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Facial Emotional Perception, Psychosis, Antisocial Traits, and Violence in Schizophrenia

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Abstract

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by

Clarita Villafranca Hipol Ligot

Ed.M. Columbia University, 1992

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

Compromised social cognition, psychosis, and antisocial traits are associated with violence in individuals with schizophrenia. Facial emotional perception (FEP) has been used to measure social cognition in schizophrenia, but its relationships to psychosis, antisocial behavior, and violence have not been explored. Archival data from a sample of 38 participants ages 18-55 with schizophrenia were analyzed in a quasi-experimental design using a 2-way analysis of variance to determine the relationship of psychosis, antisocial traits, and FEP. The main factors of the analysis were psychosis, classified as either high or low, and antisocial traits, classified as high or low. The dependent variable was FEP. Additionally, logistic regression was used to determine if the recent violent behavior was related to FEP, psychosis, and antisocial traits. Results showed significant main effects for psychosis and antisocial traits and interaction between psychotic state and antisocial traits. Logistic regression identified antisocial traits as a predictor of violence. The results are consistent with previous studies showing that a deficit in social cognition is a risk factor in violence. This study shows that antisocial traits are a predictor of a recent history of violence. These findings are consistent with the theory of the mind, perceptual organization theory, and integrative emotional system theory and provide additional information about how social cognition is manifested in some adults with schizophrenia. The study contributes to positive social change by providing a basis for treatment options with schizophrenia which distinguish social cognition, psychosis and antisocial behavior and violence.

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Dedication

To the brave men and women who confront the challenges of recovering from a mental disorder. To the treatment team who genuinely and tirelessly advocate for the men and women with mental challenges.

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Chapter 1: Introduction to the Study

Reports from mass media increasingly sensationalize violence and mental illness,

especially for those with schizophrenia. Unfortunately, the relationship between mental

illness and violence is complex as factors such as homelessness; poverty substance abuse,

personality traits, and social cognition are also associated with schizophrenia (Elbogen &

Johnson, 2009). Regardless, individuals with schizophrenia are approximately four times

more likely to commit a violent act than those without the disorder (Douglas, Guy, &

Hart, (2009). For example, Volavka (2013) reports that the one-year prevalence rate of

violence in schizophrenia was 8.4%, compared to 2.1% in individuals with no disorder.

Schizophrenia is characterized by broad positive, negative, and cognitive

symptoms (Lei, 2013). Positive symptoms refer to experiences of hallucinations and

delusions. Negative symptoms include the diminished capability for social interaction.

Cognitive symptoms refer to limitations in quick thinking, memory, decision, and

planning. A deficit in social cognition is a combination of negative and cognitive

symptoms (Green & Horan, 2010). In addition, some individuals with schizophrenia have

coexisting features such as obsessions and compulsions, borderline personality features,

and behavior disorders (Swanson et al., 2008). Of note, developmental studies showed

that behavior disorders such as aggression/hostility, found in children before age 15

(Fazel, 2009), can persist into adulthood, and are diagnostically described as antisocial

traits (Silver 2007).

Social cognition tends to be impaired in some individuals with schizophrenia

(Green, Bearden, Cannon, Fiske, & Nuechterlein, 2011) and is hypothesized to be

associated with violent behavior (Tso, 2012). There are several aspects of social cognition that researchers study through the course of schizophrenia. These aspects include emotion processing, social relationship perception, and understanding the mind of others (Green et al., 2011). Of these three aspects, the current focus of researchers is emotion processing (Kurtz and Richardson, 2012). Emotion processing or emotion perception refers to how an individual recognizes emotion as expressed facially; this is referred to as facial emotional perception (FEP) (Jaracz, 2010; Kohler, 2010).

Emotion perception is vital in managing impulses in that (Weiss et al., 2006) recognizing emotions such as sad and angry impedes the ability to inhibit negative emotion (Blair, 2005) expression. When healthy people (those with no schizophrenia) have feelings of anger, hostility or have the notion of impulsivity, they can get cues from the facial the expressions and voices of the speaker to guide them in responding (Gable & Harmon-Jones, 2010). Of particular importance, antisocial behavior can be a product of aggression and poor emotion regulation (Swanson et al., 2008b) and is also associated with the inability to interpret facial emotional expression (Hofer et al., 2009). Finally, the psychotic symptoms can make it difficult to correctly recognize emotions. Hallucinations and delusions can be accepted as accurate and reliable, and vary with the degree of psychosis (Linden et al., 2010).

This study investigated the relationship of FEP, as a component of social cognition, to psychosis and antisocial traits in individuals diagnosed with schizophrenia. Additionally, the study examined if a history of violent behavior is related to FEP, antisocial behavior, and psychosis.

The results of the study can assist the treatment team in determining what particular approach will be utilized for individuals with schizophrenia with a history of violence, individuals with broad symptoms only, and individuals with trait symptoms. Volavka et al. (2011) posited that violent individuals with broad and state symptoms (such as hallucinations, delusions, and anger) tend to respond to medication. Violent individuals with additional personality traits such as antisocial behavior tend to respond to interventions that address social cognition (Kurtz & Richardson, 2012). Furthermore, the results of this study can fill in the gap regarding the complex relationship between schizophrenia and violence. In other words, most studies focus on confirming or disconfirming the presence or absence of a relationship between schizophrenia and violence. Data showing the role of broad symptoms and traits features of schizophrenia can demonstrate the complex risk combination that relates mental illness with violence.

The remainder of this chapter will present the background, problem statement, and purpose of the study, nature of the study, research questions and hypothesis, theoretical framework, definition of terms, assumptions, and limitations

Background

Since the development of antipsychotic medication, the main thrust of treatment of individuals with schizophrenia has been to decrease the impact of positive and negative symptoms (Bruijnzeel, & Tandon, 2011). Only in the last few decades have researchers and clinicians paid attention to the treatment of cognitive abilities, including the limitation in the ability to recognize and attend, as well as memory, thinking speed, and decision making (Carter et al., 2009; Green et al., 2011).

In the context of this growing interest, researchers have begun to show that there is a relationship between cognition and social cognition in schizophrenia. Cognition generally and social cognition specifically both entail the interpretation and understanding of the surrounding, though social cognition focuses on the understanding of the self and others (Lam, Raine, & Lee,2014). Understanding and accurately interpreting social cues such as those that refer to self and others are crucial in social cognition and social adaptation (Tso, Mui, Taylor, & Deldin, 2012). Importantly, deficits in social cognition include misreading or misinterpreting neutral or benign cues and signals as threatening and can then contribute to isolation, withdrawal, and paranoid thinking (Green & Horan, 2010). However, findings from studies associating cognition and symptoms manifested by schizophrenia are inconsistent (Ventura, Hellemann, Thames, Koellner, & Nuechterlein, 2009).

Psychotic symptoms, particularly hallucinations, delusions, and disorganized thinking (illogical thinking and confusion) can also lead disrupted social cognitions and are often associated with violence (Lindenmayer et al., 2013). Lack of empathy (the ability to understand others) is one factor which may accompany psychotic symptoms (Abu-Akel & Abushua'leh, 2004).

Finally, antisocial traits can be related to impaired social cognition. Individuals with antisocial traits frequently lack empathy and tend to be callous, cynical, and contemptuous of the feelings, rights, and sufferings of others (American Psychiatric Association, 2013).

FEP is a fundamental process of social cognition and in implicated in psychosis and antisocial traits (Amminger et al., 2013). FEP can contribute to misreading others' intentions and thereby lead to non-cooperative behavior, poor social judgment, and aggressive as well as violent behavior (Demirbuga et al., 2013). For example, impaired facial emotion perception was reported both in first-episode and chronic patients with schizophrenia or in first-degree relatives (Loughland, Williams, & Harris, 2004). Moreover, recent studies have shown that in addition to proper antipsychotic medication, there is a limitation in assessment strategies determining risk factors associated with violence improve emotional perception (Behere et al., 2009) and recommend social cognitive remediation strategies (Russell et al., 2008).

While studies have shown facial emotion processing deficits in schizophrenia, it is generally not known whether this impairment is related to violence. In particular, studies which examine facial emotion perception, antisocial behavior, and active psychosis who have recent history are lacking (Demirbuga et al., 2013; Fazel, Gulati, Linsell, Geddes, & Grann, 2009) However, theory mind, perceptual organization, and social- emotional systems (Abu-Akel & Abushua'leh, 2004; Blair; 2005; Ochsner, 2008) describe the relationship between emotion processing deficit schizophrenia and violence and provide a foundation for relating these factors. But we do not know if there a relationship between FEP, psychosis, and antisocial behavior, and finally, a history of violent behavior.

Problem Statement

A social cognitive deficit in the form of emotional processing difficulties is associated with individuals who have schizophrenia but also with antisocial traits and

psychosis. This deficit is primarily manifested by an inability to understand facial expressions accurately (Demimurga et al., 2013; Jaracz, Grzechowiak, Raczkowiak, & Rybakowski, 2010; Silver, Goodman, Knoll, & Isakov, 2005). Turetsky et al. (2007) noted that reduced perception of emotional expressions such as happy, sad, angry, and surprised could lead to delusions (a false belief or assumption) involving facial expressions. For instance, if someone misreads an expression as angry when actually the person has a neutral expression, the misperception contributes to suspicion or paranoia (Silver et al., 2005; Torrey et al., 2008; Volavka, 2013).

Since the core symptoms of schizophrenia are hallucinations and delusions, there is a common notion that violent acts are directly linked with these core symptoms. However, this notion does not account for deficits in social cognition, and research findings point to conflicting results (Barkatai et al., 2005; Large Nielssen, 2011; Hodgins & Riaz, 2011; Sune Bo & Abu-Akel, 2011). On the other hand, previous studies focused on a separate link between violence and risk factors such as demographic characteristics (Large &Nielssen,2011;Hodgins &Riaz,2011),, cognitive variables such as intelligence, memory, executive functioning (Barkataki et al, 2005), developmental, (Sune Bo & Abu-Akel, 2011) and clinical variables (Silver, 2006) . But few studies pointed to cognitive factors for psychotic patients such as poor facial emotional recognition and reduced facial emotion discrimination.

The proposed analysis of recently available archival data was designed to explore the relationship of FEP with violence, psychosis, and antisocial traits in a sample of schizophrenia patients (Coid et al., 2013; Torrey, Stanley, Monahan, Steadman & the

MacArthur & Study Group, 2008; Volavka, 2013). The data was obtained from a from a larger study which investigated the cognitive, clinical, demographic, and developmental risk of violent individuals with mood and thought related psychosis such as schizophrenia, bipolar, and depressive disorders (Fazel et al., 2011).

Purpose of the Study

This quantitative dissertation was designed to investigate social cognition in schizophrenia. To accomplish this, the relationship of social cognition abilities of individuals with schizophrenia to their other clinical conditions was examined. Additionally, the relationship of violence to social cognition and clinical behaviors was analyzed. Social cognition refers to facial emotional perception, and clinical descriptions refer to comorbid traits of psychosis and antisocial traits.

The data was examined in two phases. In the first phase, the role of social cognition in psychosis and antisocial traits was examined. A two-way analysis of variance was conducted: FEP was the dependent variable in this analysis, and the independent variables were the clinical categories of psychosis and antisocial traits.

The first phase addressed the following research questions:

RQ1: Do FEP scores differ at different levels of psychosis in individuals diagnosed with schizophrenia?

RQ2: Do FEP scores differ at different levels of antisocial traits in individuals diagnosed with schizophrenia?

RQ3: Do psychosis and antisocial traits interact in individuals diagnosed with schizophrenia?

The second phase re-analyzed the data to determine if antisocial traits, psychosis and social cognition ability can predict violent behavior. A logistic regression model was constructed for this analysis: Recent history of violence was the criterion variable and antisocial traits, psychosis, and social cognition ability was the predictors. Additionally, moderation and mediation were proposed to be studied to help clarify the interaction of antisocial traits, psychosis, and social cognition. The second phase addressed the following research question.

RQ4: What is the likelihood of violence based on facial emotion perception ability, psychosis, and antisocial traits?

Framework

There were three theoretical frameworks that described a relationship between facial emotional perception and violence in schizophrenia. These frameworks are the theory of the mind (ToM), the perceptual organization theory (PO), and the integrated emotional systems theory (IES).

The ToM provided an understanding of how one's mental state contributes to the perception of the mental state of others. According to this theory, understanding one's own emotional state, which is described as mentalizing or metacognition, can reduce aggression and violence towards others (Ang & Pridmoe, 2009; Bo, Abu-Akel, Kongerslev, Haahr, & Simonsen, 2011). Findings from a retrospective study demonstrated that metacognitive difficulty was associated with decreased social functioning, higher delusions, and disorganization (Bora et Al., 2009). The mentalizing, or metacognition theory, as applied to deficits in schizophrenia indicated that delusions

and ideas of reference can be seen as an inability to monitor thoughts and attribute intentions to others (Bora, Yucel, & Pantelis, 2009).

The PO theory provided a framework for understanding how visual information processing in schizophrenia contributed to poor interpretation of social cues such as facial expression (Silverstein & Keane, 2011). Researchers of PO theory posited that reduced organization of visual stimuli may be related to poor face processing and reduced the accurate perception of emotion (Turetsky et al., 2007). Researchers of PO found that gazing, a particular behavior when looking at facial expression, guided the individual in social adaptation (Tso et al., 2013).

The IES model of psychopathy (Blair, Morton, Leonard, & Blair, 2006a) proposed that expression of fear as manifested in one's facial expression such as fear can convey or prompt others to inhibit their aggression towards the (Blair, 2005). IES theorists posited that deficit in recognizing emotion is related to a deficit in social interaction and can contribute to an exhibition of aggression and violence. IES theorists further posited that unprovoked aggression is associated with emotional detachment with the victim and can escalate to violence when there is deviance (Blair, Morton, Leonard and Blair, 2006). Each of these theories will be discussed in more detail in Chapter 2.

Nature of the Study

The study was secondary data analysis. The data was obtained from a larger study of social cognition in schizophrenia. The data was analyzed in two ways. First, an analysis of variance (ANOVA) examined the relationship of facial emotional perception to clinically classified psychosis and antisocial traits, which was treated as factors in an

analysis of variance model. An ANOVA was selected to establish the relationship of FEP to clinical diagnostic categories.

Second, the data was analyzed using logistic regression (LR) model. The criterion for this model was a history (yes/no) of violent behavior, and the predictors were uncategorized measures of psychosis, antisocial traits, and facial emotional perception. An LR model was selected to determine the likelihood of violence based on behavioral measures rather than clinical categories.

Data were collected from patients at two campuses of a large mental health facility in the north and central New Jersey. The source study consisted of two distinct phases: the first phase consisted of screening and a baseline interview, the second phase, consisted of experimental tasks and completion of personality and self-report measures. taken.

Definition

Studies differed on how terms are identified and used when discussing emotion recognition and violence. These terms were defined below for the purpose of this paper

Antisocial Traits (Psychopathy): These constructs refer to long-standing personality patterns that contribute to aggression and disregard of the social norm for ethical behavior more generally. The behavior entails disregard of the rights of others. Antisocial personality disorder is often referred to as psychopathy or sociopathy in popular culture. Although some researchers and authors make a clear distinction between antisocial and psychopathy, for the purpose of this study the terms antisocial and psychopathy are used interchangeably.

The DSM-5 (American Psychiatric Association, 2013) defines antisocial personality as a condition that has three or more of the following traits:

- Regularly breaks or flaunts the law.

- Constantly lies and deceives others.

- Is impulsive and doesn't plan ahead.

- Can be prone to fighting and aggressiveness.

- Has little regard for the safety of others.

- Irresponsible, can't meet financial obligations.

- Doesn't feel remorse or guilt.

Clients/Consumers: Individuals who participated in the study. It also refers to individuals who have mental illness who receive or seek (or consume) treatment.

Facial Emotion Perception (FEP): The ability to read or understand how others feel by looking at their faces (Corby, Johnson, & Tyson, 2011). The recognition of emotion is an important neurological process that individuals use in daily functioning. Recognition of facial expressions of emotions is an important part of nonverbal communication and is related to social competence (Jaracz et al., 2010). Compared with other persistent mental disorders, individuals with schizophrenia tend to have poorer emotion recognition abilities, related to the severity or state of psychotic symptoms(Hofer et al., 2009).

Psychosis: Psychosis refers to symptoms that represent a loss of reality testing, such as hallucinations and delusions. A hallucination referred to the perception of objects, events, or people in the absence of stimuli. Delusions referred to beliefs that about the self or about others or events that are not shared by others. (Association, 2013). For the purpose of this study, psychosis referred to the positive symptoms that are reported and observed by the individuals with schizophrenia and the people around them. A meta-analysis showed that there is an association between untreated psychosis and violence in schizophrenia (Volavka & Citrome, 2011). Reports showed that among individuals with schizophrenia, 1 out of 6 violent acts are committed during first episode psychosis (Large & Nielssen, 2011).

