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Bridget M. Hegeman
The University of Montana

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FUNCTIONING IN SCHIZOPHRENIA AND SCHIZOAFFECTIVE DISORDER: QUALITY OF LIFE, SYMPTOM PRESENTATION, LANGUAGE PRODUCTION, AND NEUROCOGNITIVE ABILITIES

by
Bridget M. Hegeman
M.A. University of Montana, 1997
B.S. University of Illinois, 1993

Presented in partial fulfillment of the requirements
For the degree of
Doctor of Philosophy
The University of Montana
May 2002

Approved by:
[Signature]
Chairperson
[Signature]
Dean, Graduate School

Date 6-6-02

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Within the field of mental health, the issues of quality of life, language production, social adjustment, neurocognitive functioning, and symptom presentation are considered important components in the assessment and treatment of psychiatric patients, especially those with the diagnosis of schizophrenia. These individual domains of functioning are critical to understanding the unique functioning of a person with schizophrenia. A primary focus of mental health services is the general ability of a person with schizophrenia to function adequately within the community. Domains such as those tapped by the variables in the present study impact the ability of a person to interact and relate to other people. In addition, these are areas that can be informally assessed after brief contact with another person, and they may provide information regarding effective interventions for the individual.

The present study assessed the variables of symptom presentation, subjective and objective quality of life, social adjustment, communication failures, as manifested in unclear references, and neurocognitive abilities. Results demonstrated that participants were exhibiting relatively few psychiatric symptoms and were functioning adequately in their social adjustment, although they evidenced some impairment in measures of neurocognitive abilities. Specific relationships among variables of interest are described.

Overall, despite having a diagnosis of a severe and persistent mental illness, the majority of the participants reported that they were generally satisfied with their lives. The most important finding of this study is that quality of life can be best predicted by the absence of high levels of depressive symptomatology, better overall social functioning, and by observations of language production to identify the frequency with which persons with schizophrenia use words in such a way that the intended meaning is not clear; surprisingly, ambiguous word references are associated with higher quality of life. The ultimate goal for working with persons with schizophrenia should be to increase the individual's overall ability to function adequately within the community in the hopes of improving their global life satisfaction. Several potential strategies for intervention are discussed.
Acknowledgements

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Functioning in Schizophrenia and Schizoaffective Disorder:

Quality of Life, Symptom Presentation, Language Production, and Neurocognitive Abilities

Within the field of mental health, the issues of quality of life and social adjustment, language production, neurocognitive functioning, and symptom presentation are considered important components in the assessment and treatment of psychiatric patients, especially those with the diagnosis of schizophrenia. This is especially evident in the outpatient treatment that many people with schizophrenia now receive and within the context of a move towards managed care and a greater emphasis on accountability. A primary focus of case managers and other outpatient treatment professionals is the general ability of the person with schizophrenia to function adequately within the community. Domains such as those noted above impact the ability of a person to interact with and relate to other individuals in the community.

Quality of life refers to the well-being of an individual in relation to objective factors, such as type of living situation, income, and number of social contacts, and also subjective evaluations of personal satisfaction with those factors; it is a positive indicator of well-being, as opposed to only measuring the absence of debilitating or unpleasant symptoms (Frisch, 1994; Lehman, 1996). Language production refers to the manner in which an individual communicates with others, and it often focuses on errors that result in a decrease in effective communication that are associated with psychopathology (Andreasen, 1979a, 1979b). Neurocognitive ability refers to the manner in which the brain functions and how this functioning is exhibited behaviorally, often through performance on cognitive assessments (Lezak, 1995). Social adjustment describes the functioning of an individual in social situations and within his or her community (Weissman, 1975). Evaluation of symptom presentation is important in the understanding of an individual’s experiences, especially in light of the fact that psychiatric symptoms can impact overall functioning, as well as performance in areas such as neurocognitive abilities and language production.
This study examined variables that are relevant to both researchers as well as to professionals and caseworkers who interact with persons with schizophrenia and related disorders on a regular basis. The variables are ones that other individuals, such as clinicians and caseworkers, are able to assess informally and have been demonstrated to be areas of great importance for functioning within the community. The present study evaluated variables of symptom presentation, quality of life (both subjective and objective), social adjustment, language production (specifically communication disturbances manifested through unclear references), and neurocognitive functioning (evaluated in the domains of attention/concentration, verbal memory, verbal fluency, higher cognitive functioning, and general mental abilities), to determine relationships among these domains of variables and to discover patterns predictive of outcome. It is apparent that the manner in which an individual functions, whether exhibited through symptoms, language, or neurocognitive abilities, can greatly impact his or her interactions with others, general social adjustment, and overall quality of life. Thus, it is important to understand the relationships among these variables in order better to understand the disease process, to provide adequate care to individuals with schizophrenia, and to assist in the improvement of their life situations.

This paper initially discusses issues related to the disorder of schizophrenia, including history of the illness, diagnostic and classification issues, common symptoms and their presentation, course, and outcome. The variables of interest for this study are then described in more detail. Quality of life, both in its current and its historical use, as well as relevant research, is explained. Social adjustment and its similarity to quality of life are described. Aspects of language production commonly seen in patients with schizophrenia are discussed in terms of common errors, theoretical underpinnings of these deviances, and strategies to measure such errors. Common patterns in the neurocognitive functioning of persons with schizophrenia are explored, while their relations to long-term outcome and specific tests for measuring performance are explained. Literature related to these different domains individually and relationships between
them is explored, after which the hypotheses, methods, and results for the present study are presented and discussed.

Introduction to Schizophrenia

Schizophrenia is a disorder involving disorganization of thought, serious difficulty distinguishing reality from fantasy, frequent delusions and hallucinations, and abnormalities in emotional expression, interpersonal relationships, attention, motivation, and drive (Andreasen, Arndt, Alliger, Miller, & Flaum, 1995). It is characterized by psychotic symptoms, such as hallucinations and delusions, as well as disorder of thought, as the defining features. It is also considered to be a heterogeneous disorder with an often-changing presentation, causing researchers to have trouble determining etiology, treatment, and even classification for individual patients (Andreasen & Carpenter, 1993; Malla, 1995a; 1995b). Schizophrenia is regarded by many to be a chronic, recurring disorder that is likely to affect multiple systems in the brain (Andreasen, et al., 1995; Malla, 1995a; Schultz & Andreasen, 1999).

The Diagnostic and Statistical Manual for Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR; American Psychiatric Association, 2000) presents diagnostic criteria for schizophrenia requiring that two or more active characteristic symptoms be present for at least one month, and signs of the disorder to be present for at least six months. The characteristic symptoms consist of delusions, hallucinations, disorganized speech, grossly disorganized or catatonic behavior, and negative symptoms. In addition, there needs to be a decreased level of functioning in one or more major life areas, such as employment, education, interpersonal relations, or self-care. There is general agreement that a diagnosis of schizophrenia can only be given to an individual who has at least several of the diagnostically relevant symptoms (DSM-IV-TR, 2000; Strauss, Carpenter, & Bartko, 1974). However, this allows for a variety of presentations within the disorder of schizophrenia and has resulted in an acceptance of the idea that schizophrenia probably involves multiple dysfunctions rather than one unitary process.
A disorder that is related to schizophrenia is schizoaffective disorder, in which an individual experiences an uninterrupted period of illness during which he or she also experiences a major depressive, manic, or mixed episode concurrent with the symptoms of schizophrenia (DSM-IV-TR, 2000). Specifically, the individual must experience one of a number of the symptoms of schizophrenia for the majority of the time during a one-month period. These symptoms are delusions, hallucinations, disorganized speech, grossly disorganized or catatonic behavior, and negative symptoms. In addition, during the same period of illness, delusions or hallucinations must have been present for at least two weeks in the absence of an affective disturbance.

The diagnosis of schizoaffective disorder is commonly given to those patients who have both affective and schizophrenic symptoms, but who do not clearly fit into the diagnostic categories of schizophrenia or bipolar disorder (Lapensée, 1992). After a review of the literature, Lapensée concluded that schizoaffective disorder appears to be a heterogeneous construct, which includes patients with a variety of presentations and predispositions to the disorder. It seems that schizoaffective disorder may be more similar to schizophrenia with a depressive component, although the debate is far from over, and this may depend to a great extent on the criteria used to define the disorder.

The diagnosis of schizophrenia is made in approximately .5 to 1.5% of the population in the United States, which has one of the highest reported rates for schizophrenia in the world (DSM-IV-TR, 2000). Explanations for the cross-national differences in prevalence of schizophrenia vary, but issues such as industrialization, life expectancies, or diagnostic practices and customs, which differ from other countries, may play a part (Torrey, 1987). The breadth of the prevalence range for schizophrenia is most often accounted for in terms of the variety of methodology (e.g., specific operational definitions, rural vs. urban populations, community vs. hospitalized populations) employed in different research that has studied prevalence rates of schizophrenia.
The onset for the disorder usually occurs in early adulthood, but it can develop at any age, and it has been seen in children as young as five years old. Males tend to develop schizophrenia earlier than females, often between the ages of 18 and 24 years, whereas females generally develop this disorder after age 25 (Larsen, McGlashan, & Moe, 1996; Moriarty, et al., 2001). A variety of factors have been associated with the development of schizophrenia, such as genetic vulnerability, season of birth effects, and, pregnancy and birth complications, although research has been inconclusive and none of these factors have been unequivocally demonstrated to be causal (Eaton, 1991; Häfner & an der Heiden, 1997). Specific information about the prevalence of schizoaffective disorder is not available, even after a review of the literature, but it appears that this diagnosis is made less frequently than that of schizophrenia (DSM-IV-TR, 2000), which appears to be, in part, due to the diagnostic systems and criteria that are used to define the disorder (Lapensée, 1992).

Once diagnosed with schizophrenia, patients are further classified into subtypes based upon the predominant symptomatology at the time of the current evaluation. According to the DSM-IV-TR (2000), a specific exclusion order should be followed to determine an individual patient’s subtype. Catatonic subtype is assigned if prominent catatonic symptoms are present, regardless of the presence of other symptoms. Disorganized subtype is assigned if disorganized speech and behavior and flat or inappropriate affect are present, unless catatonic features are also present, which then indicates the catatonic subtype. Next, the paranoid type is considered if delusions or hallucinations are prevalent and if the catatonic and disorganized subtypes have been eliminated as alternatives. The subtype of undifferentiated schizophrenia is assigned if the patient shows signs and symptoms of schizophrenia but does not meet the criteria for the other subtypes. Finally, a patient is categorized as residual type if s/he presents with continuing evidence of the disturbance, but no longer meets criteria for active-phase symptoms. Although a common practice in some research, an analysis of the subtypes of schizophrenia was not undertaken as part of the current research.
These subtypes are supposed to have high predictive validity, help therapists select specific treatment and predict individual outcome, and provide researchers with homogeneous groups. However, the utility of these subtypes has been questioned by many professionals due to the heterogeneity of the disorder (Fenton, 1996). Some researchers have presented a variety of alternative conceptualizations for subtypes or syndromes of schizophrenia. These are discussed in the next section.

**Symptom Classifications**

An awareness of the importance of symptoms has been present in the study of schizophrenia since Kraepelin first defined Dementia Praecox in 1898. Kraepelin focused on the description of symptomatology and acknowledged that symptoms related to a “weakness-state” illness existed. As early as 1914, Berze (Sass, 1989) recognized two broad types of symptoms in schizophrenia, which included those that were excesses or distortions in functioning and those that were deficits or decreases in functioning. A similar distinction was later conceptualized based on a typology of neurological symptoms specifically described by J. Hughlings-Jackson in 1889 (Sass). Hughlings-Jackson referred to a “double condition” in insanity, which included both positive and negative components. Using epilepsy as his model, he referred to the negative components as a “loss of control permitting” the body to do something, and the positive components as “increased automatic action” resulting from activity in the lower portions of the nervous system which arise as involuntary behavior. Translating this to present work within psychiatry, these are commonly known as negative and positive symptoms, respectively, and are considered to represent independent dimensions of pathology. The distinction between positive and negative aspects of any condition in general, which are independent of each other, dates back to J. R. Reynolds in 1858, although in relation to schizophrenia this distinction is generally attributed to Hughlings-Jackson (Berrios, 1985).

Positive symptoms consist of hallucinations, delusions, formal thought disorder, and bizarre or disorganized behavior, all representing functions that are in excess of the reality and
behaviors of most people. Negative symptoms consist of alogia, affective flattening or inappropriate affect, anhedonia, asociality, avolition, apathy, and attentional impairment (Andreasen, et al., 1995; Andreasen & Olsen 1982; Malla, 1995b), although others have found through factor analysis that inappropriate affect does not correlate highly with other negative symptoms and have concluded that it should not be included in the construct (e.g., Kibel, Laffont, & Liddle, 1993; Peralta & Cuesta, 1995; Schuldberg, Quinlan, Morgenstem & Glazer, 1990).

Care needs to be taken when considering the cause of negative symptoms, and if they are actually a result of schizophrenia. The appearance of negative symptoms could be due to depression or dysphoria, from which many schizophrenia patients may suffer, and should be differentiated from true negative symptoms (DSM-IV-TR, 2000; Kibel, Laffont, & Liddle, 1993; Malla 1995a, 1995b), or as a result of an impoverished environment and a lack of social stimulation, especially when the patient is hospitalized or extremely withdrawn (Owens & Johnstone, 1980). There is also the suggestion that negative symptoms may be sequelae of neurological insult. Additional discussion of depressive symptoms can be found in the affective disturbances portion under the heading “clinical findings in schizophrenia” in this paper.

This dichotomy of symptoms has been utilized to subtype patients into classes of positive and negative schizophrenias (Andreasen, Flaum, Swayze, Tyrrell, & Arndt, 1990; Andreasen & Olsen 1982; Malla, 1995a; Rosen, et al., 1984). This can be useful for description and to provide information about individual patients for clinicians. Patients diagnosed with positive, or Type I (Crow, 1987), schizophrenia are generally characterized by prominent positive symptoms, normal brain structure, relatively good response to neuroleptic medications, fairly good premorbid adjustment, and an underlying neurochemical mechanism for the disorder probably related to the dopamine system (see also Crow, Johnstone, Longden, & Owen, 1978). Those patients characterized by negative, or Type II, schizophrenia usually present with prominent negative symptoms, structural brain abnormalities, impaired cognitive functioning, poor response to
treatment and poor premorbid adjustment. Crow also indicated that the two classifications represent overlapping syndromes and not discrete illnesses.

It was originally thought that positive and negative symptoms were inversely related (Andreasen & Olsen, 1982), but it has been shown that this is not always the case, as symptoms on the two dimensions can co-occur (Liddle & Barnes, 1990; Liddle, Barnes, Morris, & Haque, 1989). Ratings of the two types of symptoms are not always negatively correlated. In some patients, both positive and negative symptoms are present, causing the subtype of “mixed” schizophrenia to be assigned. In a portion of these patients, as positive symptoms increase over time, negative symptoms also tend to increase, although there is no relation between the number of positive symptoms and the severity of the negative symptoms. This has been especially evident in the most severely disturbed of individuals with schizophrenia (Rosen, et al., 1984). Instead of meeting criteria for both positive and negative symptoms, some patients who do not meet criteria for either positive or negative schizophrenia are also given the subtype of mixed schizophrenia according to this classification system (Andreasen & Olsen; Malla 1995a). This latter classification is not considered useful or informative to clinicians.

Alternatives to the positive and negative schizophrenia classification system have been introduced by a number of authors. An early enhancement of the positive-negative symptom classification was presented by Strauss, Carpenter and Bartko (1974), who suggested that three categories of symptoms be considered in the process of schizophrenia rather than the previous two. These three categories are positive symptoms (disorders of content of thought and perception, types of form of thought such as distractibility, and behaviors such as catatonic motor disorders), negative symptoms (blunting of affect, apathy, and types of formal thought disorder such as blocking), and disordered personal relationships. The authors posited that the separation of symptoms into these three categories lends support to a multiprocess conception of schizophrenia in which more than one symptom process may be present in the presentation of the disorder.
Another variation has been proposed by some current researchers who have suggested that again three syndromes of schizophrenia be considered (Liddle & Barnes, 1990; Liddle, Barnes, Morris & Haque, 1989; Malla, 1995a, 1995b). These are not to be thought of as subtypes, but instead are hypothesized to be different sets of symptoms that may or may not coexist in the same patients, with these sets potentially having different responses to specific interventions, such as different types of neuroleptic medications. These dimensions are reality distortion or psychoticism (delusions and hallucinations are prominent), psychomotor poverty (deficits such as poverty of speech, decrease in spontaneous movements, and blunted affect) and disorganization (poverty of content, inappropriate affect, and formal thought disorder). Symptoms within each dimension have been found to vary in severity together, and symptoms across dimensions show lesser congruent variation. In creating these dimensions, the positive symptoms were split into two separate syndromes, reality distortion and disorganization, while negative symptoms were maintained, except for the transfer of inappropriate affect to the disorganized dimension. Similar results have been found by other groups who classify the symptoms of schizophrenia into the categories of psychotic symptoms, disorganization (together make up the positive symptom dimension) and negative symptoms (Andreasen, et al., 1995). Over time, these three symptom categories have been found to change along with one another, however in a completely independent manner from the others (Arndt, Andreasen, Flaum, Miller, & Nopoulos, 1995). Typically, the two positive symptom dimensions, psychoticism and disorganization, tended to improve much more over time, while the negative symptoms tended to improve much less or even worsen over time, although this is now controversial as some studies suggest that negative symptoms do improve over time (Quinlan, Schulenberg, Morgenstern & Glazer, 1995) or at least remain relatively constant (Herbener & Harrow, 2001). Interestingly, changes in the dimensions of psychoticism and disorganization are also not correlated with one another, indicating that these two dimensions are separate and independent from one another (Arndt, et al.)
Additional research has indicated that four or more distinct types of symptoms may be present in schizophrenia. The analysis of one research group (Schuldberg, et al., 1990) revealed symptom factors of positive symptoms, negative symptoms, attentional impairment, and formal thought disorder. Two additional factors, bizarreness and avolition-apathy, emerged as possibly separate symptom categories as well. An item-level factor analysis of individual items on two symptom measures in another study (Toomey et al., 1997) resulted in two negative symptom factors of diminished expression and disordered relating, two positive symptom factors of bizarre delusions and auditory hallucinations, and a disorganization factor. This different research indicates that additional attention should be given to more detailed classifications of symptoms and the variety of syndromes they reveal.

The issue of symptom presentation and the positive-negative distinction was included in this project by studying both total symptom presentation (by using the Brief Psychiatric Rating Scale; BPRS; Overall & Gorham, 1962) and by discriminating those symptoms that load most predominantly on the positive symptom dimension from those that load most predominantly on the negative symptom dimension, as identified by Ventura, Nuechterlein, Subotnik, Gutkind, and Gilbert (2000). In addition, factors such as manic and depressive affect were also considered. These factors will be addressed in more detail in the methods section of this paper.

Clinical Findings in Schizophrenia

Perceptual and cognitive disturbances. As noted above, disturbances in thinking and language are usually considered the primary pathognomic feature of schizophrenia (see also Bleuler, 1950; Meehl, 1989). Problems in the form of thought are referred to as "thought disorder" or "formal thought disorder." This is differentiated from problems involving the content of thought, which include delusions and possibly hallucinations. Thought disorder is usually inferred from the patient's language production, for it is assumed that disorganized thought, if severe enough, will substantially impair effective communication. The term "thought disorder" is used somewhat loosely to refer to both disturbances of language and communication. Andreasen (1979a) defined...
a set of specific terms for disturbances in language behavior and production - based on a number of clinical descriptions in the literature - that are still applicable today and include both deficits and excesses in communicative behaviors. These categories are discussed in greater detail in the language section.

Language disturbances can be very pervasive and affect a wide range of types of communication, although patients with schizophrenia are often not aware that their language production is abnormal and may become frustrated when trying to communicate with others who do not understand them (Amador & David, 1998). Other persons with schizophrenia sometimes seem oblivious or “not to care” about being hard to understand. In general, subjects with schizophrenia may have little insight into their disturbance. Language and communication disturbances are discussed in greater detail in the language section of this paper, and form the basis of one of the predominant areas of research in this study.

Psychotic symptoms of hallucinations and delusions are also symptomatic of schizophrenia, even though they may also occur as part of other disorders. Hallucinations are perceptions that are experienced as originating in the outside world or within one’s own body, yet do not involve an external stimulus to any of the sense organs. These experiences nevertheless seem to the patient to be true perceptions and are experienced by a reported 70% of persons with schizophrenia (Mueser, Bellack, & Brady, 1990).

Delusions involve disturbances in the end products of logical thinking rather than in perception or the formal processes of thinking themselves. Delusions are firmly held ideas, with no plausible reason for the beliefs that are untrue and often bizarre, yet are maintained by the patient. The “untrueness” or “bizarreness” of the belief must be judged by the clinician or researcher based upon the patient’s educational and cultural background. A delusion is considered to be bizarre if it is clearly implausible, not understandable, or not deriving from normal life experiences (DSM-IV-TR, 2000; Spitzer, First, Kendler, & Stein, 1993). Bizarre delusions have
been estimated to occur in as many as 79% of persons with schizophrenia (Goldman, Hien, Haas, Sweeney, & Frances, 1992).

A final cognitive disturbance common in patients with schizophrenia is a lack of insight, mentioned above. As many as 97% of schizophrenia patients may believe that they are not ill or abnormal, and their hallucinations and delusions are perceived as actual and not imagined experiences (Sartorius, Shapiro, & Jablensky, 1974). This lack of insight is found more commonly in patients with schizophrenia than with other psychiatric condition, such as bipolar affective disorder or schizoaffective disorder (Amador, et al., 1994). As noted above, a lack of insight can cause significant difficulties in communication with others for the individual with schizophrenia (Amador & David, 1998). These patients usually have normal orientation and memory, although they may experience some age disorientation, evidenced by difficulty in providing their own age. This lack of insight with intact orientation and memory makes patients with schizophrenia extremely difficult to treat, especially because rates of treatment compliance are greatly decreased when the patient does not believe s/he is ill (Black & Andreasen, 1994).

Behavioral and motor disturbances. Some people with schizophrenia exhibit both behavioral and motor disturbances throughout the course of the illness. At times it is difficult, however, to separate true behavior disturbance in schizophrenia from effects of medications provided to the individual, and possibly from the effects of chronicity or institutionalization. A deterioration in social behavior can also be observed as the individual neglects him/herself and his/her surroundings. Social withdrawal and isolation also become prominent for these individuals and they may experience a lack of motivation and exhibit a disinterest in planning for the future (DSM-IV-TR, 2000; Black & Andreasen, 1994) which result in a paucity of motor behaviors. Such disturbances are most often seen in the Disorganized and occasionally in the Residual Types of schizophrenia.

A variety of motor disturbances are sometimes seen in persons with schizophrenia. They may exhibit uncontrolled and aimless motor activity (excitement) including repeated but non-goal
directed movement, such as rocking (stereotypy), or regular goal-directed activities appearing to have social significance but which are out of context and odd in appearance (mannerisms). Catatonic motor behavior may be exhibited, such as extremely decreased reactivity to the environment (stupor), allowing one’s body to be posed by another person (waxy flexibility), maintaining a rigid posture over an extended period of time (rigidity), or posing in an inappropriate and bizarre posture (posturing) while resisting attempts to be moved (negativism). This is most often seen in persons given the subtype of Catatonic Schizophrenia or in those with negative symptoms (Chandrasena, 1986; DSM-IV-TR, 2000; Gelenberg, 1976).

Impulse control is another behavioral problem exhibited by patients with schizophrenia. Some individuals may become quite agitated and exhibit a decrease in judgment and impulse control when experiencing active-phase symptoms which increases their risk of suicide or other self-harm and demonstrating violent behaviors towards others. Although violence may occur, knowing that a patient has schizophrenia does not generally predict violence or dangerousness (Swanson, 1994). However, recent research has shown that violence in persons with schizophrenia is related to clinical variables, especially an increase in positive symptoms (Arango, Barba, González-Salvador, & Ordóñez, 1999; Krakowski, Czobor, & Chou, 1999). When a person with schizophrenia is violent, the victims are usually family members or friends of the patient. These violent behaviors seem to be in response to delusions and hallucinations, or are traceable to incorrect dosages of medications (Gottesman, 1991; Junginger, 1996), and violent behavior also seems to be associated with a poor prognosis (Karson, & Bigelow, 1987), as patients with a history of violence evidenced a greater number of previous hospitalizations.

Affective disturbances. Alterations or decreases in affect can be seen in some individuals with schizophrenia, such as those diagnosed with Disorganized or Residual Types, or in patients exhibiting negative symptoms. People with affective disturbances tend to exhibit indicators of blunted affect, such as indifferent and apathetic responses to others, a lack of empathy, decreased intensity of emotional expression, unchanging facial expressions, and poor eye
contact. A more extreme form of reduced emotion, anhedonia, in which the patient is unable to experience or even imagine any form of pleasure, is also seen in some people with schizophrenia. Research has revealed that persons with schizophrenia report significantly greater physical and social anhedonia, less positive affect, and more negative affect than control subjects, and these phenomena have all been found to be stable over time (Blanchard, Mueser, & Bellack, 1998). Inappropriate expressions of affect are also common, such as exhibiting a profound silliness or discussing a sad or morbid topic with a smile and cheerful manner, and are most often seen in the Disorganized subtype. It has been noted that patients with schizophrenia may actually experience appropriate emotions despite their outward appearance (Black & Andreasen, 1994). The discrepancy, in part, seems to arise from their difficulties in communication and reduced expression of affect.

Due to affective disturbances, approximately 60% of schizophrenia patients appear as though they have significant depressive symptoms as well (Escamilla, 2001; Kibel, Laffont, & Liddle, 1993; Sands & Harrow, 1999; Siris 1991, 2000; Taylor, 1992). The separate diagnosis of a mood disorder is difficult to make, because the symptoms (e.g., of anhedonia and depression) greatly overlap, and because antipsychotic medications can cause what seems to be depression (drug-induced akinesia). Care must be taken to determine if a depressive disorder should be diagnosed in addition to schizophrenia, or if the depressive symptoms are just manifested through other symptoms of schizophrenia. Alternatively, the diagnosis of schizoaffective disorder (discussed previously) needs to be considered when a patient presents with both the symptoms of schizophrenia and affective disturbance, especially when the mood disorder appears to be an episode of major depression or a mixed episode.

Course and Outcome

The paths that patients with schizophrenia patients follow throughout their illness are heterogeneous; there is no way to predict the exact course of an individual person with schizophrenia, for it varies from patient to patient (McGlashan, 1988; Strauss & Carpenter, 1972).
However, there are some general patterns observed that are used to describe the course of schizophrenia. There are three stages of schizophrenia which patients cycle through (Black & Andreasen, 1994). The prodromal stage precedes the active phase of the illness, sometimes by many years. It is characterized by a general decline and deterioration in behavior and emotional responsiveness. The active phase is when psychotic symptoms, often delusions and hallucinations, are predominant. During this phase the patient's behavior is florid and alarming to others and often leads to hospitalization. The residual phase is similar to the prodromal phase and equivalent to the experience of the patient subtyped with residual schizophrenia, where active-phase symptoms are no longer present, but there is still evidence of a disturbance.

As noted, the course of schizophrenia is variable, and it generally follows one of four patterns (Black & Andreasen, 1994; DSM-IV-TR, 2000). The first is of an illness that resolves completely with or without treatment and the patient remains stable over time. The second is an illness that recurs repeatedly, with a full recovery every time. Each of these patterns is seen very infrequently among schizophrenia patients. The third pattern is of an illness that recurs repeatedly, but without full recovery, causing a persistent deficit state to develop. The last is of an illness with progressive worsening from the onset of the disorder. These last two patterns are most commonly found among patients with schizophrenia. The classic course of schizophrenia is one of repeated exacerbations and remissions, with a lack of return to baseline functioning following the active phase. Research has found that after the first exacerbation of psychotic symptoms, the course of schizophrenia tends to remain fairly stable, with the most activity and severity of symptoms early on in the illness (Mason, Harrison, Glazebrook, Medley, & Croudace, 1996).

