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Relationship between Crime, Psychological Diagnosis and Cognitive Functioning

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Relationship between Crime, Psychological Diagnosis and Cognitive Functioning

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Each person whose signature appears below certifies that this dissertation in his/her opinion is adequate, in scope and quality, as a dissertation for the degree Doctor of Philosophy.

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CONTENT

FIGURES

Figure Page

TABLES

Table Page

ABBREVIATIONS

M	Mean
SD	Standard Deviation
α	Alpha
β	Standardized Path Coefficient (Beta)
p	Probability
r^2	Variance Explained
χ^2	Chi-Squared
RBANS	Repeatable Battery for the Assessment of Neuropsychological Status
APD	Anti-social Personality Disorder

ABSTRACT OF THE DISSERTATION

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Within various forensic state hospitals, neuropsychological testing is used to improve patient management through treatment and release planning because cognitive impairment and a diagnosis of Schizophrenia have direct implications on chance of release from a state hospital and risk of future violence. To understand the seeming inter-workings of the variables of cognitive functioning, mental health diagnosis, and violence, this study sought to test how various demographic, developmental, mental health, and cognitive factors impact a patient's crime committed and the presence of violence during the commission of the crime, as well as testing the direct relationships between these variables. Results from this study revealed significant differences in demographic variables of gender, as well as history of developmental delay, diagnosis of an intellectual disorder, and Total RBANS score for the type of crime that a patient committed. Individuals without the Presence of Violence were more likely to have a history of developmental delay and have a diagnosis of an Intellectual/Cognitive Disorder than those with the Presence of Violence. In testing the relationship between Type of Crime and having a history of Intellectual/Cognitive disorder, Psychotic disorder, Antisocial Personality Disorder, and Total RBANS, it was found that Type of Crime was directly influenced by a diagnosis of Intellectual/Cognitive disorder and those patients with a

Severe Violent crime were more likely to have a higher RBANS Total score and were less likely to have been diagnosed with Antisocial Personality Disorder. It was also found that patients diagnosed with an Intellectual Disorder and with a Psychotic Disorder were more likely to have a lower RBANS Total score and those who have committed a Severe Violent crime were more likely to have a higher RBANS Total score and a higher RBANS Categorical score. Findings from this study suggest that a more detailed analysis of patterns of functioning on neuropsychological tests along with a diagnosis of a psychotic disorder may reveal additional relationships between the presence of violence and commission of violent crime, which confirms past research that states there is a combination of factors influencing violence and violent crime.

CHAPTER ONE

INTRODUCTION

Significance of the Study for Offenders with Severe Mental Illness

Violence committed by individuals with Schizophrenia (i.e. institutionally and within the community) cannot be solely explained by the presence of psychotic symptomology and research has suggested in the past that a combination of neuro-pathological factors and psychiatric symptomology leads to higher risk of aggressive behavior for mentally ill psychiatric patients (Barkataki et al., 2005; Jones, 1992; Krakowski & Czobor, 1997). A variety of causes have been found to relate to the increase in the presence of violence within this population, such as violence prior to the onset of their psychotic symptomology (Fazel, Gulati, Linsell, Geddes & Grann, 2009; Naudts & Hodgins, 2006; Tengstrom, Hodgins & Kullgren, 2001) or being diagnosed with paranoid Schizophrenia and cognitive impairments (Hanlon, Coda, Cobia & Rubin, 2012; Naudts and Hodgins, 2006; Schug and Raine, 2009). However, the presence of violence in individuals diagnosed with Schizophrenia appears to be influenced by many of the same risk factors as those in the general population (Tengstrom, Hodgins & Kullgren, 2001; Erb, et al., 2011; Large, Smith & Nielssen, 2009). Specifically, research has consistently shown for the general population that the presence of violence is influenced by cognitive deficits, such as those present in brain injury, delinquency, intellectual disability (Fazel, Lichtenstein, Grann & Langstrom, 2011; Farrington & Welch, 2007; Holland, Clare & Mukhopadhyay, 2002), worse neuropsychological impairment (Weiss, 2012; Hanlon, Coda, Cobia & Rubin, 2012) and low intellectual

functioning (Reichenberg, Weiser, Caspi, Knobler, Lubin, Harvey, Rabinowitz & Davidson, 2006; Bufkin & Luttrell, 2005).

Due to the apparent relationship between cognitive functioning, diagnosis of Schizophrenia, and violence, it could be argued that a diagnosis of Schizophrenia and cognitive performance might predict the presence of violence and type of crime committed by a forensic patient. There are also studies that suggest that performance on neuropsychological tests that measure executive functioning could be used to assess for future aggressive and violent behavior (Giancola, et al., 1996; Foster, Hillbrand & Silverstein, 1993). Thus, it could be argued that a patient with a mental health diagnosis and poor cognitive functioning as measured by their score on a neuropsychological test (e.g. RBANS) would have a significant effect in increasing the risk of violence or violent crimes compared to a high cognitive functioning patient with a mental health diagnosis. By testing this relationship, the results can be utilized in treatment planning to provide more accurate and specialized therapies with the ultimate goal of improving the clinical care of individuals housed in the nation's forensic state hospitals, as well as be used in discharge planning to determine the patient's risk for future violence and appropriateness for release. For example, if it is found that lower cognitive functioning is not associated with commission of a violent crime for a patient with Schizophrenia, then the presence of cognitive deficits should not be considered as a risk factor for future dangerousness or risk of violent recidivism. This research may also have more global applications in prisons and psychiatric in-patient hospitals, as well as for use in the judicial system by informing officials of more accurate ways to identify individuals with cognitive

impairments and how these impairments are related to violent or aggressive behavior and crime.

Risk Factors for Violence and Crime

One key factor that must be considered when determining both level of risk and likelihood of release for forensic patients is the presence of violence or aggression. In clinical practice, particularly in forensic settings, being able to determine who will be violent under what circumstances is essential (Shah 1978), as is a determination of when those specific patients are safe to release back into the community (McDermott, Edens, Quanbeck, Busse & Scott, 2008). Within several of the research studies that follow, aggression was operationalized as aggression or violence present within a psychiatric hospital ward (i.e. physical and verbal aggression, as well as violent outbursts on the ward), whereas when crime was discussed this was specifically related to both violent and non-violent offenses that led to arrest. However, many of these studies have methodological concerns related to a combining physical and verbal aggression, as well as a mixture of proactive and reactive aggression.

Impact of Mental Illness on Violence and Crime

A group in forensic settings who have been frequently considered prone to violence and violent crime are patients diagnosed with Schizophrenia (Haller & Deluty, 1988; Fottrell, 1980; Tardiff & Sweillam, 1982; Pearson, Wilmot & Padi, 1986; Fazel, Gulati, Linsell, Geddes & Grann, 2009; Tihonen, Isohanni, Ra¨sa¨nen, Koiranen & Moring, 1997; Wallace, Mullen & Burgess, 2004; Eriksson, Romelsjö, Stenbacka &

Tengström, 2011; Swanson et al. 1990; Hanlon, Coda, Cobia & Rubin, 2012; Dack, Ross, Papadopoulos, Stewart & Bowers, 2013; Nielssen & Large, 2010; Naudts & Hodgins, 2006). However, empirical evidence shows that only a small minority of patients with Schizophrenia commit violent crimes (Fazel & Grann, 2006; Monahan et al., 2001) and it seems that a specific subgroup of patients with Schizophrenia are at a higher risk of violence compared to individuals without mental illness (American Psychiatric Associations, 2013; Arseneault et al., 2000; Brennan et al., 2000; Hodgins, Hiscoke & Freese., 2003; Tiihonen et al., 1997; Wallace et al., 2004; Walsh et al., 2002). One reason for the belief that patients with Schizophrenia are at a higher risk of violence is due to the presence of paranoid command auditory hallucinations. Yet, several studies of psychiatric patients showed no significant relationship between auditory hallucinations and violent behavior (Monahan, et al., 2001; Cheung, Schweitzer, Crowley & Tuckwell, 1997). Other studies, however, have demonstrated that command hallucinations increased the rate of violent acts (Bjorkly, 2002) when there are also paranoid or persecutory delusions (Liettu, Saavala, Hakko, Rasanen & Joukamaa, 2009). Lastly, when compared to individuals without a mental disorder, it has been shown that individuals with Schizophrenia had several additional risk factors that contribute to their criminal offending, such as substance abuse history (Tengstro¨m, Hodgins, Grann, La°ngstro¨m & Kullgren, 2004; Modestin & Wuermle, 2005; Rasmussen, Levander, & Sletvold, 1995), impaired social relationships (Swanson, Swartz, Estroff, Borum, Wagner & Hiday, 1998), and homelessness (Folsom, et al., 2005). For state prisoners who were diagnosed with a mental illness, nearly 49% had committed a violent offense, 20% had committed a property crime, and 19% had committed a drug crime; and for those without a mental

illness, 46% had a violent offense, with 13% of the 46% committing violent offenses being incarcerated for homicide, and 24% had a drug offense (James & Glaze, 2006). These statistics demonstrate that there is not a significant connection between the presence of a mental illness alone and conviction for a violent crime, but that it is more likely that other factors, such as cognitive impairment, in conjunction with a diagnosis of a mental illness increase the likelihood of a conviction for a violent crime or future violence. Due to extensive research demonstrating that not all individuals with Schizophrenia are violent or will commit a violent act, but that a combination of factors influence violence and violent crime, it is critical to study which of the many factors involved with violence will contribute to violent behavior in these individuals.

Impact of Co-Morbidity on Violence and Crime

Individuals with Schizophrenia that have either a co-morbid personality or substance abuse disorder have been shown to be more likely to become aggressive (Soliman & Reza, 2001). Most notably, individuals with Schizophrenia showed an increase risk of arrest or violent offense (i.e., serious violent offense and less violent offense) when they had a co-occurring diagnosis of Antisocial Personality Disorder (APD; McCabe, Christopher, Roy-Bujnowski & Grudzinskas, 2012). The presence of a co-occurring Anti-social Personality Disorder would increase such an individual's maladaptive characteristics of aggression, impulsivity, deception, and psychopathic lack of remorse, which would further increase the likelihood of the commission of violent crimes for patient's already at risk for cognitive deficits. Specifically, for individuals with Schizophrenia, the likelihood of future violence was found to increase as a function of the

antisocial behaviors (Swanson et al. 2008; Eriksson, Romelsjö, Stenbacka & Tengström, 2011) and that the majority of violent offenses were committed by individuals with Schizophrenia and co-morbid substance abuse disorders (Fazel, et al., 2009; Dack, Ross, Papadopoulos, Stewart & Bowers, 2013; Swanson, et al., 2008; Hodgins, Hiscoke & Freese, 2003; Moran & Hodgins, 2004; Volavka & Swanson, 2010; Modestin & Wuermle, 2005). Although evidence demonstrates that other demographic risk factors are related to increased violence, it appears that there is a significant impact of a co-morbid Anti-social Personality or Substance Abuse Disorder influencing the likelihood of aggressive or criminal behavior for an individual with a diagnosis of Schizophrenia.