Schizophrenia: Schizophrenia is a mental disorder characterized by a long- term course with the presence of one or more or of the symptoms of positive, negative, and cognitive symptoms. In particular, some individuals with schizophrenia are characterized by delusions, hallucinations, disorganized speech and behavior, and other symptoms that cause social or occupational dysfunction. For a diagnosis, symptoms must have been present for six months and include at least one month of active symptoms (Association, 2013; Bruijnzeel & Tandon, 2011). For the purpose of this study participants are diagnosed along the schizophrenia spectrum, meaning some have schizophrenia, and some have schizoaffective disorder.

Violence: Violence is an observable behavior characterized by harming others through the use of one's body, or use of an object to cause physical, sexual, or emotional

harm to others. Violence is an act that results in physical injury, sexual assaults, or acts or threats that involved a weapon (MacArthur Research Network, 2001).

Assumptions

This study was conducted using archival data from two sets of patients. The first set will be those who have had known incidence of violence or aggression occurrences within the past six months. These included clients who were admitted to psychiatric hospital for hitting/ injuring people, and or breaking objects/properties. The second set of data was from clients who had no history of violence. Measures on FEP, levels of psychosis, and antisocial trait were compared.

It is assumed that the clinical tests from archival data were administered with fidelity. It is assumed that participants completed the measures with the best effort. It is assumed that participants gave truthful information. It is assumed that case managers who rated the participants gave objective reports.

Scope and Delimitation

The participants in the study were clients of an inpatient or partial hospital programs who are medicated and received group therapy treatments to address their symptoms. This particular population was chosen to control factors such as issues of safety as well as issues focusing on individuals with mental illness.

Individuals with developmental disabilities and those who were above 50 years old were not included in the study. This exclusion was based on previous research which showed that that intelligence had a separate impact on the management of aggressive or violent impulses (Fazel et al., 2009). Studies also showed there was an age-related

performance decline on neuropsychological assessment in this population (Silverstein et al, 2015). Lastly, given the heterogeneity of previous results, the current secondary study will analyze data from participants who were sober for at least two months.

Limitations

The interviews were obtained from the clients after their treatment program. It was possible that fatigue or tiredness could have impacted the accuracy of reporting. To address this issue, the clients were given breaks and snacks. Some tests were administered using a computer. Since some clients did not have a background in computer tasks, it was possible that lack of fine-motor skill or practice could have affected the rate of responding to identifying the stimuli. This issue was addressed by providing practice on how to use the computer mouse. Lastly, the absence of a healthy control group of individuals that have been violent with no diagnosis or a healthy control group with a violent history could have increased the study design manipulation (Demirbuga et al., 2013).

The data was obtained from patients in partial and in- patient settings of Rutgers UBHC, a facility that serves lower-income individuals. It is possible that the findings may be different to a participant who has different income, different setting, and different location.

Significance

There is a low rate of individuals with schizophrenia in the general population (Silverstein, Del Pozzo, Roche, & Miskimen, 2015), and these clients tend not to be violent. However, within this diagnosis, there is a group of individuals who are at an

increased risk for violent behavior. This risk was addressed with appropriate assessment, which can be useful in prevention and treatment. Untreated psychosis in this particular group poses a high risk to violence (Allely et al., 2014). However, there are many patients for whom violence is independent of psychosis, and for this group, it is the extent of antisocial features that drive violent behavior. Understanding schizophrenia symptoms such as facial emotional perception impairments can potentially assist the treatment team in predicting the risk for violent behavior. Identifying this risk and intervening to prevent the occurrence of violence will achieve positive social change.

Schizophrenia is one of the most debilitating mental disorders (Dickerson & Lehman, 2006) with profound effects on the patient, family and the society (National Center for Mental Health, 2010). There is a prevalence of schizophrenia in 1% of the nation's population (Fazel et al., 2009). However, individuals with schizophrenia with a history of violence have 3.8 times risk of becoming violent again compared with the general population (Witt, Hawton, & Fazel, 2014). Understanding FEP can decrease the stigma and educate the public about psychotic disorders and violence. By identifying risk such as perceptual and emotion recognition deficits, treatment aimed at decreasing the violence can be implemented. It costs United States about $62 to $65

billion a year to pay for mental health care (Wu et al., 2005). One third of this goes to medical care; the rest goes to disability and loss of productivity (Awad,& Voruganti,2008)The total cost includes the loss of earnings by family who cares for those with mental illness and the construction and maintenance of prisons to contain those who commit violent acts (Luckhaus et al., 2013). These monetary and family losses are tragic

because there is growing evidence that finding risk factors to violence among individuals with schizophrenia can provide information that providers can utilize in managing the symptoms.

Summary

Chapter 1 was a discussion of the need for further research regarding facial emotional recognition and violence in schizophrenia. The theoretical foundation of this research was introduced and will be further explored in the next chapter. Research questions and hypothesis were also discussed. In Chapter 2, the literature review provides a discussion on previous research and support of this study. Chapter 3 is a discussion of the methodology that fits the questions and nature of this study. It also describes the design instrumentation and data analysis plan.

Chapter 2: Literature Review

Introduction

Schizophrenia is a persistent and pervasive condition which affects the quality of life (van Os & Kapur, 2009). Social interaction is one area that is affected by this condition and in particular the ability to understand or interpret emotions (Mancuso et al., 2011). Studies have shown that correct and accurate reading of facial expression, also known as FEP, contributes to better social interaction (van Os & Kapur, 2009; Weiss, 2012). On the other hand, when individuals have difficulty recognizing and discriminating emotional expression, there is a possibility that they will have difficulty modulating their social interaction.

A deficit in facial emotional perception has been identified as one of the risk factors for violence in schizophrenia (Demirbuga et al., 2013). While this risk is important, few studies have been done in this area (Kohler et al., 2010) Previous studies (Silver, Goodman, & Knoll, 2005) focused on the impact of demographics (gender, homelessness, education), neurobiological (frontal deficit), developmental (abuse, neglect, injury), and clinical variables (psychosis, personality attributes)

The purpose of this chapter is to review the studies regarding schizophrenia, facial emotional perception, and violence. I start by reviewing the construct of schizophrenia with its core symptoms, followed with the construct of facial emotion perception from the context of social cognition, and continued the discussion on violence. I conclude with a discussion on the theoretical framework related to the schizophrenia, facial emotional perception, and violence and the link between these variables.

Search Strategy

I used a wide range of methods to identify articles. I searched the databases from Academic Search Complete, PsycINFO, MEDLINE, PsycARTICLES, and the multidisciplinary data baseline and PubMed, using the terms *schizophrenia, perceptual organization, emotion, facial emotion recognition, violence, nonviolence, neuropsychological,* and *neuroscience*.

Prevalence and Consequences of Schizophrenia

Schizophrenia is a persistent mental disorder that affects about 0.3% - 0.7% of the population (American Psychiatric Association, 2013. It is characterized by auditory, perceptual, and thought experiences in the absence of sensory stimuli and thus not validated or shared by others. The most challenging symptoms of individuals with schizophrenia are delusions and hallucinations (American Psychiatric Association, 2013; Bruijnzeel, & Tandon, 2011). At the height of these symptoms, clients may react to or may manage distressing voices and visions by harming themselves or others (Leichen et al., 2013).

Schizophrenia is a disabling condition described as a spectrum ranging from mild, moderate to severe. Some individuals with schizophrenia hear voices that other people do not hear, or believe ideas that others do not believe or have ideas that are irrational. Some individuals may believe that their mind is being read or being broadcasted or others are plotting to harm them. They respond to these beliefs by withdrawing or by getting agitated, or by speaking in ways that do not make sense to others. The individuals themselves and their family are affected by these behaviors. They are unable to keep jobs

or fend for themselves and sometimes aggress or harm their caregivers (Picchionni &

Murray, 2007).

Schizophrenia affects individuals across culture, class, religion and gender

(Bruijnzeel & Tandon, 2011). However, there are variations and incidences which vary in

groups of people. Schizophrenia ranks among the top 10 causes of disability. Incidence is

higher in an urban neighborhood; the symptoms occur earlier in males (between 15 and

40) than females (occur around age 25 and older). There is higher hospitalization in

younger males. In summary, schizophrenia does not discriminate demographics, but it

tends to manifest earlier in males and in highly stressful locations.

The symptoms of hallucinations and delusions start in mid adolescence up to

one's 30s. It is difficult to diagnose schizophrenia in the beginning because adolescence

can be masked by unrelated sleep difficulties, a decrease in grades, and changes in

friends, isolation, and irritability. However, a combination of factors can predict whether

an adolescent will eventually develop schizophrenia. These factors include a family

history of psychosis, drug use, social withdrawal, development, and an increase in odd

thoughts (Lei Chen, 2013).

Over the past decades, researchers have developed more effective medication and

intervention tools to understand the causes and treatment of schizophrenia. Medication

and psychological interventions can decrease the severity of symptoms and some

individuals with schizophrenia can lead satisfying and rewarding lives. Pharmacological

interventions have been effective in blocking excessive dopaminergic turnover which in

turn decreases some of the core symptoms such as hallucinations and delusions, also

known as the positive symptoms. However, medical interventions alone are often not adequate (van Os & Howes, 2012) to address other schizophrenia symptoms such as lack of motivation and difficulty thinking (also known as negative and cognitive symptoms). Cognitive and motivational impairments are improved much better when pharmacological interventions are combined with psychological therapies. Treatment interventions provide control over the disabling effects of the symptoms and decrease the incidence and length of hospitalization (Picchioni & Murray, 2007). Lastly, vocational training and integrated case management assist clients in independent living.

First and second generation antipsychotic medications can be taken in pill, liquid, or injection forms. Antipsychotics can decrease agitation and hallucinations within days, while delusions may take few weeks or even years to dissipate, and many patients retain residuals. Antipsychotic medications treatment started in the 1950's with first generation antipsychotics such as chlorpromazine (Thorazine), haloperidol (Haldol), Perphenazine (Etrafon, Trilafon) and Fluphenazine (Prolixin) (Van os & Howes, 2012). First-generation medications can elicit motor movement side effects such as tremors, restlessness, muscle spasms, and rigidity. In the 1990s, the second-generation antipsychotics were developed such as clozapine (Clozaril), Risperidone (Risperdal), olanzapine (Zyprexa), Quetiapine (Seroquel), Ziprasidone (Geodon), Aripiprazole (Abilify), and Paliperidone (Invega). Antipsychotics can elicit side effects in some individuals such as increased heart rate, sensitivity to the sun, drowsiness, dizziness, skin rash, and menstrual irregularities. Some of the side effects dissipate or subside with medication adjustment (van Os and Howes, 2012).

Individuals respond to antipsychotic differently and often several medications are tried

before the best medication is found for that person. Symptoms of hallucinations,

delusions, cognitive, and negative symptoms can return on a worst form when individuals

stop taking medications. Doctors usually adjust, combine, or taper off medications to

alleviate side effects or to address symptom relapse. However, since each respond

differently, treatment needs to be designed accordingly (de Koning et al., 2009).

Psychosocial treatments interventions often benefit individuals with schizophrenia

who are already stable. These interventions assist with daily challenges, including

forming and sustaining relationships, self-care, going back to school, vocational training,

and finding suitable jobs. Individuals on psychosocial treatment tend to maintain their

medication intake and thus also need less re-hospitalization. Psychosocial treatment

includes illness management skills, co-occurring substance management, rehabilitation,

family education, and cognitive behavior therapy and self-help groups Dickenson and

Lehman, 2011).

Individuals with schizophrenia can develop skills to manage their illness. When

they are given basic information about their condition, they, and others in their support

system can learn to watch for early warning signs of relapse and learn how to prevent

symptoms from getting worse. They can learn how to cope with the persistency of their

illness and how to seek help from their family and treatment team. Researchers at the

National Institute of Mental health (2010) recommend evidenced based intervention such

as rehabilitation programs, especially in the management of money, the practice of

communication skills, use of public transportation, and supervision of work. On-the-job

training can improve thinking skills and subsequently improve the quality of life of individuals with schizophrenia. Family education helps family members to understand the condition and how to assist clients in managing symptoms, which fosters medication and intervention compliance. Family education also assists parents, siblings, and others to find services as well as social support for themselves and their children.

Cognitive behavioral therapy (CBT) can improve the lives of individuals with schizophrenia. CBT can help reduce the severity of symptoms and reduce the risk of relapse. With CBT, the therapist coaches and trains people with schizophrenia on how to test the reality of their thoughts and perceptions, how to not act on what the voices command or tell them to do (Dickerson& Lehman, 2006). Self-help groups facilitated by group members provide comfort and support for family members. Participants in self-help groups share similar daily challenges in living with individuals with schizophrenia. Communication and networking in self-help groups empower family members to find more evidence-based interventions and treatment programs. In summary, while symptoms of schizophrenia can be debilitating, current interventions such as CBT can help affected individuals to manage their living .Understanding what contributes to perceptual distortion such as seeing a neutral facial expression as angry or sad can improve strategies in managing fear or anxiety elicited by distressing facial expression (Pinkham et al., 2011).

A thorough discussion of schizophrenia will not be complete without discussing the core symptoms that characterized this condition. I will start with the three core

symptoms of schizophrenia, positive, negative, and cognitive, and proceed then discuss social cognition in a separate section.

The Core Symptoms of Schizophrenia

The core symptoms of schizophrenia refer to characteristics that define the general condition. I discussed the three core symptoms (positive, negative, and cognitive symptoms) on the proceeding sections and I continued the discussion by introducing the construct of social cognition.

Positive Symptoms

Some individuals with schizophrenia have positive symptoms (Leichen et al., 2013). These symptoms include hallucinations, delusions, and paranoid thinking, a disorder of movement, thought problems, and perceptual disorganization. Hallucinations are perceptual disturbances (auditory, olfactory, tactile, and visual). Auditory hallucinations come in forms of voice or voices that the individuals either recognize or do not recognize. Voices can talk with each other or talk to the individual. The voices can be loud or can whisper, say pleasant or distressing things, or command or warn the individual. Hallucinations may be present long before the individuals, or the family recognizes that they are not shared by others (van O & Kapur, 2009).

Delusions are beliefs that are not shared by others and may include delusions of persecution (where the person thinks they are victims of a plot or events). Other delusions include an identity of fame (where the person thinks he or she is a celebrity, deity, or have special skills) or thought broadcasting (the belief that people can read minds of others) or thought insertion (Fletcher & Firth, 2009).

Thought disorder is another characteristic manifestation of positive symptoms. It is characterized by disorganized, dysfunctional thinking and difficulty processing in a logical manner. (Fletcher & Firth, 2009). While disorganized thinking is usually manifested as confusing communication or language (such as tangential or circumstantial speech), there is evidence that the perceptual disorganization and communication disorganization share a common cortical process (Silverstein & Keane, 2011). Some individuals with schizophrenia have more noticeable communication disorder, while others have more hallucinations or delusions or both (APA, 2013).

Researchers on thought disorder and perceptual organization found that individuals with schizophrenia tend to have difficulty in determining visual contour, a vital aspect in accurate recognition of faces and emotion expression (Hong et al., 2005) Findings from separate studies pointed out that the severity of psychosis is related to reduced perceptual organization, i.e. the higher the visual disintegration, the more severe is the schizophrenia (Gagarin, MacDonald, & Sponheim, 2011; Keane & Silverstein, 2011; Silverstein Kean, Wang, & Papathomas, 2013;. Interestingly, the disintegration on facial expression contributes to the client's ability to recognize fractured and distorted pictures of celebrities (Gagarin, MacDonald & Sponheim, 2011).

Negative and Cognitive Symptoms.

The second and third core symptoms of schizophrenia are called negative symptoms and cognitive symptoms. Negative symptoms are behavior representing the loss of a normal function. Negative symptoms include flat affect, anhedonia and unwillingness to interact with others or an unwillingness to help oneself with personal

activities. Frequently, negative symptoms do not necessarily co-occur with depression.

However, in contrast to depression, negative symptoms include diminished interest or

lack of pleasure in daily life and minimal speech. Negative symptoms frequently

contribute to limitation or apparent lack of concern with grooming/hygiene (Bruijnzeel &

Tandon, 2011).

Cognitive symptoms refer to the difficulty in understanding information and in

making decisions (executive functioning), difficulty focusing or paying attention, and

difficulty using current information for practical learning after this information is

acquired (working memory). Cognitive symptoms contribute to difficulty in earning a

living. Cognitive impairment accounts for a large portion of disability (McGurk, Mueser,

Harvey, LaPuglia, & Marder, 2003). In the past, the focus of studies has been on

psychotherapeutic impact and symptom management. In the last 25 years, an increasing

number of studies of schizophrenia focus on cognition as a rate limiting factor for real

world functioning

Perceptual disorganization, a cognitive-perceptual problem in schizophrenia, is

also a form of thought disorder (Silverstein & Keane, 2011a). Perceptual organization

refers to the "the ability to organize stimulus elements into meaningful edges, patterns,

groupings, or object representations" (Feigenson, Gara, Roche, & Silverstein, 2014, p.1).