In relation to the positive (Type I) and negative (Type II) syndromes of schizophrenia, Crow (1987) noted that although either syndrome may be present at any time during the course of the illness, the negative syndrome tends to be identified in the patients with more chronic states, may be associated with some level of irreversibility, and indicates a limited prospect of improvement. Additional research has shown that schizophrenia characterized by primarily
negative symptoms is associated with a progressive course that often results in permanent disability, whereas schizophrenia characterized by primarily positive symptoms are associated with a better prognosis (Fenton & McGlashan, 1991; see also Breier, Schreiber, Dyer, & Pickar, 1991). Arndt et al. (1995) found that negative symptoms tended to remain fairly constant over time, whereas positive symptoms were less stable and fluctuated over the course of the illness (see also Davidson & McGlashan, 1997).

Some patients experience what is commonly referred to as the "revolving door phenomenon." This is a function of both clinical course, and treatment and clinical management practices. These patients have a high frequency of hospital readmissions and discharges, commonly thought to be caused by inadequate rehabilitation facilities and a lack of utilization of after-care services. These patients also have a tendency towards noncompliance with their treatment regimens and also possibly a history of substance abuse, which increases their chances of rehospitalization. This revolving door phenomenon previously was thought to be due in part to the use of psychiatric hospitals for non-psychiatric purposes, such as holding facilities for individuals with a lack of money, no housing, or family problems. This phenomenon is now considered to be caused by more frequent exacerbations of the illness influenced by various factors described above (Haywood, Kravitz, Grossman, Cavanaugh, Davis, & Lewis, 1995; Prendergast, 1995). Patients in circumstances such as these may have a lower quality of life due to their numerous hospitalizations and the disruption this occurs in their lives, their refusal of case management and other community services, or the lack of available community resources (Geller, 1986).

The symptoms of schizophrenia may change over the course of the illness, but this idea is controversial within the literature. Some sources (Black & Andreasen, 1994; DSM-IV-TR, 2000) indicate a symptom course of negative symptoms being seen early in the illness, especially during the prodromal phase, and positive symptoms being prevalent primarily during the active phase. Overall, this can result in a progressive downward course of the disorder. Such a
conceptualization has been refuted by some authors, who adhere to the more "classic course" of schizophrenia evidencing more negative symptoms over time, or that in general a more variable development and course of symptoms may be present in people with schizophrenia (Davidson & McGlashan, 1997; Liddle, et al., 1989; Quinlan, et al., 1995). Others have noted that the severity of symptoms appear to stabilize after five to ten years of active symptoms (McGlashan, 1988).

The expected outcome or prognosis for persons with schizophrenia today is more optimistic than in the past, due in a large part to the development of a variety of antipsychotic medications. After a first hospitalization, approximately one-quarter of patients are expected to have a good outcome with no subsequent hospitalizations. Another one-fourth is expected to have a severe and chronic outcome with continued hospitalization, intellectual and/or social impairment. Approximately one-half of persons with schizophrenia are found to have a moderately good outcome, with some subsequent hospitalizations and social impairment, but able to function fairly well otherwise (Marengo, 1994; see also Mason, et al., 1996). Alternatively, one can consider outcome groups in slightly larger categories. Clinical lore asserts that persons with schizophrenia fall into three categories, approximately one-third of whom have a good outcome, one-third a poor outcome, and one-third experience a moderately good outcome. A more optimistic report has supported the considerable heterogeneity in the long-term outcome of individuals with schizophrenia, and present that approximately one-half to two-thirds of persons with schizophrenia significantly improve or recover from the disorder (Harding, Zubin, & Strauss, 1987).

Indicators of a good prognosis for patients with schizophrenia include an acute onset at a later age, having a family history of mood disorder rather than schizophrenia, exhibiting good premorbid adjustment and interepisode functioning with minimal residual symptoms, the presentation of brief active-phase symptoms with few or no negative symptoms, and having normal neurological functioning indicating an absence of brain abnormalities (Davidson & McGlashan, 1997; Häfner, et al., 1998). In addition, increasing evidence has indicated that long-
term prognosis is greatly improved through early detection of symptoms and intervention with medication(s) to relieve the symptoms and assist in the prevention of relapse (Kasper, 1999; Robinson, et al., 1999). This apparently tends to curtail the progression of the disorder and facilitates better overall functioning.

The present study considered the issue of quality of life (to be discussed below) as an outcome measure to be compared to variables of language production, social adjustment, symptom presentation, global assessment of functioning, and neurocognitive functioning in order to determine predictive patterns and relationships among the variables.

Quality of Life

Quality of life and schizophrenia. As noted above, the outcome for patients with schizophrenia is greatly varied. Lehman (1996) stated that one of the various challenges in evaluating services for persons with schizophrenia is the development of adequate outcome measures that consider a broad range of issues faced by the patients. Many different areas of functioning and/or disease aspects can be considered when evaluating the outcome of patients with schizophrenia. A construct that includes a number of these areas is Quality of Life, which is generally considered to be composed of functional status, burden on family and community, access to resources and opportunities, and subjective sense of well-being (Attkisson, et al., 1991). A more detailed discussion of the construct and history of quality of life, approaches, and measurement, will follow.

Although some measures of quality of life assess functioning from the “outside” in an objective manner, a current focus in mental health has been to include the patient’s perspective in determining relevant outcomes. This has resulted in the growth of the construct of subjective quality of life (Awad & Voruganti, 2000; Diener, 1984). Frisch (1994) describes subjective quality of life as composed of two parts, a component involving positive affect, and a cognitive component in which an individual judges whether needs and wishes have been fulfilled, and relates this to personal satisfaction.
When assessing a patient’s functioning, as done by a medical doctor, issues related only to physical health are considered and those concerns related to satisfaction or subjective quality of life are often ignored. Quality of life assessments are helpful to the field of mental health (as well as to medicine in general) because they contribute information about how patients are functioning in various domains of their lives, which, although beyond issues of medicine specifically, are still affected by and can impact the individual’s physical health (Lehman, Ward, & Linn, 1982). This approach to measuring outcomes through quality of life also allows the professional to have a broader focus and directs additional attention to positive or adaptive areas of functioning when determining the status of the individual patient (Lehman, 1996).

Measures of quality of life are also important because some of the information gathered comes from the patient’s own point of view. This is especially relevant in the study of schizophrenia, because the disorder inherently affects the overall functioning of the patient. As a result, it is imperative to research the patient’s subjective evaluation of his or her own life and experiences. Also, in asking the patient directly, the professional is showing a respect and understanding that the patient does not often experience, especially when receiving medical or mental health services (Awad & Voruganti, 2000).

Some clinicians may express discomfort with the process of asking patients directly about their quality of life, because it is assumed that psychopathology would confound and interfere with the patient’s responses. This is especially relevant in the study of schizophrenia, where patients often exhibit a variety of neurocognitive deficits as well as disturbed thinking and communication which many clinicians assume result in unreliable reports. However, this appears to not be a concern for most domains assessed by quality of life measures. Lehman (1983) determined that psychopathology does not bias overall quality of life findings. He found that the structure of the assessment results was not significantly changed due to the removal of the effects of psychopathology in the analysis of overall quality of life ratings. Instead, the only influence of mental health effects was found in the assessment of patients’ self-rated (perceived) health,
utilization of health services, and satisfaction with health care, all of which are part of only one of the nine subjective areas of quality of life that Lehman considers. This, as the author notes, is not surprising in light of the fact that the general notion of health involves both mental and physical health. Voruganti, Heslegrave, Awad and Seeman (1998) reported similar results and found that patient's self-reports were consistent over time and evidenced significant correlations with objective measures completed by clinicians. This group of authors also determined that although patients' reports of subjective quality of life were impacted by symptom severity, side effects, neurocognitive functioning, clinical interventions, and medication levels, the reliability of the reports were not affected by these factors.

It has also been argued that professionals already make informal quality of life assessments during the process of “getting to know” a patient and understanding his or her experiences. But even such a practice is not specific enough to truly assess the patient's quality of life, and formal assessments are needed. A number of domains of quality of life can be considered, which may include the patient's health care, safety, security, housing, food, occupation, social contacts, finances, and education (Frisch, 1994; Packer, Husted, Cohen & Tomlinson, 1997; Skantze, Malm, Dencker, May & Corrigan, 1992). The third group of authors explained that quality of life is not the same concept as standard of living, which is only an objective assessment of the previously listed areas. Also considering the patient's satisfaction with these domains constitutes quality of life. At the least, the concept of quality of life should emphasize the patient's perspective on his or her sense of well-being and consider issues such as how the patient feels that he or she is doing, how the patient feels about what he or she has, and how the patient feels about his or her life situation (Frisch, 1994; Lehman, 1996). This is considered the patient's subjective quality of life. In addition, researchers often do consider more objective areas of quality of life, including the patient's functional status and access to resources and opportunities, in order to add to the patient's own perspective. It appears that using a multidimensional approach to quality of life assessment rather than a global self-report rating may
yield more reliable information. To a great extent, the concept of quality of life has come to represent the ultimate outcome of the interaction between the patient and the illness, its treatment, its psychological impact, as well as social contributions and consequences (Awad & Voruganti, 2000).

History of quality of life assessments. The precise origins of the concept of quality of life are largely undetermined, but it appears that the idea developed after World War II when many of the population of Western societies were experiencing an increased standard of living which followed the economic prosperity of the times. This led to people's expectations of greater satisfaction, fulfillment, and well being in their lives. This concept of satisfaction with domains of life was readily applied by society to areas such as physical health and job satisfaction. The term quality of life appears to have been first introduced to the general population by President Johnson in 1964 during his address on "the Great Society" (Awad & Voruganti, 2000). The 1960's saw an increased focus and concern with the concept of quality of life in psychiatric patients due to the deinstitutionalization movement. Many chronically mentally ill patients, especially those with schizophrenia, were released from facilities without the necessary abilities to live independently and in a time in which the community was not prepared to cope with their needs. The subsequent deterioration of the patients' living conditions, personal safety, income, and social support resulted in an inferior quality of life that soon came to the notice of mental health professionals.

Thus, evaluating and improving quality of life became an emphasis in the study of discharged psychiatric patients. Initially, the focus was placed upon identifying patients' needs in the community and drew considerable attention to the situation of the chronically mentally ill in the community. This attention was not maintained, however, through the late 1970's and early 1980's when the concept of quality of life was essentially discounted and ignored. It appears that the disinterest resulted primarily from a lack of agreement on a consistent definition of the term "quality of life," a lack of adequate conceptual models pertaining to the concept, questions
regarding the reliability of self-report measures, and a lack of standardized measures appropriate for patients with specific disorders, such as schizophrenia (Awad, 1997).

In the last decade, there has been a revival of interest in the concept of quality of life for psychiatric patients. Many factors are potentially involved in this change, one of which is the issue of cost of care and services for psychiatric patients in a time when resources are limited (Awad, 1997; Frisch, 1994). Professionals are now being pressed to consider alternative outcome measures when evaluating services and treatments. This is as prevalent in the field of physical health as it is in the field of mental health. In addition, the pharmaceutical industry, while introducing and promoting new medications, has stressed quality of life as a significant marketing tool to underline differences between various medications and to emphasize a favorable health economic status (Awad & Voruganti, 2000).

In the age of consumerism, people are motivated to consider more personal outcomes, one of which has been quality of life, and cause professionals to do the same. This focus on quality of life has also been utilized to address the costs and benefits of various types of treatment. Unfortunately, most of the recent focus has been directed towards the application and measurement of quality of life, and little research has been completed on determining a globally accepted definition for quality of life, the boundaries of the concept, determinants of quality of life, and discovering relevant clinical correlates. It is clear that research in these areas must be undertaken before further advancement can be made with the issue of quality of life for the chronically mentally ill (Awad, 1997). Indeed, it may be that multiple definitions of the term quality of life are needed depending on the population under study, the progression of the illness and its treatment, as well as societal expectations at the particular point in time of a research study (Awad & Voruganti, 2000).

Quality of life and schizophrenia research. Recent studies have shown that patients with schizophrenia report a decreased satisfaction in particular areas of their lives such as mental health, inner experiences (i.e., self-fulfillment, self-reliance, freedom, joy, love), social contacts,
and, employment (Skantze et al., 1992), as well as income level, knowledge base, education, general opportunities and leisure activities (Grawe & Lovaas, 1994). This has been found even in situations where the patient was enjoying a relatively adequate standard of living and having all basic needs met. Similar findings were reported in a study that compared individuals with schizophrenia in the United States and Italy (Warner, de Girolamo, Beilelli, Bologna, Fioritti, & Rosini, 1998). These studies determined that the subjective quality of life reported by these patients was not just the absence of acute suffering and/or symptoms, nor just having some income and a place to live. Instead, it appears that subjective quality of life for these patients involved dynamics of their inner world and overall satisfaction with their experiences. This supports the idea that subjective quality of life is not the same as objective assessments of life domains.

Other research has found that seriously mentally ill patients who lived with family members in a very poor and rural area but reported high support from those same family members expressed significantly less dissatisfaction in all life domains except finances/income (Sullivan, Wells & Leake, 1991). It was presumed that the positive and supportive relationship with family members increased patient life satisfaction, even when the subject was living in adverse conditions. Results such as these are in direct contrast to other findings which indicate that family interactions can be experienced by persons with schizophrenia in very negative and critical ways (Hooley, 1998). Such interactions are high in expressed emotion, which is a measure of criticism, hostility and emotional overinvolvement within the family. Similar contrasts again support the notion that patient perspective is crucial in considering quality of life.

Involvement in educational groups which address issues related to schizophrenia and the course of the disorder was found to be related to significant gains in quality of life, even when no specific skills training was provided to these patients (Atkinson, Coia, Gilmour & Harper, 1996). Thus it appears that education, understanding, and overall insight into the disorder of schizophrenia provides the patient with an increased satisfaction with his or her own life. Other
Functioning in Schizophrenia

Researchers have found opposite results, in that no increase in quality of life was found as the patient gained insight into the disorder of schizophrenia (Browne, Garavan, Gervin, Roe, Larkin & O'Callaghan, 1998). However, these authors do state that their population under investigation already maintained high levels of insight into the disorder, and a ceiling effect in gaining insight may have occurred.

Some researchers have undertaken to compare patient reports of quality of life with overall psychopathology, as well as the difference between negative and positive symptoms, and have found some significant results (Packer et al., 1997). The findings of this research indicate that level of psychopathology, as measured by the Brief Psychiatric Rating Scale total score for inpatient schizophrenia patients, was negatively correlated with global life satisfaction and subjective quality of various life domains (see also Heslegrave, Awad & Voruganti, 1997; Kaiser et al., 1997), although not with objective evaluations of the same domains. In addition, negative symptoms were found to have a greater negative correlation on subjective measures of quality of life than positive symptoms. The impact of psychopathology on ratings of physical health, which are a component of quality of life, may again be implicated here. An explanation was provided for the finding that negative symptoms were more related to quality of life; the negative symptoms appear to exert a large impact on the patient and his or her experiences in part because they are often seen as not "treatable" and imply a more pejorative attitude towards the patient because the negative symptoms could be seen in some way as able to be altered. Negative symptoms also interfere more with basic aspects of functioning and thus potentially with satisfaction of one's life.

An extension to the concept of negative symptom presentation is that of the deficit symptoms or deficit syndrome which involves impairment in intrapsychic, interpersonal, and instrumental functioning. The deficit syndrome has been related to quality of life and is assessed in measures such as The Quality of Life Scale (Heinrichs, Hanlon, & Carpenter, 1984). This particular measure rates the person with schizophrenia on a variety of domains (i.e., sense of purpose, emotional interaction, social experiences, occupational role, possession of common...
objects) providing a score which reflects the individual's functioning, ranging from normal or unimpaired functioning to severe impairment on each of the domains in question. These authors assert a conceptual link between quality of life and the deficit syndrome, that they are inversely related. This measure is intended to be used by the clinician to make judgments about deficit symptoms, to register levels of change, and to describe the course of illness for the individual.

An important consideration regarding the impact of symptoms, especially the florid and unusual positive symptoms, on the life of a person with schizophrenia are the attributions a spouse makes about the etiology of the behaviors (Hooley, Richters, Weintraub, & Neale, 1987). When a spouse attributes the deviant behaviors as unintentional and involuntary aspects of a genuine illness, he or she is less likely to blame the patient for any difficulties in the relationship and this attribution will contribute to the marriage remaining intact. Thus it appears that not all symptoms are as salient or problematic for the families of individuals with schizophrenia as many professionals would believe.

Related to the impact of negative symptoms of the patient's functioning and perception of his or her life is the effect of neuroleptic medications. Many patients report that a negative response to medications and a resulting "zombie-like" state leads to a perception of an inferior quality of life (Browne, et al., 1998), although the authors do caution that the patient's perceived response to the medications may actually instead be negative symptoms of schizophrenia.

In addition to the effects of psychopathology, the relationships between neurocognitive deficits and quality of life have been examined. Researchers have found that patients with schizophrenia perform poorly on tests of iconic memory via a backward-masking task, and frontal functioning, measured via the Wisconsin Card Sorting Task (Heslegrave, Awad & Voruganti, 1997). These same patients reported a compromised quality of life. Although both neurocognitive deficits and decreased quality of life were found, correlations between the two were nonsignificant or very weak. This led the researchers to conclude that quality of life is not related to
neurocognitive deficits unless in extreme instances when the deficits are in basic rather than in higher cognitive functioning.

Issues such as symptom presentation and neurocognitive functioning appear to be important factors in the study of quality of life. These areas are domains of functioning that can often be readily assessed by clinicians and are relevant to successful community functioning. The present study examined these and other variables to better understand their impact on the quality of life of the person with schizophrenia.

Significant differences have also been found between inpatients and those living in the community in several areas. Patients living in the community consistently reported greater satisfaction in domains of general well-being, living situation, safety, mental health, and work, than patients who were hospitalized (Kaiser, et al., 1997). Contradictory results have been found in other research which determined that there were no differences in global assessments of the quality of life reported by these two groups, but that some differences on specific life domains were present (Grawe & Lovaas, 1994). These authors stated that outpatients more often report greatest dissatisfaction with their inner experiences and overall mental health. Inpatients tend to express the greatest dissatisfaction with their financial situation, low level of social contacts, and overall mental health. It is not surprising that both groups express dissatisfaction with their mental health, as this is the determining factor in much of their daily functioning and ongoing limitations.

When considering the issue of multiple respondents in the assessment of patient quality of life, it was found that different reports are provided by mental health professionals than those from patients with schizophrenia for particular life domains (Sainfort, Becker & Diamond, 1996). The two groups evidenced much agreement on areas of functioning, symptoms experienced by the patient, and overall physical health. Reports differed when considering social support and occupation. Providers rated the quality of each area as lower than the patients did themselves. In fact, the patients evaluated each of these areas as adequate in their own lives. This result raises the interesting question of whose point of view to consider when making these types of
evaluations. It appears that either source will provide accurate judgments of the quality of clinical aspects of the patient's life, but that the patient him or herself should be questioned regarding social aspects of their perceived quality of life. It was unclear to these authors why such a discrepancy would arise, although they did present some possibilities, including a greater patient knowledge of relevant factors, provider emphasis on clinical aspects of patient's experiences, and patient focus on the social aspects of his or her own experiences. This relates to validity issues of both self-report, observer, and informant data which are always of concern in any assessment measure, especially those related to quality of life. This issue was addressed in the present study by using a measure that relies on patient report, of primary significant to ratings of satisfaction, and corroboration of more objective reports through an interview with a "current informant." In addition, this study included the use of a "reliability" checklist for interview measures to indicate if particular responses were of questionable reliability.

A review of the literature has revealed that factors such as gender (Kaiser, et al., 1997; Lehman, Slaughter, & Myers, 1992) and levels of neuroleptic medication for those on medication (Kaiser, et al., 1997) apparently have no direct impact on the reported quality of life of an individual with schizophrenia. As noted previously, it does appear that a negative (dysphoric) subjective response to neuroleptic medication, rather than the actual level of the medication, is associated with diminished quality of life for persons with schizophrenia (Browne, et al., 1998).

Selection of quality of life assessments. Many different quality of life measures have been developed over the years, each with a particular focus and application to research and practice. A number of issues related to the selection of a specific quality of life assessment for research have been addressed by Lehman (1996). These are as follows:

1. The investigator must determine his or her particular purpose and needs before selecting a specific measure; this includes an operational definition of quality of life, means to measure the domains under consideration, ability to make comparisons to other relevant populations (other psychiatrically impaired, physically disabled, general population, economically
disadvantaged, etc.), selection of a time frame (longitudinal or not) to study quality of life, and, the ability to apply quality of life results to interventions and evaluations with patients

2. The measure chosen should assess both subjective and objective domains of life
3. The assessment should be based upon a comprehensive quality of life model
4. The measure should be developed for or applicable to the population of interest
5. Training of administrators and time involved in the assessment must be considered
6. Consideration of the psychometric properties of the measure (e.g., reliability, validity, etc.) is important.

Another area of concern noted by the author includes the possibility of encountering floor effects with patients with schizophrenia, especially in role functioning domains such as spouse, parent, and employment roles. Researchers are also warned about the limited task perseverance and comprehension of psychiatric patients, recommending an interview format rather than pencil-and-paper measures to gather information.

Additional concerns regarding selection of a quality of life measure should also consider whether or not responses may be biased by patient psychopathology, whether it validly differentiates patients with different severity of illness (e.g., inpatient versus community living) and housing status (homeless versus domiciled), and whether the measure assesses symptoms that are nonredundant with the anhedonia common to depression (Russo et al., 1997). It was recommended by the authors (Lehman, 1996; Russo) that a researcher carefully select a quality of life assessment based upon the needs of the study and the specific characteristics of the measure.

Quality of life and the present study. The issue of quality of life has been demonstrated to be an important component in the assessment and treatment of psychiatric patients and it forms a central focus of the current research. This importance is especially evident in the outpatient treatment that many people with schizophrenia now receive and within the context of a move towards managed care and a greater emphasis on accountability of treatment organizations and
agencies. With the rising cost of chronic illnesses such as schizophrenia, emphasis has shifted from merely prolonging life to actually enhancing the patient's quality of life. The focus has also moved away from mere alleviation of symptoms. A primary emphasis of case managers and other outpatient treatment professionals is the quality of life of the patient and his or her ability to function adequately within the community. Through clinical management, quality of life assessments can theoretically provide information regarding a needs assessment, gaps in services, implementation and effectiveness of corrective measures, and focus on the patient's potential return to a somewhat productive role in society (Awad & Voruganti, 2000).

Due to the importance of this potential clinical management, accompanied by the relative lack of comprehensive research involving quality of life assessments and their integration into clinical psychiatric care, quality of life has been a focus of this study. A number of other variables (communication, social adjustment, neurocognitive functioning, and symptom presentation) have been assessed to determine their relationships to both the subjective and objective quality of life reported by persons with schizophrenia.

The quality of life measure that was selected for inclusion in the present study is the Quality of Life Interview - Brief Version (QOLI; Lehman, 1988; 1996). This measure is intended to be used with the chronically mentally ill and assesses general quality of life rather than health related quality of life. The QOLI is focused predominantly on current levels of satisfaction, recent functional status, and access to resources. The main purpose of the QOLI is to assess life circumstances of patient populations both in terms of what the individuals actually do and their feelings about those situations. Thus it involves both an objective and a subjective assessment of quality of life. For the subjective assessment, patients are requested to utilize a life satisfaction rating scale consisting of ratings 1 = terrible through 7 = delighted. The Objective Subscales assess areas of living situation, daily activities, family relationships, social relations, finances, work-school issues, legal-safety issues, and health issues. The Subjective Subscales assess
satisfaction with the same areas excluding daily activities, and instead include ratings of satisfaction with leisure activities and overall quality of life.

The effects of psychopathology and its biasing effects of self-report measures have been mentioned previously in this review. Conclusions have been drawn which implicate the role of symptom presentation and general health concerns much more than satisfaction ratings involved in quality of life (Lehman, 1983). In addition, Lehman's research with the QOLI has concluded psychopathology does not impact quality of life ratings on this particular measure.

Initial studies on the QOLI were completed with patients in board and care homes, supervised community residences, and psychiatric hospitals. Research with the QOLI has shown differences between various groups and their quality of life. When considering community residents versus hospitalized patients, it was found that regardless of length of stay in the particular placement (community or hospital) the community residents more favorably rated their living conditions, had access to more financial resources, and were less likely to be assaulted in the past year than the hospitalized patients (Lehman, Possidente, & Hawker, 1986). Factors that best predicted the quality of life of individuals with chronic psychiatric illness attending a day treatment program were found to be the number of admissions to the hospital in the past year, frequency of family contacts, satisfaction with social life, psychiatric health, and adult education (Levitt, Hogan, & Bucosky, 1990). In addition, of the patients in day treatment, those not of Caucasian race, and/or those with higher levels of anxiety and depression (as measured by the BPRS) rated their quality of life as significantly lower than other participants. A study discussed previously involving the QOLI indicated that seriously mentally ill patients who lived with family members in a very poor and rural area expressed significantly less dissatisfaction in all life domains except finances/income when they perceived high support from those family members (Sullivan, et al., 1991). Additional research involving the QOLI has determined that, with the possible exception of social relationships, there are no differences in the patient reports of quality
of life between men and women with schizophrenia, and that this finding has proved true for populations in the United States, Canada, and Cuba (Vandiver, 1998).

A recent study involving the QOLI found that this measure of quality of life was less sensitive to change and treatment effect than other measures in patients with schizophrenia (Cramer, et al., 2000). The authors concluded that this could be a result of the highly symptomatic population under investigation and the tendency for these patients to experience extreme deprivation that results in a minimization of differences over time. They point out that patient responses to subjective questions on the QOLI might correlate poorly with rater assessments on other measures, which corresponds with arguments described previously made by Lehman about measurements of quality of life made by various sources. However, this study did determine that the QOLI question on global health-related quality of life was moderately to highly correlated with most other subjective scales, which indicates that this simple scale may be an accurate indicator of overall subjective quality of life. The authors concluded that the QOLI would be an appropriate measure for documenting either patient-rated status or objective manifestations of change in experiences, although it may be less likely to show significant change over time.

An alternative quality of life measure is the Quality of Life Inventory (Frisch, 1994), which includes a descriptive discussion of the construct of quality of life. This inventory is modeled after the Quality of Life Theory, which involves life satisfaction and subjective well-being and the integration of these factors into a theory of depression and other disorders. This self-report measure elicits responses from the individual regarding his or her satisfaction in sixteen areas of life, including love, work, and health. This measure was not chosen for inclusion in the present study because it does not involve both subjective and objective ratings of quality of life, the impact of psychopathology was unknown for this measure, and it is intended to be used more in evaluations of outcome and treatment response, which is not the focus of this research.
Social Adjustment

Social adjustment and schizophrenia. Related to the interest in a patient’s quality of life is evaluation of the social and community functioning of that individual. Social adjustment is generally accepted to be the interactions between the person and his or her social environment and performance in social roles (Weissman, 1975). Like quality of life, the evaluation of social adjustment in mental health patients has developed in response to the number of patients now living in the community and the increased interest in the experiences and abilities of those individuals (Weissman, Sholomskas, & John, 1981). The consideration of social adjustment in the lives of patients with schizophrenia is especially relevant due to the oftentimes profound impact that the disease has on the social functioning of those individuals, even when they are relatively asymptomatic and medicated (Glazer, Aronson, Prusoff, & Williams, 1980). These individuals may experience difficulties with activities of daily living, social relationships, use of leisure time, occupational performance, and even the ability to make use of therapy and other interventions. In general, poor social functioning contributes to the social isolation, poor performance in social roles, and dissatisfaction with social interactions of individuals with schizophrenia.