Impact of Demographic Factors on Violence and Crime

In terms of violence and aggression, there are several studies that conflict in reported demographic risk factors, such as age, gender, and ethnicity. With regard to aggression seen in psychiatric patients, there were studies that found no significant difference in age (Daffern, Howells, Ogloff & Lee, 2005; Dietz & Rada, 1982; Dolan, Fullam, Logan & Davies, 2008; Doyle, Dolan & McGovern 2002; Fullam & Dolan, 2008), yet several others found that younger patients were shown to be more aggressive on both acute and forensic psychiatric wards (Tardiff & Sweillam, 1982; Hoptman, Yates, Patalinjug, Wack & Convit, 1999; Soliman & Reza, 2001; Dack, Ross, Papadopoulos, Stewart & Bowers, 2013). Younger age was also associated with more violence in crime(s) committed (Fottrell, 1980; McCabe, Christopher, Druhn, Roy-Bujnowski, Grudzinskas & Fisher, 2012). For gender, the majority of studies found no significant gender differences between aggressive and non-aggressive patients

(Krawkowski, et al., 1997; Daffern, Howells, Ogloff & Lee, 2005; Watzke, Ullrich & Marneros, 2006), but newer studies found contradictory evidence indicating that when violence was operationalized as a combination of physical and verbal aggression being male increases the rate of aggression on acute inpatient psychiatric wards **(**Dack, Ross, Papadopoulos, Stewart & Bowers, 2013). The majority of studies that have examined psychiatric patients have found that there is no significant relationship between ethnicity and aggression for individuals with a psychotic disorder (Hoptman, Yates, Patalinjug, Wack & Convit, 1999; Tardiff & Sweillam, 1982; Doyle, Dolan & McGovern, 2002; Ketelsen, Zechert, Driessen & Schulz, 2007), but that there was an association between being non-Caucasian and committing a violent assault (Dietz & Rada, 1982), which is typically attributed to the increased likelihood of socioeconomic inequality present for minority populations (Blau & Blau, 1982; Messner & Rosenfeld, 1997). Interestingly, there was no significant difference between aggressive and non-aggressive patients in terms of years of education (Dietz & Rada, 1982; Fullam & Dolan, 2008; Dack, Ross, Papadopoulos, Stewart & Bowers, 2013).

There were several other significant developmental variables that increase both aggression and violence in adulthood and the likelihood of criminal/deviant behavior, including child abuse and neglect, direct exposure to violence and racism (Weiss 2012; Bufkin & Luttrell, 2005), an unstable family life or poor parenting, lack of prenatal and perinatal services, maternal drug use during pregnancy, poverty (Bufkin & Luttrell, 2005), poor or crowded living conditions (Walsh, Swogger & Kosson, 2004; Cannon, Huttunen, Tanskanen, Arseneault, Jones, Murray, 2002), and socioeconomic status at

birth (Corcoran, et. al., 2009). These variables demonstrate the significance of several key factors that impact an individual's potential for aggression and violence.

Presence of Mental Illness within the Criminal Justice System

In a comparison of jail inmates and individuals who had not been incarcerated, male inmates were three times more likely to be diagnosed with a mental illness (Teplin, 1990) and female inmates were two times more likely to be diagnosed with a mental illness (Teplin, Abram & McClelland, 1996). In 2005, over half of inmates were found to have a mental health problem with 56% of state prison inmates, 45% of federal prison inmates, and 64% of jail inmates having such a history (Torrey, et al., 2010). Approximately 16% of prison and jail inmates were considered seriously mentally ill with 15% of prison inmates and 24% of jail inmates experiencing psychotic symptoms (James, 2002).

There has also been a dramatic increase in the rate of admission to state mental health facilities in the United States and the number of admissions to secure state hospitals in California has shown an increase by 109% between 2000 and 2005 (Manderscheid, Atay, & Crider, 2015). Those individuals legally committed within one of California's State Hospitals have been committed for a variety of reasons and those of interest for this study are individuals diagnosed with a severe mental illness, who were found not guilty due to their mental illness, which require further therapeutic intervention (NGRI; PC 1026) or were found in need for further psychiatric treatment (PC 2972, 2962, 2964; Bailie, King, Kinney & Nitch, 2012). Of those individuals who were acquitted by reason of insanity (NGRI), between 36% and 52% (Pantle, Pasewark, & Steadman, 1980)

had a primary diagnosis of Schizophrenia. Based on the annual census of admissions to secure state hospitals, there was an increase of 23% of patients diagnosed with Schizophrenia and an increase of 16% of patients diagnosed with affective disorders between 2002 and 2005 (Manderscheid, Atay, & Crider, 2015).

Risk Factors for Cognitive Functioning

Previous research that looked at scores on the RBANS for the same forensic population that was utilized in this study found that the average RBANS Total Score was 74.59, which is within the borderline range of intellectual functioning and is more than 1.6 standard deviations below the population norm, with 35.8% of patients performing in the impaired range and 13.1% performing in the average range (Bailie, King, Kinney & Nitch, 2012). As research has shown, cognitive impairment and a diagnosis of Schizophrenia have negative implications for the timeliness of a patient's release from a state hospital and will cause an increase in the length of a patient's hospitalization (Pirelli, Gottdiener, et al., 2011; Cochrane, Grisso, & Frederick, 2001; Colwell & Gianesini, 2011; Heller, Traylor, Ehrlich, & Lester, 1981; Morris & DeYoung, 2012; Warren et al., 2006; Denney & Wynkoop, 2000); as such, a patient's length of incarceration can be shortened with specific and specialized treatment and intervention that increases the rate of treatment progress. However, without the results of a formal assessment, the specific cognitive impairments would need to be identified by hospital staff based on behavioral observations. By being able to determining which patients are more likely to suffer from cognitive impairments based upon case history and demographic information, these patients can be more quickly chosen to undergo an

administrations of additional cognitive testing (Bailie, King, Kinney & Nitch, 2012), be placed in the appropriate specialized treatment program, and improve the patient's outcome for length of hospitalization and chance of release.

Impact of Mental Illness on Cognitive Functioning

Several studies have corroborated the significant impact of mental illness on cognitive functioning and the most extensively studied mental illness is Schizophrenia and/or other psychotic disorders. Cognitive impairment has consistently been associated with Schizophrenia (Kahn & Keefe, 2013) and research has identified various cognitive impairments for individuals with Schizophrenia, such as evidence demonstrating that patients with Schizophrenia perform worse than healthy controls by as much as two standard deviations (Kahn & Keefe, 2013). Some of the specific impairments found in individuals with Schizophrenia include both verbal and visual memory, attention, executive functioning, motor speed, and overall performance (Saykin et al., 1991; Heinrichs and Zakzanis, 1998), whereas individuals with Bipolar Disorder demonstrated impairments in verbal memory, executive functioning, and sustained attention (Dickerson, Boronow, Stallings, Origoni, Cole & Yolken, 2004). In a study of deficits on Total RBANS score, individuals with Schizophrenia were shown to be significantly more impaired when compared to individuals with Bipolar Disorder and normal controls (Gogos, Joshua & Rossel, 2010; Heinrichs & Zakzanis, 1998). Compared to individuals diagnosed with Bipolar disorder, those with Schizophrenia were more impaired in visuospatial ability, immediate and delayed memory, but were similar in their impairment on language and attention subtests when compared to controls (Dickerson, Boronow,

Stallings, Origoni, Cole & Yolken, 2004; Hobart, Goldberg, Bartko & Gold, 1999). The presence of cognitive deficits among individuals with Schizophrenia drastically affects the severity of the illness and subsequent disability (Green et al., 2000/2004; Ahmed et al., 2014) and causes more difficulty in the overall functioning for the individual than even the presence of the positive symptoms associated with Schizophrenia (Kurtz et al., 2005). Interestingly, for individuals diagnosed with Schizophrenia, a higher score on neurocognitive tests, especially those assessing verbal memory, was found to predict improvement in the individual's functioning within the community (Green, 1996; Brekke et al., 2007; O'Reilly, et al., 2015), as well as improve risk of future violence. Similarly, the presence of neurocognitive deficits has been associated with difficulties in long-term functionality of an individual with Schizophrenia (Ahmed et al., 2015a, 2015b; Juola et al., 2015; Rannikko et al., in press; Kahn & Keefe, 2013) and the presence of the negative symptoms of Schizophrenia can also contribute to likelihood of relapse or re-hospitalization (Hughes et al., 2013; Rund et al., 2007, Strassnig et al., 2015).

Impact of Demographic Factors on Cognitive Functioning

Other demographic factors have been found to influence neuropsychological functioning for patients with Schizophrenia, such as age and gender (Wilk, et al., 2004; Golstein et al., 1998), prenatal development, developmental delays, a history of a learning disability, a history of enrollment in special education, history of having to repeat at least one grade in school and less than 12 years of education (Bailie, King, Kinney & Nitch, 2012). In contrast to what would be expected, a history of self-reported head injury, seizures or familial dementia was not associated with lower RBANS

performance and it was speculated that other more salient risk factors present in certain psychiatric conditions (e.g., psychotic spectrum mental illness) mitigated or overshadowed the influence of other variables on cognitive performance (Bailie, King, Kinney & Nitch, 2012).

The cognitive impairment seen in individuals with Schizophrenia and the impact of various demographic factors on cognitive performance shows the importance of considering not only how mental illness impacts cognitive functioning, but also how a combination of diagnosis of a psychotic disorder and other variables (i.e. demographic, co-morbidity, etc.) can interact to cause even more severe impairment on overall cognitive performance, which in turn increases the risk of violence and aggression. By finding this relationship between cognitive functioning and specific demographic variables, these variables can be used in the future to determine which new patients would benefit from a neurocognitive evaluation and could lead to improved and more efficient psychiatric care in state hospitals.

Importance of Assessing Cognition in the Forensic Population

Cognition plays an important role in the consideration of treatment progress across different types of criminally committed forensic psychiatric patients. Consistent with previous research (Iverson, Brooks, & Haley, 2009), nearly 36% of a diverse sample of forensic psychiatric patients scored two standard deviations below the normative mean of the RBANS Total Score (Bailie, King, Kinney & Nitch, 2012). Also, two thirds of Incompetent to Stand Trial patients performed two standard deviations below the normative mean of the RBANS Total Score (i.e., scores of less than 70, a general

measure of cognition) and those patients who scored in the range of 51-60 (Severely Impaired range) on the RBANS Total Scale were three times more likely to have above average lengths of stay, which would require specialized clinical intervention (Toofanian, Padula, Nitch & Kinney, 2014). Patients who function within the borderline range of intellectual functioning, as well as those who have a learning disability and/or a diagnosed psychotic disorder are also more likely to be considered incompetent or un-restorable to competency (Pirelli, Gottdiener, et al., 2011; Cochrane, Grisso, & Frederick, 2001; Colwell & Gianesini, 2011; Heller, Traylor, Ehrlich, & Lester, 1981; Morris & DeYoung, 2012; Warren et al., 2006). Therefore, the presence of specific neuropsychological impairments could have direct implications in the judgement of the risk of recidivism and violence risk (Hancock, Tapscott & Hoaken, 2010), and research shows that cognitive impairment and a diagnosis of Schizophrenia have implications for the patient's release from a state hospital (Iverson, Brooks & Haley, 2009; Toofanian, Padula, Kinney & Nitch, 2014; Colwell & Gianesini, 2011; Hancock, Tapscott, & Hoaken, 2010; Pirelli, Gottdiener, et al., 2011; Cochrane, Grisso, & Frederick, 2001; Heller, Traylor, Ehrlich, & Lester, 1981; Morris & DeYoung, 2012; Warren et al., 2006).

Use of the RBANS with Forensic Patients

One of the limiting factors of being able to complete a full neuropsychological battery on a psychiatric patient in order to assess for various cognitive deficits is that most assessment batteries are too time consuming to be utilized with patients within a forensic setting (Wilk, et al., 2004), who may be limited in a variety of ways (i.e., limited attention span, large range of cognitive impairments, medication side effects, and

performance validity issues; Wilk, et al., 2004; McKay, Wertheimer, Fichtenberg & Casey, 2007; McKay, Casey, Wertheimer & Fichtenberg, 2008; Pachet, 2007; Gold et al., 1999).