Researchers hypothesize that compromised visual integration contributes to deficits in

higher-order social information processing, i.e. communicating organized thoughts (Tso

et al., 2012). Deficits in the perceptual organization contribute to deficits in social

cognitive processes since most interaction entails visual communications (Norton et. al,

2009; Tso et al., 2013). Perceptual organization dysfunction has been demonstrated in schizophrenia patients, but not in control groups of clients who have psychiatric conditions, including those with substance abuse (Silverstein & Keane, 2011b).

Social Cognition in Schizophrenia

In the last 15 years, treatment of schizophrenia shifted focus from the reduction of symptoms to increase in social and daily functioning. This focus is within the realm of social cognition. Social cognition is an important aspect of schizophrenia and is an avenue to understanding daily functioning. Social cognition studies investigate mental operations that are involved in perceiving others, interpreting communication and responding (Green at. al, 2010). Critical to social cognition is the act or the way of determining how the other person feels by observing their facial expression and body language. By looking at someone's face, we make inferences on the person's intention.

Research on social cognition in schizophrenia has demonstrated individuals have a deficit in this area (Green, 2010. Individuals with schizophrenia often misread the emotional expression of others which can contribute to withdrawal or conflict. Additionally, researchers found that impaired social cognition is associated with community functioning, including aggression and violence (Couture, Penn & Roberts, 2006). Social cognition research aims to answer questions regarding functional outcomes, understanding of clinical symptoms such as paranoia and its impact in communication, the trait and state aspect of impairment and its impact on performance, application of neuroscience principles in identifying neural basis of social information processing, and assessment of pharmacological and social interventions. Studies on social cognition focus

on domains of treatment interventions. Researchers study four domains of social cognition (Green, Olivier, Crawley, Penn & Silverstein, 2005; Green et al., 2008; Penn, Addington, & Pinkham, 2006). These domains include social perception, attributional bias, mentalizing, and emotion processing (Green et al., 2008).

Social Perception Domain. Social perception studies focused on assessing the individual's ability to identify roles and rules in the social context. The participants were instructed to infer relationships between groups of people based on verbal and non-verbal behavior (Sergi, Rassovsky, Nuechterlein, & Green, 2006).

Social Attribution Domain. Social attribution studies focused on how people made inferences on events they observed. Participants were instructed to rate if others caused an event, by a situation or by the person himself (Brune et al., 2007).

Mentalizing Domain. Studies on mentalizing domains focus on inferring what people intend and what people think of other's beliefs. Participants in this study were given social scenarios and instructed to demonstrate perspective taking (Green & Horan, 2010).

Emotion Processing Domain. Studies of emotion processing focused on perceiving and on using emotions adaptively. These studies examined how individuals utilize facial and verbal cues of others in understanding the emotion conveyed. Participants were instructed to identify emotions and discriminate emotions, and then researchers analyze correct perceptions and pattern of erroneous perceptions. Results of the analysis provide rich information on how poor emotional perception impacted on behavioral interpretation. Couture, Penn and Roberts (2006) reported that

misinterpretation of emotion leads to social conflict and social withdrawal (Green et al., 2010; 2006). Of the four domains, emotion processing was the most relevant to the study of facial emotion perception and violence in schizophrenia.

Of the four domains, researchers posit that emotion recognition is the domain related to facial recognition perception (Green et al, 201; Wilhelmet.al, 2014). The most common approach that researchers explore is emotion processing. Researchers obtain data by showing faces with different emotions and participants were instructed to identify the emotion. Another approach was by showing faces with emotion and participants are instructed to identify which of the face has more intense emotion than others (Gur et al., 2010). The first task was called emotion recognition, while the second task is called emotion discrimination. (Gur et al., 2010; Kohl et al., 2010).

Facial Emotional Perception (FEP)

The human face can convey a wealth of information, which can guide an individual in social interaction (Jefrey & Rhodes, 2011). FEP is the ability to read or understand how others feel by looking at their faces (Corby, Johnson, & Tyson, 2011). Face recognition and emotion recognition are an important neurological mechanism that individuals use in daily functioning. How we read or perceive emotion affects how we interact with that person who has that emotion and our own reaction to what we perceive.

The processing facial expression can evoke positive or negative feelings (Curby & Johnson, 2012). A face that is perceived with positive emotion tends to be processed more holistically that a face perceived with negative emotions (Gable & Harmon-Jones, 2010). Infants can comprehend facial expressions as social cues, and by 12 months they

recognize that facial expressions are social cues (Curby & Johnson, 2012; Jeffrey & Rhodes, 2012).

Measures of Facial Emotional Perception

There were two main approaches in measuring or in describing facial emotion perception: psychological/neuropsychological measures and brain imaging. In understanding emotion perception in schizophrenia, researchers compared FEP in the normal or typical functioning and the disordered brain Studies on facial emotional perception utilize brain imaging as well as psychological and neuropsychological measurements (Chen et al., 2009).

Brain imaging studies on FEP. Cognitive psychology and neuroscience utilize brain imaging techniques in assessing emotional processing and several imaging tools have been quite reliable, such as the Electroencephalogram (EEG), event-related potentials (ERP), and functional magnetic resonance imaging (fMRI). Because these tools measure functioning in vivo or in real time, researchers can obtain information on spatial localization and neural changes (Rossion, Hanseeuw, & Dricot, 2012; Sabatinelli Lang, Keil, & Bradley, 2007). For instance, compared with control groups, individuals with schizophrenia tend to have brain "hypoactivation" when viewing faces with strong emotional content were shown using fMRI (Spilka, Arnold, & Goghari, 2015).

Neuropsychological task and FEP. Researchers frequently use facial, vocal and combined facial/vocal expressions to measure emotional perception (Dondaine et al., 2014). Of these three measures, facial emotion stimuli are easiest to manipulate. Studies that focused and or combined visual stimuli with vocal stimuli cannot control for pitch,

timbre, and intensity of the vocal stimuli. Visual stimuli controlling for race and gender tend to elicit more reliable results. Furthermore, FEP measured through picture recognition showed that delusions (such as paranoia) tend to have a greater impact than hallucinations on task performance (Amminger et al., 2012).

FEP in the Typical or the Normal Population

Facial emotional perception in the normal population described as "the view centered description model*"* (Bruce and Young, 1968). This model describes how faces are processed. Sensory processing starts by analyzing facials feature such age, gender, and expression. Then the brain creates a facial model which allow for a comparison of those features with a previous features or memory. Finally, the brain recognizes the details of that face and connects that memory with experience. At that point, the expression of the face is processed in context.

FEP in Brain Injury

Researchers posit that facial perception involves different parts of the brain. Using the blood-oxygen-level-dependent (BOLD) measures in fMRI studies. Rossion, Hanseeuw and Dricot (2012) compared a typical (or normal) brain with those who have prosopagnosia. This is an acquired brain injury associated with the difficulty or inability to recognize faces. Results of the study indicate that prosopagnosia is found among patients who have damage in the fusiform gyrus in the temporal lobe. Additionally, researchers pointed out that the different parts of the brain are involved in face perception include the occipital face area (located in the occipital lobe), the fusiform face areas (located in the superior temporal sulcus), the amygdala (located in the in the temporal

lobe), and the anterior/superior cortex (also located in the temporal lobe. Results of people with prosopagnosia provide evidence that facial emotion processing involved several stages. In particular, processing starts in the OFA in the occipital gyrus (and contributes to recognition of single features such as the eyes, nose, and mouth). The next stage is associated with the fusiform gyrus and involves the holistic perception of the face. The later phases include interpretation of the meaning and expression of the face.

FEP in Schizophrenia

FEP studies in schizophrenia vary according to chronicity, some groups (chronic, first episode, chronic and first-episode compared), and types of schizophrenia (paranoid types, versus non-paranoid). The literature is consistent with the findings that individuals with schizophrenia have a deficit in recognizing emotional expression. FEP studies of schizophrenia patients with delusions posited that impairment in emotion categorization was due to inability to interpret emotion in social context. Studies which utilize visual scan path techniques showed that individuals with schizophrenia had increased sensitivity and avoidance of threat-related expressions such as anger and fear. In particular, this response in found among those with active delusions (Huang et al., 2009, p. 439). Pinkham et al. (2011) posited that it is possible that emotion processing deficits emerge around the first psychotic episode.

Studies on FEP in schizophrenia have investigated the emotional responses among those with paranoia. Although recruitment of participants with paranoia is difficult (because they tend to lose interest or become suspicious with the study), results from these studies show that identification of positive and negative emotions (happy,

excited, sad, and angry) and emotional discriminations is somewhat slower and less accurate for participants than for control groups (Kholer et al., 2003). Additionally, paranoid patients tend to identify neutral expressions as angry (Pinkham, 2011). These studies (Kohler et al., 2003; Pinkham, 2011) clarified that impairment was salient to neutral stimuli and related to the heightened perception of threat in ambiguous situations. In other words, there is difficulty in using social context in understanding the facial expression. Furthermore, the presence of paranoia points to the relevance of positive symptoms in understanding facial emotional perception. They concluded that emotional perception deficits in schizophrenia are illness-related and can contribute to cognitive disturbances.

Deficits in facial recognition have been demonstrated in studies implemented among those with first and multiple episodes of schizophrenia (Amminger et al., 2011). The "first episode" refers to the first inpatient admission for individuals while "chronic" refers to long-standing illness typically with several inpatient hospitalizations.

Overall the studies discussed above are consistent with the assertion that individuals with schizophrenia have deficits in recognizing emotional expression. The measures that are used are reaction time, imaging, the number of errors, etc. However, Kohler et al. (2010) pointed out that the results are inconsistent in some ways. Pinkham et al. (2011) reported that there is sensitivity to positive emotion but not to negative emotion. However, Russell et al. (2007) and Williams et al. (2007) indicated that there is sensitivity to negative but not to positive emotion. Koelkebeck et al., (2010) studied recently diagnosed adults with schizophrenia by comparing then with a compared with

the control group. The results of the comparison showed that the deficit in recognizing emotion was not related to the severity of psychosis, but to the deficit in verbal and reasoning abilities.

More recent large-sample studies examined the perception of morphed facial expressions, that is, expressions gradually changing from a neutral face to a full-blown emotional expression. West et al. (2012) used computerized tests such as the Penn neuropsychological subtest on emotion recognition and discrimination. Participants were presented with a series of faces and were instructed to make forced choices. The results showed that relative to controls, patients showed significantly reduced accuracy in visual detection of faces, moderately degraded performance in perceptual discrimination of faces, and significantly impaired performance in working memory of faces). The pattern of responses indicates that individuals with schizophrenia require more cues or signal strengths to process facial information (Chen et al., 2009).

Compared with control groups, individuals with schizophrenia have difficulty categorizing emotions in changing context. Chen et al. (2009) further argued that the "deficit in emotion context processing contributes to deficits in social interaction" (p.443). Overall, schizophrenia studies from those with paranoia or delusions confirm the theory that limitation in understating social context lead to poor social cognition is a feature of schizophrenia and possibly related to poor social interaction.

FEP tasks focused on two areas. There are tasks that identify particular or specific emotion, and there are tasks that inquire about the intensity of such emotion. Identification tasks require choosing a qualitative label, while differentiation task requires

judgment on two or more emotions. Some studies include the two tasks. Few studies failed to find valid findings on emotional impairment in schizophrenia because the group rather than the task difference was accounted by methodology and design differences (Kohler et al., 2010).

Given the results of sampling, timing, and stimuli utilized from previous studies, this study will utilize visual stimuli as part of a neuropsychological measure (the Penn-CNP test) from mixed groups of participants with more than one hospitalization. Description of the measures will be discussed in the methodology section in this proposal. The next section is a discussion on aggression and violence.

<center>**Aggression and Violence in Schizophrenia**</center>

Aggression, including violence, was of the main variables in this study. In this section, I briefly discussed the overview of studies on violence in schizophrenia, followed by the pathway model describing behavioral traits associated with violence. At the end of the section, I will discuss the studies relating facial emotional perception with violence in schizophrenia

Historical and classic studies on aggression and violence were based on case studies such as the famous 1884 brain injury study of Phineas Gage, a foreman who sustained brain injury after a blasting accident (McMillan, 2008). He was carefully followed up by neurologists and findings from his injury, showing that lesions on the ventral frontal lobe led to a change in personality from pleasant and mild mannered to irritable (Yang & Raine, 2009). In spite of the personality changes, his cognition seemed spared. Subsequent experimental work similarly showed that lesions or surgical ablation

of the amygdala led to decreases in aggression. Additionally, neuropsychological assessment of individuals with damage in this subcortical area is associated with facial and emotional recognition deficits. However, patients also tend to have dull or sub level assessment of negative emotion such as fear and sadness (Adolph's & Trannel, 2004).

Aggression and violence, including criminal behavior in schizophrenia, were associated with multiple and interacting factors (Fazel et al., 2009). Studies on attention and executive control showed that these patients tend to react more slowly, and spend longer time analyzing conflict and tend to have a disorganized approach to conflict situations (Breton, Planté, Legauffre, Ramoz & Dubertret, 2011). Godefroy at al. (2010) also studied aggression and executive control in schizophrenia by investigating working memory, a cognitive ability associated with planning. He compared these cognitive skills in schizophrenia and Alzheimer's, Parkinson's, and multiple sclerosis. The results showed that while these three conditions shared memory problems, individuals with schizophrenia tend to have difficulty with episodic and working memory. This difficulty possibly explains why they have difficulty in using social context and subsequently make poor inferences on what they perceive. Limitations in the executive capacity and deficits in the interpretation of emotional signals such as facial affects can lead to cognitive biases which increase the chances of behaving aggressively in response to stressful and provocative situations (Fazel et al., 2009).

Studies that showed relationships between brain activation change, cognitive deficits, personality traits, and violence showed inconsistent results due to methodological problems (Weiss, 2012). Researchers also varied in defining violence.

Some defined violence as exhibited in the community setting, some defined it in prison

setting, while others defined it in the context of a forensic hospital or partial hospital

setting (Fazel et al., 2009; Volavka and Citrome, 2011; Weiss, 2011). Researchers also

varied in obtaining measures. Some researchers utilized self-report, staff reports or

records. Participants also varied across studies. Some researchers recruited participants

who have co-occurring substance use, and some researchers interviewed those with co-

occurring personality problems.

The Pathways of Violence

Individuals with schizophrenia who have violent tendencies tend to follow two

developmental routes characterized by the " pathways to violence model" (Volavka &

Citrome,2011). One pathway describes individuals with schizophrenia who have anger

and increased delusions and hallucinations. The second pathway describes individuals

with schizophrenia who have the antisocial traits of hostility and impulsivity and whose

history of violent behavior is independent of symptom type or severity (Volavka &

Citrome, 2011).

The first pathway to violence was described as the "state pathway of

schizophrenia" and was characterized by high core symptoms such as delusions and

hallucination, with the possibility of co-morbid substance use and anger. Interestingly,

Volavka and Citrome (2011) also pointed out that the profile of low positive and high

negative symptoms (lack of energy, and anxiety) is associated with decreased risk of

violence. From the intervention perspective, the state pathway was quite responsive to

medication, (Silver, Goodman, Knoll, & Isakov, 2004).

Some researchers posit that clients on the second pathway may respond to psychological intervention that emphasizes social cognition. This dissertation seeks to investigate FEP, which is associated with the second pathway of schizophrenia. FEP indirectly contributes to the social value of developing social cognition interventions that could reduce violence. The next section is a continuation of the discussion about the second pathway of violence by focusing on studies of antisocial behavior and violence.

Antisocial Behavior and Violence

The second pathways of violence in schizophrenia was characterized by low positive symptoms and personality traits associated with violence and aggression (Thornton et. al. 2010), including antisocial behavior, impulsivity, and lack of regard when hurt and suffering are inflicted (Bettencourt, Talley, Benjamin, & Valentine, 2006; Fazel et al., 2009; Large & Nielssen, 2011).

Personality studies in aggression posited that individuals who have aggression and violence tended to have difficulties in regulating affect and impulse and have narcissistic and paranoid traits (Nestor, 2002). Additional studies on antisocial traits, such as the characteristics described by Nestor, plus active symptoms of schizophrenia predict an increased risk for violence (Volavka & Citrome, 2011b). In other words, high symptoms of delusions and hallucinations combined with antisocial traits are highly associated with violence. Psychopathy, a trait which overlaps with antisocial traits, is associated with individuals who have biological rather than environmental etiologies. (Winsper et al., 2013). However, studies also showed that the antisocial and psychopathy traits in schizophrenia differ from those in people with these traits but without schizophrenia.