Research has determined that individuals with schizophrenia are able to report their social adjustment accurately, as significant agreement has been found between the reports of patients and those of their significant others (Glazer, Sholomskas, Williams, & Weissman, 1982).

Gender differences have also consistently been reported in relation to social adjustment. Females tend to exhibit better premorbid social functioning and tend to survive longer in the community without additional relapse of symptoms. In addition, the social adjustment of males appears to deteriorate at a faster rate than that of females after the onset of schizophrenia (Häfner, et al., 1998; Moriarty, et al., 2001).

Social adjustment can be seen as measuring similar constructs to those tapped by quality of life measures when one considers factors such as social and family relationships, occupational functioning, and leisure activities. However, quality of life looks at broader areas of functioning.
than just social interactions and often includes the individual's satisfaction with these numerous areas.

There has been much speculation about the interaction between symptomatology and social adjustment, as many have presumed that social functioning was a reflection of current psychopathology, especially those categorized as negative or deficit symptoms. However, research has revealed that social functioning is independent of severity of overall psychotic symptoms (Halford & Hayes, 1995) and that individuals with schizophrenia experience fairly significant social impairment regardless of their level of negative symptoms (Bellack, Morrison, Wixted & Mueser, 1990).

**Social adjustment and the present study.** Assessments of social adjustment are regularly made as part of providing services to patients with schizophrenia and is also a significant interest in the research of psychotic disorders. Because a measure of social adjustment was available for this project, social adjustment had been added as another variable of interest.

The Social Adjustment Scale II (SAS-II; Schooler, Hogarty, & Weissman, 1979) is a scale that was designed specifically to assess the social adjustment of patients with schizophrenia. The SAS-II was modified from the SAS-I (Paykel, Weissman, Prusoff, & Tonks, 1971), a scale that assessed the social functioning of depressed individuals, but did not take into consideration important concerns of those persons with schizophrenia, such as unemployment, lack of spouse and children, special living arrangements, and impaired skills of daily living. The time period of interest in assessment with this measure is the preceding two months. The SAS-II consists of 52 questions that are asked within the context of a semi-structured interview by a trained rater. This measure takes 45 minutes to one hour to complete.

The SAS-II assesses the areas of work role, relationship with a principal (primary) household member, conjugal and nonconjugal sexual adjustment, romantic involvement, parental role, extended family relationships, social leisure activities, and personal well-being. Each area of interest includes ratings of performance at expected tasks, interpersonal relations, friction, and
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satisfaction in the roles. Ratings for these items are made on a 5-point scale, with higher numbers indicating greater impairment in the area being assessed. Five global ratings are also completed, to assess areas of work and daily responsibilities, relationship with primary household member, relationship with external family, social leisure activities, and general adjustment. Ratings of most specific items were based upon the reports of the study participants and their descriptions of their social roles and interactions with others. Interviewers are instructed to focus their ratings on the global items by comparing the participant to the adjustment of a "normal" person (i.e., one without mental illness) within the community and considering community norms and standards rather than knowledge of the individual's adjustment or comparisons to other patients. For the purposes of this research study, only the global ratings will be examined.

**Language Production**

*Language production and schizophrenia.* Language errors and deviances are common in the speech of individuals with schizophrenia. The concept of thought disorder in schizophrenia was emphasized by Kraepelin's (1919, 1971) descriptions of abnormal communication, and in Bleuler's (1911, 1950) conceptualization of schizophrenia with his identification of "associative loosening" as the characteristic symptom of the disorder. Although thought disorder has continued to be considered pathognomic of schizophrenia, Bleuler's vague description of associative loosening and the more recent finding that thought disorder is present in disorders other than schizophrenia (Andreasen, 1979b; Harrow, Silverstein, & Marengo, 1983), has changed the course of research on the topic.

Some past researchers postulated that there was a "schizophrenic language" common to all patients, and that if one could learn this language, one would be able to communicate with persons with schizophrenia. This has been disputed by studies that have shown that persons with schizophrenia tend to respond to associations in fairly idiosyncratic ways, and that there is very little commonality in associations among persons with schizophrenia (Sommer, Dewar, & Osmond, 1960)
A significant amount of past research has focused on the attempt to identify a fundamental and underlying deficit for language disturbances, and when assuming that language reflects underlying thought patterns, for thought disturbances (Maher, 1972; McGrath, 1991). Thus, studies have focused on specific aspects of thinking disturbances, such as concreteness and overinclusion in concept formation, idiosyncratic thinking and looseness of associations in cognitive focusing, and, overgeneralization and circumstantiality in reasoning (Johnston & Holzman, 1979; Maher, 1972; Pavy, 1968). However, it has become more evident over time that thought disorder varies across a continuum ranging from slight slippage, as sometimes seen in normal speech, to extremely deviant verbalizations, and that any given individual may exhibit varying degrees of thought disorder over time (Andreasen, 1979a; Chapman, Chapman, & Miller, 1964).

The DSM-IV-TR (2000) characterizes the speech of patients with schizophrenia as disorganized via speech behavior such as frequent derailment (ideas "slip off the track" onto one another and appear to be unrelated or only vaguely related) or incoherence (speech that is incomprehensible or seemingly random). Most clinicians will agree that the communication disturbances observed in the speech of these individuals are an integral component in the identification and diagnosis of schizophrenia.

As discussed earlier, the concept of thought disorder is related to language and communication in schizophrenia. The idea of thought disorder has been plagued in the past with the absence of any agreement as to its definition, although the concept has been present in the literature for an extended period of time. Different conceptualizations of thought disorder have involved reasoning, concept formation, set maintenance, and abstraction of thought. This has shifted with the conceptualization of thought disorder as being composed of or at least manifested as an observable language disturbance that could involve any of eighteen different language behaviors considered to be subtypes of thought disorder (Andreasen, 1979a). These behaviors are poverty of speech, poverty of content of speech, pressure of speech, distractible speech,
tangentiality, derailment, incoherence, illogicality, clanging, neologisms, word approximations, circumstanciality, loss of goal, perseveration, echolalia, blocking, stilted speech, self-reference, and paraphasias (use of wrong words or using words in wrong or senseless combinations), both phonemic and semantic.

A number of researchers (Barch & Berenbaum, 1996; Docherty, Hawkins, et al., 1996) state that multiple language production processes are associated with thought disorder and communication disturbances in schizophrenia. These processes include discourse planning, encoding of information, monitoring speech, editing own speech for errors, and articulating ones own speech. Barch and Berenbaum (1996) studied a variety of language production tasks and found that common errors in schizophrenic speech were associated with specific processes. Increased referential errors (vague or unclear references) were associated with impaired discourse planning on a story-telling task. Greater word approximations (use of an existing word in a new and unconventional way or development of a new word used in an understandable way) and neologisms (creation of a completely new word with no understandable derivation) were associated with decreased grammatical and phonological encoding on a speech error induction task. What these authors termed derailment-non sequiturs (ideas within spontaneous speech that are obliquely related or completely unrelated) were associated with decreased performance on a reality monitoring task.

The authors concluded that thought disorder is multidimensional and that the variety of tasks used measured different aspects of language production because they were associated with different speech errors. Factors such as general verbal intelligence and medication effects were explored and were not related to the results. The authors clarified that theirs was only a correlational study and did not conclude that language production deficits cause thought disorder.

An alternative theory of the communication disturbances evidenced by patients with schizophrenia is that the patients exhibit deficits in general cognitive processes of working memory and sustained attention rather than thought disorder or specific language production.
difficulties (Docherty, Hawkins, et al., 1996; see also Saykin, et al., 1994). Results supporting this theory have been seen in the performance of patients with schizophrenia when compared with those with bipolar and nonpsychiatric control subjects (Docherty, Hawkins, et al.). Tests of verbal fluency, concept formation, working memory, and attention were completed by these subjects. Results revealed that the persons with schizophrenia performed significantly worse than the control subjects. The mania group was no different from either the schizophrenia or the control groups. Specifically, reference performance was associated with general working memory and sustained attention, but not with concept formation or verbal fluency. Opposite results were found for the bipolar and normal control groups, in other words that verbal fluency and concept formation were associated with reference errors. Severity of illness was examined and was not related to the results. These researchers conclude that errors for the patients with schizophrenia are caused by general cognitive processes rather than specific language production processes.

The debate whether language errors are due to cognitive processes or specific language production processes is ongoing in the literature. It is unclear at this time which theory is correct, or whether both have an impact on language errors. This study will assess communication disturbances (which are related to discourse structure, linguistics, and specific language processes) and neurocognitive functioning in hopes of shedding additional light on this topic.

Language errors exhibited by patients with schizophrenia are common in the area of general verbal fluency, involving both letters and words, or categories. Kuperberg, McGuire and David (1998) presented patients with schizophrenia having thought disorder, those without thought disorder, and normal subjects with verbal fluency tasks to produce words beginning with a specific letter or to provide examples of specific categories. The results of a portion of the study revealed that patients with schizophrenia performed significantly worse than the normal subjects, and within the schizophrenia group those having thought disorder were more impaired than those not having thought disorder. Common errors were production of an alternative form of the same
word, repetitions, perseverations, neologisms, and associations to other stimuli. It was noted that these are common errors produced by patients with schizophrenia in less formal tasks as well.

A concerted effort has been maintained in the literature to differentiate schizophrenia from aphasia, because at times the language productions of individuals in both groups are similar. One study examined both patients with schizophrenia having a formal thought disorder and those with aphasia (Faber, et al., 1983). The results revealed that the two groups were essentially the same in the frequency of neologisms and paraphasias (mispronunciation of a word because sounds have slipped out of sequence or substitution of an inappropriate word in an effort to say something specific). The patients with aphasia evidenced significantly more poverty of speech content, anomia (word finding problems), and decreased auditory comprehension. Those with schizophrenia produced significantly more word approximations, derailment, and tangentiality (response to a question in an oblique or even irrelevant manner). The authors reported that most errors in classification arose in the misidentification of aphasia patients as having schizophrenia. They concluded that a difference in verbal productions of individuals with schizophrenia and aphasia can be seen, even though a large overlap exists between the two groups.

The speech of patients with schizophrenia has been found to differ from that of other groups when considering syntactic properties of the speech (Fraser, King, Thomas & Kendell, 1986). Individuals with schizophrenia were found to be significantly different than those with mania as well as normals. The schizophrenia groups showed decreased complexity of speech, decreased number of well-formed sentences, increased syntactic and semantic errors, and increased dysfluencies. Steps were taken to control for medication effects within this study. These authors concluded that the psychotic illness of schizophrenia is reflected in linguistic features even if the disorder is not necessarily a primary language dysfunction.

Similar results were found when patients with schizophrenia are separated into those with chronic and those with acute forms of the disorder (Thomas, King, Fraser, & Kendell, 1990). Analysis of symptom measures revealed that positive symptoms predominated for patients with
acute schizophrenia, while those in a more chronic state evidenced both positive and negative symptoms. Analysis of syntactic properties of schizophrenic speech revealed that the language productions of the chronic group were significantly worse than the other two groups, while the acute patients evidenced performance between the chronic and the control groups. Overall, individuals with chronic schizophrenia evidenced less fluency, more errors and less complexity in their speech. When separating hospitalized and community patients in this study, it was found that the performance of hospitalized patients was less complex and less fluent than those in the community. Symptom severity had been controlled for, and it was determined that the poorer performance of hospitalized patients was not due to severity of symptoms at the time of testing. A three year follow up to this research project (King, Fraser, Thomas & Kendell, 1990) found that the language of patients with schizophrenia had become more impoverished and degraded over time even though the patients’ symptoms were in remission. Further study showed that this degradation was not due to medication effects, a prolonged hospital stay, nor to patient relapse because patients with schizophrenia still evidenced decreased complexity and fluency over time when compared to previous ratings. This deterioration was not seen in persons with mania because at follow up they appeared essentially normal in their language productions.

Language production and the present study. The preceding review has indicated that language disturbances are common in persons with schizophrenia and are considered to be an integral component in the identification and diagnosis of schizophrenia. These language disturbances have included both clinical aspects of language, noted in the observations of Kraepelin (1919, 1971) and Bleuler (1911, 1950), and more technically-defined and measured linguistic aspects of language. Each area, clinical and linguistic, are relevant to the study and understanding of schizophrenia. Due to the importance and prevalence of language disturbances in people with schizophrenia, this construct has been included in the present study. Unclear references, a subtype of language disturbance and one periodically seen in the speech of non-
patients, was considered in conjunction with the variables of quality of life, social adjustment, neurocognitive functioning, and general symptom presentation.

The concept of unclear references considers language disturbance with a more specific and scientific focus and allows the researcher to tap into the linguistic components of natural language within the context of the clinical aspects of the speech. The study of unclear references has provided valuable information about the relationships of these language disturbances with the other variables of interest of this study and contributed to a literature that contains relatively little information relating unclear references to other domains of functioning.

The Communication Disturbances Index (CDI) was developed as a measure of natural language that would specifically assess the level and type of communication disturbances evidenced in the speech of psychotic patients, even with subtle instances of communication failure (Docherty, DeRosa & Andreasen, 1996). The CDI focuses specifically on failures of communication rather than on signs of underlying thought disorder or disturbances of language structure. As such, it measures failures in the transmission of meaning from one person (the speaker) to another (the listener). Thus, vague words or incorrect usage of words are not measured unless they confuse or otherwise impede the meaning of the statement. The CDI involves a wider and more inclusive index of communication disturbance than other commonly used measures such as the Scale for the Assessment of Thought, Language, and Communication (TLC; Andreasen, 1979a, 1986) which focuses on specific examples of language behaviors that contribute to formal thought disorder. Docherty and her research group based the development of the CDI on the theory that communication disturbance, or a failure in the transmission of meaning from speaker to listener, is the hallmark of schizophrenia and other psychotic disorders. The idea of communication disturbance implies that the patient speaks and uses words or phrases in such a way that the meanings are not socially shared with the listener(s).

The CDI is focused on the concept of "the unclear reference" which refers to unclarity of meanings in speech. These unclear references are: (1) vague references, (2) confused
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references, (3) missing information references, (4) ambiguous word meanings, (5) wrong word references, and, (6) structural unclarities. The CDI is more inclusive than other scales because it includes instances of very subtle unclear meanings, considers violations of "common knowledge" as unclear references, takes into account unclear meanings of any word or phrase rather than only nominals and pronominals (as seen in other scales), and includes instances of faulty word usage or grammatical structure that precludes the clarity of speech meaning.

It is for these reasons that the CDI was selected for inclusion in the present study. The unclear reference is a construct that is periodically seen in the speech of normal subjects and is easily noticed by the listener in most situations. Thus, this measure tends to capture even low levels of communication disturbance and provide more detailed analysis when applied to the other variables of interest in this study (quality of life, social adjustment, neurocognitive, symptom, and demographic). The unclear reference language disturbance is one which affects individuals with schizophrenia in their daily interactions with others and can be applied through the interventions that are done with persons with schizophrenia via managed care and case management. All six of the communication failures were considered as part of the current study, specifically because each type of failure exhibits a different sort of unclarity in speech. A Total Communication Disturbance rating is also obtained by summing the six unclarities.

Initial research with the CDI has shown a number of differences between healthy persons and patients with mania or schizophrenia (Docherty, DeRosa, et al., 1996). It was found that the total number of words produced was greatest within the mania group, followed by the healthy group, then the schizophrenia group. Overall, the two patient groups (mania and schizophrenia) were equivalent and exhibited significantly more unclear references than the healthy persons in all areas, although the group with schizophrenia did evidence a greater frequency of vague references than the mania patients.

Three of the six types of disturbances (missing information references, ambiguous word meanings, and structural unclarities) have shown to be more prevalent in the speech of relatives
of patients with schizophrenia and may be potential indicators of genetic vulnerability to the
disorder (Docherty & Gottesman, 2000). In addition, these three communication disturbances
have also been found to occur even more frequently in the speech of the patients themselves than
in their relatives. Of these three disturbances, missing information references were found to be the
most "schizophrenic" in quality and are speculated to be associated with specific cognitive
weaknesses, although this connection is not well understood and needs to be studied in more
detail.

Exploration of these communication failures exhibited by patients with schizophrenia and
their potential cognitive origins has recently been completed. Initially, research indicated that
patients with schizophrenia exhibited significant numbers of communication failures and that these
were associated with both deficits in immediate auditory memory (as measured by a digit span
task) and distractibility (involving a distracter voice) on the same task (Docherty & Gordinier,
1999). Follow up research expanded on these results (Docherty, Hall, Gordinier, & Cutting, 2000)
when it was found that four of the communication failures (grammatical unclarities, confused
references, missing information references, and ambiguous word meanings) were significantly
related to conceptual sequencing as measured by a conceptualization test in which the subject is
required to analyze a series of items and add to the series with the next sequential item. In
addition, each of these four failures was also associated with a specific combination of other
cognitive abilities, sustained attention (as measured by a computerized visual continuous
performance task), immediate memory (as measured by a digit span test), and organization and
sequencing (as measured by a trail making test). Confused references were associated only with
deficits in immediate memory. Missing information references were associated with deficits in
sustained attention and organization/sequencing. Ambiguous word meanings were associated
with deficits in sustained attention and organization/sequencing. Finally, grammatical unclarities
were associated with deficits in immediate memory and organization/sequencing. These results
support the theory that communication disturbances do have some connections to specific
cognitive abilities, at least to some extent.

Additional research has been completed considering the impact of affectively positive and
negative topics on communication disturbances utilizing the CDI. Docherty and Hebert (1997)
found that CDI scores for patients with schizophrenia were significantly higher in the affectively
negative than in the positive condition. When specific communication disturbances were
considered, vague references, confused references, and ambiguous word meanings were found
to be most affected by the affectivity of the topic. When utilizing scores from the TLC to assess for
formal thought disorder, the authors found that there was a significant increase in positive thought
disorder ratings in the affectively negative condition but no change in negative thought disorder.
Patients with schizophrenia have been found to be reactive to affectively-laden material
(Docherty, Hall, & Gordinier, 1997). Although normals did exhibit some reactivity, patients with
schizophrenia were found to evidence much more disturbances in speech when discussing
negative topics.

Neurocognitive Functioning

Neuropsychology and schizophrenia. Neuropsychology is generally accepted to refer to
the study of the relation between brain function and behavior of the individual, with a specific focus
on the behavioral expression of brain dysfunction (Keefe, 1995; Lezak, 1995). In clinical practice,
neuropsychology has allowed professionals to determine the location of disease or damage to the
brain as well as the abilities of the individuals in treatment. The areas of functioning traditionally
assessed through neuropsychological assessment are: attention, higher cognitive and executive
functioning, motor and perceptual skills, spatial abilities, affect, language, memory, and intellectual
ability (Lezak). Such assessments are becoming much more common and this practice is no
longer reserved only for patients with brain injury.

Benefits of neuropsychological assessment with psychiatric patients are diverse (Keefe,
1995). An assessment can provide an objective indication or description of the patient’s mental
functioning as well as his or her cognitive and behavioral abilities and weaknesses. The results of an assessment can assist in predicting the course of the illness and potentially improve diagnostic classification while contributing to the development of individual treatment strategies and interventions. The author cautions that poor performance on a single test or measure does not necessarily indicate a specific deficit because a number of other factors may be involved, such as motivation, difficulty of the task, symptoms of the illness, impaired memory, and, medication effects. Corroborating evidence should always be sought. One must also be aware that a specific deficit does not necessarily indicate dysfunction in a specific brain region because the complexity of the task and damage in other areas may affect the region of concern. In the study of schizophrenia, considering alternative applications of neuropsychological assessment such as those discussed above is especially important because a summary of previous research has determined that there is no conclusive evidence for the presence of a specific lesion indicative of schizophrenia (Levin, Yurgelun-Todd & Craft, 1989). In addition, a review of fifteen longitudinal studies (with at least follow up at one year) found that neurocognitive functioning of patients with schizophrenia did not decline over time (Rund, 1998).

As a result of the findings that cognitive functioning is stable over time, that no one specific lesion is indicative of schizophrenia, and no typical deficits are to be expected with schizophrenia, an understanding of the patient's individual functioning is needed. Once this individual pattern of neurocognitive functioning is established, it can be applied to other areas of interest, such as those involved in this study (psychiatric symptoms, social adjustment, communication disturbances, and quality of life) to see what relationships exist and to determine patterns in outcome. Specific domains of neurocognitive interest for this research included attention and concentration, verbal fluency, verbal memory, general mental, and higher cognitive functioning. A review of each of these domains and research involving neurocognitive variables, schizophrenia, and outcome follows.
Neurocognitive functioning and schizophrenia research. Researchers are in agreement that schizophrenia is associated with neurocognitive deficits in a number of areas of functioning. A review of the research was provided in a meta-analysis of 204 studies involving 7420 patients with schizophrenia assessing 22 neuropsychological test variables (Heinrichs & Zakzanis, 1998). The goal of the research was to estimate the consistency, strength, and selectivity of neurocognitive deficits in schizophrenia relating to most neurocognitive tasks in common use today. The authors concluded that neurocognitive impairments are a reliable finding in schizophrenia but that no one test and its indicated deficits are completely indicative of schizophrenia. The authors instead argue that neurocognitive deficits are not defining characteristics nor central to the illness, but rather secondary to other processes within the disease. Results are presented according to areas of functioning.

The authors concluded that for memory, defective total verbal learning over trials is a reliable finding in schizophrenia. Problems with verbal memory are related to a number of the language disturbances discussed in the previous section. The finding of decreased verbal learning was replicated with more specific indices of verbal memory such as rate of forgetting or savings after a delay. Nonverbal memory evidenced the same conclusions, but with more heterogeneity in the results. Executive functioning revealed a moderately large and reliable impairment. More specifically, performance on the Wisconsin Card Sorting Test (WCST) was significantly associated with IQ as measured by the Wechsler Adult Intelligence Scale, Revised (WAIS-R). Within general intellectual ability, a greater sensitivity was found with the WAIS-R than other measures of IQ. Impairments of intellectual functioning of patients with schizophrenia were large and reliable when the WAIS-R was used. A modest discrimination was found between patients with schizophrenia and normal controls on measures of attention. Tests such as ones like the continuous performance test and Trail Making Test were equally sensitive. In addition, no difference was found between the performance on Trails A and Trails B. Several of these domains were studied in the present study and relationships between the different domains were
examined. The domains of interest included verbal memory, verbal fluency, higher cognitive functioning, general mental abilities, and attention.

A moderately large and reliable unilateral deficit was found with motor functioning. When considering tactile transfer of information a large effect was found, but the results were very heterogeneous across patients. A moderately large effect was found between the spatial ability of individuals with schizophrenia and those without. These findings were presented with caution because spatial ability is not often studied in schizophrenia research and only a few studies were considered.

The assessment of language functioning through neurocognitive measures is important in the understanding of how language deficits impact other neurocognitive abilities and functioning in various areas of their life. At a gross level, language in the context of neuropsychology refers to comprehension, fluency, repetition, and naming. Assessment of neurocognitive abilities in the domain of language functioning allows the clinician to understand the individual's brain functioning as expressed by language behavior. Assessment of language functioning revealed that large effects in the impairment of patients with schizophrenia are found in language, as measured by the Controlled Oral Word Association Test, a test of verbal fluency, and the Token Test, a test involving oral commands to the individual to manipulate "tokens" of various colors and sizes. Moderate effects were found for a variation of vocabulary test, although there was no difference between the WAIS-R Vocabulary subtest and other measures of vocabulary. Medication effects were found with these results as a significantly larger impairment on verbal fluency is found in those individuals who are taking greater doses of medications. These specific deficits in language functioning can again be tied to the discussion in the preceding section about language disturbances and the communication of persons with schizophrenia. This literature in some aspects overlaps with that specific to language, but in no way replaces the research done primarily in the domain of language disturbances. The domain of verbal fluency was also under consideration as part of the present study.
The authors assert between 61 and 78% of individuals with schizophrenia exhibit some neurocognitive deficit(s). They related that the evidence shows a number of patients with schizophrenia are neurocognitively normal, but that most have some deficit(s) and often they are more impaired than some individuals with neurological disorders. The best indicators of impairment in people with schizophrenia were determined to be the score of global verbal memory, Performance IQ and Full Scale IQ on the WAIS-R, scores from the CPT, and word fluency. The measures with the least ability to differentiate were the Block Design and Vocabulary subtest from the WAIS-R, and IQ scores derived from non-WAIS-R measures. As previously noted, the domains of verbal fluency and general mental ability were included in the present study.

Similar findings have been presented which reflect a generalized deficit in schizophrenia (Dickerson, Boronow, Ringel, & Parente, 1996; Heaton et al., 1994; Jeste, et al., 1995; Perlick, Mattis, Stastny, & Teresi, 1992). However, different conclusions have been drawn regarding specific impairments in persons with schizophrenia. Specific selective deficits for both in-patients and out-patients have been found to be in semantic memory, visual memory and verbal learning, while little if any impairment has been found in abstraction/flexibility, verbal intelligence, attention and motor skills (Saykin, et al., 1991). Other conclusions have indicated that out-patients with schizophrenia evidence impairments on tasks of efficiency, attention, auditory discrimination, learning, incidental memory, fine motor coordination, and sensory perceptual skill, while performance equivalent to normal controls is seen on tasks of forgetting, aphasia screening, spatial relations, and motor speed (Braff, et al., 1991).

A review of the literature that did not involve any quantitative meta-analysis of the findings supports these findings (Levin, et al., 1989). In general, individuals with schizophrenia were found to have significantly lower global performance scores than brain-damaged patients. No comparisons to normal controls were provided. Overall, deficits in performance were seen more with chronic schizophrenia than acute schizophrenia. Specific indications were provided for several of the separate areas of functioning. Memory was found to be especially impaired in
severely disturbed patients with schizophrenia. Attention was found to differ across classifications of schizophrenia. When considering subtypes of the disorder, those with non-paranoid schizophrenia evidenced greater impairments in attention than those diagnosed with paranoid schizophrenia. Both of these areas, verbal memory and attention, are constructs of interest in the present study. However, no analysis of subtypes was done for the current study. Symptomatology also influenced attentional performance, in that patients with predominantly negative symptoms were more impaired than those with predominantly positive symptoms (see also Lieh-Mak & Lee, 1997). Basic language functions such as naming and repetition were intact for patients, but difficulties were found in language behaviors involving semantic content, discourse, and complex language. This has been discussed in more detail in the language disturbances section above. Visual and verbal affective processing were impaired in patients with schizophrenia and those with predominantly negative symptoms exhibited specific deficits in conveying vocal affect to others.

Further evidence for the differentiation of neuropsychological performance in individuals with schizophrenia based upon symptom classification has been presented (Green & Walker, 1985). Individuals with predominantly negative symptoms showed significant impairment on visual motor and visual spatial tasks, such as the Block Design subtest of the WAIS-R. Those with predominantly positive symptoms showed significant impairments on short-term verbal memory recall tasks while their performance on recognition tasks was not impaired. Exploration of the relationship between neurocognitive functioning and symptom presentation was undertaken as part of the current study.

A comprehensive review of the literature has concluded that positive symptoms tend to be associated with deficits in auditory information processing and self-monitoring, while negative symptoms tend to be associated more with deficits in visual and motor skills (Strauss, 1993). The author summarized recent reports that included recommendations that neurocognitive research focus on the analysis of individual symptoms rather than symptom dimensions (e.g., positive and negative symptoms). This is due to findings that individuals with hallucinations tend to have
difficulty with discriminating the source of information and persons with delusions tend to have difficulty with inferential thinking and dysfunction with perceptual processes.