However, the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) is a neuropsychological test that is used to screen for and characterize cognitive impairments (Randolph, 1998). Although it was originally designed to screen for Alzheimer's disease and other forms of dementia, the RBANS has proven useful in forensic state hospitals for several reasons. First, administration time is approximately twenty to thirty minutes, which can be a more effective tool for patients with limited attention spans or for whom a longer assessment battery would be impractical (Randolph, 1998). Second, the test is sensitive enough to characterize specific cognitive impairments, such as those associated with Schizophrenia (Wilk et al., 2002, 2004; Gold et al. 1999; Hobart, Goldberg, Bartko, & Gold, 1999; Iverson, Brooks, & Haley, 2009; Bailie, King, Kinney & Nitch, 2012; King, Bailie, Kinney, & Nitch, 2012; Dickerson et al., 2004) and various forms of dementia (Duff et al. 2008), is sensitive to changes in cognitive functioning due to psycho-pharmacological agents (Olincy et al., 2006) and has proven useful in testing for insufficient effort (Silverberg, Wertheimer & Fichtenberg, 2007). Frequently, patients diagnosed with Schizophrenia have impaired memory, attention, executive functioning, motor skills and language (Nuechterlein et al, 2004; Heinrichs & Zakzanis, 1998). The RBANS is able to measure immediate and delayed memory, visuospatial skills, language, attention and a global measure of functioning in the total scale score (Randolph, 1998). Also, evidence has shown that patients with Schizophrenia have significant deficits in the Total RBANS score when compared to

controls and patients with Bipolar Disorder (Gogos, Joshua & Rossell, 2010), which may be because the RBANS Total Score is influenced by attention and memory and the language index is weighted by verbal fluency (Gold, et al., 1999). Lastly, the RBANS has shown high correlation with patient's performance on the WAIS-III and Wechsler Memory Scale – III (WMS-III) (Gold et al, 1999; Saykin et al, 1994; Braff et al., 1991; Goldberg et al., 1990; Hobart, Goldberg, Bartko & Gold, 1999) and studies have shown that the Total Score is moderately associated with measures of general ability and memory, but that the individual indices were not as strongly reliable (Wilk et. al, 2002; Gold, et. al, 1999; King, Bailie, Kinney & Nitch, 2012; Hobart, Goldberg, Bartko & Gold, 1999).

Neuropsychological Factors Influence on Violence and Crime

One major contributing factor related to continued criminality, aggression, and future risk of violence is the presence of cognitive deficits present since childhood (DeLisi & Vaughn, 2011), which can cause childhood behavioral problems that continue into adulthood (Beaver et al., 2010; Moffitt, 1993). Volavka (2002) found that there are several types of brain dysfunctions that have been shown to be present in violent individuals, such as within the temporal cortex/limbic system (amygdala, hippocampus, cingulate gyrus, portions of the thalamus, and hypothalamus and their connections) and the orbitofrontal cortex. There are two main hypotheses (Lateralization and Executive Dysfunction) that relate to the neuropsychological causes of violence or aggression risk in individuals without a mental illness. The Lateralization-Related Hypothesis posits that the impulsive antisocial behaviors, inability to properly perceive social signals, and poor decision making of psychopathic individuals are characteristics of a drastic increase in

left hemispheric demands caused by the need for divided attention when a variety of stimuli are present within the environment, which further limits cognitive processing (Kosson, Miller, Byrnes & Leveroni, 2007).

The Executive Dysfunction Hypothesis proposes that the characteristics of psychopathy or Antisocial Personality Disorder, such as disinhibition, impulsive aggression, and poor decision making skills, are caused by frontal lobe dysfunction and poor executive functioning (Cleckley, 1976; Bauer, O'Connor, Hesselbrock, 1994; O'Connor, et al., 1994; Raine et al., 2000; Woerman, et al., 2000; Volkow, et al., 1995; Raine, Buchsbaum & LaCasse, 1997; Raine, et al., 1998; Pietrini, et al., 2000), which may have been caused by negative prenatal or childhood events (Beaver et al., 2010; McGloin, Pratt, & Piquero, 2006; Moffitt, 1993). Significantly, executive functioning deficits cause difficulties in delaying immediate gratification and lead to continued negative consequences of property damage, injury to self and others, and criminal arrest (Cleckley, 1976). However, research linking poor executive and frontal lobe functioning to psychopathy, risk of violence, and antisocial behaviors conflicts (Morgan & Lillenfelf, 2000; Hare, 1984; Hare, et al., 1990; Losel & Schmucker, 2004). Research has not consistently demonstrates a significant relationship between poor executive functioning and psychopathy, violence risk or antisocial behaviors. This may be a function of some individuals with Antisocial Personality Disorder or psychopathy being able to effectively plan and carry out specific violent crimes and that many neuropsychological tests that measure executive functioning tests the dorsolateral prefrontal regions, which further alludes to the likelihood of a more complex system impacting aggression and violence.

Assessment of Future Violence Risk

Difficulties with Prediction of Future Violence

Similar to the difficulty in using full neuropsychological test batteries, actuarial measures of violence are labor intensive and are not consistently utilized within forensic facilities (Monahan, 2008). These measures also show a lowered accuracy when used to predict the behavior of specific individuals (Hart, Michie & Cooke, 2007) and testing of violence frequently focuses upon a combination of inpatient and community violence. However, violence in the community (i.e. violent crime) is considered a more realistic predictor of the risk of future violence and the strength of this relationship is the same for both inpatient and outpatient violence (O'Reilly, et al., 2015; Fazel, Gulati, Linsell, Geddes & Grann, 2009; Singh, Serper, Reinharth & Fazel, 2011; Witt, Van Dorn & Fazel, 2013).

Predictors of Future Violence Risk

Notably, there has been a dramatic increase in admissions within both prisons and state hospitals and evidence shows that mentally ill offenders are more likely to re-offend than the general population (Wallace, Mullen & Burgess, 2004; Teplin, 1984). Several factors have been found as predictors of future violence risk and recidivism for individuals diagnosed with a mental illness, such as the number of previous hospitalizations (Lin et al., 2008), number of days hospitalized, intelligence, the presence of Antisocial Personality Disorder (Castillo & Alarid, 2010), the presence of comorbid substance use (Hunt et al.,2002; Turkington et al. 2009; Lin et al., 2013), homelessness, employment problems, relationship problems, and lack of social support (Abidin, et al., 2013; Singh, Serper, Reinharth & Fazel, 2011; Witt, Van Dorn & Fazel. 2013). Cognitive

impairment has been shown to directly impact the presence and magnitude of many of these factors for patients diagnosed with Schizophrenia, which in turn increase the level of risk for a patient with Schizophrenia (Soyka, 2011; Kahn & Keefe, 2013; McGlashan, 2006; Brent, Seidman, Thermenos, Holt & Keshavan, 2014). Although forensic patients with Schizophrenia are more likely to re-offend than the general population, they are actually less likely to re-offend than other criminal offenders without mental illness (Bonta, Law & Hanson, 1998; Miraglia & Hall, 2011) and research has demonstrated that there is not a direct relationship between the presence of mental illness and risk of recidivism or risk of future violence (Skeem, Winter, Kennealy, Louden & Tatar, 2014). Nonetheless, risk of dangerousness and the control of a patient's mental illness are directly related to decisions regarding a patient's readiness for release from a state hospital (McDermott, et al., 2008). So, the study of ways to improve treatment and care for forensic patients is crucial, especially in relation to understanding which factors can be utilized to predict future violence, such as cognitive impairment and mental health diagnosis.

Using Violence Risk Factors to Tailor Treatment

The rate of re-arrest for forensic patients has been shown to decrease with the initiation of psychological treatment (Frankle, et al., 2001) and with an intensive program and a longer participation of treatment there is a reduction in recidivism (Gendreau, 1996; Bourgon & Armstrong, 2005; Wormith & Olver, 2002). For individuals within the criminal justice system, the main goal is to prevent future violence and reduce recidivism, which is especially important for individuals diagnosed with a mental illness. Several

studies have been conducted to test the impact of the initiation of mental health treatment on violence risk and criminal re-offense. Indeed, there was found to be no treatment-related differences in re-arrest rates between initiation of Acceptance and Commitment Therapy (ACT) compared to case management (Clark, Ricketts, and McHugo, 1999) or the initiation of ACT, Integrated Dual Diagnosis Treatment (IDDT), or regular treatment (Calsyn, Yonker, Lemming, Morse, and Klinkenberg, 2005; Chandler & Spicer, 2006). Although there has been improvements shown in the reduction of future hospitalizations and reduction in mental health symptomology, research demonstrates the need to have mental health interventions aimed at reducing risk factors of violence and criminal behaviors (Calsyn, Yonker, Lemming, Morse, and Klinkenberg, 2005; Morrisey, et al., 2007), such as cognitive impairment, antisocial attitudes, and mental illness, rather than treatment aimed at improving psychological flexibility and value based behaviors (ACT) or focusing on substance abuse within the presence of mental illness (IDDT).

Presence of Multiple Factors Associated with Risk of Violence

The public perception that individuals with mental illness are prone to increased criminality has been sensationalized by the media, especially in relation to violent mass shootings and crimes (i.e. Adam Lanza [Sandy Hook] with suspected Asperger's and Schizophrenia Disorder, Seung-hui Cho [Virginia Teck] with suspected Major Depression and Anxiety Disorder, James Holmes [Aurora] with suspected Schizoaffective Disorder, Jared Loughner [Tuscon] with suspected Schizophrenia Disorder, and Elliot Roger [Isla Vista] with suspected Narcissistic, Asperger's and Schizophrenia Disorder). More importantly, the increased likelihood of violence for

individuals with mental illness, specifically Schizophrenia, has been supported by past research (Wallace, Mullen & Burgess, 2004; Eriksson, Romelsjö, Stenbacka & Tengström, 2011; Hanlon, Coda, Cobia & Rubin, 2012; Dack, Ross, Papadopoulos, Stewart & Bowers, 2013; Bufkin & Luttrell, 2005; Fazel, Gulati, Linsell, Geddes & Grann, 2009; Nielssen & Large, 2010; Naudts & Hodgins, 2006). Yet, these individuals sensationalized by the media have been also found to have a high or average level of cognitive functioning, many of whom were found to either be recently or currently attending college. However, research shows that offenders also frequently have poor cognitive and social skills (Rees-Jones, Gudjonsson & Young, 2012) and those individuals committed to forensic settings seem to be at an increased risk of cognitive deficits due to the presence of additional neuropsychological risk factors (Bailie, King, Kinney, & Nitch, 2012). Martell (1992) reported that 66% of a sample of male patients committed to a maximum security forensic psychiatric state hospital had multiple factors contributing to brain dysfunction and neuropsychological impairment. Specifically, increased cognitive impairments in individuals with paranoid Schizophrenia positively impact the likelihood of a commission of domestic homicide and increase the risk of violence for individuals within the forensic population (Hanlon, Coda, Cobia & Rubin, 2012).

Moreover, it is believed that individuals with Schizophrenia that are prone to violence can be distinguished from both those with Schizophrenia who are non-violent as well as controls based upon performance on neuropsychological tasks (Naudts and Hodgins, 2006; Schug and Raine, 2009), thus suggesting that cognitive impairment in individuals with Schizophrenia may contribute to violent behaviors and the presence of

cognitive impairment can be utilized in determination of risk of future violence. When comparing violent and non-violent individuals with Schizophrenia, violent men had significantly worse neuropsychological impairment in the memory and executive functioning domains (Weiss, 2012; Schug & Raine, 2009; Hanlon, Coda, Cobia & Rubin, 2012; Bufkin & Luttrell, 2005), low verbal intelligence (Erikkson, Hodgins & Tengstrom, 2005; Bufkin & Luttrell, 2005), slower processing speed (O'Reilly, et al., 2015), low intellectual functioning (Reichenberg, Weiser, Caspi, Knobler, Lubin, Harvey, Rabinowitz & Davidson, 2006; Bufkin & Luttrell, 2005; Adams, Meloy & Moritz, 1990; Raine, 1993; Fullam & Dolan, 2008), when compared to non-violent men and controls. Furthermore, Walsh, Swogger & Kosson (2004) found that a combination of low IQ and psychopathy even further increased the individual's risk of increased violence. Although several studies have demonstrated that violent crime and behavior are associated with impaired neuropsychological functioning (Adams, Meloy & Moritz, 1990; Foster, Hillbrand & Silverstein, 1993), many others show violent patients outperformed non-violent patients on cognitive tasks (Rasmussen, Levander & Sletvold, 1995; Lapierre, et al., 1995). However, those studies that found violent patients outperforming non-violent patients and that assessed the presence of violence and violent crime for patients with schizophrenia compared to controls did not account for the type of physical violence being a function of impulsivity (spontaneous) or planned action. This contradiction alludes to the possibility of a more complex process working to influence violent behavior in the population, and the need for an alternative method to assess for level of risk.