While both groups share the common mood of irritability and hostility, individuals with schizophrenia were described as lacking in sympathy, lacking realistic goals, and having grandiose and oversensitive symptoms. Individuals with psychopathy tend to be more callous, unremorseful and novelty seeking (Moran & Hodgins, 2004). Again, as found in other studies, the presence of negative symptoms serves a protective barrier for expressing aggressive impulses (Fazel et al., 2009).

The term psychopathy and sociopathy were used interchangeably. Historically, doctors in the 1800's used the word psychopathy to describe patients who appear and act with no regard to the rights of others or no sense of ethics (Dollan & Fullam, 2009). Individuals with psychopathy or "psychopaths" were historically described as men lacking in or of depraved morality. They were also described as men and women who have "moral insanity." In the 1930's the term "psychopath" was changed to "sociopath", emphasizing the damage they do to society. Current researchers returned to using the term "psychopath" to refer to a more serious disorder linked to genetic traits, and used "sociopath" to refer to less dangerous people whose violent behavior was linked to the environment such as poverty, abuse and upbringing (Koenigs, 2012). Furthermore, there is an increasing finding that violence is associated with adults who a have a history of adolescent conduct disorder, a common precursor to antisocial personality disorder (Gosden, Kramp, and Gabrielsen).

Winsper and his colleagues (2013) studied the association between personality traits and violence. This study analyzed the kind of violence that individuals with psychosis committed (Winsper et al., 2013). They reported that there are three types of

patients about onset of violence. The first involves antisocial-behavior observed in childhood and that into adulthood. Examples of this early onset of antisocial behavior include children who hurt animals or who were quite aggressive in school and the community. A second type involves patients in whom the aggression and violence started shortly before the manifestation of psychosis. The third group involves the type of patients who start to manifest antisocial behavior after the onset of their psychotic disorder.

Violence committed by individuals with schizophrenia is relatively low (about 10-15% of the patient population). Consistent with previous studies, violence committed by individuals with schizophrenia is mediated by active core symptoms, personality factors (antisocial traits), social dislocation, and state of substance use (Bo, Kongerslev, Dimaggio, Lysaker, & Abu-Akel, 2015).

Cognitive deficits were greater among adults with schizophrenia than those with antisocial personality disorders. Violent individuals with schizophrenia demonstrated poorer performance than their nonviolent schizophrenia peers on a measure of executive function (Barkataki et al., 2005). Different cognitive impairments were manifested by individuals with antisocial personality disorders and schizophrenia with violent behaviors, suggesting differences in underlying pathology. Furthermore, cognitive impairment appears to be more a feature of schizophrenia than of violent behavior, although there is evidence that a combination of schizophrenia and violent behavior is associated with greater cognitive deficits (Barkataki et al., 2005, p. 13). The next section

discusses another variable that the current study will explore, i.e. emotion perception and violence.

Facial Emotional Perception and Violence in Schizophrenia

In addition to core symptoms (positive, negative and cognitive), some individuals with schizophrenia tend to have difficulties in identifying and discriminating facial emotions (Demirbuga et al., 2012). This section was a review of studies on facial emotional perception in schizophrenia and how a deficit in this area contributed to social cognition difficulties and its association with violence.

Studies on functional outcomes of social cognition deficits indicated that emotional recognition was quite limited in some individuals with schizophrenia (Couture et al. 2006; Kohler et al. 2009; Pinkham et al. 2012). These studies, however, focused only on the association between emotional perceptions and severity of psychosis and anti-social traits. Other studies focused on the association between violence and schizophrenia. While these three variables (history of violence, the severity of psychosis, and antisocial traits) were each related to facial emotional perception, there was limited literature examining the interaction of these variables and how they are associated with poor facial emotional perception.

Pinkham et al., (2012) explored facial emotional perceptions, the degree of psychosis and subgroup of schizophrenia. Using the accuracy of error responses and patterns of error, she found that the subgroup of paranoid schizophrenia patients tended to have fewer errors in facial emotional perception, however, the pattern of their error showed that they were quite deficient in attributing neutral emotions. The sample of the

study simply compared subgroups of schizophrenia and severity of symptoms. A similar study was performed by focusing on the severity of symptoms based on time of assessment. Individuals with schizophrenia who were recently hospitalized had the poorer facial emotional perception (Kohler, 2009). Furthermore, when controlling for severity of symptoms (state of psychosis), those with schizophrenia and those with schizoaffective disorders did not differ in misidentifying facial emotional perception.

Performance on emotional perception differed from emotional discrimination. Patients with severe psychosis can recognize that a face appeared happy, sad, and angry or had a neutral expression. However, these patients could not identify which two faces with the same emotion has a stronger expression (one face is angrier than the other face, one face is sadder than the other face, one face has neutral expression and the other one is happy, etc. (Hoefer et al., 2009)

A study comparing schizophrenia with non-schizophrenia confirmed the previous studies that the experimental group has more deficits in facial recognition (Jarac, 2009). Neuropsychological analysis of the experimental group pointed out that dysfunction in the prefrontal cortex is associated with this deficient recognition. The only study that explored the three variables (state, trait, and violence) included samples of schizophrenia patients with violence but did not include a control group (Weiss, 2009). However, it did find that number of incarcerations is associated with poor recognition of fear and angry expressions. The findings also showed that severe positive symptoms and low negative symptoms are associated with increased number of criminal behavior.

Modulating emotion is a manifestation of social relatedness. When there was a poor modulation, maladaptive behavior such as aggression and violence occur. There were studies that link aggression with poor social cognition in schizophrenia. Meanwhile, there were studies which also linked poor facial emotional perception in schizophrenia. However, there was literature gap linking facial emotional perception and violence.

Theoretical Foundation

The next section of this chapter was a discussion of the several theories that provide content for the study. Three theories were relevant to facial emotional perception and violence in schizophrenia

Theory of the Mind (ToM)

Accurate perception, interpretation of social signals, and understanding one's own emotions contribute to successful social interaction (Koelkebeck et al., 2010). In 1978, Premack and Woodruff studied primates and coined the term *Theory of mind* (ToM). This theory refers to the ability of the individual to understand his mental state and the mental state of other individuals (Ang & Pridmore, 2009).

ToM in the typical population. In the normal or typical population, three stages of ToM unfold (Ang & Pridmore, 2009). The first stage is acquired at around four to five years old when children recognize that other people can have false beliefs. The second stage emerges at around six to seven years of age. At this age, children recognize that they can have a false belief about the belief of others (Wellman, 1990). The third stage develops at around 10 or 11 years when children recognize that others can say inappropriate things without knowing that they did so. The third stage requires an

understanding of what is called as an ethical blunder. This stage entails more mature thinking because the child must understand that that the other person is saying something and he are not aware that what he is saying can be offensive to others. This stage requires an understanding of cognitive mental states as well and empathy toward the other person (Abu-Akel & Abushua'leh, 2004).

ToM in individuals with schizophrenia. A delay and lack of advancement from one ToM stage to another contributes to malfunctioning of social skills. This delay possibly contributes to some of the deficits in psychiatric symptoms, such as autism spectrum disorders, schizophrenia, and antisocial personality (Ang & Pridmore, 2009).

Understanding one's mental state and the mental state of others is important in understating violence (Addy, Sannon & Brookfield, 2007). The ability to reason about belief (cognitive) and reason about emotion (affective) are necessary for regulating behavior, controlling impulses, feeling guilty and emphasizing with others. Understanding one's own emotional state can reduce aggression and violence towards others. Mentalizing tends to be compromised among individuals with schizophrenia (Ang & Pridmoe, 2009; Bora, Yucel & Pantelis, 2009, 2009b). Delusions and ideas of reference can be seen as an inability to monitor thoughts and to infer the intentions of others (Bora et al., 2009). Individuals with a more developed theory of the mind tend to accurately interpret signals about others, while those with the deficient theory of the mind tend to arrive at wrong conclusions. Deficiency in the theory of the mind is associated with psychiatric disorders such as schizophrenia and antisocial personality disorders (Ang & Pridmore, 2009). This will be further discussed in the next section.

Frith (1992) proposed that lack or limited mentalizing can explain some schizophrenia symptoms. Initially, this proposal was investigated through a qualitative study (Brune and Harrington as cited by Ange et al., 2009). A more recent meta-analysis utilized the quantitative approach and provided sample size effect findings (Sprong et al., 2009). This meta-analysis showed significant and stable mentalizing impairment in schizophrenia.

The finding that patients in remission are also impaired favors the notion that mentalizing impairment represents a trait marker of schizophrenia. In particular, the inability to see the perspective of others in people with schizophrenia is related to deficits in executive functioning which is manifested in the core of positive and negative symptoms (Bora et al., 2009). The theory suggests that disorders of willed action, self-monitoring, and other monitoring in schizophrenia contribute to the production of hallucinations and delusions. Further studies, however, do not substantiate if the theory of the mind improves when the psychosis is in remission or not active (Ang & Pridmore, 2009; Bora et al., 2009). Theory of mind in schizophrenia is a factor that appears to be involved in the intensity of psychosis (positive and negative core symptoms), as well as emotion processing, perception, and violence.

Theory of the mind in psychopathy/antisocial disorder. Psychopathic personality traits such as superficial charm, unreliability, cold-heartedness and emotional unresponsiveness are DSM-diagnostic criteria of the antisocial disorder. It is usually assumed that individuals with antisocial traits tend to have an undeveloped or impaired theory of mind. This assumption was tested by several researchers (Blair, Morton,

Leonard, & Blair,2006; Reidy, Shelley-Tremblay, & Lilienfeld, 2011). Individuals with

antisocial disorder or traits are actually capable of appreciating others, but they tend to

lack the perspective taking or the concern regarding the impact of violence or other

exploitative behavior on potential victims. Individuals with antisocial traits survive the

pressures of violent lifestyles due to the lack of concern about the consequences of their

behavior. In addition to poor mentalizing, violence is associated with the combination of

hostility towards others and poor empathy (Bragado-Jimenez & Taylor, 2012). Theory of

the mind in the context of antisocial traits presents a model to explain the relationship

between traits in schizophrenia and deficits in emotional processing and violence.

Additional theoretical frameworks are useful in explaining the relationship of emotion

processing and violence in schizophrenia namely perceptual organization (discussed in

next section) and the integrated emotional system (the last section of this chapter).

Perceptual Organization Theory

Perceptual organization is "the ability to organize elements of a stimulus into

meaningful edges, patterns groupings, and representations" (Silverstein & Keane 2011a).

The perceptual organization theory posits that there is a perceptual organization-

disorganization dimension found in the whole population, from those with no

schizophrenia to those with schizophrenia (Feigenson, Gara, Roche, & Silverstein, 2013).

However, with the schizophrenia population the disorganization is more severe and is

considered an "illness-related process" (p. 1).

Perceptual organization in schizophrenia. Perceptual organization requires

making sense of what is seen so that sensory input can be stored and retrieved properly.

Visual integration or perceptual integration refers to the process of form perception in the visual cortex. An fMRI examination in schizophrenia showed that reduced perceptual organization was associated with reduced activation of visual cortex areas V2-V4 (Silverstein et al., 2009). This reduction has implications for top-down visual processing, an important step in understanding visual stimuli such as facial features and facial emotional expression. If signals emerging from sensory regions are degraded, they will only weakly activate memory and semantic representations. This can lead to poorer top-down feedback (including attention) to increase the strength of signaling of relevant vs. irrelevant stimuli . They may also activate inappropriate higher level representations, which could contribute to thought disorder, stimulus flooding, and confusion.

Perceptual organization and emotion recognition. The ability to recognize facial expressions is vital in social interaction. Some individuals with schizophrenia tend to perceive fractured and distorted facial images, thus when asked to described the emotion of these faces they report erroneous expressions (Norton et al., 2009). The responses to the images showed difficulty in depth perception, facial recognition, and facial expression discriminations. Thus, while both typical and schizophrenia perceptions have variations, the magnitude perceptual deficit is more severe in schizophrenia and is a defining trait of the condition. Furthermore, the severity of perceptual organization in schizophrenia is related to the severity of the positive symptoms and correlates with the cognitive abilities of the individual for attention and working memory. Clinical studies show that perceptual organization is diverse in typical adults as well as with the schizophrenia population

Individuals with schizophrenia tend to have perceptual organization impairments, and such deficits are posited to contribute to contribute to their face processing difficulties (Silverstein et al., 2010). Face processing refers to identifying the face as well as identifying the emotion that faces convey. Prochwicz and Rózycka, (2012) reported that the studies on emotional processing among individuals with schizophrenia have different findings. There were results that pointed to negative symptoms (the individual himself lacked the ability to feel emotion), positive symptoms (the individual had delusions or hallucinations), or due to general cognitive problems (the individuals were not smart enough to recognize what emotion the person has).

There are multiple factors that contribute to deficits in face processing. Some individuals have minimal deficits in facial identification but have severe deficits in emotion recognition. Some researchers posit that those who have emotional processing deficits have generalized visual impairment and attentional dysfunction as well (Drake, Peterman, Park, Sundram, & Carter, 2013). The literature on face processing presents various findings on emotional processing. This variability can lead to confusing results, possibly as a result of different definitions of constructs as well as different methodological approaches. Drake et al. (2013) conducted a study that disentangles the confusion in the literature. He changed the study task so that processing ranged from emotional to non-emotional features of the face stimuli such as identity and gender. The authors also investigated the processing of non-familiar elements such as the car that the person drives and gait of the person. The results of the study indicated that the deficits were specific to facial expression.

The Integrated Emotional System (IES)

K.S. Blaire and his associates (2006a) postulated the Integrated Emotional System (IES) model of psychopathy. This model proposes that expression of emotion (i.e. fear) as manifested in one's facial expression can cue another person to inhibit their aggression. In other words, if someone is very angry with someone and sees that the other person has a fearful reaction or facial expression, the IES posits that most likely the anger will decrease.

The IES is a comprehensive model that integrates the biological and psychosocial aspects of emotion. The biological aspect of this model hypothesizes that dysfunction in the amygdala impedes the perception of emotion in others (Blair, 2005). The model extended the idea that some individuals with impaired empathy, such as those with psychopathic or antisocial traits, tend to have "selective ability to recognize fear and sadness in others" (Marsh & Blair, 2008). Additionally, Dollan and Fullam (2009) pointed out that there is a neural difference between violence in individuals with schizophrenia and individuals with schizophrenia who have antisocial traits.

Based on the IES model, Hoefer et al. (2009) investigated schizophrenia patients' responses to different facial expressions. The results showed that those who are violent tend to misread angry facial expressions as sad. Furthermore, these authors found that patients with schizophrenia tended to interpret the emotional expression of disgust as anger. In particular, 30% of the patients with schizophrenia from both groups interpreted a disgusted face as angry. Hoefer et al.'s study supported the previous findings that individuals with schizophrenia tend to interpret ambiguous stimuli as threatening. The

researchers concluded that social dysfunction in schizophrenia is related to the underlying mechanisms that contribute to facial emotion misidentification and discrimination.

The IES theories posit that emotion processing is pivotal in early development. This theory indicates that psychopathy is consistent with a deficit in emotional processing. This model posits that emotional detachment (factor 1) and social deviance (factor2) are pervasive patterns of emotion and processing. Factor 1 is related to unprovoked aggression associated with poor emotion processing of distress and negative affect of others. Factor 2 is related to experiences of anger, hostility and reactive aggression. Studies that investigated these two factors showed that impaired emotional processing is associated with psychopathy and contributes to proactive aggression (Mitchell et al., 2006; Reidy et al., 2008).

To summarize, the three theories above provide frameworks for understanding the relationship between facial emotional perception and violence in schizophrenia. Theory of the mind (ToM) serves as a framework on how the lack of ability to infer the mental state of others contributed to the lack of empathy and thus aggression. The perceptual organization theory (PO) served as a framework for understanding how a problem in organizing facial features during perception can lead to poor emotion perception.

Chapter 3: Research Methods

Introduction

This study was a secondary data analysis of social cognition in schizophrenia. I investigated the relationship of social cognition with clinical conditions such as psychosis state and antisocial traits. Additionally, I examined the relationship of violence to social cognition and clinical behaviors.

Chapter 3 presents the methodology of the study. The secondary data was procured from a larger study conducted at Rutgers University, which investigated the characteristics of violent psychiatric patients with psychosis (schizophrenia, major depressive disorder, and bipolar disorder). In this chapter, I briefly describe the primary source study including the population and screening criteria. I also include the strategies I used to protect the identity of the participants in the archival data.

Research Design and Rationale

A quantitative design was used to answer the research questions regarding the relationships of facial emotional perception with psychosis, antisocial traits, and to determine which variable predicted violence. The data used to answer these questions were obtained from a set of quantitative checklists and tests.

