compulsive and borderline traits. Additionally, only 10% of the participants scored in the severely impaired range to the mildly to moderately impaired range of the WCST. The scores on the measure of executive functioning and

the measure of personality function suggest that the sample utilized in this study is homogeneous in nature, which might have had an impact on the results.

It could also be possible that those deficits that people with personality disorders have such as difficulty with interpersonal relationships, which is often characteristic of people diagnosed with borderline personality disorder do not have a significant effect on their ability to perform on a measure of executive functioning. The perception that people have of those with significant borderline and compulsive disorders is often characterized by the inability to function in a “typical” manner on a daily basis. Furthermore, the characteristics these people often possess have negative impacts on their relationships with others, which might appear to others as deficits in executive functioning. Despite the perceptions that others might have of those diagnosed with a personality disorder or of those that exhibit those traits, these individuals might still have the capacity to perform adequately on a measure of executive functions.

Additionally, the breadth of cognitive issues resulting from the conditions that were present in the participants being tested, such as Parkinson’s disease, multiple sclerosis, stroke survivors, and traumatic brain injury might have impacted the executive functioning results, making it difficult to determine whether or not a significant relationship between executive functioning and personality traits does exist. It appears that the heterogeneity of the neuropsychological problems within this sample placed limitations on the study.

Limitations of the Study

The particular limitations of the study include issues related to sample size, assessment measures that were utilized, and the population being studied. Because of the exploratory nature of this study and the use of an archival data base, the most evident limitation was sample size. Even though the database contained a large number of participants, the number of participants that fit the criteria of the suggested hypotheses was low. For example, only 2% of the participants scored 85 or higher on the Borderline Scale and only 7% of the participants scored 85 or higher on the Compulsive Scale, which made it difficult to determine whether or not a relationship existed between the MCMI-III scales and the measure of executive functioning. Additionally, only 10% of the participants scored in the severely impaired range to the mildly to moderately impaired range of the WCST, making it difficult to examine the relationship between the MCM-III scales and the measure of executive functioning. Furthermore, several of the criteria being measured in the hypotheses were not met by the sample, making it impossible to conduct an analysis to compare the relationship between variables.

The use of an archival data base also limited the types of measures that could be utilized to explore executive functioning. The Wisconsin Card Sorting Test is considered to be a test commonly utilized for assessing executive functioning and is considered to be psychometrically sound. However, there are several other measures of executive functioning utilized in neuropsychological test batteries, as well as in conceptualizations of executive functioning, such as the holarchical model. (McCloskey, 2001). The holarchical model portrays how independent developmental lines of executive function enable others to regulate emotion, cognition, and action and to engage in evaluation of self, goal setting and long term planning. The independent developmental lines of

executive functioning include self-activation, self-regulation, self-realization, self-determination, self-generation, and self-integration. Furthermore, utilizing an additional measure of executive functioning, such as the Trailmaking Test, Part B (Trails B), might have increased the power of the study and yielded different results. Trails B assesses cognitive flexibility, set maintenance, visuomotor tracking, and attention. Additionally, Trails B expands upon the measures of executive functioning that are assessed by the Wisconsin Card Sorting Test (Lezak et al., 2004). Including additional conceptualizations of executive functioning as well as increasing the number of measures of executive functioning might have yielded different results.

Furthermore, qualitative data such as effort and cooperation of the participants during test taking procedures was not contained in the archival data base. Therefore possible effects of disinterest, fatigue, medication, or lack of motivation could not be determined within the context of the scores.

In regard to the instrument utilized to measure personality traits, the MCMI-III is a self-report measure making it possible for the occurrence of over-reporting or under-reporting biases, which could also influence the results. Although invalid protocols were excluded from the database, it is not possible to verify the validity of profiles that came close to the cut-off points for invalidity. Furthermore, the MCMI-III is not a tool for providing participants with a diagnosis. It is designed to measure personality constructs and can be taken into consideration when making decisions regarding behavioral disorders or syndrome diagnoses; however, an elevation on a given scale does not determine a participant's diagnosis (Millon, Davis, & Millon, 1997). Therefore, it cannot

be determined if elevated scores on specific scales indicate the presence of a personality disorder.

In addition, utilizing an archival database requires retrospective analyses which imposed limitations on the study, such as the inability to determine causality. Utilizing cut off scores for the scales in the MCMI-III also appeared to be a limitation in the study. Three of the analyses to test the hypotheses could not be conducted, because participants in the database did not meet the criteria. Utilizing continuous variables as opposed to cut off scores might have increased the power of the study and might have yielded different results. The archival nature of the data base also made it impossible to explore the effects of moderating variables such as medication usage, comorbidities (e.g., substance abuse or mood disorders), and participant presentation. Additionally, ethnicity was not controlled for in this study as a result of the information provided in the database. When administering the MCMI-III to a sample consisting of 96 combat veterans, Ghafoori & Hierholzer (2010) found that Hispanic veterans were more likely to have cluster A traits, when compared with non-Hispanic veterans. Therefore, ethnicity should be a consideration in future research.

Future Directions

The current study was intended to explore a topic that has not received much attention and to contribute to pre-existing research from which future discussion and research questions might arise. The absence of significant results can provide information in regard to guiding future research questions and sparking an interest in a topic that has

not been heavily researched. Future research in this area would benefit from conducting a prospective study, which generates a larger sample size. Conducting analyses other than Correlations and Independent Samples T-Test might yield significant results.

Methodological weaknesses could be improved upon by including group comparisons with matched controls to monitor factors such as symptom severity, medication effects, ethnicity, and comorbidities. Furthermore, utilizing an additional diagnostic measure, such as a structured or semi-structured interview, perhaps the Structured Clinical Interview for the DSM-IV (SCID), would provide more information about personality symptomatology and group inclusion comparisons. It is possible that the MCMI-III is not sensitive to impairments in executive functioning. Incorporating neuroimaging studies (fMRI, PET, etc.) would provide for a comprehensive examination of the neuropsychology of personality traits by identifying specific areas of dysfunction within the brain.

Additionally, future research could increase the number of executive functioning measures administered, such as utilizing Trailmaking Test, Part B (Trails B), which was discussed in the limitations section. This study focused on the domain of executive functioning; however, other neuropsychological domains such as information processing, visuospatial skills, and verbal and nonverbal memory could be explored. Frontal lobe activity is also associated with attention, memory, and verbal functioning, as well as executive functioning (Lezak et al., 2004).

Conclusion

The purpose of the present study was to explore the relationship between executive functioning and compulsive personality traits and borderline personality traits. The absence of significant results in the study may be attributed to the methodological restrictions and limitations associated with the specific archival database utilized for the study. The results of this study should be viewed as a need to continue investigating relationships between neuropsychological functioning and personality traits.

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