Most individuals who are admitted into a forensic state hospital have committed at least one crime; therefore, the type of crime may be related to significant differences in cognitive performance. Those individuals who have poor cognitive performance and history of violence or aggression are more prone to poorer functional outcomes upon release and will likely require in-depth mental health treatment to remediate or improve cognitive functioning and antisocial attitudes to lower their risk of violence. However, in order to improve the treatment and legal outcome of patients with cognitive impairments, specialized treatment and intervention plans need to be completed. As such, results from testing the relationship between neuropsychological impairment and violence can be used in treatment planning for future forensic patients, such as determining placement in cognitive remediation treatment groups (Wykes et al., 2011; Galderisi et al., 2010; McGurk et al., 2009). There are a wide variety of cognitive deficits and mental illness diagnoses present within any given forensic population (Manderscheid, Atay, & Crider, 2015; Fazel, Lichtenstein, Grann & Langstrom, 2011; Farrington & Welch, 2007). In order to improve patient care and public safety, research designed to determine whether a specific Type of Crime and the Presence of Violence for a psychiatric forensic patient is associated with cognitive performance is an important area to develop. The results of this exploratory research can improve patient outcomes by helping to determine which individuals require specialized treatments that are aimed at lowering the patient's risk of future violence.

Hypotheses for the Present Study

The purpose of this study is to consider whether there is a relationship between the presence of violence during the commission of a crime, the type of crime, the type of

mental health diagnosis and cognitive performance on the RBANS for forensic patients admitted to a large forensic psychiatric hospital in California.

The first hypothesis is designed to determine whether or not there are significant differences in several demographic factors (i.e. age, ethnicity, education, type of legal commitment, history of cognitive problems, history of substance abuse, and history of developmental problems) between the different types of crime, and between violent versus non-violent crimes, which will further validate research related to crime and violence. Due to the contradictory findings related to the influence of demographic factors and cognition on violence risk and crime, this exploratory research hopes to better understand this relationship.

The second hypothesis is formulated to test the relationship between having a mental health diagnosis (i.e., Schizophrenia Spectrum Disorder, Antisocial Personality Disorder, and Intellectual or Cognitive Disorder) and cognitive performance on the RBANS Total Score on type of crime and presence of violence for a forensic inpatient population. For the second hypothesis, it is expected that individuals with low cognitive functioning, a diagnosis of a psychotic disorder, a diagnosis of an intellectual or cognitive disorder, or a diagnosis of Antisocial Personality Disorder would be more likely to have a violent crime type or have the presence of violence (Barkataki et al., 2005; Serper et al., 2008), whereas a patient with higher cognitive functioning would be less likely to have a violent crime type.

The third hypothesis is formulated to test the relationship between the type of crime and having a mental health diagnosis on cognitive performance on the RBANS Total Score for a forensic inpatient population. For the third hypothesis, it is expected

that an individual with a diagnosis of a psychotic disorder, intellectual disability, or Severe Violent crime would be more likely to have a lower RBANS Total Score, whereas a patient with Antisocial Personality Disorder, Mild Violent or less violent crime type would have higher RBANS Total Score. This hypothesis was tested in order to determine whether or not the relationship between type of crime, mental health diagnosis, and cognitive impairment functioned both ways, so that these results can be used to determine the patients that would require quicker administration of the RBANS upon admission to the state hospital.

CHAPTER TWO

METHODS

This majority of the data used within this study was collected during routine treatment and care within a large forensic psychiatric hospital in California, as part of the hospital's initiative to screen for cognitive impairments. Specifically, upon admission to this hospital, patients are eventually administered either the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) or the Montreal Cognitive Exam (MoCA), but this could occur much later in their admission and may mean a delay in the development of a specialized treatment that addresses cognitive impairments. The hospital's RBANS Project compiled demographic, neurological and test data into a database with all participant information being derived directly from patient charts that were previously reviewed following an administration of the RBANS.

Procedure of Original Project

The original RBANS Project database is maintained on a secure server at the forensic psychiatric hospital and is only accessible to the hospital's Neurological clinicians. The patient records at this forensic psychiatric hospital are kept in a sealed vault and were examined to get scores from the RBANS, which were transposed onto the record sheet (Appendix A) and to get the necessary demographic and neurological information (Appendix B). Once the data was transcribed, all hard-copy information was stored in a locked file cabinet within a locked room, all electronic data was stored within a secure server at this hospital and the only copy of the participant list was within document on the secure server with all files encrypted and password protected. The

information in the database has been de-identified and contains no protected health information. However, a separate patient identification key is maintained in a locked file cabinet that is located in a locked office and is separate from the RBANS Project electronic database. This identification list was maintained so that researchers would have the ability to seek additional data from the medical records for empirical research, if needed.

The variables in the original RBANS Project database include the study-related identification number for each patient chart, legal commitment type, raw and standardized RBANS summary scores, as well as neuropsychologically relevant demographic and neurological or medical information. Demographic variables include age, education, handedness, ethnicity, gender, and psychiatric diagnoses. Other relevant factors include: a history of head injury (including whether they experienced a subsequent loss of consciousness or needed medical treatment following the injury), history of cerebral vascular insult, history of seizures, history of substance abuse, history of prenatal complications, history of developmental delays, a history of a learning disability, and whether or not they were enrolled in special education classes in school.

Participants of Original Project

The hospital's original RBANS Project database included 485 individuals that range in age from 18 to 76 (M = 42.49, SD = 10.81). Patient's charts were included in the original RBANS Project if they were admitted to this forensic psychiatric hospital from February 2004 to October 2009 and during that same time period were referred for a neuropsychological evaluation that included the RBANS through the Neuropsychological

Consultation Service (NCS). The group is diverse is terms of race (32% Caucasian, 20.3% African American, 14.2% Hispanic, 2.8% Asian, 5.4% other) and years of education (M = 11.08, SD = 2.40; minimum = 2, maximum = graduate degree). The individuals in the original database also have a wide range of psychiatric diagnoses including Schizophrenia, Schizoaffective Disorder, Major Depressive Disorder, and various substance abuse disorders.

Procedure of Current Project

This retrospective study is a continuation of two past archival studies that were done with prior California State IRB approval, as part of the original RBANS Project. These prior studies analyzed patient information from this database that was created as part of the project and looked at the applicability of the RBANS for forensic patients (Bailie et al, 2012) and compared scores on the RBANS with length of commitment for forensic patients deemed Incompetent to Stand Trial (Toofanian, Padula, Kinney & Nitch, 2014).

Approval for the current study was obtained from the Institutional Review Boards of the State of California and Loma Linda University, respectively, prior to data analysis. As part of the data requested within the California State IRB application, this project added an additional piece of data, which was not included in the previous database. The patient's medical and/or legal record was accessed to determine the type of crime that each patient committed in order to be admitted to the forensic psychiatric hospital.

Inclusion Criteria

To be included in this retrospective study, the patient record must show a legal or

civil commitment code of PC §1026 (not guilty by reason of insanity), PC §2962 (mentally disordered offender certified for treatment as parole condition), PC §2964 (mentally disordered offender returned from community outpatient treatment) or PC §2970 or PC2972 (post-parole mentally disordered offender committed for an additional year of treatment; see Appendix C). Subjects must also have a valid RBANS protocol (i.e., all subtests have been completed), a diagnosed psychotic or Anti-social Personality diagnosis and had at least one of the above civil commitments, but were excluded if they had a diagnosis of malingering or significant evidence of malingering during the assessment.

Participants of Current Project

The number of patients from the database that met the inclusion criteria was 372 with the group being diverse in terms of age from 21- to 73-years-old (M = 43.99, SD = 9.78), gender (21.2% female, 78.8% male), race (42.7% Caucasian, 28% African American, 21% Latino, 4.3% Asian, 0.3% Middle Eastern, 0.8% Native American, 1.3% multi-racial, 1.6% other) and years of education (M = 10.85, SD = 2.34; minimum = 1, maximum = graduate degree). The individuals in the database also had a wide range of psychiatric diagnoses including Schizophrenia Spectrum Disorders (86%; i.e. Delusional Disorder, Schizophrenia, Schizoaffective Disorder, Substance/Medication-Induced Psychotic Disorder, and Unspecified Schizophrenia Spectrum and Other Psychotic Disorder), Personality Disorders (0.5% for Schizoid, Paranoid, and Dependent each; 25.3% Antisocial; 4.3% Borderline, 3% Personality Disorder NOS; 0.3% Avoidant), Intellectual or Cognitive Disorders (7.8% Borderline Impairment, 3% Mild Impairment,

1.6% Learning Disorder, 2.2% Dementia, 1.3% Cognitive Disorder NOS, and 1.3% Attention-Deficit Hyperactivity Disorder) and various substance abuse disorders (86.8%).

Informed Consent

Due to the nature of this study and the client population, a waiver of informed consent was requested from the California State Institutional Review Board. This research could be considered minimal risk because all data was previously collected as part of routine clinical services at a forensic inpatient psychiatric hospital in California and so it is not believed that a failure to obtain informed consent would negatively impact a patient's welfare or rights. Also, a retroactive attempt to obtain informed consent from the patients of interest would be impractical due to patients being discharged or transferred from the hospital and attempting to do so might inadvertently cause unnecessary psychological risk, as many patients have diagnosed psychotic disorders with paranoid or persecutory delusions. Finally, all data was de-identified for further protection.

Measures

RBANS Data Sheet (Appendix A)

The RBANS is a measure designed as a brief evaluation of neuropsychological and cognitive functioning for adults. It was originally developed as a measure of cognitive impairment in patients with dementia or Alzheimer's disease, but has proven useful in the assessment of cognitive functioning for forensic patients with severe mental illness. The subtests are either administered orally or in paper-pencil format to the

patient. The test consists of 12 subtests that are part of five broader indices: Immediate Memory (List Learning and Story Memory subtests); Visuospatial/Constructional (Figure Copy and Line Orientation subtests); Language (Picture Naming and Semantic Fluency subtests); Attention (Digit Span and Coding subtests); and Delayed Memory (List Recall, List Recognition, Story Memory Recall, and Figure Recall subtests). Following administration of the RBANS, raw and standardized scores of the subtests and total score were transcribed by the neuropsychologist onto the RBANS protocol record form, which is kept within the patient's chart in the locked record vault at the hospital, as is hospital policy. As part of the RBANS Project, the scores from the RBANS protocol record form were transcribed onto a separate de-identified record form, which is kept in a locked file cabinet in a locked room at the forensic hospital. The RBANS Total Score is a continuous variable based on an accumulated index score with these patients having a range of forty-two to one hundred and seventeen.

Crime of Commitment & Presence of Violence (Appendix B)

The patient's medical records and legal records were accessed to determine the type of crime that each patient committed in order to be admitted to the forensic psychiatric inpatient hospital. Using similar methods employed by past research (Chen, Chung, Xu, Wang, Qin & Chau, 2004; McCabe, Christopher, Roy-Bujnowski & Grudzinskas, 2012; Modestin & Wuermle, 2005; Anwar, et al., 2011; Tengström, et al., 2004; Baillargeon, et al., 2009), each crime of commitment from the charts were categorized in one of six categories: Severe Violent crime (e.g. murder, attempted murder, assault with a deadly weapon, voluntary manslaughter; coded as 5); Mild Violent

crime (e.g. assault, battery, kidnapping, involuntary manslaughter; coded as 4); Drug crimes (e.g. possession, sales, etc.; coded as 0); Property crimes (e.g. robbery, burglary, larceny, motor vehicle theft; coded as 2); Sexual crimes (e.g. rape, assault to commit rape, sexual violations with child; coded as 3); or Other crimes (e.g. failure to register, prostitution, etc.; coded as 1).