ANOVA. I employed a two-way analysis of variance (2x2) to determine if facial emotional perception (FEP) was associated with psychotic state and antisocial traits. The independent variables were psychosis and antisocial traits while the dependent variable was FEP.

The independent variables were scored dichotomously:

- Psychotic state (high or low)

- Antisocial traits (high or low)

A 2x2 factorial design was chosen to best describe the relationship of each independent variable to the dependent variable and to explore if there is an interaction of these variables. Previous studies employed a one-way ANOVA to describe the relationship of each variable with FEP. However, a factorial design is an efficient and best approach to determine the relationship of the severity of psychosis (high or low), and antisocial traits (high or low) and facial emotional perception ability. This particular research design was useful in another study that investigated the relationship between emotional attribution and paranoia (Pinkham et al., 2012), the relationship between schizophrenia cognitive symptoms, subtypes, and violence (Barkataki et al., 2005), and the relationship between facial recognition and cognition in schizophrenia (Linden et al., 2010)

Logistic Regression. I selected logistic regression (LR) model to determine the likelihood that violence based on behavioral measures rather than clinical categories. The criterion for this model will be history (yes/no) of violent behavior, and the predictors will be uncategorized measures of psychosis, antisocial traits, and facial emotional perception. Additionally, moderation and mediation effects were examined to clarify the interaction of antisocial traits, psychosis, and social cognition.

Methodology

Population

The participants for the source study were adults, 18-55 years old, diagnosed with schizophrenia and voluntarily admitted at the inpatient and at the partial hospital programs of a mental health facility in Piscataway and Newark, New Jersey. The inclusion criteria included:

- Psychiatric stability (not suicidal, homicidal or disorganized)

- English speaking

- Able to provide informed consent.

The exclusion criteria included:

- Intellectual disability or mental retardation that compromises the ability to participate in a semi-structured interview, as determined by medical records and/or case managers or in the clinical judgment of the investigators

- Serious head injury due to an accident or illness with loss of consciousness lasting more than 10 minutes;

- A prior diagnosis or other evidence of a pervasive developmental disorder or a neurological disease

- Any other clinical condition that, in the opinion of the primary investigator, would jeopardize a patient's safety while participating in this study

- Unable to speak or read in English

Sample

The original data came from 50 clients with thought and mood problems, which is a form of psychosis. The data were obtained from volunteer participants from 2014-2016. Their ages ranged from 26 to 50. Of this original set of 50, 38 participants completed the 6-hour assessment and met the schizophrenia and exclusion criteria (no intellectual deficiency, no brain injury and pose no imminent harm to self and others during the data gathering interview). Half of the 38 participants had a history of violence, and the other half had no history of violence. The data from these 38 participants were used in the dissertation study.

Due to the nature of the mental disorder and the location of the facility, all participants received treatment at the time of the study.

Source Study Data Collection Procedures

The primary study was a pilot study (Silverstein, Del Pozzo & Miskimen, 2015) to determine those characteristics that are most related to a history of violent behavior in patients with psychotic disorders. The goal of the primary study was to determine the relative strength of the predictors (demographic, clinical, cognitive, and developmental variables). The primary study did not analyze the association of these variables with emotional facial processing.

Participants were recruited via presentations at community meetings in partial hospital programs (in the north and central New Jersey), and via inpatient staff (in central New Jersey) meetings. Data was conducted in several phases. The initial screening phase entailed asking patients general questions were asked about their age, ability to read and

understand English, education level, and diagnosis. If the responses in the initial

screening phase indicated potential eligibility, the violence screening document was

completed by the patient's psychiatrist, clinician, case manager, and/or relevant member

of the treatment team prior to determining capacity to consent and, if appropriate, to

determine if the patient was interested in participating in the study.

If the patient was interested, a 2-step consenting phase began:

- The study team member met with the patient to review the IRB-
  approved study consent form and to answer any questions.

- The patient was asked to complete the UCSD Brief Assessment of
  Capacity to Consent to document if the patient was considered to
  have the capacity to consent by the clinical staff and by the study
  staff.

A score of 2 on each item on the UCSD Brief Assessment of Capacity to Consent

indicated that participants have the capacity to consent. Lastly, when the patients signed

the consent form, they were considered to be enrolled in the study.

The data collection phase occurred in three sessions. In the first session, scales

that measured history of violence were completed. In the second session, scales that

measured severity of schizophrenia core symptom and severity of antisocial trait scales

were completed. In the third session, the facial emotional perception test was completed

Clients were offered the option to take a 15-minute break and light snack after

each 45-minute assessment session, which were completed in 3 to 5 days. Each

participant received $10.00 per 1-hour session.

Instruments

Facial emotional perception. The facial emotional perception was measured using scores from the PENN Computerized Neuropsychological Battery (PENN CNP). The PENN CNP is a computerized neuropsychological test that measures cognitive, motor, memory, and emotional function. Data from the emotion subtest was used to determine emotional perception ability by identifying both the emotion and intensity of the emotion in photographs of faces depicting very happy, somewhat happy, neutral somewhat sad, and very sad expressions. The pictures are presented in a random order for 100 milliseconds each. This task takes about 30 minutes on a computer (Gur at al. 2010).

PENN CNP emotion subtests derive the *ER40*, a measure of emotion recognition (Gur et al., 2010; Weiss, 2012). A series of 40 faces were shown to the participants, one at a time. The participants were instructed to determine the emotion of each face (happy, sad, anger, fear, and no emotion) by clicking a mouse on a word on the computer screen that described the emotion they thought that had just viewed. The measure is coded as ER40_CR (ER40 Correct Responses), and the total correct response ranged from 0-40.

Scoring. The scores were based on the (Silver et al., 2005) discrimination score (correct response on differentiating happy, sad, and no emotion) divided by the correct responses on the five emotions and are based on the number of correct responses for t*he number of correct responses on happy, sad, anger, fear," and no emotion faces*. The percentages were converted into whole numbers and were used as the scores for the statistical analysis of facial emotional perception.

Psychometric properties of the PENN CNP. The construct validity of the ER-40 was obtained by comparing performance on this subtest with existing literature on emotional recognition. Emotional recognition studies showed that *happiness* is the most accurately identified emotion (Carter et al., 2009). The accuracy of identification increases with increased intensity of expression. Females were better than males on overall task performance. This difference was related to significant differences in happy and sad expressions only. Nevertheless, males and females did not differ on accuracy for angry, fearful, or neutral expressions. Partial correlations controlling for the effects of IQ demonstrate that accuracy scores on the ER-40 are more highly related to the EmoDiff scale than other emotion recognition task assessing only happy and sad recognition, than to tasks assessing other cognitive abilities such as working memory motor skills (Spearman partial and abstraction and mental flexibility). Overall, the coefficient alpha for the ER-40 is .587 (Gur et al., 2010)

History of Violence. Data for this variable was obtained from two instruments: The Violence Screening Form and the Historical Risk for Violence (HCR-20).

Violence Screening Form. The Violence Screening Form is a three-item form which gathered information about the participant's violent behavior before obtaining the informed consent to participate in the study. The three items were from the Life History Aggression Scale (Weiss et al., 2006) and inquired about the kind of violent behavior the client engaged in (hit, kicked, punched, yelled, screamed, spit, thrown objects, etc.), the frequency of these behaviors, and if the client is safe or stable enough for an interview.

The demographic form included the last incidence of violence. Trained clinician researchers scored the form as 1 (violence not present) and violence present (2).

Historical Risk for Violence (HCR-20). This measure was obtained from a 20-item semistructured interview scored by trained clinicians. Subtest H1 or History of violence is scored as 0 (no previous violence), 1 (one or two acts of moderately severe violence) and 2 (three of more acts of violence).

Scoring. Scores from the violent screening form (VSC) and the historical screening risk for violence (HCR-20) were summed. The sum of each subject's score as their score on the test, and compare the groups on the means of these scores. Scores that are equivalent or above the means were categorized as high (2) and scores below the mean will be categorized as low (1). These categories are used for data analysis.

Psychometric Property. Measures of violence to others, destruction of property and verbal threats comprise the score for History and Clinical subscales (HCR-20).The scale predicts these constructs between.53 and.56, AUCs between.79 and.83, and ORs between 2.55 and 8.85. The two subscales (History and Clinical) have good predictive validity with little difference between the subscales. Overall, the total HCR-20 was consistently better than either of the subscales alone (Gray et al., 2003).

The severity of Psychosis. Severity of psychosis was obtained from the *Positive and Negative Symptoms Checklist* (PANNS: Kay et al., 1987). This rating scale measures mental positive, negative, and general psychopathology symptoms. The PANNS is a 30-item test scored using a 7-point scale that describes the severity of the psychotic

symptoms (1= absent, 2= minimal, 3= mild, 4= moderate, 5= moderate severe). I used this scale to measure the severity of psychosis.

Psychometric properties of PANNS. There are several ways to analyze the PANNS. The five-factor model is considered as the most useful approach to describe the core symptoms of psychosis and is associated with other measures related to violence (Pinna, Bosia, Cavallaro, & Carpiniello, 2014).

The best values, indicating a moderately accurate test, were observed for PANSS Five Consensus test (PANNS FCT). The area under the receiving operating characteristic (AUROC) = .74, Youden's J = .48)

Scoring. A study testing the structure of the PANNS five-factor model showed mean and standard deviations of 23.5 (7.1), for negative factor, 18.4 (6.3), for positive factor, 8.5 (3.6) for excitation factor, 7.8 (2.9) for depression factor, and 12.8 (3.3) for cognitive factor (Lançon, Auquier, Nayt & Reine, 2000) . In this study participants who score above the mean were classified as high psychosis, while those below the mean will be classified as low psychosis.

Antisocial (Psychopathy) Traits. The severity of antisocial traits will be obtained from the data measured by Hare Psychopathy Checklist. The Hare Psychopathy Checklist: Screening Version. (HPCL-SV; Multi Health Systems, 2004) is a 20-item inventory of psychopathic personality traits. It consists of a semi structured interview along with a review of collateral information such as official records. A mental health professional, such as the clinician or case manager, rates the participant. The psychopathy four-factor models and the aggression subscale have been associated with

violence in the forensic population (individuals with mental disorders who committed crimes). The four factors include interpersonal, affective, behavioral, and antisocial. Three subscales has been useful in screening psychopathy traits (Langton, Hogue, Differ, Mannion, & Howells, 2011)

Scoring. Participants who score above the cut-off score of 12 will be classified as having high antisocial (psychopathy) traits and those who score 12 or below will be classified as having low antisocial traits (psychopathy). Studies showed that a score of 12 or lower in the HPCL-SV is considered non-psychopathic (Bo et al., 2011, Christie, Neumann, & Rogers, 2004; Hodgins, Hiscoke; & Freese, 2003)

Psychometric Property of HPCL-SV: The Hare Psychopathy Checklist is an established instrument for measuring antisocial (psychopathy) traits. It was derived from a sample of about 5000 prison inmates and demonstrated an alpha coefficient of 0.87 (Kennealy, Hicks, & Patrick, 2007). The HPCL-SV and the International Personality Disorder Examination scale (IPDE) are tests that measure of antisocial traits. The PCLSV total score and the Factor 2 of IPDE has a correlation of .49 (Backburn, Logan, Donnelly, & Renwick, 2008; Langton et al., 2011).

Data Analysis

The secondary data was analyzed using a between subject, 2 X 2 ANOVA and a logistic regression model. Given the small sample, in addition to the significance level, the author also examined the effect size. An alpha level of .05 was utilized to answer the following research questions:

RQ1: Do FEP scores differ at different levels of psychosis in individuals

diagnosed with schizophrenia?

H01: FEP scores do not differ at different levels of psychosis.

Ha1$_1$: FEP scores differ at different levels of psychosis.

RQ2: Do FEP scores differ at different levels of antisocial traits in individuals

diagnosed with schizophrenia?

H$_0$2: FEP scores do not differ at different levels of antisocial traits.

Ha2: FEP scores differ at different levels of antisocial traits.

RQ3: Do psychosis and antisocial traits interact in individuals diagnosed with

schizophrenia?

H$_0$3: There is no interaction between psychosis and antisocial traits.

H$_{a\,3}$: There is no interaction between psychosis and antisocial traits.

This design was useful in evaluating the mean differences between two or more

treatments or populations and minimize the risk of a Type I error rate. In addition, it

affords the research a better chance of identifying a statistically significant difference by

maintaining the integrity of the .05 alpha level (Field, 2013). Participants who met the

criteria and completed the assessment will be included in the study. I utilized the IBM

Statistical Package for Social Sciences (SPSS) Version 21 to perform analysis of the data.

I employed a three-way analysis of variance to test the relationship between facial

emotion perception, history of violence (presence of history/ absence of history, severity

of psychosis (high/low) and antisocial traits (high/low).

This study also explored the relative contribution of FEP, psychosis, and

antisocial traits to the dichotomous variable of history of violence. For this analysis,

scores obtained from the psychosis and antisocial trait measures were not categorized. The logistic analysis tests these statistical hypotheses:

RQ4: What is the likelihood of violence based on facial emotion perception?

ability, psychosis and antisocial traits?

$H_0$4: There is no significant likelihood of violence based on facial emotional perception, psychosis, and antisocial trait.

Ha4: There is a significant likelihood of violence based on facial emotional perception, psychosis, and antisocial trait.

Threats to Validity

In the primary study, the threats to internal validity included selection bias, attrition, and fatigue. Selection bias was address by giving an opportunity for all partial hospital consumers (or clients) to volunteer or participate in the study. An IRB approved announcement was posted in the client (consumer) bulletin boards two campuses of the Rutgers University Behavioral Healthcare (North and Middle countries). The poster announcement had a toll-free number for interested clients to call. Those who called up were called "volunteer" pre-screened (diagnosis, last inpatient hospitalization, and nature of aggression/violence.). After the pre-screening, appointments were set up between the prospective participant and a researcher. The volunteer becomes a participant when they meet the screening criteria during the first session (client is safe to be interviewed, can understand English, no significant head injury, can sign and understand confidentiality form). Attrition was addressed by carefully screening who can meet the assessment steps (two hours each three sessions). The appointments were scheduled in a week's time, and

the participation fees were given after each session. Fatigue was addressed by giving breaks in during the two-hour session and by offering snacks. The small number of participants (n=38) also pose a threat to the generalizability of findings.

Additionally, there are two possible sources of validity threats in this secondary data: The first source comes from the procedures that the source study followed; the second source comes from how I handle the secondary data such as errors in copying, entering, and computing the data. A threat in handling the secondary data was addressed by asking a doctoral graduate student to check errors in copying and entering the data. The principal study was monitored by the university research committee to assure that all recruitment and data procedures were followed.

Ethical Procedures

The source study was conducted under the authorization of the Rutgers IRB, and according to the policies and procedures of Rutgers University Behavioral Healthcare. The University IRB approved data procurement from the participants after completion of a document confirming that subjects had an adequate understanding of the study. I obtained a certificate of confidentiality from the NIH in November 2013 and was approved to participate in gathering the data in January 2014. A copy of the facility IRB approved permission is found in the appendix. The principal investigator gave permission to utilize the schizophrenia data for the purpose of determining the specific risk of this population. In addition to Rutgers IRB approval, the Walden IRB approval and Data Use Agreement were obtained from the providers before conducting the study.

To ensure confidentiality, absence of coercion, and respect of the clients, I took a six-hour training course on research with human subjects and passed the certification test. I was also included in the primary study research protocol and approved by the agency's institute of behavioral research protocol. I was supervised by the primary investigator and the research specialists to ensure that the personal identifications are coded and kept in a locked safe area.

I also followed the standards set up by Walden University's secondary data analysis protocol (approval # 08-08-16-0328639). The standard included a description of the main study participant recruitment and access to the data set. Access to the dissertation data analysis was obtained from the coded data safely stored in the Rutgers University Division of Schizophrenia Research in Piscataway, NJ. All identifying information was removed prior to access and use of the data. Rutgers University will be re-de-identified and will be stored for five years.

Summary and Transition

I conducted a quantitative, secondary analysis of data obtained from participants with schizophrenia, antisocial traits, and psychosis who have a recent history of violent behavior and compared this group to patients without a history of violence. I hypothesized that facial emotional recognition was one of the variables that can discriminate between the groups. I analyzed archival data and utilized a two-way analysis of variance (between subject 2x2 factorial design) to test my hypothesis. Measures of facial emotional recognition and discrimination were obtained using an established computerized test (ER-40 subscale of the Penn CNP). Measures of violence were

obtained using screening and semi-structured tests. For those with a history of violence,

measures of severity of psychosis and antisocial behavior were obtained from scales and

semi-structured inventories. Chapter 4 included the details of the analysis and the results

of the findings. Chapter 5 included further explanation of the findings and the

conclusions drawn from the research.