Some confusion between older patients with schizophrenia and individuals with Alzheimer's Disease (AD) arises due to impaired memory evidenced by each group. Relatively little is known about the interaction between the disease process of schizophrenia and the effects of aging. A question in the literature is whether schizophrenia continues later in development or if diagnoses of late-onset schizophrenia should actually be AD. A hallmark of AD is the rapid forgetting of recently learned information (Lezak, 1995), whereas in schizophrenia the memory difficulties appear to stem from inefficient learning with intact remembering of what was learned.

Heaton, et al. (1994) engaged in a project to study memory performance in AD and schizophrenia. All participants were individuals living in the community, and were classified into groups as normal control, AD patients, or those diagnosed with schizophrenia. The patients with schizophrenia were further classified as early onset-still young, early onset-older, or late onset. Results indicated all patient groups (schizophrenia and AD) were within the normal range on Full Scale IQ and the Average Impairment Rating on the Halstead-Reitan Neuropsychological Battery (HRB), but were significantly lower than the normal controls. AD patients exhibited significantly lower Global Deficit Scores on the HRB than the control group or the three schizophrenia groups. The four patient groups performed worse than the control group on all measures except memory which was calculated as percent retention of information learned. Individuals with schizophrenia performed equally with the control group, while the AD group had a significantly greater learning impairment. No significant differences were found on any measures across the three schizophrenia groups. The authors conclude that neuropsychological impairment in schizophrenia is unrelated to current age, age at onset, or duration of the illness. In addition, they state that late onset schizophrenia is not just AD with psychotic features because the memory impairments measured with rapid forgetting were seen only in the individuals with AD and the deficits associated with schizophrenia were nonprogressive.
Similar results have been found in other studies of late-onset schizophrenia (Jeste, et al., 1995). Specifically, individuals with early and late-onset schizophrenia showed essentially equal performance to each other and lower performance than the normal controls on most neuropsychological tests. No differences were found between patients and the controls on delayed recall or memory, perceptual motor tasks and sensory abilities. Persons with late-onset schizophrenia did perform better than those with early-onset on the WCST and the California Verbal Learning Test. The authors conclude their results support the diagnostic validity of schizophrenia with onset after age 45.

Neurocognitive functioning and outcome in schizophrenia. Based upon the above discussion, it appears no debate is necessary regarding whether people with schizophrenia suffer from neuropsychological and cognitive impairments. The impact of these deficits on the daily lives of the patients is less understood. A review of the literature relating neurocognitive measures to functional outcome for individuals with schizophrenia has indicated several important consistencies in research (Green, 1996). The goal of Green’s review was to determine which neurocognitive impairments may restrict the functioning of patients with schizophrenia in the community. Functional outcome is defined as the result of competence in a large number of tasks. The domains of community outcome, social problem solving, and social skill acquisition are considered.

Results of studying community outcome have been quite variable, but several findings consistently emerge (Green, 1996). Secondary verbal memory and card sorting via the WCST both emerged as predictors of community functioning, each of which were also examined as part of the current project. Secondary verbal memory refers to memory for lists of words or stories and is usually assessed after a delay. This is in contrast to immediate memory, which is equivalent to short-term memory and is often assessed with measures such as the Digit Span. No relationship was found between psychotic symptoms and community outcome. Social problem solving was best predicted by secondary verbal memory and vigilance, measured by a continuous
functioning task. A relationship between negative, but not psychotic symptoms, and social problem solving was found. Primary and secondary verbal memory as well as vigilance were determined to be the most probable predictors of social skill acquisition. No relationship between symptoms, negative or psychotic, was found with social problem solving.

The author concluded that the WCST performance and secondary verbal memory, as measured by the Rey Auditory Verbal Learning Test (AVLT), a list learning task, or the Logical Memory I and II subtests from the WMS-R, measuring memory for paragraph length material, are the best predictors of functional outcome. Primary verbal memory and vigilance were determined to be moderate predictors of overall outcome. The lack of a strong relationship between functional outcome and symptoms was attributed to a number of potential influences. Symptoms may be more informative across diagnostic classifications where more variability in both symptoms and outcome are found rather than within the single diagnosis of schizophrenia. Not all symptoms are equally disruptive to outcome and some may preclude individuals from community life in general. A primary indicator of outcome is occupational status, and it is important to note that not all job positions would be equally affected by symptoms and symptoms may be more tolerated in some positions than others. Regardless of these considerations, the author points out that several neurocognitive measures were consistently more associated with outcome than symptoms.

Outcome as assessed by social functioning has been examined in relation to neurocognitive functioning. Results indicate that verbal memory, overall verbal ability, and cognitive flexibility are associated with social problem solving (Addington & Addington, 1999; Addington, McCleary, & Munroe-Blum, 1998) as measured by an individual's ability to assess an interpersonal social problem, then develop and implement a solution. These authors also determined that neither social functioning in the community nor quality of life (both areas considered in this study) were associated with neurocognitive performance. Similar results have been found which revealed that deficits in higher cognitive functioning, although quite prevalent in persons with schizophrenia, were not associated with reports quality of life (Heslegrave, et al.,
These authors did postulate that deficits in more basic areas of neurocognitive functioning would be associated with decreased quality of life.

The study of the relationship between occupational functioning and WCST performance of outpatients with schizophrenia has revealed that “task orientation” at work, better social skills, and higher levels of occupational functioning were significantly related to WCST trials to first category and total number correct (Lysaker, Bell, & Beam-Goulet, 1995). The authors present the idea that the WCST should continue to be used in neuropsychological studies of schizophrenia and focused attention should be placed upon the implications of results for vocational counselors and neuropsychological professionals. Contrasting results have been presented which indicate that the WCST was not helpful in predicting social or occupational functioning in outpatients, while performance on aphasia, spatial organization and visual spatial tasks were correlated with social functioning (Dickerson, et al., 1996).

Performance on WCST has also been associated with community tenure and avoiding hospitalization for individuals with schizophrenia. Poorer performance on the WCST predicted shorter duration of community life before a first rehospitalization better than did an individual’s history of hospitalization (Lysaker, Bell, Bioty, & Zito, 1996). An explanation for the result posits that impairments in cognitive flexibility and reasoning are closely associated with difficulties in community life and compromise the individual’s ability to function which limits adaptation to social situations and increases vulnerability to relapse.

Specific neuropsychological functions have been found to discriminate between hospitalized patients and those individuals living in the community. Although all patients overall evidenced mild to moderate impairment on all tasks, measures of motor coordination, initiation and perseveration as measured by the Dementia Rating Scale (DRS), a measure used to assess the changes that characterize senile dementia, and measures of memory and attention significantly discriminated inpatients from outpatients (Perlick, et al., 1992). Measures of conceptualization, language, somatosensory and oral association were not significant.
discriminators of hospitalization status. Most specifically, bilateral and nondominant hand Purdue Pegboard performance were the most clear discriminators, followed by the DRS initiation and perseveration scale and the DRS memory and attention scales.

Neurocognitive functioning and the present study. The previous section suggests that the study of neuropsychological abilities in persons with schizophrenia is still warranted, especially in considering factors such as functional outcome. The present study assessed a number of neurocognitive domains (attention/concentration, verbal memory, verbal fluency, higher cognitive functioning, and general mental ability) and examined their relationship with variables of quality of life, social adjustment, language production, and general symptom presentation. The neurocognitive domains examined by this study were ones in which individuals, such as case workers, are able to assess informally and are areas relative to good functioning within the community. This research explored the interactions between neurocognitive functioning and the other variables in this study, providing knowledge that will be helpful in providing improved care for persons with schizophrenia. Findings from recent research have revealed that neurocognitive deficits are more closely associated with quality of life if the deficits are in basic functioning rather than in higher cognitive functioning (Heslegrave, et al., 1997). A review of the literature has also indicated that impairments in attention (Landre & Taylor, 1995; Nuechterlein, Edell, Norris, & Dawson, 1986) and reality-monitoring (Harvey & Serper, 1990) are associated with language disturbances. Exploration of higher cognitive abilities and attentional skills was undertaken as part of this study, and the relationships between neurocognitive abilities and indications of overall functioning, as measured by social adjustment and quality of life, were completed.

The Present Study

The constructs of quality of life and social adjustment, language production, neurocognitive functioning, and symptom presentation have been demonstrated to be important components in the assessment and treatment of psychiatric patients, yet their inter-relationships have not been studied extensively. A primary focus of mental health services and more
specifically case management is the general ability of the person with schizophrenia to function adequately within the community. Domains such as the variables of interest to the present study relate to the ability of a person to interact and relate to other individuals in the community and otherwise function adequately.

An understanding of an individual patient’s functioning is needed in order to predict his or her ability to survive in the community and overall outcome. Very little research has been completed which considers together any of the different areas of interest for the present study. In particular, the study of quality of life has focused predominantly on outcome and symptom presentation, with little emphasis on neurocognitive functioning and no focus on language production. Findings from recent research have indicated that increased symptom presentation is associated with diminished subjective quality of life (Lehman, 1983; Packer, et al., 1997), and neurocognitive deficits are more closely associated with quality of life if the deficits are in basic functioning rather than in higher cognitive functioning (Heslegrave, et al., 1997). Some research has centered on the relationships between symptom presentation and neurocognitive functioning which have found that neurocognitive deficits are related to negative symptom presentation (Levin, et al., 1989; Lieh-Mak & Lee, 1997; Nuechterlein, et al., 1986). More specific evidence for the relationship between neurocognitive performance and symptom presentation has determined that negative symptoms are inversely related to visual-motor tasks, while positive symptoms are inversely related to verbal memory performance (Green & Walker, 1985).

The present study assessed variables of symptom presentation, quality of life (both subjective and objective), social adjustment, language production (specifically communication disturbances manifested through unclear references), and neurocognitive functioning (evaluated in the domains of attention/concentration, verbal memory, verbal fluency, higher cognitive functioning, and general mental abilities), to determine existing relationships and to discover patterns in outcome. The variables considered for this study are those which other individuals, such as clinicians and case workers, are able to assess informally and have been demonstrated
to be areas of great importance for functioning within the community. This research examined relationships between each of the variables in this study which are relevant to both researchers as well as to professionals and case workers who provide care and intervention in hopes of improving community functioning for persons with schizophrenia.

Hypotheses

Based upon the research reviewed regarding each of the different variables of interest for the study, a number of findings were predicted. In some cases these were only speculative, as a number of these areas had not been studied specifically in relation to one another in the past, or else research had addressed them only in an oblique manner. Several preliminary hypotheses were omitted due to insufficient numbers of participants in some groups to make analyses. These include exploration of the differences in functioning between males and females, exploring differences between those who live in rural and urban areas, and comparisons between inpatients and those persons living in the community. In addition, as the measure of social adjustment became available for this research, global ratings of social adjustment were added as variables as data collection was coming to an end. General hypotheses involving the social adjustment variables were intended to be similar to those of the quality of life assessment, as they in some ways measure similar constructs and can both be used as outcome measures. Social adjustment was expected to correlate negatively with overall symptom presentation, correlate positively with neurocognitive functioning, and correlate positively with ratings of quality of life.

The specific hypotheses for this study were as follows:

1. Overall symptom presentation would be negatively correlated with the measures of quality of life (1a) and neurocognitive functioning (1b).

2. Overall symptom presentation would be positively correlated with communication disturbances.

3. Negative symptoms would have a stronger negative correlation with quality of life (3a) and neurocognitive functioning (3b) than positive symptoms.
4. Quality of life (objective) would be positively correlated with measures of verbal memory, attention, and higher cognitive functioning within the domain of neurocognitive abilities.

5. Participants would exhibit more ambiguous word meanings than other types of unclear references within the area of communication disturbances. The second most common form of communication disturbances will be missing information references.

6. Communication disturbances (unclear references) would be negatively correlated with performance in the specific neurocognitive domains of memory, attention, and verbal fluency.

7. Participants would exhibit greater deficits in the areas of verbal memory, word fluency, attention, and higher cognitive functioning than in general mental ability, the remaining domain of neurocognitive functioning.

8. Individual scores on the QOLI could be predicted from the other variables of the study.

Method

Participants

Participants were 55 patients diagnosed with DSM-IV (American Psychiatric Association, 1994) schizophrenia or schizoaffective disorder. The patients were recruited from the Minneapolis VA Medical Center (n = 43), Hennepin County Mental Health Center (n = 5), or other programs within the community (n = 7) such as the National Alliance for the Mentally Ill of Minnesota, or the Tasks Unlimited program, which facilitates employment and provides other resources to persons with mental illness. Potential participants were screened with a medical history questionnaire either by review of their medical records or interview to exclude for the following: (a) current alcohol abuse, (b) current or past substance dependence or current substance abuse, (c) neurological illness or history of a medical condition with likely central nervous system effects, (d) history of head injury with skull fracture or loss of consciousness of greater than 20 minutes, (e) significant tardive dyskinesia (DISCUS score greater than 7), (f) history of Electro-Convulsive Therapy, (g) adoption, (h) mental retardation or charted IQ of less than 70, (i) being a non-native
English speaker, and (j) being younger than 18 or older than 60 years of age. See Appendix A for Checklist for Exclusionary Criteria form that was used for the study’s initial chart reviews.

Most patients were medicated and had been receiving the same medications and dosages for at least two months prior to entrance into the study. As previously noted, subtypes of schizophrenia were not explored as part of this research study. Daily oral doses of antipsychotic medications were converted to chlorpromazine equivalents according to guidelines suggested by Bezchlibnyk-Butler and Jeffries (2001) for descriptive purposes. Depot doses were converted to average daily dosages using similar guidelines set by the same authors.

Materials

Chart review. After receiving permission to access medical records, a chart review (see Appendix B) was completed for each participant. The chart review included information about medical and psychiatric conditions and treatments, current psychotropic medications and compliance plus recent changes to medications, and current outpatient therapy. In addition, a record of hospitalizations was generated which included information about length of stay, location of hospitalizations, presenting issues, and discharge diagnosis.

Diagnostic Interview for Genetic Studies. To establish diagnosis, the Diagnostic Interview for Genetic Studies (DIGS; Nurnberger, et al., 1994) was completed with each patient by a trained rater at either a pre-doctoral or doctoral level. The DIGS is a semi-structured clinical interview that was developed for the differential diagnosis of mood and psychotic disorders and related “spectrum” disorders. The DIGS incorporates items which, when answered completely with sufficient detail and examples, can provide diagnoses through a variety of diagnostic systems. The individual items included on the DIGS were derived from other structured interviews in order to be used with the various diagnostic systems. The authors have described a number of additional key features of the DIGS, including the extensive coverage of the course, chronology of symptoms, and comorbidity with other disorders, and algorithmic scoring capability of the interview results. This interview collects self-reported psychiatric history data that may be
supplemented with additional medical record and relative information prior to determining the diagnosis. It is intended to be used by interviewers who employ significant clinical judgment, make ratings on symptoms, and utilize a narrative format to indicate additional information. The DIGS is designed for use in research settings that require a detailed and organized history of symptomatology since it is an interview that is not easily administered by lay interviewers or in use with cognitively disorganized individuals. As reported by the authors, reliabilities for the DIGS using computer-generated diagnoses based on algorithms (item scores that are evaluated in predetermined combinations to establish for which diagnoses criteria are met) were excellent, ranging from .73 to .96, except for schizoaffective disorder, for which disagreement on duration of mood vs. psychotic symptoms reduced reliability. See procedures section for a discussion of the present study’s inter-rater reliability for the DIGS.

A procedure often used in conjunction with the DIGS interview involves the rating of a series of 90 items that have been taken from the operational criteria for major clinical syndromes. This procedure allows the precise recording of signs and symptoms as an accurate method to establish a diagnosis. These rating are then entered into a computer scoring program that provides a diagnosis based on computer-scored algorithms. This program, the Operational Criteria Checklist (OPCRIT; McGuffin, Farmer, & Harvey, 1991) system, was developed to be used after a comprehensive diagnostic interview was completed and detailed information was obtained about the individual’s psychiatric history. The OPCRIT has been found to provide convenient, reliable, easy, and valid psychiatric diagnoses according to a variety of diagnostic systems.

Diagnostic reliability between raters using the OPCRIT has been found to be very good, with coefficients between .69 and .78 for DSM-III-R diagnoses, the most recent system when the measure was first developed (McGuffin, et al., 1991). Item-by-item agreement, although less good, still achieved reasonable reliability despite the problem of low base rates for some items, with coefficients ranging from .34 to 1.0. A larger multicenter assessment found that the OPCRIT
provided good reliability across a variety of geographical and theoretical backgrounds, with an inter-rater reliability coefficient of .73 for DSM-III-R diagnoses (Williams, et al., 1996). Concurrent validity was determined with comparisons between lifetime diagnoses generated by OPCRIT and consensus best-estimate diagnoses, with coefficients exceeding .80 for DSM-III-R diagnoses (Craddock, et al., 1996). Previous research on the OPCRIT has shown that independent clinicians having extensive experience with both the DIGS and the OPCRIT can make reliable diagnoses, providing a more structured procedure to establish best-estimate consensus diagnoses. Agreements between clinicians' diagnoses and consensus diagnosis produced were excellent, with reliability coefficients ranging from 0.83 to 0.89 for DSM-III-R syndromes (Azevedo, et al., 1999).

**Brief Psychiatric Rating Scale.** To assess current symptomatology, the Expanded Version of the Brief Psychiatric Rating Scale (BPRS; Ventura, et al., 1993) was administered. This version involves the original eighteen items relating to patient symptom presentation and experiences of the BPRS (Overall & Gorham, 1962), plus an additional six items, all of which were rated for the period of one month preceding the assessment. The BPRS can be easily scored based upon interview information that can be gathered after engaging in any standard therapeutic session and possibly some direct questioning about behavior that is not elicited in the session. The BPRS takes only a few minutes to complete once familiarity with the items is established. Interrater reliabilities for the BPRS, using Cronbach’s alpha, are very satisfactory, with \( r = .87 \) for the BPRS Total score (Bell, Milstein, Beam-Goulet, Lysaker, & Cicchetti, 1992). Specific factors for consideration in this study incorporated the factor structure identified by Ventura, et al., (2000) for the expanded BPRS. This structure incorporates symptom factors of Manic-Excitement, Negative Symptoms, Positive Symptoms, and Depression-Anxiety.

**Global Assessment of Functioning.** A judgment of each participant’s overall level of psychiatric functioning was made with the Global Assessment of Functioning (GAF) Scale as it is used with DSM-IV (1994) diagnoses. The GAF involves a clinician’s judgment of a patient’s
psychological, social, and occupational functioning at the time of the assessment. Scores range from 100 (superior functioning) to 1 (persistent danger of hurting self or others, inability to maintain minimal hygiene, or serious suicidal acts). The GAF provides detailed descriptions for each rating to assist in assigning a score for the individual. Reliability for the GAF has been found to range from .72 to .76, and it has been determined to be valid in relation to other measures of clinical need such as support time provided by staff and changes in neuroleptic medication (Jones, Thornicroft, Coffey, & Dunn, 1995).

Quality of life. The quality of life measure that was selected for inclusion in the present study is the Quality of Life Interview - Brief Version (QOLI; Lehman, 1988; 1996). This measure is intended to be used with the chronically mentally ill and assesses general quality of life rather than health related quality of life. The QOLI – Long Version is a highly structured interview of 143 items that takes approximately 45 minutes to complete and can be administered by a trained nonclinical interviewer. The Brief Version takes approximately 15 minutes to complete, allows for the consideration of the same scales, and has psychometric properties comparable to the Long Version and moderate to high correlations between similar scales on each version (Lehman, Kernan, & Postrado, 1995). The Brief version was used in the present study. The scale is focused predominantly on current levels of satisfaction, recent functional status, and access to resources.

The QOLI provides a general assessment of an individual's life experiences in eight domains: living situation, daily activities and functioning, family relations, social relations, finances, work and school, legal and safety issues, and health. In addition, a global measure of life satisfaction is obtained at both the beginning and completion of the interview.

The main purpose of the QOLI is to assess life circumstances of patient populations, both in terms of what the individuals actually do and their feelings about those situations. Thus it involves both a subjective and an objective assessment of quality of life. For items which apply to the individual's subjective quality of life, patients are asked to indicate their satisfaction using a life satisfaction rating scale consisting, as previously described, of ratings 1 = terrible through 7 =
delighted. The Delighted-Terrible scale is presented to the patients on a continuum, with each of the ratings from one to seven accompanied by a computer-generated picture of a face with varying degrees of a smile or frown corresponding to the particular rating. Anchor-point descriptions for each of the ratings (1 through 7) are also provided.

Psychometric properties of the full version of the QOLI have been studied and are determined to be quite satisfactory with only a few ranges including statistics lower than ideal (Lehman, 1988). Internal consistency reliabilities reported by Cronbach’s alpha range from .79 to .88 for the life satisfaction scales and from .44 to .82 for the objective quality of life scales. Test-retest reliabilities of one week have been found to range from .41 to .95 for the life satisfaction scales and from .29 to .98 for the objective quality of life scales. Large variations in the ranges for objective ratings may be a result of drastic changes in the individual’s life circumstances from one test session to the next, and were attributable mostly to “cohesion” and “independence” within the current living situation, specific areas that are assessed only by the full version of the QOLI. Construct and predictive validity have been deemed good by a variety of methods. The QOLI discriminates between patients with severe mental illness and persons in the general population, as well as hospitalized patients and those living in supervised community settings. These findings regarding the psychometric properties of the QOLI were replicated by other researchers studying a total of 981 acutely ill psychiatric inpatients (Russo, et al., 1997). The psychometric qualities of the brief version are comparable to the full version (Lehman, 1988).

Social adjustment. The social adjustment measure that was available for this research project was the Social Adjustment Scale-II (SAS-II; Schooler, Hogarty, & Weissman, 1979). The SAS-II is a semi-structured interview consisting of 52 items that takes approximately 45 minutes to complete. It is focused predominantly on performance at relevant tasks, interpersonal relations, friction with others, and satisfaction in the roles within the areas of work/daily responsibilities, relationship with a principal (primary) household member, conjugal and nonconjugal sexual
adjustment, romantic involvement, parental role, extended family relationships, social leisure activities, and personal well-being.

The main purpose of the SAS-II is to assess the functioning of the individual within the given areas for the preceding two month period. Ratings for most items are made on a 5-point scale, with higher numbers indicating greater impairment in the area being assessed. Area means can be calculated from the scores on sets of individual items within each section. Five global ratings are also completed, to assess areas of work and daily responsibilities, relationship with primary household member, relationship with external family members, social leisure activities, and general social adjustment. Ratings on these global items are made on a 7-point scale, again with higher numbers indicating greater impairment. Interviewers are instructed to make these global ratings based upon comparison with persons generally found in the community in relation to community norms and standards, without regard to knowledge of the patient's earlier adjustment or expectations of mentally ill individuals.

Only the global ratings were used for the purposes of this study. The Work global rating takes into consideration the consistency and effectiveness of the individual's work performance and completion of daily responsibilities in relation to his/her education, prior training, and experience. The Household Member global rating examines the relationship with the patient's primary contact within the household in terms of support, affection, and involvement with each other. The External Family global rating considers the relationship with family members outside of the home in terms of support, affection, and involvement with one another. The Social Leisure global rating evaluates the level and quality of social activities, and meaningfulness of interactions in social situations. The General Adjustment global rating takes into consideration the individual's overall functioning, while considering performance in each of the social roles (work, parental, marital, etc.), interpersonal relationships, and personal comfort or well-being.

Psychometric properties of the SAS-II have been reported to be similar to those of the SAS, for which Pearson correlations were quite high, with a mean correlation of .83 (Weissman,
Paykel, & Prusoff, 1993). The SAS-II has been found to have high agreement between patients and their significant others, as measured by a Spearman's rank correlation coefficient of .98 (Glazer, et al., 1982).

**Language production.** Language disturbances of each participant were assessed with the Communication Disturbances Index (CDI; Docherty, DeRosa, et al., 1996). This scale was developed with consideration of the concept of "the unclear reference" which refers to unclarity of meanings in speech. Definitions of each of the unclear references are provided within the scale along with several examples (see Appendix C). The six types of unclear meanings included in the CDI are Vague References, Confused References, Missing Information references, Ambiguous Word Meanings, Wrong Word References, and Structural Unclarities.

Speech samples for the CDI are obtained via an audiotaped semistructured interview lasting ten to fifteen minutes that is later transcribed for analysis. The topic(s) of this interview are intended to be ones unrelated to the diagnosis or treatment of the patient, but rather outside interests or hobbies of the individual. If a participant begins to talk about their diagnosis or treatment, they are redirected to discuss more neutral topics. In addition, the interviewer is instructed to speak as minimally as possible in order to obtain adequate speech samples from the participant. To control for different production rates of speech among the different experimental groups, the authors calculated the number of each type of communication disturbance per 100 words of speech. Total CDI communication disturbance scores are computed by summing the numbers of each of the six subtypes per 100 words of speech. Thus each is a frequency rather than absolute score.

Initial research involving the CDI revealed that the psychometric properties are quite satisfactory (Docherty, Hawkins, et al., 1996). The inter-rater reliabilities for each of the six subscales and for the overall total communication disturbances are as follows: Vague references (.73), Confused references (.88), Missing information references (.89), Ambiguous word meanings (.88), Wrong word references (.80), Structural unclarities (.93), and Total communication
disturbances (.94). The CDI discriminates the language of persons with schizophrenia from normal controls on all subtypes, and from the language of persons with mania, specifically on the subtypes of vague references. Considering correlations between scores on the different subtypes, it was found that most of the subtypes were moderately to highly correlated with each other. Vague references were the least related to the other subtypes, but were still correlated with the total communication disturbances score. When regarding the proportions of the six subtypes in speech of the participants, those individuals with schizophrenia evidenced a higher proportion of Missing Information references compared with other groups.

Neurocognitive functioning. A variety of neurocognitive measures was employed within this study. These measures included: (1) Trail Making Test, parts A and B, (2) Controlled Oral Word Association Test, (3) Wisconsin Card Sorting Task, (4) California Verbal Learning Test, (5) WAIS-III Block Design, (6) WAIS-III Digit Symbol, (7) WAIS-III Digit Span, (8) WAIS-III Vocabulary.

The Trail Making Test (Reitan & Wolfson, 1985) from the Halstead Reitan Battery, employing standard scoring and norms (Heaton, Grant, & Mathews, 1991), was completed by each subject. Participants on the Trail Making Test must first connect consecutively numbered circles on a page (Part A), and then connect the same number of consecutively numbered and lettered circles on another page by alternating between the numbers and letters (Part B). The Trail Making Test is generally thought of as a measure of orientation and attention, while part A is often considered a measure of visual sequencing and part B is considered to tap into set-shifting and higher cognitive abilities. The reported reliability coefficients for the Trail Making Test vary between .60 and .90, although a low reliability of $r = .36$ has been reported for patients with schizophrenia on Part A (Lezak, 1995).

The Controlled Oral Word Association Test (COWAT; Benton & Hamsher, 1989) is composed of three trials in which subjects are to orally produce words beginning with a designated letter. The letters FAS were the first to be used with this measure. Additional word sets
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have included PRW and CFL, of which the latter was used in the present study. The COWAT is a measure of verbal fluency and word production. Reliability of the COWAT is quite satisfactory, with only the letter A (of the FAS set) having a reliability coefficient below .70, and then only for elderly subjects (Lezak, 1995). Updated norms reflecting a more normally distributed range of scores was used for this measure (Ruff, Light, Parker, & Levin, 1996).