Based upon the crime of commitment that was reported, the presence of violence during the commission of the crime was made into a dichotomous variable. Those crimes of commitments categorized as Severe or Mild Violent crime types were coded as having the presence of violence. However, those crimes of commitments that are classified as Drug crimes, Property crimes, or Other crimes were assessed based upon whether or not they also had a co-occurring violent crime. For example, a patient with both a Drug crime and another crime (i.e. battery, assault, etc.) was coded as having the Presence of Violence, but if the patient only had a Drug crime, their case would be coded as not having the Presence of Violence. Due to the unique nature of Sex crimes, those convicted of a failure to register or child pornography offense were categorized as a non-violent crime, but all hands-on sexual offenses were categorized as a violent crime.

Axial Diagnoses (Appendix B)

The patient's records were accessed to determine the full axial diagnosis that has been given to the patient at the time of the RBANS administration while at this hospital. Patients were diagnosed by mental health staff clinicians (i.e. psychiatrist or psychologist) at this forensic state hospital and were based upon the Diagnostic and Statistical Manual of Mental Disorders-Test Revision (DSM-IV-TR; APA, 2000) most of

which were diagnosed with a Schizophrenia Spectrum diagnosis due to the setting in which this population is admitted. The full axial diagnosis is a five-part system and includes clinical disorders (Axis I), personality disorders and intellectual disabilities (Axis II), physical conditions (Axis III), severity of psychosocial and environmental factors (Axis IV) and overall level of functioning (Axis V). However, the diagnoses of interest for this study include psychotic disorder, intellectual or cognitive disorder and Anti-social Personality Disorder due to the research demonstrating that the presence of these diagnoses increases the risk of violence and aggression within this population. Psychotic disorder, intellectual/cognitive disorder and Anti-social Personality disorder were coded dichotomously (0=no, 1=yes). Mood disorders were not used for the purposes of this study due to the majority of research demonstrating that patients with a diagnosis of Schizophrenia being more prone to violence, as well as the majority of patients at this forensic state hospital being diagnosed with a Schizophrenia Spectrum Disorder.

Demographic Information (Appendix B)

The demographic information was obtained from the patient's records and neuropsychological reports. The demographic information that is applicable for this retrospective study includes: several continuously or categorically coded variables (i.e., age, race/ethnicity, education and type of legal commitment) and several dichotomously coded (0=not present; 1=present) variables (i.e., history of cognitive problems including traumatic brain injury, cerebral vascular insult, seizures; history of substance abuse, and history of developmental problems such as prenatal complications or developmental delay, and enrollment in special education classes. The legal or civil commitment codes

that were included within the demographic information included PC 1026 (not guilty by reason of insanity, PC 2962 (mentally disordered offender certified for treatment as parole condition), PC 2964 (mentally disordered offender returned from community outpatient treatment, or PC 2970 or 2972 (post-parole mentally disordered offender committed for an additional year of treatment; see Appendix C).

CHAPTER THREE

RESULTS

Preliminary Analyses

Due to the scope of this study, there were several statistical procedures that were utilized to test the various study hypotheses. The cases were first screened for missing data to determine which cases would need to be deleted and the retained cases were analyzed using SPSS 23. The dataset included a total of 468 subjects, but seventy-seven cases were deleted due to no crime data found in patient record, seven cases were deleted due to not having data related to RBANS Total Score and/or mental health diagnoses, and twelve cases were deleted due to being outliers within the main variables of this study.

A total of 372 subjects were found to have a valid RBANS protocol, a diagnosed psychiatric diagnosis, at least one of the above civil commitments, and were not found to be malingering. The resulting sample of patients was separated by two main variables: Type of Crime (Severe Violent, Mild Violent, Drug, Property, Sex, or Other) and a dichotomous variable of Presence of Violence, which were included in subsequent analyses. When assessing for the distribution of the variables used within this study, histograms graphs and normal Q-Q plots were run and several tests of normality were run (i.e. Kolmogorov-Smirnov, Shapiro-Wilk, skewness, and kurtosis). For the demographic variable of age, the Q-Q plot demonstrated overall normal distribution with some outliers at the upper (71) and lower (22) ends of the age groups. However, the Kolmogorov-Smirnov (0.200) and Shapiro-Wilk (0.166) tests both demonstrated a normal distribution. The Q-Q plot demonstrated a mostly normal distribution with outliers present for years of education starting at three and eighteen years and for RBANS Total Score at the low

score of 44 and high score of 117. For the RBANS Total Score and years of education, the Kolmogorov-Smirnov (0.000) and Shapiro-Wilk (0.000) tests both demonstrated non-normal distribution. Although there is some mild issue based on the Kolmogorov-Smirnov test with regards to normality, research demonstrates that this test has low power (Thode, 2002; Ghasemi & Zahediasl, 2012) and that with a large sample size, the issue of normality doses not cause major problems within parametric testing (Pallant, 2007; Elliot & Woodward, 2007). It should be noted that due to the sample utilized for this study coming from a maximum-security forensic state hospital, a larger portion of subjects had committed a Severe Violent crime compared to Drug or Other crimes, as well as the majority of subjects having a history of developmental delay (60.2%) and not having a diagnosed Intellectual or Cognitive Disorder (82.8%).

Test of Hypothesis 1

The first hypothesis was partially confirmed for type of crime in that there were significant differences in Type of Crime for the demographic variables (age and gender), neuropsychological variables, having a history of developmental delay and diagnosis of intellectual disorder, and Total RBANS score. A series of chi-square tests revealed significant differences in age (χ^2 (50) = 66.52, p=0.05) for Severe Violent crime with the majority of subjects being forty years of age or older (62.4%; M=45.50, SD=9.45), but these results did not account for age at the time of the crime. To further test this unexpected relationship, the approximate age of incarceration was calculated based on age the patient was at the date of admission to the state hospital. This relationship was then tested for Types of Crime and there was found to be no significant differences in age

at date of admission (χ^2 (43) = 29.18, p= 0.947). Several chi-square tests revealed significant differences in terms of gender (χ^2 (5) = 33.13, p < .000) and a history of developmental delay (χ^2 (5) = 14.95, p = .011). Individuals with a Drug Crime (M=0.00, SD=0.00) were more likely to be female than all the Other Crimes (M=1.00, SD=0.00). Moreover, individuals with a Sexual Crime (M=1.00, SD=0.00) were more likely to be male than those with a Mild Violent Crimes (M=0.74, SD=0.44) and Severe Violent Crimes (M=0.78, SD=0.41). Also, individuals with a Severe Violent Crime (M= 0.30, SD=0.46) are less likely to have a history of a Developmental Delays than those with Property Crime (M= 0.54, SD=0.50). A chi-square test revealed significant differences in history of Intellectual and/or Cognitive Disorder (χ^2 (30) = 57.43, p = .002) for the Type of Crime. Post hoc comparisons revealed that individuals with Property Crime (M = 0.26, SD =0.44) and Other Crime (M = 0.33, SD =0.58) were more likely to have history Intellectual and/or Cognitive Disorder than other crime types. Upon further analysis of specific Intellectual or Cognitive Disorders, it was found that there was a significant difference in frequency of Dementia Diagnosis (χ^2 (5) = 17.60, p = .003) and Learning Disorder Diagnosis (χ^2 (5) = 23.59, p = .000) by Type of Crime. However, when age was controlled for in the Dementia Diagnosis, there was no longer a significant variable for any of the Types of Crime. Also, individuals who committed an Other Crime (χ^2 (1) = 19.177, p = .000) were less likely to have a diagnosis of a Learning Disability.

The first hypothesis was also partially confirmed for Presence of Violence in that there were significant difference for neuropsychological variables, such as having a history of developmental delay, and diagnosis of Intellectual and/or Cognitive disorder. A chi-square test revealed significant differences in history of developmental delay (χ^2 (1) =

6.97, p = .008) for the Presence of Violence variable. Individuals without the Presence of Violence (M=0.53, SD=0.50) were more likely to have a history of developmental delay than those with the Presence of Violence (M=0.36, SD=0.48). A chi-square test revealed significant differences in having a history of Intellectual and/or Cognitive Disorder (χ^2 (6) = 14.15, p = .028) for the Presence of Violence. Post hoc comparisons revealed that individuals without the Presence of Violence (M = 0.26, SD = 0.44) were more likely to have a history of Intellectual and/or Cognitive Disorder than those with the Presence of Violence (M = 0.15, SD =0.35). Upon further analysis of Intellectual/Cognitive Disorders, it was found that an individual with the Presence of Violence was less likely to be diagnosed with a Learning Disorder Diagnosis (χ^2 (1) = 6.64, p = .010).

Table 1. *Demographic Characteristics for the Types of Crime*

	Severe (n = 175)	Mild (n = 66)	Property (n = 77)	Sexual (n = 46)	Drug (n = 5)	Other (n = 3)
Age *M* (*SD*)	45.5 (9.45)[af]	41.09 (8.96)[a]	42.01 (10.35)	45.93 (9.85)	40.60 (13.32)[f]	46.00 (2.00)
Male Gender (%)	78.3[fi]	74.2[eh]	75.3[g]	100[dghi]	0.00[bdef]	100[b]
Education *M* (*SD*)	11.16 (2.48)	10.47 (2.53)	10.90 (2.14)	10.39 (1.78)	9.00 (1.41)	9.67 (0.58)
Race/Ethnicity (%)						
Caucasian	45.1	43.9	39.0	39.1	40.0	33.3
African Amer	26.3	27.3	26.0	39.1	20.0	33.3
Asian Amer	2.30	4.50	6.50	8.70	0.00	0.00
Latino Amer	21.7	18.2	26.0	13.0	20.0	33.3
Native Amer	0.60	1.50	0.00	0.00	20.0	0.00
Middle Eastern	0.00	0.00	1.30	0.00	0.00	0.00
Multi-Racial	2.30	1.50	0.00	0.00	0.00	0.00
Other	1.70	3.00	1.30	0.00	0.00	0.00
Legal Commitment (%)						
1026	66.2	45.5	36.4	39.1	20.0	100
2962	4.00	12.1	5.20	0.00	60.0	0.00
2972	13.1	25.7	33.8	47.8	0.00	0.00
2684	1.10	0.00	1.30	0.00	0.00	0.00
2964	0.00	0.00	1.30	2.20	0.00	0.00
2974	0.60	0.00	0.00	2.20	0.00	0.00
Multiple	14.9	16.7	22.1	8.70	20.0	0.00
Histx Cog. Problems (%)	45.7	40.9	45.5	52.2	60.0	100
Diag. of Intell/Cog Disorder (%)	12.0[jk]	18.2[l]	26.0[cgj]	19.6[g]	20.0[cb]	33.3[bkl]
Histx Dev. Problems (%)	26.3[j]	30.3	49.4[j]	47.8	40.0	33.3
Histx Sub. Problems (%)	83.4	87.9	92.2	87.0	100	100

Note:

[a] refers to significant differences between Mild and Severe Violent
[b] refers to significant differences between Drug and Other
[c] refers to significant differences between Drug and Property
[d] refers to significant differences between Drug and Sexual
[e] refers to significant differences between Drug and Mild
[f] refers to significant differences between Drug and Severe Violent
[g] refers to significant differences between Sexual and Property
[h] refers to significant differences between Sexual and Mild Violent
[i] refers to significant differences between Sexual and Severe Violent
[j] refers to significant differences between Property and Severe Violent
[k] refers to significant differences between Other and Severe Violent
[l] refers to significant differences between Other and Mild Violent