Chapter 4: Results

Introduction

Facial emotional perception is an important component of social cognition, an area of interest in schizophrenia research (Carter et al., 2009; Green et al., 2011; Mancuso, Horan, Kern, & Green, 2011). The purpose of this study was to examine the relationship of FEP, psychosis, and antisocial behavior and to examine their association with violence in schizophrenia. Psychosis is a symptom of schizophrenia which can be severe or low (state), while antisocial behaviors can be a comorbid trait (APA, 2013).

To determine the relationship of FEP with the clinical variables (state and trait) and violence, I analyzed a set of secondary data obtained from a primary study which included participants with mood disorder conducted at Rutgers University. These data were analyzed in two ways. First, the relationship of facial emotional perception to psychosis and antisocial behavior was examined using analysis of variance (ANOVA). Second, the relationship of violence to facial emotional perception, psychosis, and antisocial behavior was analyzed using logistic regression (LR).

Chapter 4 is a review of the research questions and hypotheses, a demographic description of the data, an evaluation of the assumptions that need to be met for each statistical analysis, and a presentation of the results. Chapter 4 will also describe the how data were secured and transferred from the source study.

Research Question and Hypotheses

The research questions for this study and the associated testable hypotheses are:

RQ1: Do FEP scores differ at different levels of psychosis in individuals diagnosed with schizophrenia?

H_01: FEP scores do not differ at different levels of psychosis.

H_a1: FEP scores do differ at different levels of psychosis.

RQ2: Do FEP scores differ at different levels of antisocial traits in individuals diagnosed with schizophrenia?

H_02: FEP scores do not differ at different levels of antisocial traits.

H_a2: FEP scores do differ at different levels of antisocial traits.

RQ3: Do psychosis and antisocial traits interact in individuals diagnosed with schizophrenia?

H_03: There is no interaction between psychosis and antisocial traits.

H_a3: There is an interaction between psychosis and antisocial traits.

A 2 x 2 ANOVA was used to address these three questions.

RQ4 Do facial emotional perception, psychotic state, and antisocial traits predict a history of violence in adults with schizophrenia?

H_04: FEP, psychotic state, and antisocial traits can predict history of violence in adults with schizophrenia

H_a4: FEP, psychotic state, and antisocial traits cannot predict the history of violence in adults with schizophrenia.

Logistic regression was used to address this last question.

Data Collection

Secondary Data Procurement

The data was obtained from a large primary study conducted by the Rutgers University Division of Schizophrenia (RUDSR) conducted from November 2014 to November 2016. The primary study obtained 19 measures from schizophrenic adults with psychosis. A formal data release agreement was obtained (Appendix A)

The data released for this dissertation included measures of FEP, psychosis, and antisocial traits of schizophrenic individuals with a history of violence. I contributed to the study with approval from the Rutgers University Institute of Research Board (RUIRB). My primary role was to post the recruiting flyer in the north New Jersey campus of the university.

Fifty-one participants were initially interviewed for the Rutgers study. Of these, the primary investigator at Rutgers disqualified three cases who failed the screening (due to instability or threatening behavior during the interviews), three provided incomplete and unscorable responses, and three withdrew from the interviews. The current researcher did not include four additional participants who have psychosis related to a nonschizophrenia diagnosis (such as major depressive disorder and bipolar disorder). Therefore, the final sample size was 38.

The physical research data was maintained by RUDSR. Access to the database was provided through a time-limited password and by logging into a coded portal. The data consisted of participant codes, basic demographic data, the Penn Computerized Neuropsychological emotional perception subtest scores, Positive and Negative

Symptoms Scales, and the Hare Psychopathy Checklist scores. The original data were initially loaded into MS Excel to validate that the transfer of data did not include visually detectable errors, and subsequently transferred to SPSS for statistical analysis.

Conversion of Data

To measure psychosis, the means of the five PANNS subtests were calculated, and from these, a grand mean was determined. Those above the mean were scored as high psychosis and these below the mean were scored as low psychosis.

To measure antisocial traits, scores were obtained from the HPCL based from a range of 1-20. A score of 12 or above was classified as high in psychopathy traits and a score below 12 as low in psychopathy traits. The FEP scores were not transformed but treated as continuous variables.

Sample Characteristics

Table 1 provides the demographic profile of the participant set. Participants ranged in aged 18 to 55, with 30% falling within the 46-55 age range. In addition, 79% were males and 63% blacks. The education distribution shows high school or GED education 21%, vocational training 8% and special education 18%. Half of the participants have a history of violence and this proportion, 8 % was mild, 30% was moderate, and 12 % was severe moderate, and 13% were severe. The sample characteristics reflected the characteristics of schizophrenia population as discussed in Chapter 2. To reiterate, schizophrenia tends to manifest its symptom earlier in males. However, the higher percentage in a particular ethnic group was reflective of the location of the study.

Table 1

Demographic Characteristics of Study Samples Participants (N= 38)

Characteristic	Frequency (*n*)	%
Gender		
Male	30	79
Female	8	21
Age		
18-25	7	18
26-35	10	26
36-45	10	26
46-55	11	30
Ethnicity/Race		
White	8	21
Black	24	63
Native American	1	3
Asian	4	10
Other	1	3
Education		
9th-11th Grade	9	24
High School/GED	8	21
Some College	9	24
Completed College	2	5
Vocational Training	3	8
Special Education	7	18
Types of Violence		
None	19	50
Mild	3	8
Moderate	12	30
Severe	4	12

PreAnalysis Data Treatment

Missing Data and Outliers

Two methods were utilized to determine case outliers. The first method was quartile approach via Boxplots and histograms from the three variables (FEP, psychosis and antisocial). There were no potential outliers identified in the facial emotional perception score distribution (Figures 1 and 2). However, the independent variables showed a potential outlier: Case #38 for psychosis (Figure 3) and Case #38 for antisocial (Figure 4). When examining uncategorized data, potential outliers were noted in the severity of psychosis (Case #38) and antisocial score distribution (Case #38). Likewise, potential outliers were observed in antisocial trait using boxplot and histogram (Figures 5 and 6).

A second method was utilized to determine outliers. To statistically confirm the potential outlier, the Mahalobinis distance measures were applied. This measure was considered as a powerful method to detect outliers in two or three variables by comparing them at the same time using SPSS. The Mahalabonis measure of method considers the different scales between the three variables (FEP is continuous, while psychosis and antisocial variables were dichotomous)**.** The Mahalanobis distance metric is based on a chi-square distribution (Xiang, Nie, & Zhang, 2008). Using this method, outliers for the FEP, psychosis, and antisocial cases were determined. With a critical value of 16.32 (from the chi-square table) the three variables did not have significant outliers. This meant that all 38 cases were within the normal curve and thus could be used for computation.
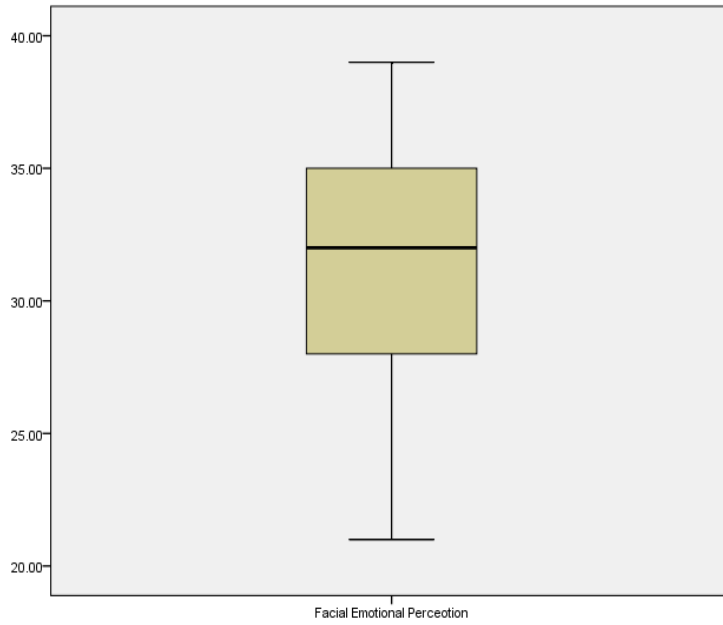
Figure 1. Box Plot Outlier for Facial Emotional Perception
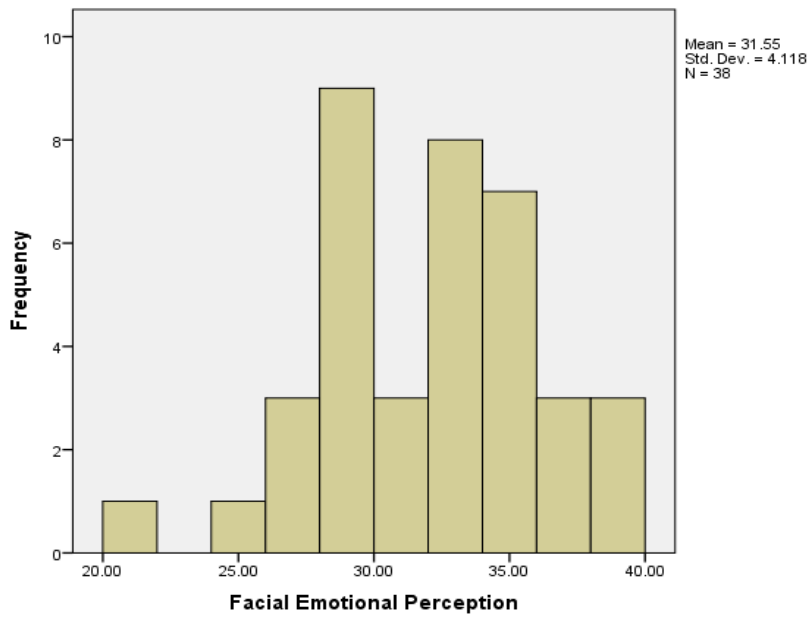

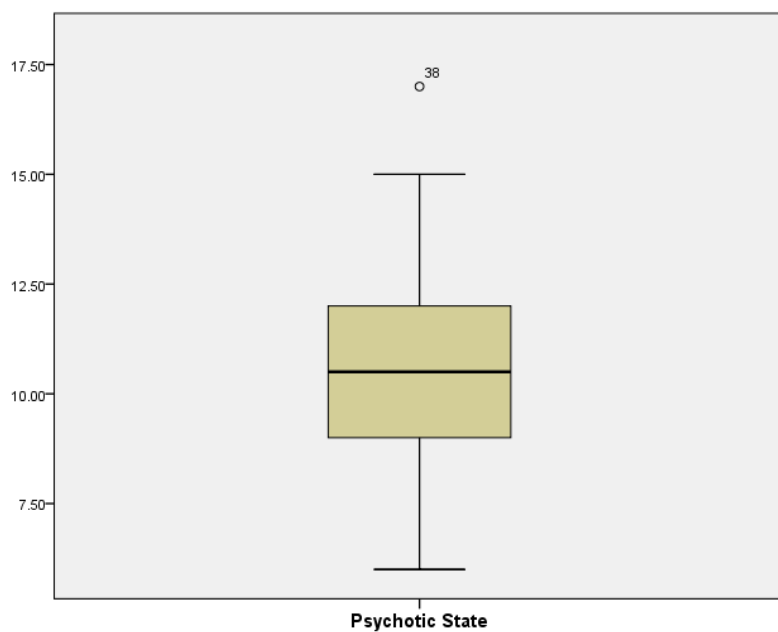*Figure 2*. Histogram for Facial Emotional Perception Score Outlier
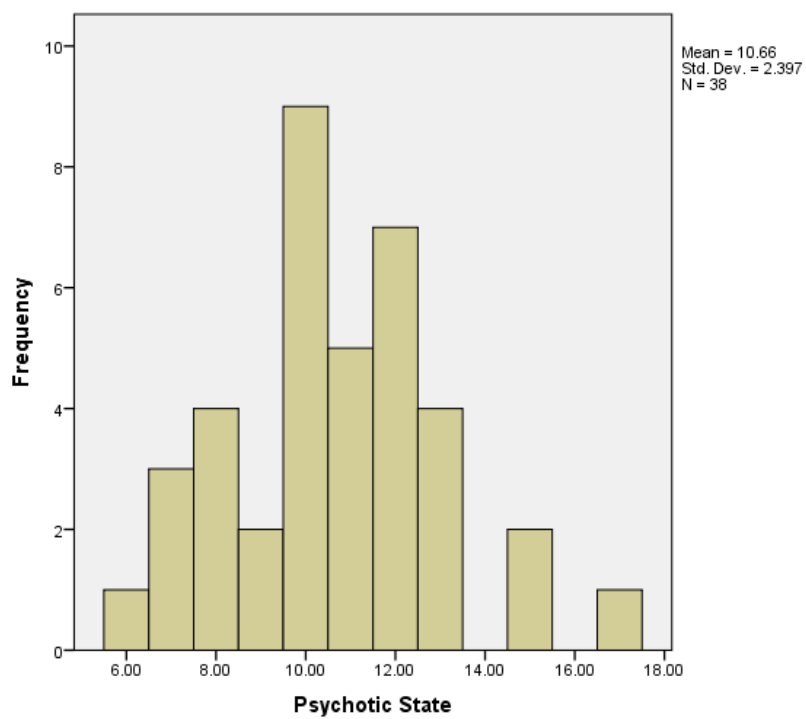
Figure3. Boxplot for Psychotic State Scores Outlier
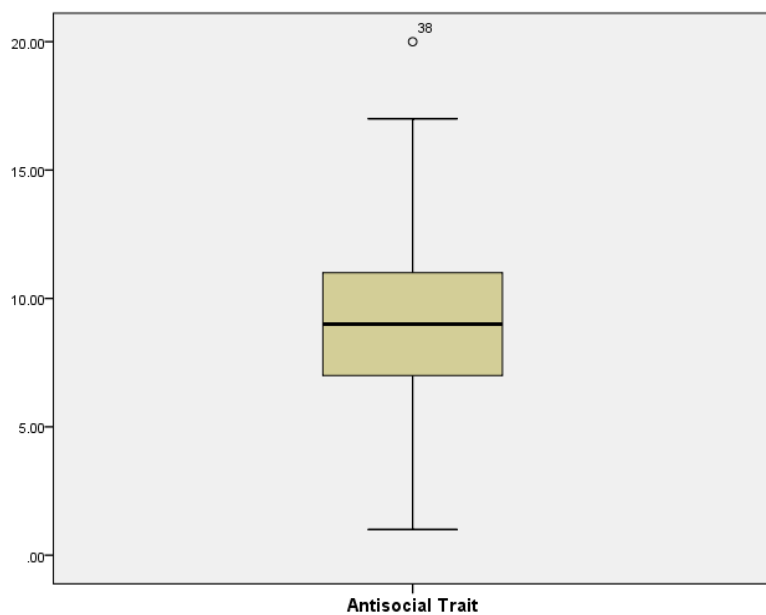

Figure 4. Histogram for Psychotic State Scores Outlier
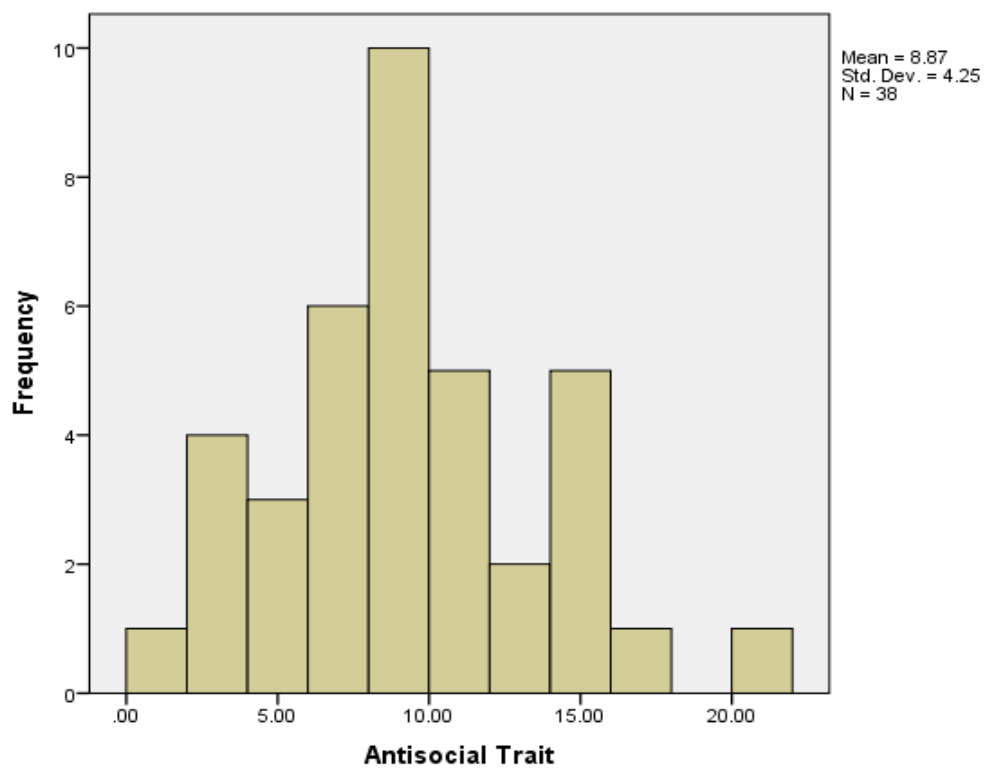
Figure 5. Boxplot for Antisocial Scores

Figure 6. Histogram for Antisocial Trait Scores

Assumption Testing for ANOVA

Assumption #1: The dependent variable (DV) should be measured at the continuous level (Laerd, 2015). Facial Emotional Perception (FEP), the dependent variable, was measured using the Penn CNP. The scores were responses to 40 facial stimuli presented to the participants. The scores ranged from zero to 40, a continuous measure. The first assumption was met.