The Wisconsin Card Sorting Test (WCST; Heaton, 1981; Heaton, Chelune, Talley, Kay, & Curtiss, 1993) involves a pack of cards on which are printed one to four symbols, in the patterns of triangle, star, cross, or circle. These symbols appear in one of four colors, red, green, yellow, and blue. The subject's task is to place them one by one under four stimulus cards (one red triangle, two green stars, three yellow crosses, or four blue circles) according to a matching principle that the subject must deduce from the pattern of the administrator's responses to the patient's placement of item cards under the four stimulus cards. The subject is not provided with any initial information about the assessment and just begins by placing cards and the administrator states whether the placement is correct or not. After a series of ten correct placements in a row, the examiner shifts the matching principle, indicating the shift to the subject only by the altered pattern in correct and incorrect item card placements. The matching principle starts with color, shifts to form, and then to number. The matching principles are then repeated for a maximum total of six principles. The test is discontinued after placement of 128 cards or six successful series of cards. Versions of the WCST are available which involve computer administration. The reliabilities of this procedure are comparable to the card administration. The WCST measures higher cognitive functioning, specifically concept formation and reasoning abilities. Satisfactory interrater reliabilities have been reported for the WCST; however, reliability coefficients are not available since success on the test depends upon discovery of the set principle and once determined most subjects are unlikely to exhibit impaired performance on future administrations of the WCST (Heaton, 1981; Lezak, 1995).
Specific scores provided by the WCST can be evaluated in order to better understand the individual's performance on the test. A **Failure to Maintain Set** occurs when the individual achieves five or more consecutive correct responses and then makes an error before eventually completing ten consecutive correct responses for that category. A **Perseverative Error** occurs after the individual has obtained ten consecutive correct responses and the examiner then changes the sorting principle without informing the individual, yet the individual continues to match on the previous sorting principle and does not incorporate feedback that these responses are now incorrect and instead persists with the previous sorting principle. The **Number of Categories Completed** refers to the number of categories (sequences of ten consecutive correct responses) that the individual successfully completed during the test. This value can range from zero to a total of six categories.

The California Verbal Learning Test (CVLT; Delis, Kramer, Kaplan, & Ober, 1987) is a measure of immediate word list recall. The administrator reads a list (A) of 16 words at the rate of one word per second. The subject is then asked to recall as many words from the list as possible while the administrator writes down the words recalled in the exact order as the subject says them, including repetitions and intrusions. This is repeated for a total of five trials. The administrator then reads a second word list (B), and writes down in exact order the subject's recall of the words, again including any repetitions and intrusions. After this trial, the administrator returns to the first list (A), and records the number of words recalled by the subject in a "free recall" condition. Each of the words on List A belongs to one of four categories of shopping items, those being clothing, fruits, spices and herbs, and tools. Each of the words on List B also belongs to one of four categories, namely fish, kitchen equipment, fruits, and spices and herbs (the latter two which are categories that are also included on List A, but involve completely different words). After the free recall condition, the subject completes a "cued recall" condition, in which they are asked to recall items from each of the four individual categories. A 20-minute delay is imposed, and list A is again recalled by the subject, under both free and cued conditions. A recognition trial...
is included at the end of the test as 44 items are presented orally and the subject is required to identify whether each item was included on List A. All 16 items from List A are part of the recognition trial, in addition to 8 from List B. Additional non-list items come from several sources, including one of the four List A categories, phonetic resemblance to List A items, or other common shopping items.

It is assumed that the CVLT measures not only verbal memory, but also its interaction with conceptual ability. Test results provide information about use of learning strategies and the effectiveness of those strategies. Reliability of the CVLT has been studied and found to be quite good, with split-half reliability correlation coefficients between .77 and .86 (Delis, Kramer, Fridlund, & Kaplan, 1990).

The Wechsler Adult Intelligence Scale – Third Edition (WAIS-III; Wechsler, 1997) is a measure for assessing the general mental or intellectual ability of an individual. It is described as helpful in the differential diagnosis of various neurological and psychiatric disorders that affect mental functioning. Determining scores for the WAIS-III involves comparing the examinee’s performance to that of individuals of similar age. This is done to control for the differences in performance across age groups and to assure that the results obtained are meaningful based upon age-appropriate comparisons. Subtests from the WAIS-III that were used in the present study were the Vocabulary, Digit Symbol, Block Design, and Digit Span.

The Vocabulary subtest is a task in which the subject is verbally and visually presented with a series of words that must be defined orally. The test administrator records verbatim the subject’s response and scores the response based upon specific scoring guidelines. Scores of two, one, or zero are assigned based upon the quality of the definition provided by the subject. All word meanings recognized by standard dictionaries or otherwise show good understanding of the word are assigned two points. Responses that are not incorrect but show a poverty of content are assigned a score of one. Responses that are clearly incorrect are assigned a score of zero. If a subject’s response if too vague or unclear to score easily, a neutral inquiry is made to determine if
a superior response can be elicited. Only one query is allowed per word. The test continues until the subject has defined all of the words included in the test (a total of 33) or until six responses in a row are scored zero. The Vocabulary subtest is considered to be an excellent measure of general mental ability and intellectual capacity. Split-half reliability coefficients are extremely high, ranging from .90 to .95 across age groups, with the average across groups being .93. Test-retest reliability for the Vocabulary subtest was excellent, with a reliability coefficient of .91. Interrater reliability was very high, with a coefficient of .95 (Psychological Corporation, 1997).

The Digit Symbol-Coding subtest is a task of symbol substitution that consists of 133 split squares with a randomly assigned number from one to nine in the upper half of the square. A key is provided that pairs each number with a different nonsense symbol. The subject is to fill in the blank half of each square with the symbol that corresponds to number in the upper half of the square. The subject is to complete as many squares as possible in a 2-minute period. Incidental memory, a measure of the subject’s ability to recall the nonsense symbols from memory without prior knowledge that this will be requested, can be assessed by several optional procedures of the Digit Symbol subtest as well. Incidental Learning-Pairing is an assessment of the subject’s ability to recall the nonsense symbols and match them to the correct numbers from memory. The subject is presented with two rows of nine split squares with each of the numbers one through nine in random order to which the subject is requested to provide the appropriate nonsense symbol. Incidental Learning-Free Recall is an assessment of the subject’s ability to recall the nonsense symbols independent of the matching number. The subject is presented with a blank page and is requested to recall as many of the nonsense symbols as possible, without needing to match them to numbers. If these procedures are to be administered, the subject is allowed additional time, if needed, to complete a total of four rows during the Digit Symbol-Coding portion of the subtest. These optional procedures assist the administrator in determining what abilities (i.e., memory retention) may be deficient if the subject obtains a low score on the Digit Symbol-Coding task. The Digit Symbol subtest is a measure of complex attention and is considered to be one of the most
sensitive of neurocognitive tests to brain damage (Lezak, 1995). Test-retest reliability is very good, with correlation coefficients ranging from .81 to .87 across age groups, with the average across groups being .84 (Psychological Corporation, 1997) for most individuals, but as low as .38 for persons with schizophrenia (Lezak, 1995).

The Block Design subtest is a task in which the subject is presented with blocks which are to be used in the construction of a variety of designs ranging in difficulty and number of blocks needed (two, four, or nine). Each block has two red sides, two white sides, and two half-red and half-white sides divided along the diagonal. The designs to be replicated are either put together by the test administrator in a model to be duplicated by the subject or printed in smaller scale on cards that are presented to the subject. The Block Design subtest is a measure of general mental ability, and specifically assess visuospatial organization. Split-half reliability coefficients ranged from .79 to .90 across age groups in the standardization population, with the average across groups being .86. The test-retest reliability coefficient of .82 is very good for this subtest as well (Psychological Corporation, 1997).

The Digit Span subtest is composed of two different tasks, Digits Forward and Digits Backward. Digits Forward involves eight pairs of random number sequences of varying length that the administrator reads aloud at the rate of one per second. Digits Backward involves seven pairs of number sequences. In Digits Forward, the sequence ranges from two to nine digits, and the subject repeats the numbers back to the administrator in the same order as they were presented. In Digits Backward, the sequence ranges from two to eight digits, and the subject repeats the numbers back in the opposite order as they were presented. The Digit Span subtest is a measure of attention, specifically for span of immediate verbal recall. Split-half reliabilities ranged from .87 to .93 across age groups, with the average across the groups being .90. The stability of this subtest over time is quite high, with a test-retest coefficient of .83 (Psychological Corporation, 1997).
Procedures

Recruitment. Relevant staff at each recruitment site were requested to provide information regarding potential subjects who could be contacted and requested to participate in the study. This process generally involved discussing with each clinician their patient case load and determining which patients were appropriate and stable enough for participation. In some cases, the clinician discussed possible participation with individual patients before their names were released to study staff. Patients were then contacted either by telephone or approached after an appointment at the VA Medical Center. They were provided a standardized verbal description of the study (See Appendix D) to determine their interest in participating. If interested, they answered various demographic questions (See Appendix E) and scheduled to participate.

For outreach programs, recruitment information was posted at each site or included in newsletters, and interested participants were encouraged to contact research staff. For these potential participants, a more extensive telephone screening process (See Appendix F) was employed to assure criteria was met for inclusion in the research project. Those who met criteria and were interested in participating answered the same demographics questions and were scheduled for appointments.

Those patients who agreed to participate were asked to provide written consent after reading through a detailed consent form, having an opportunity to ask any questions, and answering several questions about their participation to assess for understanding of the study (Appendix G). Each participant was provided with a copy of their signed consent form.

Risks to the participants and negative effects of the research were minimized through a number of procedures. The informed consent and release of information documents allowed the participants to have complete information and accurate expectations regarding their participation so that they were able to make an informed decision whether or not to participate. Participants were provided with general information about their ongoing participation and the procedures they were completing. In addition, participants were encouraged to ask questions and identify any
distress or discomfort that they were experiencing. It was explained to all participants that they
could terminate their participation at any time. All assessment results and other information about
the participants were identified using only a code number rather than by name or other identifying
information. A master list matching each participant code number with the name of the subject
was kept separately by the project coordinator in a secure location. All research personnel were
required to complete training on issues related to confidentiality and research procedures.

A variety of additional measures were collected as part of a larger study, however this
report will focus on the variables of symptomatology, language production, quality of life, social
adjustment, and neurocognitive functioning.

Initial procedures. Once individuals agreed to participate in the research study, a
comprehensive review of the medical record was completed, using the previously described chart
review form. In addition to gathering the information on the chart review form, copies of various
reports and current progress notes were obtained. This was to provide additional information
about symptomatology during psychotic episodes and descriptions of current functioning and
presentation. Medical records for patients at the Minneapolis VA Medical Center were reviewed as
part of their participation. Subjects recruited from other sites were asked to sign release of
information forms (See Appendix H) in order to obtain relevant psychiatric information from prior
hospitalizations and other service providers. These forms were standard Release of Information
forms used throughout the Department of Veteran’s Affairs.

Daily oral doses and depot doses of antipsychotic medications were converted to
chlorpromazine equivalents according to guidelines suggested by Bezchlibnyk-Butler and Jeffries
(2001). This process involved applying the “apparent clinical equivalence in schizophrenia” (pp
89-91) for a specific dose of a given medication and converting it to an equivalent dosage of
chlorpromazine. This is accomplished by dividing the individual’s medication dosage by the listed
apparent clinical equivalence and then multiplying this by 100 (the clinical equivalence of
chlorpromazine) to obtain the chlorpromazine equivalence for the given medication and dosage.
Medications were broken down into two classes, novel agents and conventional agents. See Table 1 for a description of the medications prescribed to study participants, average daily dosage, class of medication, and the assigned chlorpromazine equivalence for each.

*Training and reliability for clinical assessments.* Clinicians for this study went through extensive training for the DIGS, BPRS, and GAF. Initially, all clinicians met as a group to review and become familiar with the DIGS. Any questions that arose were addressed to the developers of the interview and the responses were discussed among the clinicians and descriptive or explanatory notes were added to the body of the interview. Videotapes containing clinical interviews produced by the creators of the BPRS were reviewed and rated by each clinician. These ratings were then compared to “gold standard” ratings provided with the videos. After training, reliability coefficients for the BPRS training interviews were found to range from .92 to .97 across the different clinicians. The clinicians then alternated administering the DIGS to volunteer psychiatric patients from the Minneapolis VAMC with the other clinicians present and following along while independently rating the DIGS. These interviews were video taped for future reference. After the completion of the interview, the group of clinicians discussed their ratings for the DIGS and any significant deviations were explored and a “gold standard” for the interview was generated. In addition, the BPRS and the GAF were also rated. After the completion of each interview, the clinicians discussed their ratings for the BPRS and the GAF, and a “gold standard” for each according to our research group was developed. Reliability coefficients were found to range between .87 and .92 on the BPRS, and all ratings were within five points on the GAF, a standard developed by this research group. No specific reliability coefficients were calculated for the DIGS, as it was deemed more important to be reliable with ratings on the BPRS and GAF than on individual items on the DIGS.

Training on the QOLI included instructing interviewers to present questions to participants in a standardized format without bias. Reliability on the QOLI tends not to be undertaken, as the interviewer records only what ratings the participant provides (Lehman, 1983).
Clinical assessments. All participants were administered the DIGS by a trained clinician, who also rated the individual on the BPRS and the GAF. The interviewing clinician used available chart review information, as release of information records were not always received in a timely manner, to inform and guide their interview with the patient. A reliability assessment was completed after each interview to assess the overall credibility of the data provided by the patient and to identify any sections of the interview that may contain information of a jumbled or inconsistent nature. The SAS-II and the QOLI were administered by a trained research staff. Again, after each interview, a reliability assessment was completed by the rater to assess the overall quality of the data provided by the participant and to identify any sections of the interviews, which may have contained information of a jumbled or inconsistent nature. These interviews were generally administered on one day as part of a longer session that included additional interviews for the larger research study.

Once the DIGS was completed with the participant, the interviewing clinician rated the questions needed to score the OPCRIT. The item responses were next entered into the OPCRIT program that then provided a diagnosis based upon the algorithmic scoring program. Although diagnoses that correspond to a variety of different diagnostic systems are provided, DSM-IV (1994) diagnoses were used for the purposes of this study.

After diagnosis had been established by the interviewing clinician and any additional information relevant to the participant's psychiatric history had been received, a second "diagnostic" clinician also reviewed all the available information and independently rated the OPCRIT. This diagnostic clinician was blind to the interviewing clinician's OPCRIT diagnosis. For all cases where there was agreement, this was the accepted diagnosis. For situations in which the two clinicians did not obtain the same diagnosis, they met for a "consensus meeting" in which items were compared and discussed so that a consensus diagnosis could be established. This consensus diagnosis was then used as the final diagnosis for the individual.
As previously noted, symptomatology was rated by the BPRS, and the four factors as identified by Ventura et al. (2000) through a principal components analysis were examined. A total score was calculated by summing the ratings from all 24 of the items. The four BPRS symptom factors were Positive Symptoms, Negative Symptoms, Manic-Excitement, and Depression-Anxiety. The Positive Symptom scale included items of suspiciousness, hallucinations, unusual thought content, bizarre behavior, and disorientation. The Negative Symptom scale included items of self-neglect, blunted affect, emotional withdrawal, and motor retardation. The Manic-Excitement scale included hostility, elevated mood, grandiosity, excitement, distractibility, and motor hyperactivity. The Depression-Anxiety scale included anxiety, depressed mood, suicidality, and guilt feelings. The other five items on the BPRS (somatic concern, conceptual disorganization, tension, uncooperativeness, and mannerisms/posturing) did not load onto any of these factors. A score for each of the four scales was calculated by taking the mean of the individual items that loaded on the factor.

Neurocognitive assessment. The neurocognitive assessment was completed by trained research staff on a different day than the clinical interviews, usually within a few days, but always within a two week time period. All measures were administered according to established standard procedures. The administration order of the tests varied across participants due to the fact that this study was part of a larger project in which the tests were not administered in a fixed order and other procedures were also completed during the testing session. Participants were also allowed breaks when requested or when it appeared to the tester that the participant was fatigued. Behavioral observations were made of each assessment to identify any procedures that may not have reflected accurate performance by the subject. All measures were scored based upon standardized norms provided with the tests, unless otherwise specified above.

Impairment index. Impairment scores for the neurocognitive test scores were calculated by identifying each of the test scores as impaired if it was more than one standard deviation below the mean of the published norm. One standard deviation below the mean is equivalent to a
A percentile score of less than 16%, a T score under 40, or lower than an age-scaled score of 7. This level was selected to assure that even more subtle incidences of impaired performance for these individuals were identified. The practice of determining "impairment" as below one standard deviation is quite common in the field and is recommended by experienced clinicians (Heaton, Grant & Matthews, 1991). According to these authors, using a cut-off of one standard deviation results in a false positive rate of up to about 15%, an acceptable level of specificity. An Impairment Index score for each participant was calculated by summing the total number of test scores that fell below the cutoff of one standard deviation and dividing this by the total number of test scores that were obtained from the participant. Thus a frequency score was obtained, rather than an absolute score. This means of generating the Impairment Index was established to accurately reflect level of overall impairment when participants were missing scores on one or more tests. The Impairment Index is a global measure of the overall neurocognitive impairment as exhibited by the participant.

Neurocognitive domain summary scores. Domain summary scores for the neurocognitive test results were calculated in two different ways, depending on the type of analysis that was to be completed. For analyses involving correlations, raw scores on each test were converted to z scores (resulting in a mean of 0 and a standard deviation of 1) and averaged across the measures included in the domain. For analyses involving within subject comparisons across domains, appropriately-corrected (for age, gender, and education when available) scores were converted to percentiles and averaged across the measures included in the domain. General Mental Ability was comprised of the Vocabulary and Block Design subtests of the WAIS-III. The Attention summary score was made up of the Digit Span subtest of the WAIS-III and Trail Making Test part A. The Verbal Fluency domain reflected the COWAT score. Verbal Memory included scores from the CVLT, specifically total score, first presentation recall, fifth presentation recall, short delay recall, long delay recall, and recognition. The domain of Higher Cognitive Ability was comprised of the Perseverative Errors, Failure to Maintain Set, and Categories Completed scores.
on the WCST, and the Trail Making Test, part B, for the domain scores that averaged z-scores. For the domain score that averaged percentiles, the scores of Failure to Maintain Set and Categories Completed were not included because these two scores are not assigned discrete percentile scores, but rather performance is reported as a percentile range (i.e., < 1%, 2-5%, 6-10%, 11-16%, or >16%). Scores in this format could not be included in the average performance score for the Higher Cognitive Ability domain.

Speech samples and communication disturbance ratings. A ten-minute speech sample was also obtained during the testing session. The participant was described the speech sample procedure and then signed an audio taping consent form (See Appendix I). All speech samples were identified only by subject number without any other personal information. Participants were instructed to discuss neutral topics of their choice, such as their daily activities, and were provided with additional topics for discussion as needed to complete the ten minutes. In addition, participants were asked not to provide any identifying information and avoid discussing their mental illness during the collection of the speech sample.

Each speech sample was transcribed by one of several trained research assistants. Training initially included an explanation of the interview procedure and instructions on how to transcribe verbatim the person's speech. Several practice cases (either real cases from the study or "artificial" sample cases) were transcribed and discussed with the research assistant. Throughout the transcription phase of the study, research assistants were encouraged to discuss with the primary researcher and other transcriptionists any difficulties they may have encountered and questions they had regarding their tapes. The accuracy of the transcriptions were assessed by a different research assistant who again listened to the speech sample and made any changes or additions to the transcript to assure the accurate reflection of all of the content of the participant's speech sample.

Speech sample ratings using the CDI were made by trained research assistants. Training materials were provided to this research group by the author of the CDI who indicated that
achieving reliability within our research group should be the primary objective for the training, with a secondary goal of establishing CDI levels close to those of her group's published research. In addition, the author made herself available for consultation regarding use of the CDI and accurate rating procedures. Training was composed of several different components recommended by the author of the measure. The first stage involved didactic presentations on the CDI and the six subtypes of unclear references. The second stage involved reviewing practice speech samples and making ratings as a group. The third stage involved research assistants making independent ratings on speech samples. The fourth stage involved group comparisons of the independent ratings and discussions of any differences.

As previously noted, the author of the CDI recommended that we strive to achieve similar means for ratings as those in her published articles. This was attempted and our means were found to be fairly similar to those of the Docherty group (Docherty et al., 1996; Docherty, Hall, et al., 1998; Docherty, et al., 1999; Docherty & Gottesman, 2000; Docherty et al., 2000; Gordinier & Docherty, 2001), although our participants exhibited somewhat more Vague References and slightly fewer Structural Unclarities than found in those previous studies.

Once training was completed, research assistants were assigned a randomly selected 16% of the speech samples from the present study to rate independently. Interrater reliabilities for each of the six types of disturbance and total communication disturbance, reported by intraclass correlation coefficients, are reported in Table 2. Overall, adequate reliability was achieved, especially for Total Communication Disturbances, although less agreement was established for Confused References and Wrong Word References. Cicchetti and Sparrow (1981) have established guidelines for interpreting interrater reliability coefficients. They indicate that less than .40 is "poor," that .40 to .59 is "fair," .60 to .74 is "good," and greater than .75 is "excellent." Based on these guidelines, the interrater reliability across the three raters in this study was found to be fair for Confused References, good for Wrong Word References, and excellent for the remaining scales.
Scores for each of the six CDI unclear references were calculated as instances of the specific disturbance per every hundred words of speech. Total CDI ratings were calculated as instances of the total sum of all six unclarities per every hundred words of speech.

Data entry. Data entry was completed primarily by research assistants. Measures such as the BPRS and GAF were filled out on scannable forms. These forms were scanned and double-checked for accuracy using the TELEform scanning system. Other measures were hand-entered onto templates corresponding to the data collection sheets through the File Maker Pro 4.0 program. These measures were then double-checked for accuracy by a different research assistant. Both the TELEform and File Maker Pro programs allow exportation of the data to other programs in a spreadsheet format.

Power Analysis

A power analysis was completed in order to determine sample size needed to detect significant correlations between variables. As most of the hypotheses specified directionality for correlations, determination of significance for one-tailed tests was completed. An analysis using the nQuery Advisor 3.0 program setting alpha to .05 and requiring the power to be at least .67 to detect a correlation of .3 was found to require at least 46 subjects. A sample size of 55 was used for the present study. An additional analysis determined that when the sample size is 55 and alpha is set to .05 for a one-tailed test, a normally distributed covariate would have 74% power to detect a correlation of .03.

Statistical Analyses

Frequency statistics were calculated for the demographic and clinical variables of gender, race, diagnosis, recruitment source, marital status, current living arrangements, employment status, income level, current medications, and current therapy. Descriptive statistics were calculated for the demographic and clinical variables of age, years of education, GAF scores, age at onset of symptoms, age at first hospitalization, number of previous hospitalizations, and chlorpromazine equivalents for medications.
To evaluate the effects of selected demographic and clinical variables on the constructs of interest in the study, a multivariate analysis of variance (MANOVA) was completed with each factor variable of gender (male/female), race (Caucasian/other), marital status (married/other), work status (working at least part-time/no work), and living arrangements (living with others/living alone). A separate MANOVA was completed for each of the previously factors on each of the following dependent variables which were grouped into theoretically meaningful constructs, such as satisfaction (subjective) ratings on the QOLI, objective scales on the QOLI, SAS global ratings, BPRS and GAF scores, and neurocognitive measures. If any of the dependent variable groupings were found to be significantly related to the factor variable (based upon Wilks’ Lambda), a test of between-subjects effects was completed to determine which of the dependent variables contributed to the significance. This procedure allowed fewer comparisons to be made initially, which was deemed appropriate based on the number of comparisons being made as part of this study. For those comparisons that were significant, the results from both the original multivariate test and then the follow-up between-subjects tests are reported. For analyses involving Pearson product moment correlations, no specific correction for multiple comparisons was applied, however, as the number of comparisons was quite large, caution should be taken when considering the results.

In addition, specific analyses for each of the hypotheses were as follows:

1. Pearson product-moment correlation coefficients were used to determine the correlations between overall symptom presentation and the measures of quality of life and neurocognitive functioning (using z scores that had been converted from raw scores).

2. Pearson product-moment correlation coefficients were used to determine the correlation between overall symptom presentation and communication disturbances.

3. Pearson product-moment correlation coefficients (compared using Fisher's z transformation) were used to determine the correlations between both negative and positive
symptoms and each of the measures of quality of life and neurocognitive functioning (using z scores that had been converted from raw scores).

4. Pearson product-moment correlation coefficients were used to determine the correlations between quality of life (subjective) and measures of verbal memory, attention, and higher cognitive functioning within the domain of neurocognitive abilities. Domain scores were calculated from averages of z scores (that were converted from raw scores) for each measure included in the domain.

5. A paired sample t-test was used to compare the numbers of ambiguous word meanings with the other types of unclear references, and then again to compare missing information references with the remaining four unclear references, within the area of communication disturbances.

6. Pearson product-moment correlation coefficients were used to determine the correlations between communication disturbances (unclear references) and performance in the specific neurocognitive domains of memory, attention, and verbal fluency. Domain scores were calculated from averages of z scores (that were converted from raw scores) for each measure included in the domain.

7. Paired samples t-tests were used to determine the relationships between areas of verbal memory, word fluency, attention, and higher cognitive functioning and the other domain of neurocognitive functioning (general mental ability) using domain scores that were calculated from averages of percentile scores for each measure included in the domain.

8. Multiple regression was used to predict individual scores on the QOLI from the other variables of the study.
Results

The results will be presented in several steps. General findings for each of the measures used in the study will be described. Then individual hypotheses (identified by number and a brief description) will be reported. At the end of the results section, each hypothesis is listed and a notation is provided to indicate whether each was completely or partially confirmed, or went unsupported.

Demographic and Clinical Characteristics of Participants

Tables 3 and 4 describe the relevant demographic characteristics of the participants in this study. The average age of participants was about 47 years (ranging from 24 to 59), and 85.5% of the participants were male. The ethnic/racial distribution of the participants was 87.3% Caucasian, and the remaining 12.7% African-American, Native American, Asian, or Hispanic. Educational levels for the participants averaged 14 years (ranging from 8 to 19), and about 42% of the participants were currently employed in some capacity or attending school. Annual income for study participants averaged between $10,000 and $20,000. In terms of marital status, only 18% were married, the remaining 82% were single (never married, or separated, divorced, or widowed). Forty-two percent of the patients were involved in some shared living arrangements (either partner/spouse, other family member or roommate), 9% lived in a residential treatment facility, and the remaining 49% lived alone.

Tables 3 and 4 also show selected clinical characteristics of the participants. These tables indicate that participants experienced persistent mental illness evidenced by early age of onset, duration of illness, and number of hospitalizations. Schizophrenia was the diagnosis of 45 participants, and the other 10 were diagnosed with Schizoaffective Disorder. The average age for onset of psychiatric symptoms was between 23 and 24 years old (ranging from 13 to 47), and average age for first hospitalization was between 25 and 26 years old (ranging from 13 to 50), for the 53 participants who had been previously hospitalized. The average age of the 53 previously hospitalized participants did not differ from that of the entire sample. Status of chronic mental
Functioning in Schizophrenia

illness was also revealed by an average of more than six psychiatric hospitalizations per patient (ranging from 0 to 32) and average current Global Assessment of Functioning (GAF) score of 48.07 (ranging from 25 to 68). This average GAF score corresponds to a rating of "Any serious symptomatology or impairment in functioning that most clinicians would think obviously requires treatment or attention." Current treatment included medication focused (96.4% of participants), therapy or supportive counseling (34.4%), group therapy (21.8%), and other treatment (9.1%) such as case management. Numerous participants were involved in multiple forms of treatment; thus percentages total greater than 100%.