Table 2. *Demographic Characteristics for the Presence of Violence*

	Non-Violent (n = 85)	Violent (n = 287)
Age *M* (*SD*)	42.07 (10.31)	44.55 (9.56)
Male Gender (%)	71.8	80.8
Education *M* (*SD*)	10.74 (2.12)	10.89 (2.41)
Race/Ethnicity (%)		
Caucasian	38.8	43.9
African American	25.9	28.6
Asian American	5.90	3.80
Latino American	25.9	19.5
Native American	1.20	0.70
Middle Eastern	1.20	0.00
Multi-Racial	0.00	1.70
Other	1.20	1.70
Legal Commitment (%)		
1026	37.6	57.1
2962	8.20	5.20
2972	30.6	21.6
2684	1.20	0.70
2964	1.20	0.30
2974	0.00	0.70
Multiple	21.29	14.3
Histx Cog. Problems (%)	48.2	45.6
Diag. of Intell/Cog Disorder (%)	25.9[a]	14.6[a]
Histx Dev. Problems (%)	48.2[a]	30.7[a]
Histx Sub. Problems (%)	92.9	85.0

Note: [a] refers to significant differences between no violence and presence of violence

Test of Hypothesis 2

The purpose of hypothesis two is to examine the relationship between the presence of a mental health disorder, neuropsychological function on the RBANS, the type of crime, and the presence of violence during the commission of the crime. To test the second hypothesis, two hypothesized relationships will be tested using linear and logistic regression (SPSS 23), respectively, with cognitive functioning measured by the RBANS Total Score and mental health diagnosis (i.e. Psychotic Disorder, Anti-social

Personality Disorder, and Intellectual/Cognitive Disorder) as independent variables, and type of crime (Figure 1; Models 1, 2, 3, 4, 5, 6, and 7) and presence of violence (Figure 2) as separate dependent variables. The results from the test of the study hypotheses are presented below for each outcome variable separately.

Types of Crime

The second hypothesis was assessed through a linear regression to test if a patient's diagnosis of a psychotic disorder, Anti-social Personality Disorder, Intellectual or Cognitive disorder, or their RBANS Total Score significantly predicted the patient's type of crime. According to results (Table 3; Model 1), the proposed four predictor model was able to account for 3.7% of the variance in type of crime, $F(4, 367) = 3.49$, $p = .008$, $R^2 = .37$. The analysis for Model 1 shows that having a diagnosis of an intellectual or cognitive disorder ($\beta = -0.109$, t(371) = -2.05, p = .042) and RBANS Total Score ($\beta = 0.116$, t(371) = 2.21, p = .028) significantly predicted type of crime, however having a diagnosis of a psychotic disorder ($\beta = -0.001$, t(371) = -0.024, ns) and having a diagnosis of Anti-social Personality Disorder ($\beta = -0.076$, t(371) = -1.475, ns) did not significantly predict Type of Crime (Table 3). Specifically, a patient who is diagnosed with an intellectual or cognitive disorder was less likely to have any of the violent crimes and an individual who had a higher RBANS Total Score was more likely to have a violent crime (i.e. Severe Violent crime).

Each type of crime was then assessed separately using a logistic regression that was performed to ascertain the effects of diagnosis of a Psychotic Disorder, Intellectual and/or Cognitive Disorder, Antisocial Personality Disorder, and Total RBANS Score on

the likelihood that participants had each of the separate crime types. The predictor variables were not significantly associated with the commission of a Drug Crime [Table 4; Model 2 (χ^2 (4) = 2.76, p = .991, R^2=0.006)], commission of an Other Crime [Table 5; Model 3 (χ^2 (4) = 3.726, p = .444, R^2=0.111)], commission of a Property Crime [Table 6; Model 4 (χ^2 (4) = 7.083, p = .132, R^2=0.029)], commission of a Sex Crime [Table 7; Model 5 (χ^2 (4) = 6.076, p = .194, R^2=0.031)], or commission of a Mild Violent Crime [Table 8; Model 6 (χ^2 (4) = 5.039, p = .283, R^2=0.022)]. However, they were significantly associated with the Severe Violent crime type (Table 9; Model 7), χ^2(4) = 21.264, p = .0000. The model explained 7.4% (Nagelkerke R^2) of the variance in Severe Violent crime and correctly classified 62.6% of cases. Individuals with higher RBANS Total Score were 1.021 times more likely to have committed a Severe Violent crime. However, having a diagnosis of Antisocial Personality Disorder was associated with a 0.56 reduction in the likelihood of committing a Severe Violent crime.

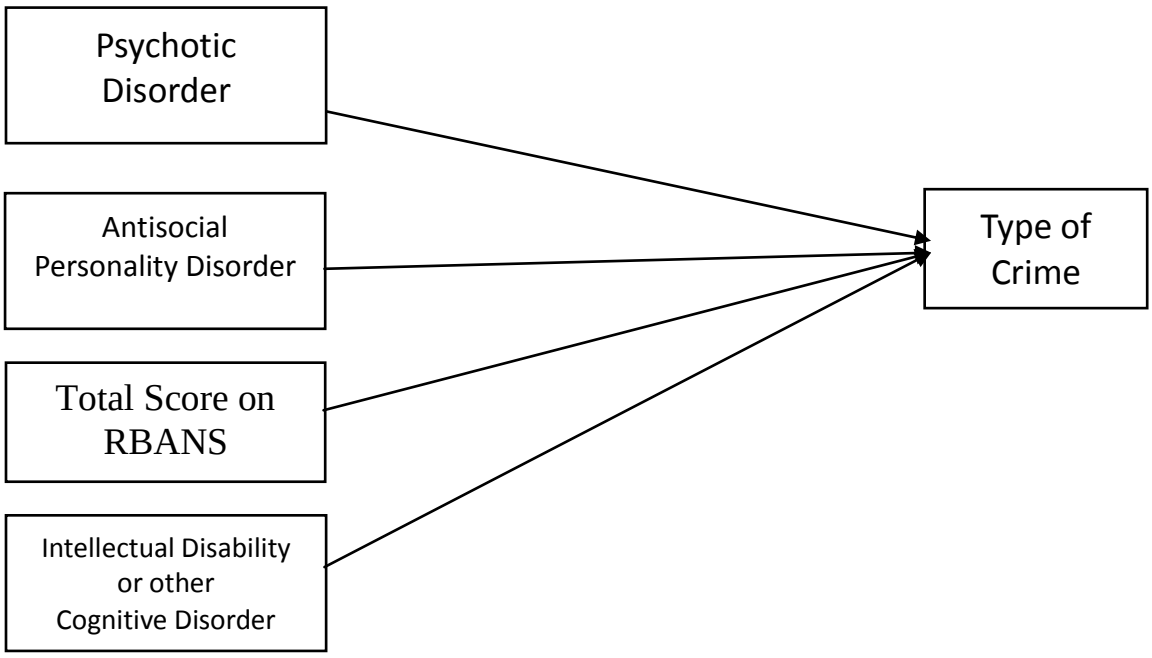

Figure 1. Model 1: Proposed conceptual regression model with effect of cognitive performance and mental health diagnosis influences type of crime.

Table 3. *Regression Model Coefficients for Types of Crime*

	Model 1		
Predictor	Unstandardized Coefficient	Standard Error	Standardized Coefficient
Constant	3.26	0.400	
Psychotic Disorder	-0.01	0.200	-0.001
Antisocial Personality Disorder	-0.23	0.154	-0.076
Intellectual/Cognitive Disorder	-0.12	0.060	-0.109*
RBANS Total Score	0.01	0.004	0.116*
ANOVA F	3.489**		
Model Variance (R^2)	0.037		

*Note. *p<0.05, **p<0.01, ***p<0.001*

Table 4. *Regression Model Coefficients for Drug Crime*

		Model 2	
Predictor	Unstandardized Coefficient (SE)	Wald	Exp (B)
Constant	-4.515 (2.689)	2.819	0.011
Psychotic Disorder	-0.366 (1.152)	0.101	0.693
Antisocial Personality Disorder	-0.261 (1.130)	0.054	0.770
Intellectual/Cognitive Disorder	0.216 (1.202)	0.032	1.241
RBANS Total Score	0.007 (0.030)	0.060	1.007
Omnibus Tests Chi-square	0.276		
Nagelkere R^2	0.006		

*Note. *p<0.05, **p<0.01, ***p<0.001*

Table 5. *Regression Model Coefficients for Other Crime*

		Model 3	
Predictor	Unstandardized Coefficient (SE)	Wald	Exp (B)
Constant	-23.37 (5272.7)	0.000	0.000
Psychotic Disorder	16.85 (5272.9)	0.000	20619.59
Antisocial Personality Disorder	-16.59 (3992.6)	0.000	0.000
Intellectual/Cognitive Disorder	1.368 (1.368)	1.000	3.927
RBANS Total Score	0.025 (0.039)	0.408	1.025
Omnibus Tests Chi-square	3.726		
Nagelkere R^2	0.111		

*Note. *p<0.05, **p<0.01, ***p<0.001*

Table 6. *Regression Model Coefficients for Property Crime*

		Model 4	
Predictor	Unstandardized Coefficient (SE)	Wald	Exp (B)
Constant	-0.928 (0.787)	1.390	0.395
Psychotic Disorder	0.007 (0.377)	0.000	1.007
Antisocial Personality Disorder	0.302 (0.288)	1.102	1.353
Intellectual/Cognitive Disorder	0.613 (0.328)	3.495	1.846
RBANS Total Score	-0.009 (0.009)	0.961	0.991
Omnibus Tests Chi-square	7.083		
Nagelkere R^2	0.029		

*Note. *p<0.05, **p<0.01, ***p<0.001*

Table 7. *Regression Model Coefficients for Sex Crime*

	Model 5		
Predictor	Unstandardized Coefficient (SE)	Wald	Exp (B)
Constant	-0.695 (0.982)	0.500	0.499
Psychotic Disorder	0.223 (0.509)	0.192	1.250
Antisocial Personality Disorder	0.356 (0.344)	1.072	1.428
Intellectual/Cognitive Disorder	-0.023 (0.425)	0.003	0.977
RBANS Total Score	-0.022 (0.011)	3.822	0.978
Omnibus Tests Chi-square	6.076		
Nagelkere R^2	0.031		

*Note. *p<0.05, **p<0.01, ***p<0.001*

Table 8. *Regression Model Coefficients for Mild Violent Crime*

	Model 6		
Predictor	Unstandardized Coefficient (SE)	Wald	Exp (B)
Constant	-0.928 (0.787)	1.390	0.395
Psychotic Disorder	0.007 (0.377)	0.000	1.007
Antisocial Personality Disorder	0.302 (0.288)	1.102	1.353
Intellectual/Cognitive Disorder	0.613 (0.328)	3.495	1.846
RBANS Total Score	-0.009 (0.009)	0.961	0.991
Omnibus Tests Chi-square	5.039		
Nagelkere R^2	0.022		

*Note. *p<0.05, **p<0.01, ***p<0.001*

Table 9. *Regression Model Coefficients for Severe Violent Crime*

	Model 7		
Predictor	Unstandardized Coefficient (SE)	Wald	Exp (B)
Constant	-1.575 (0.644)	5.982	0.207
Psychotic Disorder	0.220 (0.321)	0.471	1.246
Antisocial Personality Disorder	-0.579 (0.251)	5.325	0.560*
Intellectual/Cognitive Disorder	-0.188 (0.106)	3.144	0.828
RBANS Total Score	0.021 (0.007)	8.085	1.021**
Omnibus Tests Chi-square	21.264***		
Nagelkere R^2	0.07		

*Note. *p<0.05, **p<0.01, ***p<0.001*

Presence of Violence

The second hypothesis was assessed through a logistic regression to test if a patient's diagnosis of a psychotic disorder, Antisocial Personality Disorder, Intellectual or Cognitive disorder, or their RBANS Total Score significantly predicted patient's Presence of Violence in the commission of their crime of commitment. According to results from this logistic regression (Table 10; Model 8), the proposed four predictor model was not statistically significant, $\chi^2(4) = 5.680$, $p = .224$. The second hypothesis was not confirmed for the dependent variable of Presence of Violence.