Assumption #2: The independent variables should consist of two or more categorical, independent groups (Laerd, 2015). There were two independent variables in this study. The first variable was severity of the psychotic state (psychosis state, High and Low), the second independent variable was severity of the antisocial trait (antisocial high or antisocial low). Psychosis scores were obtained from the PANNS seven-point scale test. Antisocial Traits scores were obtained from the HPCL scores. The scores from these measures followed previous studies' conversions in the severity levels of high and low from study norms. As such, Assumption 2 was met.

Assumption #3: Independence of observations, (Laerd, 2015). This assumption means that there should be no relationship between the observations in each group or between the groups themselves. The scores in the tests were from different participants. Assumption 3 was met.

Assumption #4: The dependent variable should be approximately normally distributed for each combination of the groups of the two independent variables (Laerd, 2015). Table 2 shows the approximation of a normal distribution. Assumption 4 was met.

Table 2

Test of Normality of Facial Emotional Expression

Test of Normality	*Statistic*	*Df*	*Sig*
Kolmogorov-Smirnov	.111	38	.2
Shapiro-Wilk	.976	38	.57

Data were normally distributed, as assessed by Shapiro-Wilk's test, at p=.147 (>.05), .262 and. 631 (p > .05).

Assumption #5. The variance of the scores should be equal. The two-way ANOVA assumes that the (population) variances of the dependent variable (or residuals) are equal in all combinations of groups of the independent variables; if the variances are unequal, this can affect the Type I error rate independent variables.

The assumptions on normality and homogeneity of variance on the independent variables were not applicable to this analysis because the variables were categorical.

Results

Overview of Statistical Analysis

The purpose of this study was to explore the relationship between the social cognition construct of facial emotional perception and clinical variables in schizophrenia (psychotic state and antisocial traits). The second purpose of the study was to examine if the social cognition and clinical variables can predict participants with a history of violence. To answer the research questions, two statistical approaches were utilized: 2x2 Between Subject Analysis of Variance and Logistic Regression. Table 3 summarized the

variables for each of the hypotheses, the level of measurement, and the tests to assess

statistical significance.

Table 3

Variables and Statistics Associated with Each Hypothesis

Hypothesis	DV	IV	Level of Measurement (DV/IV)	Statistics
H1	FEP	Severity of Psychosis	Continuous/Nominal	ANOVA Main Effect
H2	FEP	Severity of Antisocial Trait	Continuous/Nominal	ANOVA Main Effect
H3	FEP	Psychotic State Antisocial Trait	Continuous/Nominal Continuous/Nominal	ANOVA Interaction Effect
H4	History of Violence	Psychotic State Antisocial Trait FEP	Nominal/Continuous	Binary Logistic Regression

Table 4 shows the description of the means for each group across the cells.

Table 4

Summary of Analysis of Variance Descriptive Statistics

Dependent Variable FEP Psychosis	Antisocial	Mean	SD	*n*
High	High	16.0000	.00000	3
	Low	20.6364	2.50091	11
	Total	19.6429	2.95107	14
Low	High	21.4286	1.81265	7
	Low	20.6471	2.17776	17
	Total	20.8750	2.07076	24
Total	High	19.8000	3.01109	10
	Low	20.6429	2.26428	28
	Total	20.4211	2.46743	38

Research Question 1

RQ1: Do FEP scores differ at different levels of psychosis in individuals

diagnosed with schizophrenia?

H_{01}: FEP scores do not differ at different levels of psychosis.

Ha_1: FEP scores do differ at different levels of psychosis.

The null hypothesis was not confirmed. $F (1, 37) = 10.16$. $p=.0003$ ($<.05$), partial

$\eta 2 =.23$.

Research Question 2

RQ2: Do FEP scores differ at different levels of antisocial traits in individuals

diagnosed with schizophrenia?

H_02: FEP scores do not differ at different levels of antisocial traits.

Ha2: FEP scores do differ at different levels of antisocial traits.

The null hypothesis was not confirmed. $F(1, 34) = 13.31$, $p = .001$, partial $\eta2 = .281$.

Research Question 3

RQ3: Do psychosis and antisocial traits interact in individuals diagnosed with schizophrenia?

H_03: There is no interaction between psychosis and antisocial traits.

Ha3: There is an interaction between psychosis and antisocial traits.

Table 5 shows that there is a statistically significant interaction between psychotic states and antisocial trait for FEP, $F(1, 37) = 10.083$, $p = .0030$ (<.05), partial $\eta2 = .23$.

Table 5

Summary of Analysis of Variance Statistics

Source	Df	F	n^2	p
Psychosis	1	10.162	0.23	0.003
Antisocial	1	5.104	.131	.030
Psychosis*Antisocial	1	10.083	.229	.003
Error	34			

Figure 7 shows the interaction effect of severity of psychosis and severity of antisocial trait to facial emotional perception. Figure 9 indicates that there is a reverse relationship between Psychosis and Antisocial Scores with respect to FEP. A high FEP score is associated with high anti-sociability and high psychosis but is also associated with low anti-sociability and high psychosis; this relation is reversed with a different level of each.

(The crossing of the line or cross over is also known as a disordinal interaction effect

(Widaman et al. (2012). A crossover interaction often indicates and suggests that a factor

has one kind of effect in one condition and the opposite kind of effect in
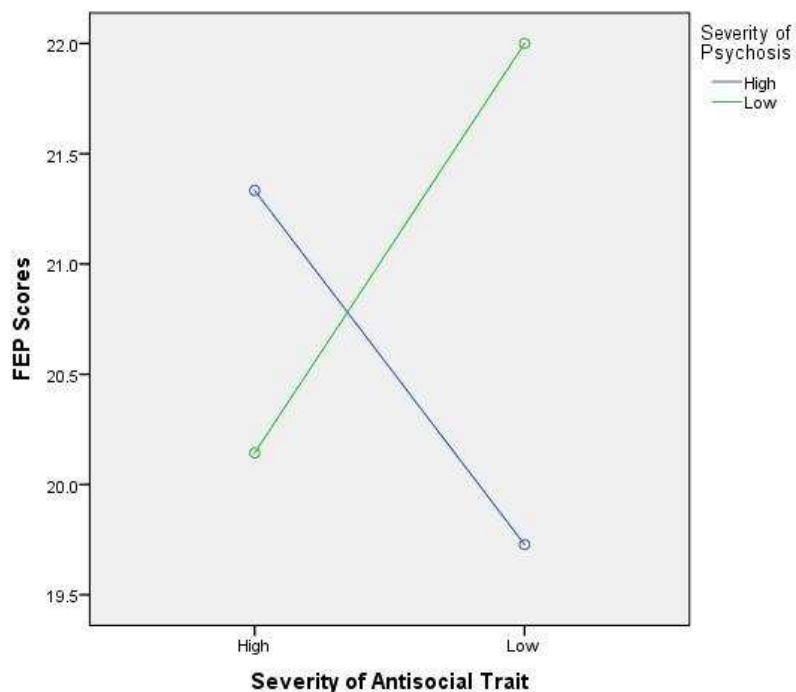
another condition.

Figure 7. Profile Plot of Severity Psychosis, and Severity Antisocial Interaction

Research Question 4

RQ4: What is the likelihood of history violence based on facial emotion

perception ability, psychosis, and antisocial traits?

H04: The likelihood is zero

Ha4: The likelihood is greater than zero

To address research question 4, the data were analyzed using logistic regression (LR) model. The criterion for this model was history of violence, and the predictors were uncategorized measures of psychosis, antisocial traits, and facial emotional perception. Additionally, moderation and mediation effects were examined to clarify the interaction of antisocial traits, psychosis, and social cognition. Prior to statistical analysis, the following section discussed the assumption testing of logistic regression (LR).

Assumptions Testing of Binomial Logistic Regression

Assumption #1. Assumption of measures for the dependent variable. A binomial logistic regression assumes that there is one dichotomous dependent variable (Laerd, 2015). In this study, the dependent variable was history of violence with two levels: no history, with history. The assumption on measures of the dependent variable was met.

Assumption #2. Assumption on measures of independent variables. Logistic regression requires that at least one of the dependent or predictor variables is measured on either a continuous or nominal scale (Laerd, 2015). In this study, the three predictors were all measured on a continuous scale: facial emotional perception score (FEP from emotional discrimination subscale of the Penn computerized neuropsychological test), severity or level of psychotic state (from Positive and Negative Symptom Scale or PANNS), and the severity of antisocial trait (from Hare Psychopathy Checklist). The assumption was met.

Assumption **#3.** Assumption on number of cases per predictor. Logistic regression requires a minimum case per independent variable. Statisticians vary on the recommended number of cases depending on the measures of the predictor (Bergtold,

Yeager, & Featherstone, 2011; Calvo & Dominguez, 2002; Ferrenberg, 2013, Laerd,

2015). A minimum of 10 cases is suggested when the predictor is non-categorical, and 15

cases are recommended if the predictors are categorical (Calvo & Domingues, 2002).

Since there were three predictors, all of which were continuous measures, the number of

cases should range from 30-45. This study had 38 cases, thus the assumption was met.

 Assumption#4. Assumption on linearity**.** There should be a linear relationship

between the IV and DV. Linearity of the continuous variables with respect to Bonferroni

logit of the dependent variable was assessed via the Box-Tidwell (1962) procedure. A

Bonferroni correction (.05/7) was applied using all seven terms in the model resulting in

statistical significance being accepted when $p < .00714$ (Tabachnick & Fidell, 2014).

Based on this assessment, all continuous independent variables were found to be linearly

related to the logit of the dependent variable.

 Assumption #5. Assumption on non- multicollinearity. The independent variables

should not be highly correlated (Laerd, 2015). Absence of multicollinearity was detected

through an inspection of correlation coefficients and Tolerance/VIF values. Table 6

shows the non-collinearity of the independent variable FEP, psychosis, and antisocial

traits.

Table 6

Collinearity of FEP, Psychosis State, and Antisocial Trait

	Collinearity Statistics	
Variable	Tolerance	VIF
Facial Emo Perception	.962	1.039
PANNS Psychosis Score	.942	1.082
Hare Psychopathy	.921	1.086

Note. Dependent variable: history of violence

The acceptable cut off for Tolerance was <.1 (.96), thus the null hypothesis was rejected. The VIF greater than <10 are acceptable. Overall, the values show that there is no Collinearity for FEP, psychosis, and antisocial variables. The assumption was met.

Binary Logistic Regression (LR) Analysis.

The logistic regression model was statistically significant, $\chi2$ (3) = 7.917, p < .05. The model explained 25.0% (Nagelkerke R2) of the variance in history of violence and correctly classified 66.0% of cases. Sensitivity was 68.7%, specificity was 63.6%, positive predictive value was 65.5%, and negative predictive value was 25.3%. Of the three predictor variables (FEP, psychotic state, and antisocial trait), only one was statistically significant: antisocial trait. Those with antisocial traits have 1.3 odds of having a history of violence. Table 7 summarizes the data showing that Psychotic state and facial emotional Perception scores did not predict a history of violence.

Table 7

Logistic Regression Predicting Likelihood of Violence from FEP, Psychotic State and Antisocial Trait

Variables	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for Exp(B)	
							Lower	Upper
FEP	.089	.156	.236	1	.568	1.093	.805	1.485
PANNS	-.007	.058	1.760	1	.185	.926	.826	1.037
HPCL	.234	.111	4.404	1	.036	1.263	1.016	1.572
Constant	-1.167	4.265	.075	1	.784	.311		

Summary

The purpose of this study was to examine the relationship of psychosis state and antisocial trait to facial emotional perception. The study also examined if a recent history of violence can be predicted from facial emotional perception, psychosis, and antisocial traits. A Two-way analysis of variance was employed to examine the relationship of the dependent (FEP) and independent variables (psychosis and antisocial traits), and binary logic regression was utilized to explore if the criterion (recent history of psychosis) can be predicted from the predictors FEP, psychosis, and antisocial traits. The result showed that the null hypothesis (RQ1H0), FEP scores do not differ in psychosis, was rejected. The null hypothesis (RQ2 H_0), FEP scores do not differ in severity of antisocial traits, was also rejected. The null hypothesis (RQ3H0), there is no interaction between psychosis and antisocial traits was rejected. Finally, the null hypothesis (RQ4H$_0$), there was a difference in the independent variables, was rejected. Of the three variables, antisocial trait predicts a recent history of violence.

Thus, results indicate that though FEP is complexly related to antisocial traits and psychosis, FEP does not function to predict violence. This is consistent with the hypothesis that psychosis in schizophrenia is a predictor of violence when the patient is acutely ill or in the inpatient setting (Volavka and Citrome, 2011). When the clients are stabilizing or discharged to a less acute setting (such as partial hospitalization, the setting of this study), antisocial traits (not psychosis) are the predictor.

Chapter 5 is a discussion of the implications of the statistical analyses. Comments will be presented on the relations of the results to each of the four research questions. The limitations of the study will also be discussed and how the results relate to the rest of the literature. Finally, implications related to future research and social change will be discussed.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

Information from mass media frequently assumes a simple relationship between mental illness and violence. However, studies on mental illness and violence point to a complex relationship between mental illness and violence. The complex relationship is often related to factors such as homelessness, poverty, substance abuse, personality traits, and social cognition (Elbogen & Johnson, 2009).

Social cognition, mental operations involved in perceiving, interpreting, and responding (Green at. al, 2010) to facial expression and body language, are vital in communication. Social cognition can be compromised in some individuals with schizophrenia (Green, Bearden, Cannon, Fiske, & Nuechterlein, 2011) and has been hypothesized to be associated with violent behavior (Tso, Mui, Taylor, & Deldin, 2012; Tso, 2012). For example, social cognition studies have explored the areas of emotion processing, social relationship perception, and understanding the mind of others (Green et al., 2011).

The focus of this study was social cognition as manifested by FEP. FEP refers to how an individual recognizes and discriminates emotion as expressed facially (Jaracz, 2010; Kohler, 2010). This study investigated the relationship of FEP to psychosis and antisocial traits. Additionally, this study examined if FEP, psychosis, and antisocial traits could predict a history of violence.

There has been limited work investigating the relationship of social cognition to clinical and cognitive variables and violence in schizophrenia. The results of the study

can also aid in suggesting the variables that can correspond to a treatment approach. For example, Volavka et al. (2011) posited that violent individuals with broad and state symptoms (such as hallucinations, delusions, and anger) tend to respond to medication. As related to this study, violent individuals with additional personality traits such as antisocial behavior tend to respond to interventions that address deficits in social cognition (Kurtz and Richardson, 2012).

Purpose and Nature of the Study

The purpose of this secondary data analysis was to investigate social cognition in schizophrenia. To accomplish this, I examined the relationship of social cognition abilities to psychosis and antisocial behaviors. Additionally, the relationship of a recent history of violence to social cognition and clinical behaviors were analyzed.

The data were analyzed in two phases. In the first phase, the role of social cognition in psychosis and antisocial traits was examined. A two-way analysis of variance was conducted: FEP was the dependent variable in this analysis, and the independent variables were clinical categories of psychosis and antisocial traits.

Logistic regression was utilized to determine the likelihood of history violence. The criterion for this model was history of violent behavior, and the predictors were uncategorized measures of psychosis, antisocial traits, and FEP ability.

Key Findings

FEP and psychosis. The first research question explored the relationship of FEP to the severity of psychosis state. The results showed that there was a statically significant difference in FEP scores at different levels of psychosis. In other words, in

schizophrenia, reading the emotion of others can be affected by the degree of hallucination and delusions. Since hallucination and delusions are present in schizophrenia (or also called as core symptoms of schizophrenia), when the core symptoms are not managed or controlled (leading to severity), the perception of emotion gets distorted (Silverstein & Keane, 2013).