Current medications of the study participants were as follows: 54.5% were prescribed antidepressants, 29.1% mood stabilizers, and 27.3% antiparkinsonians. Of the participants, 96.4% were currently prescribed at least one antipsychotic medication, with an average chlorpromazine equivalence of 416.5 mg/day (ranging from 16.6 to 1825 mg/day). Novel antipsychotics only were prescribed to 69.1% of the sample, averaging 323.9 chlorpromazine equivalents per day while the other 27.3% were receiving conventional antipsychotics, with an average chlorpromazine equivalence of 500 mg/day. See Table 1 for a description of medications that are included in each of the novel and conventional categories and average daily dosages for study participants. Steps taken to calculate these equivalents are presented in the Initial Procedures portion of the Procedures section of the paper. Of those receiving conventional antipsychotic medications, six individuals were prescribed an additional chlorpromazine equivalence of 400 mg/day of novel antipsychotics. Antipsychotic medication level, as measured by total chlorpromazine equivalence, was not correlated with any other demographic variable other than with age ($r = -.363, p = .01$). These results indicate that the older participants tended to be prescribed lower dosages of antipsychotic medications.
Symptom Presentation

Additional clinical characteristics involving psychopathology, measured by the Brief Psychiatric Rating Scale (BPRS), are described in Table 5. The BPRS factor scores revealed that these patients with schizophrenia exhibited very mild to mild positive symptoms (Mean = 2.37, SD = .96), very mild negative symptoms (1.95, SD = .83), none to very mild manic-excitement symptoms (1.54, SD = .77), very mild depression-anxiety symptoms (1.80, SD = .85), and very mild average overall symptoms (1.83, SD = .53).

Correlations of symptom presentation and demographic and clinical variables. After completing multivariate and correlational analyses, it was found that none of the demographic variables of age, gender, race, chlorpromazine equivalents for medications, marital status, years of education, and current living arrangements, were correlated with any scale from the BPRS or the GAF. Only current employment status was related to this group of scores, $F(6, 48) = 3.60$, $p = .005$, specifically BPRS Total Score, $F(1, 53) = 9.59$, $p = .003$, the BPRS Positive Symptom scale, $F(1, 53) = 7.77$, $p = .007$, the BPRS Negative Symptom scale, $F(1, 53) = 6.23$, $p = .016$, and the GAF, $F(1, 53) = 22.05$, $p < .001$. These results indicate that individuals who are currently employed at least half-time experience significantly fewer total, positive, and negative symptoms, and exhibit better overall functioning.

Quality of Life

Results of Quality of Life Interview (QOLI) Scales. Clinical characteristics involving quality of life as measured by the QOLI are described in Table 6. When considering objective ratings of Quality of Life, the QOLI scores indicated that on average these individuals engaged in at least four activities outside the home during the past week (out of a possible total of 8 activities). In addition, they generally had contact with other people in social situations and had contact with family members at least once per month during the past year. The participants generally did have sufficient funds to cover basic expenses in the past year, and on the average had $276 (reportedly ranging from $0 to $2500) per month to spend on themselves. Of these persons with
schizophrenia, 30 (54.5%) were currently working or had worked in the past year, while the remainder had not worked at all in the past year. In regards to legal and safety issues, 4 (7.3%) of the participants reported that they had been the victim of a violent crime (e.g., assault, mugging) in the past year, 12 (21.8%) had been the victim of a nonviolent crime (e.g., theft, being cheated) in the past year, and 4 (7.2%) indicated that they had been arrested at least once during the past year.

When considering subjective ratings of Quality of Life, all means for the participants in this study are at least slightly above the midpoint of the scale. These individuals reported feeling mixed to mostly satisfied with their general life circumstances. The participants also reported feeling mixed to mostly satisfied with their daily activities, family relations, social relations, overall finances, and health. In addition, they indicated feeling mostly satisfied with their living situations. Finally, the study participants indicated they were mostly satisfied to pleased with their legal/safety circumstances and employment, at least for those currently working.

Correlations of QOLI scales with demographic and clinical variables. After completing multivariate and correlational tests, it was found that none of the demographic variables of age, gender, chlorpromazine equivalents for medications, marital status, employment status, and years of education, was correlated with any objective scales from the QOLI. Race was related to this group of scores, $F(5, 49) = 2.90, p = .023$, specifically to number of daily activities, $F(1, 53) = 4.43, p = .040$, and number of family contacts, $F(1, 53) = 4.12, p = .047$. These results indicate that the Caucasian participants tended to engage in more activities outside of the home and had more contact with their family members. Age was found to be negatively correlated with money available to spend on self ($r = -.274, p < .05$) and years of education was found to be negatively correlated with number of contacts with family members ($r = -.317, p < .05$). These results indicate that older participants tended to have less discretionary funds and those who had more years of education tended to have less contact with their family members.
Correlations between QOLI global life satisfaction and other QOLI scales. One significant correlation was observed between the Global Life Satisfaction rating and the objective scales on the QOLI. Having more social contacts on a regular basis related to a greater overall life satisfaction ($r = .340, p < .01$). Subjective scales on the QOLI were found to correlate more strongly with Global Life Satisfaction than the objective scales. Table 7 shows that the highest correlations ($p < .01$) to Global Life Satisfaction were in the areas of satisfaction with daily activities ($r = .627$), health ($r = .582$), finances ($r = .508$), living situation ($r = .438$), and social relations ($r = .349$). Other areas that were also related ($p < .05$) to the Global Life Satisfaction rating were satisfaction with family relations ($r = .272$), and legal and safety ($r = .258$). These results indicate that for these participants, greater satisfaction in these specific areas of their lives is associated with increased satisfaction in their overall life situation.

Social Adjustment

Results of Social Adjustment Scale – II (SAS-II) ratings. Clinical characteristics involving social adjustment and functioning as measured by the SAS-II are presented in Table 8. Ratings were made on a scale of 0 = excellent adjustment, to 6 = severe maladjustment. Global ratings revealed that the participating individuals exhibited a mostly poor (Mean = 3.74, $SD = 1.68$) adjustment to their work role, whether it was employment, household responsibilities, or educational activities. For those subjects who were living with other people ($n = 28$), there was evidence of mainly good (2.18, $SD = 1.09$) adjustment with regard to the mutual relationship with the other primary person in their household. Participants also reported mostly fair (2.78, $SD = 1.31$) adjustment in their relationships with family members outside of the household. Social leisure adjustment was found to be mostly fair (3.22, $SD = 1.06$) when considering outside activities and interactions with others. General adjustment was determined to be mostly fair (3.11, $SD = .79$) for these individuals.

Correlations of SAS-II ratings with demographic and clinical variables. After completing multivariate and correlational tests, it was found that none of the demographic variables of age,
race, chlorpromazine equivalents for medications, marital status, and years of education, were correlated with any global ratings from the SAS. The relationship between household member global rating and current living arrangement (alone or with someone else) was not specifically analyzed as this item is only rated for those who are not living alone. Gender was related to this group of scores, $F(4, 49) = 3.19, p = .021$, specifically to the ratings of relationships with household member, $F(1, 25) = 4.82, p = .038$, and external family, $F(1, 52) = 7.35, p = .009$.

These results indicate that females tend to have poorer adjustment in their relationships with the people who they live with and their extended families. Current employment status was also related to this group of scores, $F(4, 49) = 4.61, p = .003$, specifically the ratings for work and daily responsibilities, $F(1, 52) = 18.97, p < .001$, and global adjustment, $F(1, 52) = 7.75, p = .007$.

These results indicate that individuals who are working at least part-time have better adjustment in engaging in their daily responsibilities and with their overall social functioning.

**Correlations of SAS-II ratings with symptom presentation.** After completing correlational analyses, several social adjustment global ratings were found to be significantly correlated with overall symptom presentation as measured by the BPRS. These areas were relationship with external family ($r = .315, p = .01$), social leisure activities ($r = .377, p < .01$), and general social adjustment ($r = .413, p = .001$). These results indicate that as participants were rated as more impaired in their social interactions with external family members, pursuit of social leisure activities, and general social interactions, they also experienced higher levels of current symptomatology.

**Correlations of SAS-II ratings with neurocognitive functioning.** After completing correlational analyses, several neurocognitive domains were found to be significantly related to several of the social adjustment global ratings. The neurocognitive domain of Verbal Memory was correlated with social adjustment in work and daily responsibilities ($r = -.439, p < .001$) and general adjustment ($r = -.258, p < .05$). The domain of Attention was correlated with adjustment in social and leisure activities ($r = -.287, p < .05$), while General Mental ability was correlated with
adjustment with primary household member ($r = -0.391, p < .05$). These correlations are actually in the positive direction, as lower scores on the SAS-II indicate better social adjustment. These results indicate that participants who perform better on abilities of verbal memory also experience better adjustment at work and completing daily activities, as well as in their overall social interactions. Also, as these persons with schizophrenia experience higher levels of attentional skills, they also pursued more social and leisure activities. Lastly, participants with stronger abilities of general mental ability tended to have more positive interactions with their primary household member.

*Communication Disturbances Index (CDI) Scores*

Amounts of speech gathered during the collection of the speech sample varied across participants; overall they produced a mean of 1222.2 ($SD = 371.9$) words, ranging from 453 to 2230 words. Means and standard deviations for each of the communication disturbances are presented in Table 9. The Total Communication Disturbance score was 2.88 ($SD = 1.24$), which corresponds to number of disturbances per 100 words of speech. These scores are fairly similar to those previously published by Docherty’s research group (Docherty et al., 1996; Docherty, Hall, et al., 1998; Docherty, et al., 1999; Docherty & Gottesman, 2000; Docherty et al., 2000; Gordinier & Docherty, 2001), although it appears that participants in the present study exhibited more Vague References and fewer Structural Unclarities than those in Docherty’s studies. However, the total number of communication disturbances were found to be in the same range as those reported by the Docherty group.

Correlations among CDI scores. Correlations were computed among the communication disturbance variables to assess their co-occurrence within participants. Most of the individual communication disturbances were significantly correlated with the others at $p < .01$. These results are presented in Table 10. Confused References was the only type of disturbance that was not correlated with the other types of failure, other than with the total CDI score ($r = .270, p < .05$). These findings indicate that, for the most part, as patients exhibit frequent communication
disturbances of one type, they generally exhibit other disturbances as well. This is consistent with
the results reported by Docherty, et al. (1996). In addition, to determine the internal consistency of
the scales on the CDI, a Cronbach’s alpha was calculated and found to be .74, which is generally
considered to be an adequate level of internal consistency.

Correlations of CDI ratings with demographic and clinical variables. After completing
multivariate and correlational analyses, it was found that demographic and clinical variables such
as age, gender, race, chlorpromazine equivalents for medication, years of education, living
situation, employment status, and marital status were not correlated with any of the ratings from
the CDI.

Relationships among Communication Disturbances (Hypothesis 5). A paired samples
t-test was computed to compare the frequency of Ambiguous Word Meanings to the other
communication disturbances. The Ambiguous Word meanings were found to occur much more
frequently than Vague References, \( t(52) = 6.59, p < .001 \), Confused References, \( t(52) = 5.92, \)
\( p < .001 \), Missing Information References, \( t(52) = 3.53, p = .001 \), Wrong Word References,
\( t(52) = 7.84, p < .001 \), and Structural Unclarities, \( t(52) = 7.60, p < .001 \). This is consistent with
results published by the author of the measure (Docherty, et al., 1996).

A second paired samples t-test was computed to compare the frequency of Missing
Information References to the remaining communication disturbances. The Missing Information
References were found to occur more frequency than the remaining four deviances, Vague
References, \( t(52) = 3.21, p = .002 \), Confused References, \( t(52) = 3.88, p < .001 \), Wrong Word
References, \( t(52) = 5.25, p < .001 \), and Structural Unclarities, \( t(52) = 4.93, p < .001 \). Again, this is
consistent with results published by Docherty et al. (1996).

Neurocognitive Performance

Neurocognitive test performance results will initially be presented according to the
individual measure. Raw scores will be reported and corresponding percentiles will be provided.
These percentiles were calculated after age, gender, and education corrections (when available)
were applied, after which corresponding percentile scores were determined based upon the
standardized norms provided for each measure. These percentile scores are based upon the
assumption that the scores across populations are normally distributed. For clarification, Table 11
lists standard scores, age scaled scores, T scores, z scores, and the corresponding percentiles.

Table 12 presents neurocognitive performance for the participants.

**WAIS-III subtests.** Scores from the Wechsler Adult Intelligence Scale – Third Edition
(WAIS-III) are reported as raw scores and percentile scores that were converted from age scaled
scores. Participants averaged a raw score of 43.6 on the Vocabulary subtest of WAIS-III with
performance at 51%, which is in the average range. This percentile score indicates that the
participants' average performance was in the 51st percentile when compared to normative
samples, not that they completed 51% of the items correctly. Average raw score on the Block
Design subtest was 33.85, with performance at 42%, which is also in the average range.
Participants averaged a raw score of 15.6 on the Digit Span subtest, with performance at 41%,
which is in the average range. Average raw score on the Digit Symbol subtest was 54.78, with the
performance at 24%, which is in the low average range.

When considering incidental learning as measured by the Digit Symbol subtest, these
participants recalled an average of 10.44 items (SD = 4.63) in a paired-to-symbol condition (out of
a possible 18), and 6.56 (SD = 1.38) in a free recall condition (out of a possible 9). Percentiles
were difficult to determine for these scores, as the standard scoring procedures (Wechsler, 1997)
report these values as cumulative percentages associated with given raw scores, which in this
sample range from 1% to >50%. However, the median percentile was determined to be 33.3% for
the paired condition and 25% for the free condition. These median percentiles are both in the
average range of performance.

**COWAT.** Performance on the Controlled Oral Word Association Test (COWAT) was
found to be 31% (in the average range of performance), with an average of 32.58 (SD = 10.39)
total words produced by participants (ranging from 12 to 58 words). For each of the letters C, F,
and L, participants produced an average of 11.07 words (SD = 4.38; range 3 - 21), 11.16 words (SD = 4.09; range 3 - 21), and 11.64 words (SD = 9.84; range 1 - 21), respectively.

**Trail Making Test.** Performance for visual sequencing abilities, as measured by the Trail Making Test, was found to be 33%, which is in the average range of performance, under a simple condition (Part A) in which participants are required to connect a series of circles with numbers in them. The average time to complete this condition was 34.63 seconds (SD = 11.05), with 0.40 errors. Under a condition requiring set shifting (alternating numbers and letters; Part B), performance was found to be at 32% (also in the average range of performance). The average time to complete this condition was 94.7 seconds (SD = 41.97) with 0.81 errors.

**WCST.** Some scores on the Wisconsin Card Sorting Test (WCST) cannot be standardized to discrete percentiles due to the manner in which results are reported (Heaton, et al., 1993). The standardized results report the scores for Failure to Maintain Set and Categories Completed as falling into percentile ranges (i.e., <1%, 2-5%, 6-10%, 11-16%, and >16%), thus an actual percentile score cannot be determined for the performance. Average raw scores of 1.31 (SD = 1.34) for Failure to Maintain Set, and 4.24 (SD = 1.94) for Categories Completed were found. For each of these scores, the median percentile range was determined to be >16% and 11-16%, respectively. These median percentiles both fell in the low average range of performances. Raw scores on the remaining variable, Perseverative Errors, were converted into T-scores and the average corresponding age and education corrected percentile was determined to be 23.35% (SD = 22.83), a value that falls in the low average range of performance. The average number of Perseverative Errors was found to be 22.37 (SD = 13.57).

**CVLT.** Participants recalled a total of 41.27 (SD = 11.67) words on the California Verbal Learning Test (CVLT). This level of performance averaged 13.8% (percentile score), which was determined by converting standard scores that had been scaled to T scores (provided by the standard scoring report) into percentiles. Percentiles for other scores from the CVLT were converted from z scores that were provided by the scoring report. Participants recalled 5.22
(SD = 1.65) words on the first presentation and 9.73 (SD = 2.88) by the fifth presentation of the word list. Performance on the first and fifth word lists fell at 17.34% and 17.75%, respectively, both of which are in the low average range of performance. These participants produced 8.2 (SD = 3.11) words during the short delay recall condition, and 8.56 (SD = 3.38) words during the long delay condition. Performance on the short and long delay recall lists fell at 23.28% and 24.74%, respectively, both of which are again in the low average range of performance. Participants correctly identified 13.4 (SD = 2.71) of the 16 words from the list during the recognition portion of the task. Performance on the recognition task fell at 30.76%, in the average range of performance.

**Neurocognitive domain scores.** Participants' corrected (for age, gender, and/or education when available) percentile scores were collapsed into five different areas of functioning within the neurocognitive domain. Each of the percentile scores for tests that measure abilities of the given domain area was used to compute an averaged which made up the domain score. Each of the domain areas and the tests scores that contributed to the domain summary scores were Verbal Memory (CVLT total, list 1, list 5, short delay, long delay recall scores, and recognition score), Attention (Digit Span and Trail Making Test, Part A), Verbal Fluency (COWAT total score), General Intellectual (Vocabulary and Block Design scores), and Higher Cognitive (WCST Perseverative Error score, Digit Symbol total score, and Trail Making Test, Part B). Performance in General Intellectual abilities fell at 46.72% (SD = 20.29). Performance for Attention (32.2%, SD = 18.49), Verbal Fluency (31.46%, SD = 29.1), and Higher Cognitive abilities (29.25%, SD = 18.08) were similar in score. Performance in Verbal Memory was the lowest, falling at 21.28% (SD = 20.08).

In addition to domain averages calculated using percentile scores, neurocognitive domain averages were also calculated using z scores converted from raw scores on each of the measures. These z score converted domain scores were used for a variety of the analyses. Average scores for these values are not being reported here because the resulting average z
scores are very small and contain more meaningful information when considering the individual rather than averaging across a group. For results reported later in this paper, descriptions are included to indicate whether domain summary scores were calculated using z scores or percentile scores.

**Correlations of neurocognitive domain summary scores with demographic and clinical variables.** After completing multivariate and correlational analyses, it was found that demographic and clinical variables such as age, gender, race, chlorpromazine equivalents for medication, living situation, employment status, and marital status were not correlated with any of the summary scores. The only variable to be associated with the domain summary scores was years of education, which was found to be related to General Mental abilities ($r = .294$, $p < .05$). These results indicate that participants who had more years of education tended to perform better in the domain of General Mental abilities.

**Relationships among different domains of neurocognitive functioning (Hypothesis 7).** Using summary scores for each of the five domains of neurocognitive functioning (calculated by averaging percentiles for each of the neurocognitive measures that contributed to the particular domain), paired samples t-tests were conducted to assess the differences between the domain of General Mental ability and the other four domains. An analysis of the results revealed that the participants performed significantly worse in the areas of Verbal Memory, $t (54) = 6.57$, $p < .001$, Verbal Fluency, $t (54) = 3.77$, $p = .001$, Attention, $t (54) = 3.46$, $p < .001$, and Higher Cognitive, $t (54) = 8.12$, $p < .001$, than they did in the area of General Mental ability. Participants did not exhibit a significant difference in their performance on measures within the domain of General Mental ability as measured by percentile scores on the Vocabulary and Block Design subtests of the WAIS-III, although there was a trend that participants performed better on the Vocabulary subtest, $t (54) = 1.970$, $p = .054$. The only differences found among the other four domains was that performance in the domain of Attention was significantly better than both Verbal Memory,
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$t (54) = 4.02$, $p < .001$, and Higher Cognitive, $t (54) = 3.50$, $p = .001$. In addition, performance in the domain of Verbal Fluency was found to be better than Verbal Memory, $t (54) = 2.14$, $p < .05$.

Pearson product moment correlational analyses were conducted to assess the relationships among the five domains of neurocognitive functioning. Table 13 describes the findings. Attention was not significantly related to any of the other four domains, while Verbal Fluency was positively related to the other three domains of Higher Cognitive ($r = .253$, $p < .05$), General Mental ($r = .393$, $p < .01$), and Verbal Memory ($r = .287$, $p < .05$). Higher Cognitive was also positively associated with General Mental ($r = .260$, $p < .05$).

*Neurocognitive impairment index.* Impairment cut-off scores of more than one standard deviation below the mean are listed in Table 12 for each of the neurocognitive measures along with the percentage of participants who were found to be impaired on that particular measure. This cut-off of one standard deviation below the mean is directly equivalent to a $T$ score of 40, a scaled score of 7, or a percentile score of 16%. Scores used to identify performance as impaired were age scaled scores for the WAIS-III, standard scores for the CVLT, or percentile scores corresponding to corrected raw scores (provided by test authors or available in the literature) for the other measures. Again, refer to Table 11 to see how these various scores are related.

Participants as a group produced mean performance scores that were below average (i.e., $T = 50$, scaled score = 10, or percentile = 50%) on all of the measures administered except for the Vocabulary subtest of the WAIS-III. The percentage of participants that were identified as impaired on each measure ranged from 7.3% ($n = 4$) on the Digit Span subtest of the WAIS-III, to 72.7% ($n = 40$) on the total CVLT recall score.

Because several subjects were missing one or more individual tests, a percentage of the total available tests that were impaired was calculated for each participant. Thus a frequency rather than an absolute score is obtained. The percentage of impaired scores reflects the Impairment Index for each person. The average Impairment Index across participants was 36.38% ($SD = 22.77$), which indicates that on average, participants were impaired on more than
one-third of the tests. This corresponds to an average of 6.55 (SD = 4.10) impaired scores per subject, which ranged from 0 to 16 impaired scores per participant across the sample.

Relationship Between Quality of Life and Psychiatric Status/Symptom Presentation (Hypotheses 1a and 3a)

Pearson product moment correlational analyses were conducted to assess the relationships among quality of life scales and symptom presentation. Table 14 presents these findings. Several mental health symptom ratings were correlated with the QOLI subscales. The Total Score from the BPRS was significantly related to satisfaction with social interactions ($r = -.349$, $p < .01$). These results indicate that higher levels of psychiatric symptoms over the past month are associated with less satisfaction with social relations.

A significant relationship with satisfaction with social interactions as measured by the QOLI was found for both the BPRS scales of Positive Symptoms ($r = -.256$, $p < .05$), and Negative Symptoms ($r = -.371$, $p < .01$). These results indicate that participants with higher levels of positive or negative symptoms also tended to experience less satisfaction with their social contacts. An analysis comparing the magnitude of the correlations between each of the symptom factors and the satisfaction with social interactions was computed using a test of significant differences between correlated correlations based on a corrected Fisher's $z$ statistic (Meng, Rosenthal, & Rubin, 1992). Results indicated that there was not a significant difference between the two correlations ($z = -.788$, $p = .215$).

Additional analyses revealed that the Depressive Symptom scale from the BPRS was correlated with Global Life Satisfaction ($r = -.554$, $p < .001$), satisfaction with living situation ($r = -.254$, $p < .05$), satisfaction with daily activities ($r = -.422$, $p < .01$), satisfaction with family contacts ($r = -.246$, $p < .05$), satisfaction with finances ($r = -.226$, $p < .05$), and satisfaction with overall health ($r = -.428$, $p < .01$). These results indicate that for these participants, higher levels of depressive-anxiety symptoms are associated with decreased satisfaction in each of these areas of their lives. The Manic Symptom scale was related only to victimization within the past year.
(r = .321, p < .01) and arrests within the past year (r = .411, p < .01). These results indicate that participants who exhibited greater levels of manic-excitement symptoms, also tended to have greater safety concerns and victimization, and more contacts with the law resulting in arrest.

Also, GAF scores were positively correlated with satisfaction with both family (r = .313, p < .05) and social (r = .416, p < .01) relations, as well as satisfaction with their safety (r = .241, p < .05) and number of social contacts (r = .237, p < .01). These results indicate that better overall psychiatric functioning is associated with higher satisfaction with both social interactions and safety issues, an increase in the number of social contacts, and greater satisfaction with those contacts.

Relationship Between Communication Disturbances and Psychiatric Status/Symptom Presentation (Hypothesis 2)

Pearson product moment correlational analyses were conducted to assess the relationships between communication disturbances on the CDI and symptom presentation as measured by the BPRS. Table 15 presents these correlations. None of the communication disturbances were significantly related to overall symptom presentation as measured by the total score on the BPRS, or to the specific BPRS scales of Negative Symptoms or Manic-Excitement. Missing Information References were related to the factor of Positive Symptoms (r = .261, p < .05) and Ambiguous Word Meanings were related to the factor of Depression-Anxiety (r = .242, p < .05). These results indicate that participants with more positive symptoms also exhibited more missing information references in their speech, while greater levels of depressive-anxiety symptoms are related to a greater number of ambiguous word meanings in their speech.

Relationship between Neurocognitive Abilities and Psychiatric Status/Symptom Presentation (Hypotheses 1b and 3b)

Pearson product moment correlational analyses were conducted to assess the relationships among overall symptom presentation and neurocognitive functioning. Table 16 presents these correlations. Only performance on the Digit Symbol – Coding subtest of the WAIS-
Ill was related to the Total Score on the BPRS ($r = -.228, p < .05$). This result indicates that more psychiatric symptoms are related to a decline in symbol coding task performance.

Pearson product moment correlational analyses were conducted to assess the relationships between the Positive and Negative Symptom scales on the BPRS, and measures of neurocognitive functioning. Table 16 also presents these correlations. Several neurocognitive measures were related to the Negative Symptom scale on the BPRS. These include Digit Symbol Coding ($r = -.329, p < .01$), Digit Symbol Pairing ($r = -.243, p < .05$), Trail Making Test – Part A ($r = .360, p < .01$). Only Digit Span performance was related to the Positive Symptom scale on the BPRS ($r = .243, p < .05$). These results indicate that higher levels of negative symptoms are associated with fewer correctly coded symbols and greater time to complete the Trail Making Test – Part A. And, participants with more positive symptom presentation also tended to perform better when repeating lists of numbers.

Pearson product moment correlational analyses were conducted to determine the relationship between Total Score on the BPRS, as well as both the Positive and Negative Symptom scales, with the neurocognitive domain summary scores. Table 17 presents these findings. There were no significant relationships between BPRS Total Score and any of the five neurocognitive domains. These domain summary scores were calculated by averaging across z scores converted from raw scores for each of the neurocognitive measures that contributed to the particular. The domain of Attention was related to the Negative Symptom score ($r = .252, p < .05$) and Verbal Fluency was related to the Depressive-Anxiety Symptom scale ($r = .230, p < .05$). These results indicate that within this group greater negative symptom presentation is related to better performance on measures of attention and concentration. In addition, within the sample more depressive-anxiety symptomatology is associated with better performance on tasks of verbal fluency.

Also, when assessing current functioning, it was found that scores on the GAF significantly correlated with the domains of Verbal Memory ($r = .335, p < .01$) and Higher Cognitive...
abilities ($r = .244, p < .05$). These results indicate that as participants were rated higher in overall functioning, they also exhibited better verbal memory and higher cognitive abilities.

**Relationship between Quality of Life and Social Adjustment**

Several significant correlations were identified between the social adjustment global rating scales on the SAS-II and the Global Life Satisfaction rating on the QOLI. Adjustment in the domain of social and leisure activities was related to the global life satisfaction ($r = -.270, p < .05$). This is actually in a positive direction, as lower scores on the SAS-II indicate better adjustment, while higher scores on the QOLI indicate greater satisfaction. This was also true for the relationships between the Global Life Satisfaction on the QOLI and both household member adjustment rating ($r = -.485, p < .01$) and the overall social adjustment rating ($r = -.355, p < .01$) on the SAS-II. The ratings of work and external family adjustment on the SAS did not relate to the global life satisfaction rating on the QOLI. These results indicate that participants who experience greater global life satisfaction also tend to experience increased social functioning in relationships with household members, greater involvement in social and leisure activities, and greater overall social adjustment. Table 18 presents correlations between the scales on the QOLI and those on the SAS-II.

**Relationship between Quality of Life and Neurocognitive Abilities (Hypothesis 4)**

Pearson product moment correlational analyses were conducted to assess the relationship among subjective measures of quality of life and the Verbal Memory, Attention, and Higher Cognitive summary score domains of cognitive functioning. These domain summary scores were calculated by averaging across z scores converted from raw scores for each of the neurocognitive measures that contributed to the particular domain. None of the summary score domains were found to correlate with Global Life Satisfaction as measured by the QOLI. There were two significant correlations between these neurocognitive domains and other subjective quality of life scales. There was a significant association between Attention and number of social contacts ($r = .268, p < .05$), and between Verbal Memory and both satisfaction with finances
(r = .250, p < .05) and satisfaction with legal and safety issues (r = .276, p < .05). These results indicate that participants who exhibit better performance on tasks of attention and concentration also tend engage in more social contacts. Also, better performance in verbal memory is associated with greater satisfaction with finances and legal and safety concerns. Table 19 presents correlations between scales on the QOLI and these three domains of cognitive functioning.