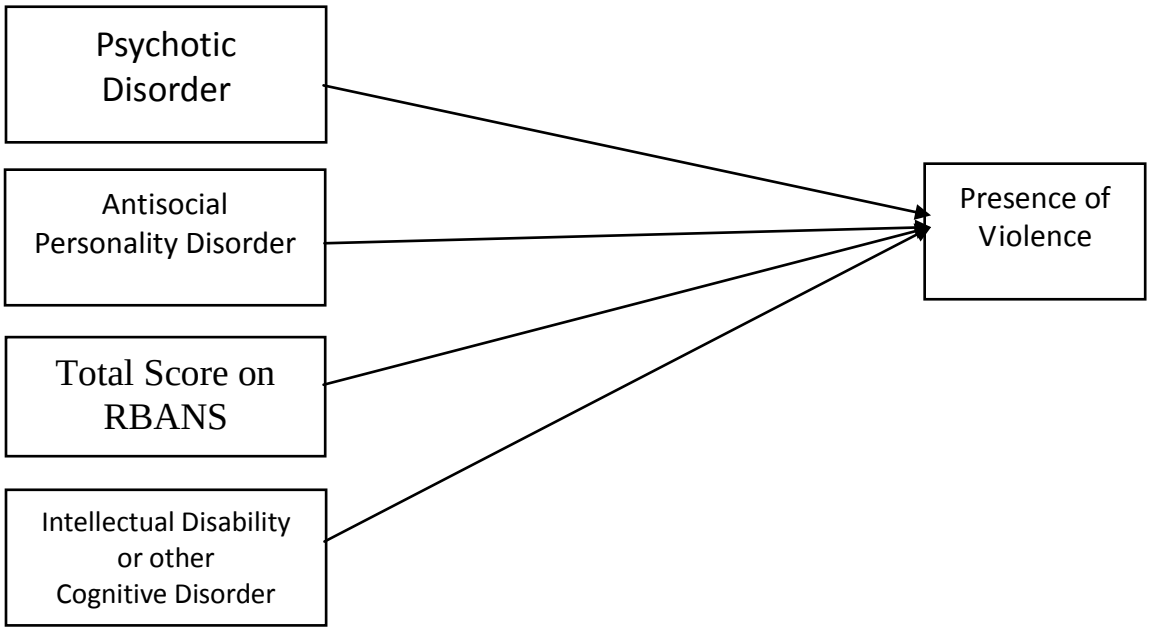

Figure 2. Model 8: Proposed conceptual regression model with effect of cognitive performance and mental health diagnosis influences presence of violence.

Table 10. *Regression Model Coefficients for Presence of Violence*

	Model 8		
Predictor	Unstandardized Coefficient (SE)	Wald	Exp (B)
Constant	0.985 (0.761)	1.677	2.678
Psychotic Disorder	-0.046 (0.365)	0.016	0.955
Antisocial Personality Disorder	-0.208 (0.281)	0.547	0.812
Intellectual/Cognitive Disorder	-0.655 (0.319)	4.229	0.519
RBANS Total Score	0.006 (0.009)	0.551	1.006
Omnibus Tests Chi-square	6.653		
Nagelkere R^2	0.027		

*Note. *p<0.05, **p<0.01, ***p<0.001*

Test of Hypothesis 3

In order to test the third hypothesis, the hypothesized model was tested using linear regression (SPSS 23). Separate models will be tested with Presence of Violence, and mental health diagnosis (i.e. Psychotic Disorder, Anti-social Personality Disorder, and Intellectual/Cognitive Disorder) as independent variables, and type of RBANS Total Score (model 9; Figure 3) as the dependent variable. Separate models were also tested with each Type of Crime and mental health diagnosis (i.e. Psychotic Disorder, Anti-social Personality Disorder, and Intellectual/Cognitive Disorder) as independent variables, and type of RBANS Total Score (model 9) as the dependent variable. The results from the test of the study hypotheses are presented below for each outcome variable separately.

RBANS Total Score

The third hypothesis was assessed through a linear regression to test if a patient's diagnosis of a psychotic disorder, Anti-social Personality Disorder, Intellectual or

Cognitive disorder, or Presence of Violence in the commission of their crime of commitment significantly predicted patient's RBANS Total Score. According to results from Model 9 (Table 11), the proposed four predictor model was able to account for 10.0% of the variance in RBANS Total Score, $F(4, 367) = 10.159$, $p = .000$, $R^2 = .100$. The analysis for Model 4 shows that having a diagnosis of an Intellectual or Cognitive disorder ($\beta = -0.294$, t(371) = -5.840, p = .000) and diagnosis of a psychotic disorder ($\beta = -0.108$, t(371) = -2.152, p = 0.03) were significant predictors of RBANS Total Score; however, having a diagnosis of Anti-social Personality Disorder ($\beta = -0.078$, t(371) = -1.156, ns) and Presence of Violence ($\beta = 0.036$, t(371) = 0.729, ns) did not significantly predict a patient's RBANS Total Score. The third hypothesis was partially confirmed in that for a patient who was diagnosed with an intellectual or cognitive disorder or a psychotic disorder was more likely to have a lower RBANS Total Score.

When each type of crime was assessed separately, there were no significant relationships between the variables of interest and any of the types of crime, except for Severe Violent crime (Model 10). According to results from Model 10 (Table 12), the proposed eight predictor model was able to account for 7.6% of the variance in RBANS Total Score, $F(5, 366) = 3.75$, $p = .000$, $R^2 = .076$. The analysis for Model 10 shows that having a diagnosis of an Intellectual or Cognitive disorder ($\beta = -0.186$, t(371) = -3.567, p = .000), diagnosis of a psychotic disorder ($\beta = -0.115$, t(371) = -2.22, p = .027), and Severe Violent Crime ($\beta = 0.145$, t(371) = 2.162, p = .031) were significant predictors of the RBANS Total Score; however, having a diagnosis of Anti-social Personality Disorder ($\beta = -0.048$, t(371) = -0.946, ns), having a Drug Crime ($\beta = 0.032$, t(371) = 0.615, ns), having an Other Crime ($\beta = 0.040$, t(371) = 0.787, ns), having a Sex Crime ($\beta = -0.049$,

t(371) = -0.814, ns), and having a Mild Violent Crime (β= 0.013, t(371) = 0.210, ns) did not significantly predict a patient's RBANS Total Score. Specifically, this model demonstrates that for those patients diagnosed with an intellectual disability and with a psychotic disorder were more likely to have a lower Total score on the RBANS and those who have committed a Severe Violent Crime were more likely to have a higher Total score on the RBANS.

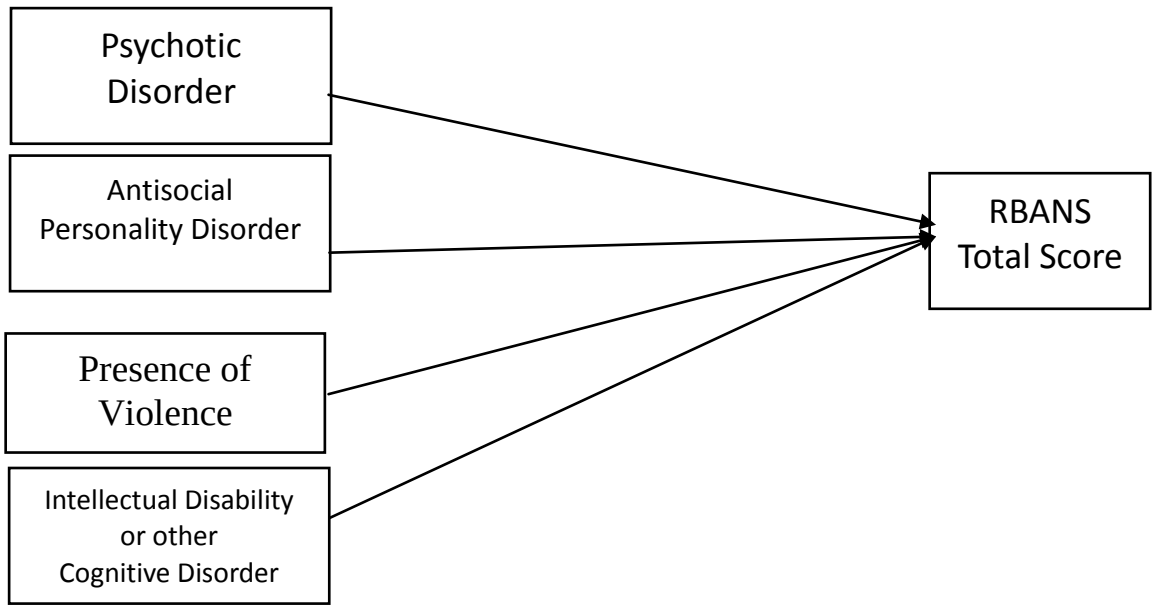

Figure 3. Model 10: Proposed conceptual regression model with effect of type of crime and mental health diagnosis influences RBANS Total Score.

Table 11. *Regression Model Coefficients for RBANS Total Score*

	Model 9		
Predictor	Unstandardized Coefficient	Standard Error	Standardized Coefficient
Constant	77.964	2.624	
Psychotic Disorder	-4.778	2.220	-0.108*
Antisocial Personality Disorder	-2.572	1.760	-0.079
Intellectual/Cognitive Disorder	-12.002	2.050	-0.294***
Presence of Violence	1.336	1.830	0.036
ANOVA F	10.159***		
Model Variance R^2	0.100		

*Note. *p<0.05, **p<0.01, ***p<0.001*

Table 12. *Regression Model Coefficients for RBANS Total Score and Specific Types of Crime*

	Model 10		
Predictor	Unstandardized Coefficient	Standard Error	Standardized Coefficient
Constant	75.970	2.745	
Psychotic Disorder	-5.122	2.300	-0.115*
Antisocial Personality Disorder	-1.714	1.812	-0.048
Intellectual/Cognitive Disorder	-2.484	0.696	-0.186***
Drug Crime	4.257	6.921	0.032
Other Crime	6.969	8.850	0.040
Sex Crime	-2.277	2.798	-0.049
Mild Violent Crime	0.528	2.519	0.013
Severe Violent Crime	4.482	2.074	0.145*
Omnibus Tests Chi-square	3.750***		
Nagelkere R^2	0.076		

*Note. *p<0.05, **p<0.01, ***p<0.001*

CHAPTER FOUR

DISCUSSION

This study points to the importance of considering the type of crime that a forensically committed inpatient commits in relation to demographic variables, mental health diagnoses and scores on neuropsychological testing, such as the Repeatable Battery for the Assessment of Neuropsychological Status. Results from this study revealed significant differences in demographic variables of age and gender, as well as neuropsychological variables related to history of developmental delay, diagnosis of an intellectual disorder, and score on Total RBANS for the Type of Crime that a patient committed and Presence of Violence.

Previous research has indicated that younger patients tend to be more aggressive (Tardiff & Sweillam, 1982; Hoptman, Yates, Patalinjug, Wack & Convit, 1999; Soliman & Reza, 2001; Dack, Ross, Papadopoulos, Stewart & Bowers, 2013) and were associated with more violent crimes (Fottrell, 1980; McCabe, Christopher, Druhn, Roy-Bujnowski, Grudzinskas & Fisher, 2012). Individuals who committed Severe Violent crimes were older than those who committed Mild Violent crimes, but this finding was likely due to the individual patient's age being calculated at the time of their testing rather than when he or she committed the crime. Indeed, when the age of the subject at the time of the crime was estimated based on the date of admission to the hospital and tested on Type of Crime, there was no significant difference in age at the time of admission and Type of Crime; therefore, this finding cannot be interpreted to mean that an older age is related to violence in this study. For gender, individuals who committed a Drug crime were more likely to be female than all the other crime types and individuals who committed a Sexual

crime were more likely to be male than those with a Mild Violent crimes and Severe Violent crimes, as would be expected by research (Dack, Ross, Papadopoulos, Stewart & Bowers, 2013; Bufkin & Luttrell, 2005).