These results support the findings by Amminger et al. (2012) that there was a correlation between deficiency in emotional perception and psychosis and the more severe the psychosis, the more severe the deficiency in perception. Findings from separate studies also point out the severity of psychosis is related to reduced perceptual organization; i.e. the higher the visual disintegration the more severe is the schizophrenia (Goghari & Vogt, 2014; Silverstein & Keane, 2013; Silverstein et al., 2014).

FEP and antisocial traits. The second research question explored the relationship of FEP to antisocial traits. There was a statistically significant difference in facial emotional perception scores at different levels of antisocial traits. This means that the presence or absence of antisocial traits was related to the accuracy of recognizing facial emotional expression. The results showed that participants who have antisocial traits have poorer facial emotional perception than those with no antisocial traits.

FEP, psychosis, and antisocial traits. The third research question explored the relationship of psychosis and antisocial traits to FEP. The results showed that there was a statistically significant interaction between severity of psychosis state and severity of antisocial traits. This means that-FEP is determined by the combined effect of severity of psychosis and the presence of antisocial trait. However, the nonordinal interaction of

psychosis and antisocial trait with FEP indicates the complexity of social cognition. It suggests that social cognitions among people with schizophrenia can function at a high level under several comorbid conditions.

Predictor of violence. A separate analysis of the data examined the relationship between FEP, psychotic state, antisocial trait, and a history of violence. The criterion variable was a history of violence, and the predictor variables were FEP, psychotic state, and antisocial traits. This analysis was employed to determine if the three variables predict a recent history of violence. The results of the logistic regression model were statistically significant. However, only one variable was statistically significant: antisocial trait. In other words, while social cognition (in the form of FEP), antisocial traits, and severity of psychosis are related, they interact. Thus, FEP does not singly predict if someone with schizophrenia was violent or not. What predicted violence was the comorbid antisocial trait condition. These results supported the theory of pathway to violence in schizophrenia, which identified the antisocial trait as one of the two pathways predicting violence (Demirbuga et al. 2013). Thus, FEP appears to be a risk factor but not a predictor of violence.

Since there were limited studies that explored the relationship between social cognition and violence in schizophrenia, the first three research questions were designed to set the ground on variables that may be related to social cognition in schizophrenia. The fourth research question then posed the question of which social cognition variable was related to violence.

The results of this study pointed out the variables associated with FEP are related in a complex manner. The data showed there was an interaction precisely described as a disordinal interaction between FEP, psychosis, and antisocial traits. However, results from the fourth research question suggest that mental illness and violence do not have a simple relationship and that social cognition is not a dominant factor. Of the three independent variables, antisocial trait is the significant predictor. These results are consistent with previous studies on the relationship of psychosis to violence. Psychotic state, a measure of FEP in schizophrenia, is a risk factor but not a predictor (Volavka & Citrome, 2011).

As briefly discussed in Chapter 2, the theory of pathways to schizophrenia posited that there are two routes that contribute to violence in schizophrenia. The first pathway refers to aggressive adults who have high psychosis. The second pathway refers to aggressive adults who have low psychosis but have a history of childhood aggression and violence (such as hurting animals, burning objects and properties, or behavioral problems in school and the neighborhood). These children develop antisocial traits, such as stealing, destruction of properties, assault, and fatally hurting others (Fazel et al., 2009). From the treatment perspective, adults who have a developmental history of violence (second pathway) do not significantly respond to medication but do respond better to behavioral interventions (Silverstein et al., 2015). The results of the logistic regression in this dissertation were in line with the developmental history of aggression, or the second pathway to violence.

Interpretation of the Findings

The core symptoms of schizophrenia are hallucinations and delusions. There is a common notion that violent acts are directly linked with these core symptoms. This notion is not supported by empirical studies which posit a more complicated link. There are many studies that examine what contributes to this complex link. The studies have conflicting results due to differences in methodology, definition, and measures (Barkatai et al., 2005; Hodgins & Riaz, 2011; Large & Nielssen, 2011; Sune Bo & Abu-Akel, 2011). Most studies focused on demographic characteristics (Hodgins & Riaz, 2011; Large & Nielssen, 2011), cognitive variables such as intelligence, memory, executive functioning (Barkataki et al., 2005), as well as developmental (Sune Bo & Abu-Akel, 2011) and clinical variables (Silver et al., 2005). There were limited studies that explored social cognitive factor variables such as poor facial emotional recognition and reduced facial emotion discrimination as factors in explaining a history of violence (Amminger et al., 2012; Linden et al., 2010; Turetsky et al., 2007). Since intervention in schizophrenia and violence provide not only empirical data, but also social value on violence and schizophrenia, this dissertation explored social cognition aspects of schizophrenia and violence.

Previous studies have separately paid attention to the relationship of FEP to psychosis, or FEP to antisocial traits (Carter et al., 2009; Green et al., 2011; Mancuso, et al., 2011). My study explored the impact of psychosis state and antisocial traits in emotion processing and violence in schizophrenia. In general terms, it examined the relationship of emotion processing impairment to the severity of psychosis

(hallucinations and delusions), antisocial traits, and the contribution of each of these to violent behavior.

The research questions addressed in this study were designed to examine these relationships in detail. The results of this study confirmed previous work, which posited that schizophrenia patients with high psychosis tend to have lower scores on facial emotional processing. In other words, psychotic symptoms such as hallucinations, delusions, and paranoia are related to a decreased accuracy in differentiating the intensity of happy, sad, and neutral expressions (Pinkham et al. 2011; Turetsky et al., 2007).

The result of this dissertation also supported previous studies on FEP in schizophrenia which showed that identification and discrimination of positive and negative emotions (happy, excited, sad, and angry) were somewhat slower and less accurate in individuals with schizophrenia compared to control groups (Kholer et al., 2009).

The theory of perceptual organization is also consistent with the findings of this study. Perceptual organization theory posits that individuals with schizophrenia tend to perceive fractured and distorted facial images. Thus, when asked to describe the emotion of these faces, they report erroneous expressions (Norton et al., 2009). In particular, the perceptual organization theory describes visual hallucinations and subsequent delusions (thought problems) as a manifestation of individual's responses to the disintegrated or disorganized perception. This disorganization contributes to misperceived facial recognition and facial expression discriminations.

The results of this study are also consistent with the theory of the mind, which describes how the perception of a distorted face elicits lack of empathy (Ang & Pridmore, 2009). In other words, the combination of the severity of psychosis (related to perceptual deficits) and a lack of social connection with the misperceived face contributes to poor social cognition as manifested by poor facial expression-detection.

Social Cognition and Violence in Schizophrenia

The second pathway of the developmental theory of aggression is also known as the *trait pathway*. Adults with schizophrenia who follow this pathway tend to have mild or low core symptoms but have high comorbid trait of antisocial traits. As discussed in the previous section, adults whose violence has a childhood root or who have a history of childhood violence, tend to respond to interventions that emphasize social cognition (Horan et al., 2009; Kurtz & Richardson, 2012). The results of the logistic regression analysis of this dissertation support the trait pathway and indirectly support the relationship of social cognition in schizophrenia violence. To extend the interpretation, this means that improving social cognition can improve empathy (from the theory of mind) in individuals with comorbid antisocial traits. A study by Horan et al. (2009) showed that social cognition training improved emotion perception. Compared with the control group, the participants in social cognition training showed better social relationships and less aggression. Thus, the results of my study, which support the trait pathway to violence in schizophrenia, indirectly support the view that social cognition in schizophrenia can be improved through emotion perception enhancement training (Couture, Penn, & Roberts, 2006; Horan et al., 2009; Kurtz & Richardson, 2012) .

Summary of Interpretation

This dissertation study was a secondary analysis of data from adults age 18 to 55 who were patients in a partial hospital for symptoms of schizophrenia. There were 38 participants, half of whom have had a history of moderate violence. The study explored the role of social cognition, indicated by facial emotional perception, to psychosis and antisocial traits. The study also examined if these variables are predictors of a history of violence. The study's results contribute to the research on the relationship of social cognition in adults with schizophrenia.

This study indicated that social cognition is related to psychosis, antisocial behavior, and a history of violence in schizophrenia. It also indicated that while impaired social cognition is related to antisocial behavior and psychosis, an antisocial trait is sufficient alone to predict violence. In other words, deficient social cognition impacts functioning of adults with schizophrenia, but these variables do not necessarily directly contribute to violent acts.

Limitations

The secondary data was obtained from participants in partial hospital settings who had compromised social cognition, a moderate recent history of violence, and were under treatment. The findings may not generalize to individuals who have severe violence with no treatment or who are in a non-partial hospital setting. The sample was disproportionately male and African American, which may also limit generalizability. Finally, it is possible that the psychological and medication treatment of the participants in the study compromised how they responded.

Due to the limited number of participants, a split analysis could not be performed. This means that poor facial emotional perception is related to the combination of severity of psychosis (in particular, high psychosis) but its combination with high or low antisocial traits was not established in this dissertation. The presence of an interaction effect means that using the main effect of psychosis or the main effect of antisocial trait to fully explain poor perceptual discrimination is incomplete or misleading (Laerd, 2015). The results support the hypothesis of Silverstein et al. (2015) that state and trait variable are related to schizophrenia and, in particular, violence. Silverstein et al. (2015) however, did not include the variable of social cognition in the form of facial emotional expression in their review on variables that predict violence in schizophrenia.

Recommendations

Increasing the number of participants can lead to extended and more detailed examination of the relationship between state and trait variables in FEP and history of violence. The current dissertation study utilized a between-subject factorial ANOVA which collapsed the core symptoms into categories. Future studies can utilize the within-subject design factorial ANOVA to analyze the different aspects and combination of core symptoms, such as high in positive and low in negative symptoms and history of violence and low in positive and high in negative symptoms and history of violence.

Adding a control group of participants with no schizophrenia and or mental illness can highlight the relationship of social cognition on violence.

An alternative approach is to strive for a larger sample and use multi-regression analysis to examine the relationship between FEP, psychosis and antisocial trait. This

design poses the question differently, can utilize a smaller *n,* and can use FEP as a criterion variable and psychosis and antisocial as predictors.

Implication for Positive Social Change

Social cognition, as exhibited in facial emotional perception, can be deficient in some adults with schizophrenia. The results of this dissertation confirmed previous studies that the severity of psychosis (state) can affect that deficiency. The results also confirmed previous studies that the posited that the presence of antisocial behavior (trait) can affect that deficiency. This dissertation offered additional data to previous studies which posit the state versus trait relationship by presenting a state plus trait relationship to social cognition. In other words, the combinations of severe or uncontrolled psychosis, plus the presence of antisocial traits, contribute to poor facial emotional perception. The result of the study indirectly contributes to de-mystifying the simple link, and thus the resulting stigma, associating schizophrenia and poor social cognition.

The results of the study pointed to antisocial traits as a predictor of history of violence in schizophrenia, It not only added evidence to the developmental pathway theory of violence, but indirectly supported the significant role of environmental processes in adult behavior. This study indirectly supports the view that violence related to developmental and environmental processes (such as exposure to neglect, trauma, and toxins) will benefit from psychological intervention. Social cognition as manifested in emotional perception while deficient in schizophrenia can be improved.

Conclusion

This dissertation study explored the role of social cognition, indicated by facial emotional perception, to psychosis and antisocial traits. Additionally, the study examined the relationship of social cognition to violence. The findings of this study indicate that social cognition is related in a complex manner to psychosis, antisocial behavior, and violence in schizophrenia.

The findings also indicate that while impaired social cognition was related to psychosis and antisocial behavior, impaired social cognition is a risk, but not a predictor, of a history of violence. In other words, deficient social cognition impacts facial interpretation and is related but not sufficient to contribute to violent acts. As such, having schizophrenia may be directly related to poor facial interpretation but not to violence.

This study contributed to demystify the notion that mental illness (such as schizophrenia) is directly related to violence, and it indirectly contributed to decreasing the stigma associated with the mental disorder. Lastly, the results indirectly provided support to the more positive outlook that by understanding the relationship of social cognition to violence, emotion perception training can improve functioning and social interaction, as well as decrease aggression.

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Appendix A Data Release Agreement

This Data Use Agreement ("Agreement"), effective as of 01/30/2015, is entered into by and between <u>Clarita V. Hipol Ligot</u> ("Data Recipient") and Rutgers <u>University Behavioral Healthcare Division of Schizophrenia Research</u> ("Data Provider"). The purpose of this Agreement is to provide Data Recipient with access to a Limited Data Set ("LDS") for use in scholarship/research in accord with laws and regulations of the governing bodies associated with the Data Provider, Data Recipient, and Data Recipient's educational program. In the case of a discrepancy among laws, the agreement shall follow whichever law is stricter.

1. <u>Definitions</u> . Due to the project's affiliation with Laureate, a USA-based company, unless otherwise specified in this Agreement, all capitalized terms used in this Agreement not otherwise defined have the meaning established for purposes of the USA "HIPAA Regulations" and/or "FERPA Regulations" codified in the United States Code of Federal Regulations, as amended from time to time.

2. <u>Preparation of the LDS.</u> Data Provider shall prepare and furnish to Data Recipient a LDS in accord with any applicable laws and regulations of the governing bodies associated with the Data Provider, Data Recipient, and Data Recipient's educational program. There is no further provider IRB review is needed for the release of this data

3. Data Fields in the LDS. No direct identifiers such as names may be included in the Limited Data Set (LDS). In preparing the LDS, Data Provider shall include the data fields specified as follows, which are the minimum necessary to accomplish the project: The data points that List all data points that partner site will be providing (Example: gender, SAT scores, and high school GPA for every student in ABC program).

30-40 participant scores on the following instruments

Positive and Negative Symptom scales (PANNS)

International Personality Examination Screening Questionnaire (IPESQ)

PENN Computerized Neuropsychological Battery (PENN CNP)

4. Responsibilities of Data Recipient. Data Recipient agrees to:

a. Use or disclose the LDS only as permitted by this Agreement or as required by law;

b. Use appropriate safeguards to prevent use or disclosure of the LDS other than as permitted by this Agreement or required by law;

c. Report to Data Provider any use or disclosure of the LDS of which it becomes aware that is not permitted by this Agreement or required by law;

  d. Require any of its subcontractors or agents that receive or have access to the LDS to agree to the same restrictions and conditions on the use and/or disclosure of the LDS that apply to Data Recipient under this Agreement; and

  e. Not use the information in the LDS to identify or contact the individuals who are data subjects.

5. <u>Permitted Uses and Disclosures of the LDS.</u> Data Recipient may use and disclose the LDS **for the present project's activities only**.

6. <u>Term and Termination.</u>

  a. <u>Term</u> . The term of this Agreement shall commence as of the Effective Date and shall continue for so long as Data Recipient retains the LDS unless sooner terminated as set forth in this Agreement.

  b. <u>Termination by Data Recipient.</u> Data Recipient may terminate this agreement at any time by notifying the Data Provider and returning or destroying the LDS.

  c. <u>Termination by Data Provider.</u> Data Provider may terminate this Agreement at any time by providing thirty (30) days prior written notice to Data Recipient.

d.   For Breach. Data Provider shall provide written notice to Data Recipient

within ten (10) days of any determination that Data Recipient has

breached a material term of this Agreement. Data Provider shall afford

Data Recipient an opportunity to cure said alleged material breach upon

mutually agreeable terms. Failure to agree on mutually agreeable terms for

cure within thirty (30) days shall be grounds for the immediate termination

of this Agreement by Data Provider.

Effect of Termination. Sections 1, 4, 5, 6(e) and 7 of this Agreement shall survive

any termination of this Agreement under subsections c or d.

7. Miscellaneous.

a.   Change in Law. The parties agree to negotiate in good faith to amend this

Agreement to comport with changes in federal law that materially alter

either or both parties' obligations under this Agreement. Provided,

however, that if the parties are unable to agree to mutually acceptable

amendment(s) by the compliance date of the change in applicable law or

regulations, either Party may terminate this Agreement as provided in

section 6.

b.   <u>Construction of Terms.</u> The terms of this Agreement shall be construed to give effect to applicable federal interpretive guidance regarding the HIPAA Regulations.

c.   <u>No Third Party Beneficiaries.</u> Nothing in this Agreement shall confer upon any person other than the parties and their respective successors or assigns, any rights, remedies, obligations, or liabilities whatsoever.

d.   <u>Counterparts</u> . This Agreement may be executed in one or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument.

e.   <u>Headings</u> . The headings and other captions in this Agreement are for convenience and reference only and shall not be used in interpreting, construing or enforcing any of the provisions of this Agreement.

IN WITNESS WHEREOF, each of the undersigned has caused this Agreement to be duly executed in its name and on its behalf.

DATA PROVIDER   DATA RECIPIENT

Signed: _[signature]_   Signed: clarita.hipolligot@waldenu.edu

Print Name: Steven M. Silverstein, Ph.D.   Print Name: Clarita Hipol Ligot

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