**Relationship between Communication Disturbances and Neurocognitive Abilities (Hypothesis 6)**

Pearson product moment correlational analyses were conducted to assess the relationship between each of the communication disturbances and the Verbal Memory, Attention, and Verbal Fluency summary score domains of cognitive functioning. These domain summary scores were calculated by averaging across z scores converted from raw scores for each of the neurocognitive measures that contributed to the particular domain. Table 20 presents these findings. Missing Information References were related to Verbal Memory (r = -.263, p < .05) while Confused References were related to Attention (r = -.248, p < .05). No communication disturbances were related to the cognitive summary domain of Verbal Fluency. These results indicate that poorer performance on tasks of verbal memory is associated with greater numbers of missing information references in speech, and poorer performance on tasks of attention and concentration is associated with more confused references in the speech of participants.

**Relationship between Neurocognitive Abilities and Social Adjustment**

Pearson product moment correlational analyses were conducted to assess the relationships among measures of social adjustment and neurocognitive functioning. Table 21 presents these findings. Only the neurocognitive domain of Verbal Memory was found to significantly correlate with the overall global rating (r = -.258, p = .05) on the SAS-II. This relationship is actually in the positive direction, as lower scores on the SAS-II indicate better social adjustment. Verbal Memory was also found to be significantly associated with work adjustment (r = -.439, p <.001), while Attention was correlated with social and leisure adjustment (r = -.287,
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$p < .05$) and General Mental was related to household member adjustment ($r = -.391, p < .05$).

Again, these are all in the positive direction as lower scores on the SAS-II indicate better social adjustment. These results indicate that participants who exhibit better performance on tasks of verbal memory also tend to experience better adjustment in work and daily responsibilities, as well as overall social functioning. In addition, better performance on tasks of attention and concentration was associated with better adjustment in social and leisure activities, while better performance on tasks of general mental abilities was associated with greater social adjustment with household members.

*Predictors of Quality of Life - Global Life Satisfaction (Hypothesis 8)*

Multiple regression analyses were conducted to determine which of the study variable predicted the Global Life Satisfaction score from the QOLI. Variables were initially grouped into predictor sets according to theoretical similarity to the construct measured (e.g., social adjustment scores, cognitive domains, etc). Using a stepwise regression analysis, only the variables predicting variance from within each predictor set were retained. Because depressive symptomatology has been found to be strongly associated with, and at times indistinguishable from, subjective ratings of quality of life (Lehman, 1983; Lehman, 1996; Packer, et al., 1997), and as a result of the high correlation between depressive symptomatology as measured by the BPRS and Global Life Satisfaction ($r = -.554, p < .001$) in the present study, controlling for this factor became an issue. Lehman (1988) recommends interpreting results from the QOLI with caution when considering the issue of depression, and in his own research has factored out the effects of depression (Lehman, 1983). Thus, in the present study, the variance accounted for by depressive symptomatology was removed by forcing the Depressive-Anxiety Symptom score from the BPRS into the regression analyses as the first predictor variable for both the initial analyses and the final regression. In the final regression analysis the retained predictor variables were entered to determine the relative contribution of each in explaining the variance in Global Life Satisfaction.
For initial analyses, the predictor sets were identified by individual scores related to social adjustment, communication disturbances, neurocognitive domains, symptomatology and psychiatric status, and demographics. The only variable retained from the social adjustment set was the rating of global social adjustment. The only variable retained from the communication disturbances set was Ambiguous Word Meanings. No variables were retained from the neurocognitive, symptomatology and psychiatric status, and the demographics sets.

For the final regression, depressive-anxiety symptomatology was forced into the equation as the first variable. Then the global social adjustment and Ambiguous Word Meanings variables were entered into the equation in a stepwise fashion. When entered together, and after taking into account the effects of depressive symptomatology, both variables still accounted for a significant amount of the variance in the QOLI rating of global life satisfaction. Table 22 describes these results.

**Overview of Hypotheses: General Social Adjustment Hypotheses**

A. The hypothesis that overall symptom presentation would be positively correlated with impairment in social interactions was confirmed.

B. The hypothesis that neurocognitive functioning would be positively related to ratings of social adjustment was confirmed.

C. The hypothesis that global life satisfaction on the QOLI would be related to increased social adjustment was confirmed.

**Overview of Hypotheses: Specific Hypotheses**

1a. The hypothesis that overall symptom presentation would be negatively correlated with quality of life was partially confirmed as total symptoms are not related to global life satisfaction, but are related to subjective rating of satisfaction with social interactions

1b. The hypothesis that overall symptom presentation would be negatively correlated with neurocognitive functioning was not confirmed.
2. The hypothesis that overall symptom presentation would be positively correlated with the
   ratings of communication disturbances was not confirmed.

3a. The hypothesis that negative symptoms would have a stronger negative relationship
    with quality of life than positive symptoms was not confirmed.

3b. The hypothesis that negative symptoms would have a stronger relationship with
    neurocognitive functioning than positive symptoms was partially confirmed as
    negative symptoms are related to a few neurocognitive measures sensitive to brain
    dysfunction, and positive symptoms are related to only one measure

4. The hypothesis that specific neurocognitive domains would be positively correlated with
    quality of life was partially confirmed as the domain of Attention is related to objective rating of
    number of social contacts, while no other relationships between domains or quality of life were
    found

5. The hypothesis that participants would exhibit more Ambiguous Word Meanings than other
    communication failures, followed by Missing Information References was confirmed.

6. The hypothesis that communication failures would be negatively associated with the
    neurocognitive domains of Verbal Memory, Attention, and Verbal Fluency was partially
    confirmed as Ambiguous Word Meanings are associated with the domain of Verbal Memory,
    and Confused References are associated with Attention

7. The hypothesis that participants would have greater deficits in the areas of Verbal Memory,
    Verbal Fluency, Attention, and Higher Cognitive functioning than in the domain of General
    Mental ability was confirmed.

8. The hypothesis that the quality of life rating of global life satisfaction would be predicted from
    the other variables of the study was confirmed.
Discussion

The objective of this study was to explore a number of variables implicated in the functioning of persons with schizophrenia and to determine the relationship of each of these variables primarily to quality of life, and secondarily to one another. The anticipated result of this study was to increase understanding of the factors that contribute to quality of life and to identify potential strategies to assist in the improvement of the quality of life of persons with schizophrenia. General results will be discussed first, and then each of the specific hypotheses will be addressed. Final concluding comments will follow.

The participants in the present study could be best described as having chronic mental illness, as evidenced by the early average age of onset of psychiatric symptoms (between 23 and 24 years old), the early age of first hospitalization (between 25 and 26 years old), and the long duration of illness, as the average age of participants was 47 years. During their participation, most participants were essentially in a residual phase of their illness, or were experiencing baseline symptoms. However, all were documented to have had florid psychotic symptoms in the past. In addition, participants averaged at least six previous psychiatric hospitalizations, and almost 95% were currently prescribed an antipsychotic medication. Other participant characteristics associated with severe and persistent mental illness include decreased interpersonal functioning as evidenced by lack of employment, general inability to maintain a marital relationship, and tendency to live alone. These findings are consistent with other descriptions of persons with chronic schizophrenia (DSM-IV-TR; Schultz & Andreasen, 1999).

As previously noted, almost 95% of the participants in the sample were prescribed antipsychotic medications. The average chlorpromazine equivalence for the participants was 416.5 mg/day, which ranged from 16.6 to a very substantial 1825 mg/day. As the typical dose for chlorpromazine ranges from 75 to 1000 mg/day (Bezchlibnyk-Butler & Jeffries, 2001), the participants in this study on average are prescribed medications well within the suggested clinical range. The results of initial analyses showed that age of participants negatively correlated with
daily medication dosage in chlorpromazine equivalents. Thus, older participants tended to be prescribed lower doses of medications. This may be a result of pharmacokinetics, or how the body handles the drug. Older individuals tend to metabolize medications at a slower rate, so dosages need to be lower because the medication remains in the system longer. In addition, changing body composition with age (i.e., more fat and less muscle) also impacts how the drug is distributed and metabolized within the body. Differences in medication could also be due to overall stabilization of symptoms and the experience of fewer positive or floridly psychotic symptoms later in the course of the illness, as medications are traditionally prescribed more to control the positive symptoms of schizophrenia. This is consistent with reports that the negative syndrome is more prevalent in the chronic state of schizophrenia (Crow, 1987) and that a percentage of persons with schizophrenia improve from the effects of the disorder over time (Harding, Zubin, & Strauss, 1987). However, debate regarding the course of schizophrenia continues, as was discussed previously in the literature review on course of the illness.

The study found that participants were exhibiting fairly mild psychiatric symptoms as measured by the Brief Psychiatric Rating Scale (BPRS), which, although warranting attention by professionals, did not result in serious impairment in functioning, as classified by the Global Assessment of Functioning (GAF). This finding lends support to the notion that older persons with schizophrenia, such as those in the current sample, tend to exhibit fewer psychotic symptoms, although symptom reduction could also be a function of the effective treatment and clinical management of medications and other services that the participants were receiving at the time. Specifically, the use of novel antipsychotic medications may speak to the relatively asymptomatic status and high functioning of the study participants. The results of initial analyses showed that lack of current employment was related to higher symptom presentation, including both positive and negative symptoms, and decreased global functioning. This is not a surprising finding, as one would expect that individuals exhibiting greater psychiatric symptoms and impairment in functioning would not be able to maintain or have interest in obtaining employment. Alternatively, it
may be that persons who are unable to find and maintain employment become despondent or unhappy with their circumstances and then begin to exhibit greater symptomatology.  

Quality of Life

The present study provides evidence that despite having a chronic mental illness, participants report feeling “mixed” to “mostly satisfied” with their general life circumstances. This may be due in part to the participants’ reports, regarding objective quality of life, which indicated that participants did engage in a number of activities outside of the home, had at least semi-regular social contact with relatives and friends, and tended to have sufficient funds to cover basic living expenses such as food, clothing, and housing. In addition, these individuals were not likely to have been a victim of a crime or otherwise have had contact with the legal system in the past year. Satisfaction with general life circumstances may also stem from the satisfaction participants reported in more specific areas, such as daily activities, social interactions, finances, living situation, safety, and employment (at least for those who were working). Overall, these individuals felt that their basic needs were generally addressed to a satisfactory degree, and felt content with most areas of their lives. These findings are similar to those in other studies using the Quality of Life Interview (Lehman, et al., 1986; Sullivan, et al., 1991; Trauer, Duckmanton, & Chiu, 1998).

The results of the present study revealed that demographic variables such as age and gender did not have any association with the ratings of quality of life. This contrasts with previous research with the QOLI (Lehman, et al., 1992), that had found that gender and decade of life appear to play a role in the quality of life experiences for persons with schizophrenia and other severe mental illness. It was discovered by these other authors that as individuals age, their reports regarding objective quality of life such as number of family contacts, and social and leisure activities, decrease for both males and females. In addition, across the life span, females were found to engage in more social activities while males tended to have more spending money available. When considering the present study, it may be that because this was an older sample, and because the participants tended to be fairly close in age across the group, no effects of age
were noted. Again, the size of the gender groups may play a part in the current lack of differences between males and females, as a larger sample size for females was not available.

Correlational analysis revealed several significant relationships between satisfaction ratings on general life circumstances and the other ratings on the QOLI. Specifically, all of the subjective ratings except satisfaction with work were significantly related to the overall global life satisfaction rating. This is to be expected, considering that satisfaction in each of the individual areas contributes to overall life satisfaction. The item on satisfaction with work was only rated by those who were currently working, and so it does not contribute to overall life satisfaction across the entire sample. Strong correlations among the subjective ratings have been found in previous research (Trauer, et al., 1998), primarily because these rate satisfaction with different areas of one's life, and satisfaction in one area can directly impact satisfaction in another. In the literature, areas of life satisfaction, as well as domains of psychiatric outcome, tend sometimes to be correlated, but exhibit surprising independence in other studies (Strauss & Carpenter, 1972).

Only one objective rating, having more numerous social interactions, was found to be associated with general life satisfaction. It is not known specifically why the other objective ratings, such as number of contacts with family members or amount of spending money, do not contribute, although this is consistent with other research on the QOLI (Trauer, et al., 1998). It may be that participants have adapted to their current circumstances and are satisfied with their experiences. Previous long-term studies of schizophrenia reveal that much of the deterioration in schizophrenia occurs in the early stages of the illness (Davidson & McGlashan, 1997; McGlashan, 1988). Most of the participants in the current study are older with a long course of illness, and it could be argued that they are more stable in their illness and/or have found methods to cope with, or become reconciled to, some of the changes in functioning or deterioration, and as a result are more satisfied with their life circumstances. Alternatively, the number of contacts with family members may not be as important to persons with schizophrenia as the quality of the contacts that they already have. Although having a social support network comprised of family members
has been found to be a positive factor in the lives of some persons with schizophrenia (Sullivan, et al., 1991), the presence of family members can also contribute to difficulties (Hooley, 1998), or possibly be a mixed blessing depending on how relatives attribute the individual's psychiatric symptoms (Hooley, et al., 1987). Also, having sufficient funds to meet basic needs may be more important than additional spending money for these individuals.

Again, the issue of current medications should be considered when evaluating the relatively high functioning and satisfaction that has been exhibited by this group. Not only do novel antipsychotic medications contribute to a decrease in both the positive and negative symptoms and improvement in overall functioning, but they are associated with a lower rate of side effects, which can also contribute to the satisfaction that these individuals report with their lives.

Another hypothesis could be that, as many of the participants were patients at a large VA Medical Center and a great number of these patients were receiving disability payments and other services or resources as part of their comprehensive care, many of their basic needs - both concrete and social - were addressed. Payments and additional services that VA patients obtain can be quite considerable in some cases, which may allow the individuals to maintain a slightly higher standard of living than other persons with severe and persistent mental illness. In addition, many patients spend considerable time at the Medical Center socializing with other veterans and engage in regular interactions with a variety of staff. This may translate into greater satisfaction with numerous areas of their lives and higher scores on the subjective ratings on the QOLI.

Alternatively, these participants may exhibit response bias in their ratings of satisfaction with different areas of their lives. Social desirability is a phenomenon that is commonly studied in the general population (Edwards, 1957). Such a response bias may be especially relevant for those participants who receive their ongoing care at the VA Medical Center and could be concerned about the opinions of research staff or the perceived possibility that information would be shared with their providers. These factors may have lent unanticipated demand characteristics.
to the context of this research. In addition, these participants just may not want to acknowledge that they are not sufficiently satisfied with the various areas of their lives.

Social Adjustment

The results indicate that social adjustment in the five areas measured (work and daily responsibilities, household member, external family, social and leisure, and global adjustment) varied in range from above average (good) to below average (poor) for these participants. This is similar to other findings that indicate persons with schizophrenia are able to function with varying degrees of social deficits depending on the specific area being assessed (Glazer, et al., 1982; Weissman, et al., 1978). These individuals exhibited the most impaired social functioning in relation to their work role, whether it was employment, household responsibilities, or educational activities. Average adjustment was seen in the areas of relationships with external family, social and leisure activities, and general social functioning. These participants reported slightly higher than average adjustment in their mutual relationship with the primary person in their household. The conclusion to be drawn here is that these persons with schizophrenia function adequately in their social interactions, even though definite improvements could be made.

Limitations to the use of the Social Adjustment Scale-II (SAS-II) include the instruction to “skip out” of a section if it does not apply to an individual. For example, those participants who had no household member because they were living alone or have no children were not asked those particular sections of the interview. As a result, they could not be rated in those section and no global rating for that social domain was available. Thus, the average global ratings for the sample include only those individuals for whom ratings were made, and as a result, the average ratings may not fully address the true social impairments of the participants. For example, the fact that an individual does not live with others or is not a parent may reflect poor social adjustment and an inability to maintain relationships. Another potential drawback to this scale is that the global ratings are made based upon the interviewer's comparison of the participant to their conception of a "normal" person in the community. This is a very subjective procedure, and as such, interviewer
biases may enter into the rating. However, these ratings do avoid some of the problems of subject response bias, as they are made by an “outside observer.”

As with completing the QOLI, the concern of response bias still may also arise with the SAS-II. Some participants may be reluctant to indicate the extent to which their social functioning is impaired and may instead over-report social activities and interactions or under-report limitations or social difficulties that they experience. This was addressed to an extent through completion of a “Current Informant” interview as part of the larger study from which this data was obtained. At times, participant reports were very consistent with those of the current informant. But just as often, the reports were dissimilar or the current informant did not have sufficient information or knowledge to address the questions. This was especially evident for those participants who lived alone and had limited regular social contacts with others. In those cases where a discrepancy was evident, efforts were taken to determine which was the more accurate report, based upon the amount of detail, consistency across the interviews, and recent progress notes that described the individual’s current functioning as observed by his or her provider. Although the ratings on the SAS-II and the QOLI were not altered, the more accurate report was taken into consideration when making diagnostic decisions and symptom ratings.

The results of initial analyses revealed that female participants exhibited significantly more impaired social adjustment in their relationship with their primary household member and external family members. Due to the vast difference in the sample size of the gender groups (47 males, 8 females), it is difficult to determine if this is a meaningful or clinically significant difference. More of the female participants lived with others and so this may have put them in situations where strained relationships are more likely to develop. Current employment was also found to be significantly related to adjustment in work and daily responsibilities, as well as in overall social adjustment. This is not surprising, as individuals who are functioning well enough to maintain employment would presumably exhibit improved social skills in interactions with people in other areas of their lives as compared to those who do not maintain employment.
Communication Disturbances.

Examination of the communication disturbances results suggests that the speech of all persons with schizophrenia contains some level of unclear references, however no comparison to a control sample or other psychiatric group was done as part of this study. In addition, these individuals produced varying amounts of speech, as the total number of words for a 10-minute speech sample ranged from approximately 450 to well over 2200 words. To account for differences in amount of speech, this measure does provide scores based upon disturbances per 100 words of speech, resulting in proportional frequency rather than absolute scores. All six of the communication failures as measured by the CDI were present in the speech of these persons with schizophrenia. Study participants produced more Ambiguous Word Meanings than any other type of communication failures. This is reflected in their frequent use of words for which the intended meaning is not obvious, especially in situations when a word or phrase has more than one possible definition and the listener is unsure as to which the speaker is referring.

Ratings of all the communication failures other than Confused References were correlated with one other, and all of the communication failures, including Confused References, were correlated with the Total Communication Disturbance score. This indicates that as participants exhibited frequent communication failures of one type, they generally exhibited other failures as well.

Limitations to this measure, as described by its author (Docherty, et al., 1996), include the fact that the measure does not take into consideration the complexity of the individual speech sample or the severity of the communication failures because only frequencies are recorded, with no weighting based on severity. Some communication failures can be quite subtle and the basic idea of the phrase can still be understood (e.g., "I would sit in the café and just glare out into the night"), while others are more extreme and the listener is unable to understand the phrase (e.g., "I was trying to predict them people that I need."). Each of these examples would be rated only as one instance of Wrong Word Reference with no impact of the severity of the failure. Generally,
those speech samples containing severe failures also contain frequent failures. However, it is possible that those participants who produced little speech and exhibited only a few severe communication failures would appear to be exhibiting less overall communication disturbance than those participants who produced extensive speech and more numerous but more subtle errors. There is no way to control for or evaluate this possibility unless a qualitative analysis of the speech samples was completed. Such a procedure was not undertaken in this study. Additional concerns about these results include the limitations to the interrater reliability across the three raters, as reliability for Confused References and Wrong Word References were determined to be fair and good, respectively. However, all other reliability coefficients for the ratings on the CDI were determined to be excellent across the three raters.

Neurocognitive Performance

Findings of the current study demonstrated that participants as a group were performing in the average to low average range on all of the neurocognitive measures. No control group was used in the present study, and so comparisons of performance level cannot be made in this way. However, norm-based standardized scores were used as part of the examination of performance, and so comparisons to a normative sample can be made. For example, none of the subjects on any of the measures, other than the Vocabulary subtest of the Wechsler Adult Intelligence Scale—Third Edition (WAIS-III), demonstrated performance in greater than the 50th percentile. One would expect more of the scores to be closer to the mean for a normative sample; therefore the results for these participants as a whole can be considered lower than what would be anticipated in the general population. In addition, based primarily on performance on the Vocabulary subtest (one of the best predictors of expected level of performance) and secondarily on performance on the Block Design subtest (another often-used indicator of expected performance) these participants are exhibiting lower-than-expected performance on the other neurocognitive tasks. It can be concluded that these individuals are exhibiting some level of deficit on their neurocognitive performance. Such a conclusion is consistent with findings that the performance of persons with
schizophrenia tends to be impaired on a wide range of measures, which indicates generalized but evident cognitive deficits (Chapman & Chapman, 1973; Rund, 1998).

Five domain scores were generated to assess the performance of these participants in particular areas of neurocognitive functioning. Percentile scores on measures that were hypothesized to tap into similar constructs were grouped together and combined in order to better examine specific areas of performance. The results provide evidence that participants as a group were performing in the average range in the domains of General Mental abilities, Attention, Verbal Fluency, and Higher Cognitive abilities, while they performed in the low average range in the domain of Verbal Memory. Again, as no control group was used, comparisons based on performance within the study cannot be made, but as none of these domains achieved a score greater than in the 50th percentile, the domain abilities can be considered lower than what would be expected in the general population. In addition, based upon comparison with the General Mental ability domain (composed of the Vocabulary and Block Design subtests of the WAIS-III), which is the best indicator of expected performance for this group, the participants are performing lower than expected on the other domains. (See also section regarding Hypothesis 7 for additional discussion on this topic).

Results of initial analyses revealed that participants' years of education were significantly related to the domain of General Mental ability, as those individuals with more education tended to perform better in this domain. This finding is not surprising, given that the General Mental domain includes a measure of word knowledge, which can be strongly influenced by education. In addition, the two tests that contribute to the General Mental domain (the Vocabulary and Block Design subtests of the WAIS-III) are considered to be good indicators of premorbid functioning, a factor itself which can be associated with educational pursuits.

When averaging over a group, individual differences are generally minimized. Thus it is important to consider an individual's performance across measures, especially when considering that patterns in neurocognitive deficits of persons with schizophrenia exhibit considerable variation.
(Heinrichs & Zakzanis, 1998; Rund, 1998). The Impairment Index provides an estimate of the individual functioning of each of those who participated in the current study. Using a cut-off score of one standard deviation below the mean (from normative data provided by test authors or selected from the literature based on the measures' psychometric properties), the Impairment Index reflects the percentage of measures on which the participant demonstrated impaired performance. Results indicate that, individually, participants were impaired on more than 36% of the measures that they completed. This percentage corresponds to an average of more than 6.5 impaired measures per individual. This is fairly consistent with the finding that persons with schizophrenia are generally impaired on 40 to 60% of neurocognitive measures (Goldberg, et al., 1988) and with descriptions of generalized deficits in schizophrenia discussed above. The number of impaired scores varied across individuals as well, ranging from a low of 0, to as many as 16. Such a finding speaks to the variability of functioning within persons with schizophrenia, the variability of functioning across persons with schizophrenia, and that no one impairment can be presumed to be diagnostic of the illness (Heinrichs & Zakzanis).

A limitation to the neurocognitive performance results is that many of the correlations between neurocognitive performance and other variables were made using neurocognitive domain scores calculated from z scores that were obtained from raw scores on each of the measures. As a result, these z scores represent each participant's performance relative to the total group of participants, rather than compared to normative data. As a result, many of the scores may be in the average range as compared to the performance of the group as a whole, when in fact the scores would be otherwise considered impaired if they had been compared to a normative sample. Thus, only the most impaired of individuals as compared to the other participants obtained z scores in the impaired range. As a result, the performance of these participants has been artificially elevated and not all impairments are evident in the data.
Hypotheses Related to Social Adjustment

The current study hypothesized that overall symptom presentation would be positively correlated with impairment in social interactions. The results support this hypothesis, as higher levels of current symptomatology were associated with difficulty in relationships with external family members, a decrease in pursuits of social and leisure activities, and impaired overall social functioning. This is not surprising, as one would expect those persons with schizophrenia who are experiencing more symptomatology to have difficulty in their interactions with others and social pursuits. Psychiatric symptoms can have a detrimental effect on the interpersonally relevant behaviors of an individual, especially if they are experiencing psychotic symptoms that are not well understood by others, or more negative symptoms which often result in withdrawal and inactivity. It is for such reasons that when persons with schizophrenia begin to exhibit serious symptomatology, they are often hospitalized because they are unable to care for themselves and maintain life in the community, or lack sufficient social support.

This study speculated that better neurocognitive functioning would be positively related to ratings of social adjustment. A review of the current data confirms this hypothesis. Participants were found to experience higher levels of adjustment in work and completing daily responsibilities, as well as with general social interactions, as they also exhibited better performance in abilities of verbal memory. This is not unexpected, as such a skill facilitates the accomplishment of work and daily responsibilities and is strongly involved in general social interactions, whether it is in following instructions, engaging in conversations, or participation in activities, for example. Attention was found to be related to adjustment in social and leisure activities. This is also not surprising, as attentional ability is needed in many leisure pursuits, such as reading, watching television or movies, or engaging in hobbies. Attention is also required for interactions with others in a social context, for example in following conversations and participating in activities. General Mental ability was found to be correlated with adjustment in relationship with primary household member. One explanation for this finding is that ongoing interactions with a given person may
become strained when it appears that the person with schizophrenia does not have the ability to engage in routine tasks or maintain a basic skill level.

Previous research has resulted in varying conclusions regarding the relationship between neurocognitive functioning and social adjustment. In some cases no neurocognitive associations were found with social functioning as a whole (Addington, et al., 1998), or only with certain aspects of social functioning, such as social problem solving (Addington & Addington, 1999). In other research, specific neurocognitive tasks measuring spatial organization and visual spatial abilities (Dickerson, et al., 1996), verbal memory and vigilance (Green, 1996), or, in the case of females, verbal memory alone (Mueser, et al., 1995) were related to overall social adjustment and competence.

The current study showed that specific areas of neurocognitive functioning are related to specific areas of social functioning. As persons with schizophrenia are identified as having deficits in one or more of these particular areas of social functioning and when it has been determined that their social functioning is an area for rehabilitation, steps can be taken to assist the individual in improving their neurocognitive abilities and developing compensatory skills that presumably will have a direct effect on their social functioning as well. Based on these results, developing rehabilitative strategies to improve verbal memory and attention may also result in better social functioning in work, social-leisure, and general social interactions.

However, it appears that more research into the impact of neurocognitive functioning on social adjustment is needed. Also, researchers need to specifically identify which aspects of social adjustment are to be studied and select neurocognitive measures that are theoretically related to the social adjustment domains under consideration.

This research hypothesized that social adjustment would be related to the quality of life rating of Global Life Satisfaction. This hypothesis was supported as the data reveals that adjustment in the areas of relationship with primary household member, social and leisure activities, and global social functioning were all significantly related to Global Life Satisfaction.
Thus one can conclude that persons with schizophrenia tend to be more satisfied with their lives when they are also experiencing positive relationships with the primary person in their households, more social and leisure pursuits, and overall have better social functioning. It can be argued that social interactions bring meaning and pleasure into most people’s lives, and it appears to be the case with the participants in this study.