Moreover, individuals without the Presence of Violence were more likely to have a history of developmental delay and have a diagnosis of an Intellectual and/or Cognitive Disorder than those with the Presence of Violence. Yet, Bufkin and Luttrell (2005) found that history of developmental problems showed an increase in aggression for an individual in the future, which further contradicts the expected results that individuals with more violence would have a history of developmental problems. This contradiction is likely due to previous research including additional variables, such as poverty, child abuse, and exposure to violence and racism that likely contributed to future aggression more than prenatal services and maternal drug use in pregnancy. Also, individuals with an Intellectual and/or Cognitive Disorder diagnosis were less likely to have committed a violent act at the time of their crime, but were more likely to have committed a Property Crime. This is likely due to the need for less in-depth planning and organization in the commission of a Property crime and which may be more related to impulsive action rather than premeditation, which would be more problematic in an individual with an Intellectual or Cognitive Disorder.

Findings regarding the relationship between Type of Crime and having a history of Intellectual or Cognitive disorder, Psychotic disorder, Antisocial Personality Disorder, and Total RBANS score only partially confirmed the second hypothesis. Specifically, it was found that Type of Crime was directly influenced by a diagnosis of Intellectual or Cognitive disorder and those patients with a Severe Violent crime were more likely to

have a higher Total score on the RBANS and were less likely to have been diagnosed with Antisocial Personality Disorder. Individuals who committed a Severe Violent crime likely have higher cognitive functioning due to the necessity of being able to organize and engage in planning in order to commit such a crime. Although this finding is unexpected, past research demonstrates that violent offenders with previous antisocial behaviors prior to the onset of a psychotic symptomology have better executive functioning and verbal skills than non-offenders (Naudts & Hodgins, 2006; Joyal, et al., 2007). Also, Hodgins and Cote (1993) found that for individuals diagnosed with Schizophrenia and Antisocial Personality Disorder increased the individual's likelihood of continued criminal behavior, which was mostly non-violent, but they also found that the presence of Anti-social Personality Disorder was not associated with an increase in violent crime.

Hypothesis two was not confirmed for Presence of Violence, in that there was not found to be any significant relationships between the Presence of Violence during the commission of the crime and any of the mental health diagnosis or clinical variables, which is contrary to what was found in violent men with Schizophrenia who displayed worse neuropsychological impairment (Weiss, 2012; Hanlon, Coda, Cobia & Rubin, 2012; Bufkin & Luttrell, 2005) and low intellectual functioning (Reichenberg, Weiser, Caspi, Knobler, Lubin, Harvey, Rabinowitz & Davidson, 2006; Bufkin & Luttrell, 2005).

Upon further testing of this relationship, the third hypothesis was also partially confirmed. Specifically, it was found that patients diagnosed with an Intellectual and/or Cognitive Disorder and with a Psychotic Disorder were more likely to have a lower Total score on the RBANS and those who have committed a Severe Violent crime were more

likely to have a higher RBANS Total Score. The findings for diagnosis of a psychotic disorder and RBANS Total Score confirms what would be expected in that patients diagnosed with Schizophrenia have significant deficits in the RBANS Total Score when compared to normal controls and patients with other mental health disorders (Gogos, Joshua & Rossell, 2010). However, it was unanticipated that patients who committed a Severe Violent crime had a higher score on the RBANS. There are several possible explanations for these unanticipated results, such as the need for an individual to engage in more organized and thought out planning to commit the Severe Violent act that is operationalized in this way (i.e. murder, attempted murder, assault with a deadly weapon, and voluntary manslaughter), whereas the other crimes (i.e. Property, Drug, and even Mild Violent Crime) may be more of a mixture of poor planning, decision making, or impulsive actions/violence rather than directly related to cognitive functioning. Interestingly, although research demonstrates that those with low cognitive functioning are more prone to violence and violent crime, this study finds that those with higher cognitive functioning were actually more likely to commit Severe Violent crime. These results point to the importance of further consideration of whether or not poor cognitive functioning truly increases a patient's risk of violent recidivism and whether or not this should be an aspect used in consideration of a patient's likelihood of discharge or future dangerousness.

Although past research (Fazel, Gulati, Linsell, Geddes & Grann, 2009; Wallace, Mullen & Burgess, 2004; Eriksson, Romelsjö, Stenbacka & Tengström, 2011; Hodgins, 2008; Hanlon, Coda, Cobia & Rubin, 2012; Dack, Ross, Papadopoulos, Stewart & Bowers, 2013; Bufkin & Luttrell, 2005) suggests that patients diagnosed with

Schizophrenia are frequently more prone to violence and violent crime, there was found to be no relationship between a patient being diagnosed with a Psychotic Disorder and the commission of a violent crime. These results appear consistent with other research that demonstrates only a small minority of patients with Schizophrenia commit violent crimes (Fazel & Grann, 2006; Monahan et al., 2001) and that a specialized subgrouping of these patients are more likely to become violent (Arseneault et al., 2000; Brennan et al., 2000), including such as individuals diagnosed with paranoid Schizophrenia and cognitive impairments (Hanlon, Coda, Cobia & Rubin, 2012; Naudts and Hodgins, 2006; Schug and Raine, 2006).

Findings from this study suggest that a more detailed analysis of patterns of functioning on neuropsychological tests along with a diagnosis of a psychotic disorder may reveal additional relationships with the presence of violent and commission of violent crime. This is evidenced by empirical evidence that a combination of neuro-pathological factors and mental health symptoms directly relate to a higher risk of aggressive behavior for mentally ill psychiatric patients (Barkataki et al., 2005; Jones, 1992; Krakowski & Czobor, 1997). Future research regarding the role of aggression and violence and mental health diagnosis based on other neuropsychological tests is warranted.

Limitations of the Study

Although each participant had a mental health diagnosis and the majority were diagnosed with a Schizophrenia Spectrum Disorder, this study did not account for the clinical status of the patient at the time that the crime was committed. The diagnoses that were utilized for the purposes of this study are dependent on the accuracy of hospital staff

diagnosing rather than the diagnoses being determined by the researchers. Also, this study relied on a diagnosis of Anti-social Personality Disorder rather than use of a measure of psychopathy, which likely impacted the type of crime that was found to be significant. Despite the type of crime being categorized based on the presence of violence, the specific type of violence [i.e. reactive (impulsive) or proactive (instrumental)] was not distinguished within this study. Furthermore, the sample of patients used in this study was representative of a group with a variety of legal commitments that were combined together (short-term and long-term commitments).

Directions for Future Research

To better understand the type of crime and presence of violence during the commission of a crime on variables related to mental health diagnosis and cognitive impairment, future research should include larger sample sizes in each of the available types of crimes to be able to more definitively show differences between types of crimes. It may be beneficial for future research to examine the impact of these relationships on other types of neuropsychological tests, including those that measure executive functioning, risk-taking, social cognition, and other relevant abilities. Also, past research has found various additional demographic factors that related to violence and crime (i.e. child abuse and neglect, direct exposure to violence and racism, poor parenting, maternal drug use during pregnancy, poverty, poor or crowded living conditions, and socioeconomic status at birth), which are beyond the scope of this study but would be important areas to study for forensic patients in future research.

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APPENDIX A

DATA RECORD SHEET

Research ID:_____ Months Between Assessments:_____

Repeatable Battery for the Assessment of Neuropsychological Status (RBANS)

Form: [] A [] B	**Raw Scores**	**Index Scores**
Immediate Memory Index		
List Learning Total Score		
Story Memory Total Score		
Visuospatial/Constructional Index		
Figure Copy Total Score		
Line Orientation Total Score		
Language Index		
Picture Naming Total Score		
Semantic Fluency Total Score		
Attention Index		
Digit Span Total Score		
Coding Total Score		
Delayed Memory Index		
List Recall Total Score		
List Recognition Total Score		
Story Recall Total Score		
Figure Recall Total Score		
Total Score		

APPENDIX B

DEMOGRAPHIC DATA SHEET

1. Commitment Type: PC _____
2. Age: ____
3. Handedness: ___Right ___Left___Ambidextrous
4. Preferred/Primary Language:_____
5. Ethnicity:
   ____African American ____Asian American ____Caucasian
   Hispanic/Latino
   ____Multi-Ethnic ____Other
6. Gender: ___Male ____Female
7. Problems with Mother's pregnancy: ___Yes ___No
8. Problems with meeting developmental milestones: ___Yes ___No
9. Years of Education: ____
10. GED: ___Yes ___No
11. Special Education: ___Yes ___No
12. Learning Disability: ___Yes ___No
13. Repeated a grade: ___Yes ___No
14. Head Injury: ___Yes ___No
15. Loss of consciousness following Head Injury: ___Yes ___No
16. Hospitalization following Head Injury: ___Yes ___No
17. Change in thinking following Head Injury: ___Yes ___No
18. Seizure history: ___Yes ___No
19. History of Cerebral Vascular Accident: ___Yes ___No
20. Family history of Dementia: ___Yes ___No
21. Self-reported Substance Abuse history: ___Yes ___No
22. Axis I Diagnosis (Primary): _____
23. Axis I Diagnosis (Secondary): _____
24. Axis II Diagnosis (Primary): _____
25. Axis II Diagnosis (Secondary): _____
26. Axis III Diagnosis: _____
27. Global Assessment of Functioning: _____
28. Type of Crime: _____
29. Presence of Violence: ___Yes ___No
30. Taking an Atypical Antipsychotic: ___Yes ___No
31. Taking a Traditional Antipsychotic: ___Yes ___No
32. Taking an Antidepressant: ___Yes ___No
33. Taking an Antianxiety medication: ___Yes ___No
34. Taking a Mood Stabilizer: ___Yes ___No

APPENDIX C

DEPARTMENT OF STATE HOSPITAL LEGAL COMMITMENTS

COURT COMMITMENTS	
PC 1370 (IST)	Incompetent to stand trial on felony charges.
PC 1370.01 (MIST)	Incompetent to stand trial on misdemeanor only charges.
PC 1026 (NGI)	Not guilty by reason of insanity.
PC 702.3 (MNGI)	Minor not guilty by reason of insanity (age 18 or over).
PC 6316 (MDSO)	Mentally disordered sex offender committed prior to 1982 termination of statue.
PC 1610	Returned from community outpatient treatment pending court hearing regarding recommitment under one of the original commitments.
PC 1372(e)	Competent to stand trial but requiring continued inpatient treatment for duration of court proceedings.

PAROLE COMMITMENTS	
PC 2962 (MDO)	Mentally disordered offender parolee certified by Board of Prison Terms for psychiatric treatment as a condition of parole.
PC 2964 (a)	Mentally disordered offender parolee returned from community outpatient treatment.
PC 2974	Parolee under Department of Corrections who is committed under one of the below-listed civil commitments.

PRISON TRANSFERS	
PC 2684	Inmate from prison transferred for psychiatric treatment.

CIVIL COMMITMENTS	
WIC 6600	Sexually Violent Predators (Females Only).
WIC 5353 (TCONS)	Temporary conservatorship pending determination of permanent conservatorship.
WIC 5358 (CONS)	Permanent LPS conservatorship on basis of grave disability.
WIC 5304	Post-Certification 180-day court commitment imminently dangerous behavior.
WIC 5008 (h) (1)(B)	"Murphy" conservatorship on basis of continued incompetence to stand trial (after 3 years as PC 1370). Charges have not been dismissed.
PC 2972	Post-parole mentally disordered offender committed for an additional year of treatment.