These results are also expected when considering the individual quality of life scales that were associated with the Global Life Satisfaction, including satisfaction with daily activities, living situation, social relations, family relations, and greater number of social contacts. Having these similarities between scales - both in terms of content sampling and of their intercorrelations - indicates that there was consistency across reports for the interviews. Also, as the SAS-II is an interviewer-rated measure and the QOLI Is based on self-report, the convergence of ratings suggests that similar information was being taken into consideration for the ratings. This also speaks to the previously discussed issue of the reliability of persons with schizophrenia in reporting their satisfaction and quality of life.

**Specific Hypotheses**

*Hypothesis 1a (Correlation between overall symptom presentation and quality of life).* The study hypothesized that overall symptom presentation would be negatively correlated with the measures of quality of life. The results partially confirm this hypothesis. Although overall symptom presentation is not related to Global Life Satisfaction, it is significantly associated with the subjective measure of satisfaction with social interactions. Based on these findings, it would appear that in those persons with schizophrenia who experience more psychiatric symptoms, the quality of their social interactions is less. This may be a direct result of their exacerbating psychiatric status and the impact that it has on the individual’s presentation and behaviors, and even desire to engage in social interactions. These factors can lead to difficult or inappropriate interactions and behaviors, a reduction in the number of social interactions, or the avoidance of interactions all together. Alternatively, participants may experience reduced satisfaction with their
social interactions, for unrelated reasons, and as a result become distressed or displeased. Such negative feelings could lead to depression and/or the expression of negative symptoms.

_Hypothesis 3a (Correlation between symptom factors and quality of life)._ The present research hypothesized that negative symptoms would have a stronger relationship with quality of life than positive symptoms. Both symptom domains were found to have a significant association with quality of life as measured by satisfaction with social interactions. However, there was no difference between the magnitude of each of these correlations, therefore the hypothesis was not proven to be true. Instead positive and negative symptoms maintain a similar relationship with participants' ratings of satisfaction with social interactions. Such a finding may be a result of the relatively low level of symptoms displayed by the participants in the study and limited variation in symptom presentations.

Several additional results reveal that other BPRS factors were associated with various scales from the QOLI. Manic symptoms are associated with victimization and arrests within the last year. A possible explanation for this finding is that persons who are experiencing manic symptomatology may find themselves in situations which result in contact with the legal system, whether as a result of victimization, illegal, or inappropriate activity. Depressive-anxiety symptoms were strongly related to less global life satisfaction, satisfaction with daily activities, and satisfaction with health. The symptoms were also moderately correlated with lower satisfaction with living situation, family contacts, and finances. This is not surprising in light of the previous discussion that depressive symptomatology is often indistinguishable from global quality of life, and these life areas should be taken into consideration when the global life satisfaction rating is made by the participants. It is interesting to note that the BPRS is a clinician-rated measure, while the satisfaction ratings on the QOLI are provided by the person with schizophrenia. One conclusion to be drawn is that the clinicians and participants are exhibiting strong parallels in their ratings of the participants' experiences. An alternative conclusion is that the QOLI measures primarily the effects of depressive symptomatology on a variety of life circumstances rather than
patient-rated quality of life. If this were the case, it may be that interventions specifically targeting depressive symptomatology, in addition to those psychotic symptoms typically associated with schizophrenia, would be warranted. Such a goal could be accomplished by antidepressant medications or psychotherapy targeted at the depressive process. Additional research is needed to fully explore the relationship between depressive symptoms and their effects on ratings of quality of life as measured by the QOLI.

Future research may want to consider the possibility of exploring the relationship between specific individual symptoms (as rated by individual BPRS items or using other instruments) and quality of life. It may be possible to differentiate the effects of various symptoms from one another and their impact on ratings of quality of life. Such knowledge may improve services that are provided to persons with schizophrenia as their individual symptoms can be targeted with the goal of improving Global Life Satisfaction and other areas of quality of life.

**Hypothesis 4 (Correlation between neurocognitive domains and quality of life.)** The study hypothesized that quality of life (objective) would be positively correlated with the neurocognitive domains of Verbal Memory, Attention, and Higher Cognitive functioning. This hypothesis was not strongly supported by the results. The only objective rating of quality of life to be related to any of the domain scores was the number of social contacts reported by the individual with the domain of Attention. The reason for this may be similar to issues discussed above in relating social adjustment to Attention. It may appear that persons with schizophrenia would engage in more social contacts (either by making plans or being asked by others) when they are better able to attend to interactions with others and the activities that they engage in. In addition, none of these neurocognitive domain scores were associated with global life satisfaction. This may indicate that persons with schizophrenia can be sufficiently satisfied with their overall life circumstances despite any neurocognitive impairments they may experience, a conclusion that other researchers have also drawn (Heslegrave, et al., 1997). Alternatively, it may be that although these participants are exhibiting some neurocognitive deficits, as can be seen by the Impairment Index
indicating that on average participants are impaired on more than one-third of the measures, the impairments are not severe enough to significantly affect functioning and quality of life. It is possible that a less stable or more neurocognitively impaired group would have rated their Global Life Satisfaction lower than the group of the present study.

**Hypothesis 1b (Correlation between overall symptom presentation and neurocognitive functioning).** This research hypothesized that overall symptom presentation would be negatively correlated with performance on neurocognitive tasks. As a whole, this hypothesis was not supported. The only neurocognitive task to be significantly associated with current symptomatology was the Digit Symbol – Coding subtest of the WAIS-III. This finding may again be a result of the limited symptomatology that was currently being exhibited by the study participants. However, as this particular measure is generally considered to be the most sensitive neurocognitive assessment to any form of brain dysfunction (Lezak, 1995), it may have been the only measure able to discriminate the small but significant effects of overall symptoms. Again, additional correlations with other measures may have been observed if the sample as a whole had been more symptomatic or if more sensitive measures of general brain dysfunction were used.

**Hypothesis 3b (Correlation between symptom factors and neurocognitive functioning.)**
The present study hypothesized that negative symptoms would have a stronger relationship with neurocognitive functioning than positive symptoms. This hypothesis was somewhat supported by the data. The negative symptom dimension was found to be significantly associated with poorer performance on the Digit Symbol – Coding and Pairing subtests of the WAIS-III, as well as to the total time on the Trail Making Test – Part A. The positive symptom dimension was found to be related only to performance on the Digit Span subtest of the WAIS-III. These results again speak to the sensitivity of the Digit Symbol subtest and its ability to discriminate the subtle effects of negative symptoms. Also, it has been shown in the literature that negative symptoms tend to impact cognitive functioning to a greater extent than positive symptoms (Paulsen, et al., 1995) and
more so in the areas of visual-motor and visual-spatial skills (Green & Walker, 1985; Strauss, 1993), abilities which both the Digit Symbol and Trail Making Test tap into. It is unclear why positive symptoms are related to improved performance on the Digit Span subtest of the WAIS-III. This is an unexpected finding as positive symptoms have been found to be related to deficits on tasks of short-term verbal memory (Green & Walker) and auditory processing (Strauss), areas which the Digit Span subtest taps into. It may be that the participants who were currently experiencing some positive symptoms, possibly on a chronic basis, have adapted to the occurrence and have in fact developed coping strategies to adjust for the impact of the positive symptoms.

Hypothesis 7 – Relative Deficits Among the Neurocognitive Domains. The current study hypothesized that the participants would exhibit greater deficits in the areas of Verbal Memory, Verbal Fluency, Attention, and Higher Cognitive functioning than in the domain of General Mental ability. The results supported this hypothesis as performance in the four indicated domains was significantly worse than performance in the area of General Mental ability. This is consistent with reports that persons with schizophrenia demonstrate mild to moderate impairments on measures of verbal ability, learning, attention, abstraction, and flexibility of thinking (Heaton, et al., 1994; Heinrichs & Zakzanis, 1998). These results indicate that as a whole participants are performing below their expected neurocognitive level (as estimated by performance on the tasks included in the General Mental domain) even though their aggregated scores in these other four domains are still in the average to low average range. This again speaks to the variability of neurocognitive performance across persons with schizophrenia, and the potential effects that higher performing individuals can exert on group scores.

Hypothesis 2 (Correlation between symptom presentation and communication disturbances). This study hypothesized that overall symptom presentation would be positively correlated with the ratings of communication disturbances. The results did not support this hypothesis, as overall symptom presentation was not correlated with any other ratings of
communication failure or with the Total Communication Disturbance rating. An explanation for this finding may be again that as the participants were exhibiting relatively few overall symptoms, the symptoms did not impact the communication disturbance ratings. In addition, much of previous research completed by Docherty's group (Docherty & Gottesman, 2000; Docherty, et al., 1996, Docherty, et al., 1998; Docherty, et al., 2001) did not report on current symptomatology and so expectations for symptom effects are not clear. Several of the studies did report symptomatology, but only by correlating BPRS total scores with other measures after the influence of conceptual disorganization was removed (Docherty & Gordinier, 1999; Docherty, et al., 2000) or in relating patient symptomatology to the speech disturbances of relatives (Docherty, et al., 1999). No total scores for symptoms were reported in these studies. Thus, it is not clear what role current symptomatology plays in the expression of communication failures. However, as the total number of communication disturbances rated in the present study was similar to that found in previous studies, and as our population exhibited a somewhat greater number of Vague References and slightly fewer Structural Unclarities than found in other research using the CDI, it can be hypothesized that overall symptoms may influence the relative frequencies of communication failures that are expressed by individuals, rather than the total number of each type of disturbance. Additional exploration of the relationship between current symptomatology and expression of communication disturbances is warranted.

_Hypothesis 5 - Frequencies of Ambiguous Word Meanings and Missing Information References_. The study hypothesized that participants would exhibit more Ambiguous Word Meanings than other communication failures, followed by Missing Information References. The results upheld this hypothesis as Ambiguous Word Meanings were found to occur much more frequently than other communication failures in the speech samples of the participants, and that Missing Information References were more prevalent than the other four communication failures. This is consistent with previous studies using the CDI (Docherty, DeRosa, et al., 1996; Docherty, Hall, et al., 1998; Docherty, et al., 1999; Docherty & Gottesman, 2000; Docherty et al., 2000;
Gordinier & Docherty, 2001) that have found Ambiguous Word Meanings to be the most common communication failure in the speech of all participants, regardless of group membership or psychiatric status. Missing Information References have been found to best differentiate the speech of persons with schizophrenia from other diagnostic groups and controls (Docherty, DeRosa, et al., 1996), and thus has been described as the most “schizophrenic” in quality. This type of communication failure makes references to information that is completely unknown to the listener and often makes the speaker especially difficult to follow. Missing Information References have also been found to be more prevalent in the speech of nonpsychiatric relatives of persons with schizophrenia (Docherty, et al., 1998; Docherty, et al., 1999) and has been identified as a possible indicator of a schizophrenic genotype (Docherty & Gottesman, 2000). It is not known at this time how Missing Information References relate to the expression of schizophrenia. Future research could consider clinical factors such as severity of the illness, duration, or age of onset, to determine differences among subgroups of persons with schizophrenia when analyzing communication disturbances.

Hypothesis 6 (Correlation of communication disturbances with neurocognitive functioning). The current study speculated that communication failures would be negatively associated with the neurocognitive domains of Verbal Memory, Attention, and Verbal Fluency. This hypothesis was partially supported by the data. Specifically, Missing Information References were found to be correlated with deficits in Verbal Memory, and Confused References were correlated with deficits in Attention. No communication failures were found to correlate with Verbal Fluency. Missing Information References have been noted to occur by Docherty and her colleagues (2000) as an inability to remember what has actually been said to the listener as opposed to only thought by the speaker. Thus, the relationship between Verbal Memory and Missing Information References is understandable. Confused References were described as an inability to remember discourse long enough to execute it. Again, the relationship between Attention and Confused References is understandable. However, in their research, Docherty and
colleagues instead have found that Missing Information References were related to performance on a continuous performance task of Attention, and Confused References were related to immediate auditory memory as measured by a digit span task. This Confused References finding is consistent with the present study, as half of the Attention domain score is attributed to a digit span task. Docherty’s group did not administer a list learning task, and the present study did not include a continuous performance task. Thus, it is difficult to determine what similarity or differences there are in the two studies’ findings. However, based on the description of the process underlying Missing Information References, verbal memory could certainly be implicated. Additional research in this area involving a more theoretically-driven selection of neurocognitive measures is needed.

Hypothesis 8 (Prediction of quality of life from other variables). The study hypothesized that the quality of life rating of global life satisfaction could be predicted from the other variables of the study. This hypothesis was supported by the data. After removing the effects of depressive symptomatology, because certain aspects of psychopathology, especially depression and anxiety, correlate moderately with QOL and should be taken into consideration (Lehman, 1988), it was found that Ambiguous Word Meanings from the CDI and the global rating of general social adjustment from the SAS-II best predicted global life satisfaction from the QOLI. Thus it appears that global life satisfaction is most closely related to fewer depressive symptoms, more frequent communication failures involving ambiguous word meanings, and better overall social functioning. Having global life satisfaction predicted by less depressive symptoms and greater social adjustment is expected, as improved psychiatric status and social interactions are important considerations for consumers of mental health services, and can contribute to a more pleasant and meaningful life. However, predicting global life satisfaction from a greater number of a particular communication failure is less expected. One potential explanation is that Ambiguous Word Meanings are the most frequently observed communication disturbance in the speech of normals. It may be that for these persons with schizophrenia, as their speech becomes more
similar to that of normals (i.e., fewer other disturbances and more Ambiguous Word Meanings), their functioning is improving, which could then result in improved life satisfaction.

Limitations to the Study

Certain characteristics of the study must be kept in mind when interpreting and attempting to generalize from the results. In particular, the sample comprised predominantly of male veterans with schizophrenia or schizoaffective disorder who were receiving care at a large midwestern Veteran's Administration Medical Center. A smaller proportion of participants was recruited from other sites in the same metro area that also provide services to the mentally ill. It is not known to what extent the veterans may differ from the general population or to what extent their military experiences may impact their functioning. In addition, this study did not address the issue of possible heterogeneity among the study's small subsamples. It is certainly possible that the results of the present study are unduly influenced by the unique experiences of the individuals under consideration, and as such may not be generalizable to the general population.

Another factor to consider is that this study was part of a larger more extensive project in which persons with schizophrenia were recruited to participate. Numerous potential subjects declined to participate due to the intensive nature of the larger project or due to the request that immediate family members be approached about possible participation as well. As a result, the refusal rate for participation was quite high and those who agreed to participate may be reflective of a higher functioning or otherwise amenable group of persons with schizophrenia. Similar difficulties in schizophrenia research recruitment, including refusal rates, exclusion due to behavioral problems, and exclusion due to medical problems, have been described elsewhere (Schreiber, Breier, & Pickar, 1990).

All persons approached to participate in this study already met criteria for participation because their medical backgrounds were reviewed for exclusionary criteria and providers were consulted regarding appropriateness and ability to participate in the study. Accordingly, no
additional analyses were completed to determine if significant differences existed between the groups of participants, refusers, and those initially excluded or deemed unable to participate.

Although limited findings were obtained from this research regarding the present sample, some speculation can be made applying these results had another group been evaluated. Presumably, other groups of persons with schizophrenia could be more symptomatic and lower functioning. These persons would probably have fewer of their needs met, have less access to resources, and in general report lower satisfaction with their overall life circumstances. Social adjustment would be lower, in relationships with others, pursuit of social and leisure activities, and in accomplishing work and daily responsibilities. This would result in a lessened overall social adjustment. Neurocognitive performance would be similar to the present group, especially in light of the fact that cognitive abilities tend to remain stable over time and that cognitive deficits vary across individuals with schizophrenia. However, one would expect relationships between neurocognitive performance and other variables to be stronger, possibly because functioning would be more impaired and impacted by even relatively subtle deficits. A lower functioning group would probably exhibit a greater frequency of overall communication failures, specifically more Missing Information References, as this is deemed the most "schizophrenic" of the failures, and potentially those other failures that are also more related to neurocognitive impairment (Confused References, Ambiguous Word Meanings, and Grammatical Unclarities) as other skills may not be able to compensate for difficulties in cognitive functioning when more symptomatic or acutely ill.

Conclusion

The concept of quality of life has developed into an important and popular concept in the field of mental health. It has increasingly been used as a means to establish new perspectives regarding the experiences of an individual, as well as to measure outcome of interventions. The concept of quality of life has contributed to a common understanding about the functioning of persons with schizophrenia for all involved, the individuals themselves, relatives, providers, and policy makers. The objective of this study was to explore a number of variables implicated in the
functioning of persons with schizophrenia and to determine the relationship of each of these variables to quality of life. It is apparent that the manner in which an individual functions, whether exhibited through symptoms, language, or neurocognitive abilities, can greatly impact his or her interactions with others, general social adjustment, and overall quality of life. The results of this study have immediate implications for researchers and clinicians to assist in the understanding of the factors that contribute to quality of life and to identify potential strategies to assist in the improvement of the quality of life of persons with schizophrenia.

The theory prevalent in the literature is that schizophrenia is a heterogeneous disorder that nonetheless has a strong genetic component which may result in a vulnerability to the illness, manifesting through an interaction with specific environmental factors (Gottesman, McGuffin, & Farmer, 1987; Schultz & Andreasen, 1999). Although the exact cause of schizophrenia is unknown, the most likely alternative is that the individual carries a susceptibility or vulnerability to developing the illness from birth, and this vulnerability interacts with an environmental agonist which results in the expression of the illness. In relation to the results of the current study, several notions can be considered. The neurocognitive deficits exhibited by persons with schizophrenia may be both a result of a genetic or early influence on brain development as well as the ongoing impact of symptomatology that the individual experiences. Interventions in this area can aid in improving functioning, but probably would not change the overall disease process, as it is clear by the variation that is found among individuals with schizophrenia that cognitive impairments in and of themselves are not diagnostic of the illness nor presumably cause the variety of impairments in functioning that are experienced by those persons.

Potentially language disturbances are reflective of an overall brain dysfunction not specific to schizophrenia, especially as communication failures are witnessed in the speech of normals, other psychiatric groups, and relatives of persons with schizophrenia (Docherty, DeRosa, et al., 1996; Docherty, et al., 1999). Thus, language production may be an accurate measure of an individual's functioning rather than a specific area for intervention. Language production may be a
reflection of the disease process and be a good indicator of current functioning, similar to the role that symptomatology plays in the assessment of schizophrenia. The subjective quality of life and social functioning of a person with schizophrenia are probably best regarded as results of the disease process, but are areas in which interventions can be surely be focused.

An alternative explanation is that this type of communication failure and language production is in some way actually representative of an adaptive process. Although the CDI does not purport to measure formal thought disorder, but rather measures the unclear references that occur even in the speech of normals, the ambiguous references may in some way indicate that the persons with schizophrenia are adapting to the disorder or that the communication disturbance may in some way be helpful for the individual. Additional research exploring the relationship between unclear references, specifically ambiguous word meanings, and adaptive, functional, or creative aspects of the disorder of schizophrenia is certainly warranted.

It may be that both communication failures and neurocognitive performance, rather than being diagnostic or pathognomic of the disorder, are instead more simple characteristics associated with the genetic liability for schizophrenia and not the full expression of the disorder, what has been called an “endophenotype” (see locono, 1998 for a review). These endophenotypes provide additional avenues for research and attempts at understanding the transmission and presentation of schizophrenia. These characteristics may be ones to be monitored to determine the stage or severity of the illness, the individual’s current functioning, and relationship to the genetic expression of the disorder, rather than representing areas to be specifically targeted for intervention.

An important question to consider concerns how different these constructs of interest for the present study really are. Based on the results, it is clear that Quality of Life and social adjustment are definitely related to one another, and that an individual's interactions with others and ability to engage in social activities plays a large role in their satisfaction with different areas of their life. However, as social adjustment is more an assessment of a person's functioning, and
quality of life involves both objective ratings of life circumstances and one's satisfaction with those circumstances, they should not be considered to be the same construct. However, it is not difficult to presume that if a person's social adjustment were to improve, satisfaction with their life situation would also increase.

The most important finding of this study is that quality of life can be best predicted by less depressive symptomatology, better overall social functioning, and observations of language production to identify the frequency with which persons with schizophrenia use words in such a way that the intended meaning is not clear. These results are relevant at least to the present group, although it is unclear whether they are generalizable to other populations or subgroups of persons with schizophrenia. Future research may want to include additional participants who represent a greater age range, more varied backgrounds, and who were more symptomatic than those in the present study. A number of the present study's results may have been specific to the functioning of the current group, most of whom were quite stable at the time of participation. This recommendation for future research corresponds to the suggestion by Sullivan, et al. (1992), which indicated factors that predict greater quality of life may vary in different populations or even within different systems of service provision. Also, this present study was purely correlational and did not examine causal relationships between variables. Thus, predictions about how to improve the quality of life of persons with schizophrenia are only speculative at this point, for it is not known how changing one variable will actually alter others.

In this population, the variables of interest show an important relationship to the quality of life of persons with schizophrenia who continue to function in the community. After considering the overall results of this study, several possible interventions are apparent to assist in the improvement of the quality of life of persons with schizophrenia. Strategies include decreasing symptomatology, perhaps through medication or therapy, increasing the number of social contacts and leisure activities of the individual, improving social relationships with family and friends, possibly through increased contact, varied activities, or counseling, and developing rehabilitative
or compensation strategies in the areas of verbal memory and attention. Although communication failures in the form of Ambiguous Word References are also implicated, monitoring their frequency may be a better indicator of an individual's performance rather than a domain for intervention. However, this could be an effective focus for intervention if an individual was taught strategies to monitor their speech (focusing on areas of verbal memory and attention to attend to and evaluate what has been said) and then to clarify instances of communication failure as they arise. In summary, the ultimate goal for persons with schizophrenia, their relatives, and providers should be to increase the individual's general ability to function adequately within the community in the hopes of improving their global life satisfaction.
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Lehman, A., Kernan, E., & Postrado, L. (1995). *Toolkit for Evaluating Quality of Life for Persons with Severe Mental Illness*. (Available from the Center for Mental Health Services Research, University of Maryland School of Medicine, Department of Psychiatry, 645 West Redwood St., Baltimore, MD 21201-1549)


Functioning in Schizophrenia


Appendix A

Checklist for Exclusionary Criteria Used During Initial Chart Review

<table>
<thead>
<tr>
<th>Name: __________________________</th>
<th>Last Four: __________</th>
<th>Gender: M F</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOB: __________</td>
<td>Age: ______</td>
<td>Education: ____________________</td>
</tr>
<tr>
<td>Ethnicity: Caucasian African-American Hispanic Asian Native American Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chart Diagnosis:________________________</td>
<td>Psychotic Features: Y N</td>
<td></td>
</tr>
</tbody>
</table>

Please note pass or fail for each criterion item based on a review of the patient's medical record or any additional sources of information.

Please note with date and source (progress note, discharge summary, psych assessment, etc.) reason why patient failed a particular criteria.

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Pass/Fail</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) English is not subject's primary language</td>
<td>F</td>
<td>______</td>
</tr>
<tr>
<td>2) Charted IQ of less than 70 or diagnosis of mental retardation</td>
<td>F</td>
<td>______</td>
</tr>
<tr>
<td>3) Current alcohol or drug abuse: current or past substance dependence</td>
<td>F</td>
<td>______</td>
</tr>
<tr>
<td>4) Current or past central nervous system (CNS) disease or condition</td>
<td>F</td>
<td>______</td>
</tr>
<tr>
<td>5) Medical condition or disease with likely CNS effects</td>
<td>F</td>
<td>______</td>
</tr>
<tr>
<td>6) History of head injury with skull fracture, or loss of consciousness of greater than 20 minutes</td>
<td>F</td>
<td>______</td>
</tr>
<tr>
<td>7) Physical problem that would render study measures difficult or impossible to administer or interpret (e.g., blindness, hearing impairment, paralysis in upper extremeties, etc.)</td>
<td>F</td>
<td>______</td>
</tr>
<tr>
<td>8) Subject is younger than 18 or older than 60</td>
<td>F</td>
<td>______</td>
</tr>
<tr>
<td>9) Significant tardive dyskinesia (i.e., DISCUS score greater than 7 (total) or greater than 3 in facial areas)</td>
<td>F</td>
<td>______</td>
</tr>
<tr>
<td>10) History of electro-convulsive (shock) therapy</td>
<td>F</td>
<td>______</td>
</tr>
<tr>
<td>11) Adopted</td>
<td>F</td>
<td>______</td>
</tr>
</tbody>
</table>
Explanation for failure:

If patient passes all exclusionary criteria, please note any mention of family in the area who may be involved with the patient.

Central nervous system and medical diseases/conditions with likely CNS system effects:

- Cerebrovascular accident (CVA, stroke)
- Transient Ischemic Attacks (TIA’s)
- Multi-infarct dementia
- Alzheimer’s disease
- Frontal lobe dementia
- Parkinson’s disease
- Huntington’s disease
- Multiple sclerosis (MS)
- AIDS dementia
- Brain tumor
- Seizure disorder (epilepsy)
- Cerebral palsy
- Thyroid disease
- Encephalitis
- Lyme disease
- Learning disability, dyslexia, ADHD, ADD (if diagnosed by a professional)
- Hypoxic episode (loss of blood flow to brain, related to cardiac arrest caused by heart attack, severe injury, etc.)
Appendix B

Comprehensive Chart Review Form

CHART REVIEW

Subject number ____________
Date of entry into the study ____________
Date of chart review ____________
Chart reviewed by ____________ (Check if review is completed ____) 
Number of chart volumes ________

General Chart Review Procedures

Confirm subject’s self-reported socio-demographic information
   Note any discrepancies:

Confirm subject’s self-reported use of alcohol and other drugs
   Note any discrepancies:

Confirm subject’s self-reported history of onset and hospitalizations
   Note any discrepancies:

Obtain copies of reports documenting symptoms of the episode leading to the first
hospitalization or treatment. Place these in the subject’s file. Do not rely only on the
subject’s retrospective self-report describing the first episode.

Medical and Psychiatric Conditions and Treatments

DISCUS Score: ________ Date of DISCUS: __________

Medical Disorders (See DSM-IV Appendix G for codes)

Review discharge summaries and note medical conditions from Axis III. Include all
chronic persistent conditions from discharge summaries. Do not review outpatient notes.

Medical Condition 1: __________________ Current __ Past only __ Code: ________
Medical Condition 2: __________________ Current __ Past only __ Code: ________
Medical Condition 3: __________________ Current __ Past only __ Code: ________
Medical Condition 4: __________________ Current __ Past only __ Code: ________
Medical Condition 5: __________________ Current __ Past only __ Code: ________
Medical Condition 6: __________________ Current __ Past only __ Code: ________
Medical Condition 7: __________________ Current __ Past only __ Code: ________
Medical Condition 8: __________________ Current __ Past only __ Code: ________
Medical Condition 9: __________________ Current __ Past only __ Code: ________
Medical Condition 10: __________________ Current __ Past only __ Code: ________
Medical Condition 11: __________________ Current __ Past only __ Code: ________
Medical Condition 12: __________________ Current __ Past only __ Code: ________
**Current Psychotropic Medication**

<table>
<thead>
<tr>
<th>Drug Code</th>
<th>Dose (mg/day)</th>
<th>Route</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drug 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drug 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drug 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drug 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drug 5</td>
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<td></td>
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<tr>
<td>Drug 6</td>
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<tr>
<td>Drug 7</td>
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<tr>
<td>Drug 8</td>
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<tr>
<td>Drug 9</td>
<td></td>
<td></td>
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<tr>
<td>Drug 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drug 11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drug 12</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Medication Compliance:**

Rate the subject's typical level of medication compliance for the entire six month period prior to entry into the study. (Use outpatient notes.)

00 = Not applicable  
01 = Excellent – Takes all psychiatric medications as prescribed and rarely, if ever, forgets or chooses not to take medications  
02 = Good – Generally takes all psychiatric medications as prescribed, occasionally forgets or chooses not to take medications  
03 = Fair – Although regularly takes psychiatric medications, does not take as prescribed (i.e. alters dose or frequency), frequently forgets or chooses not to take medications. Rarely goes longer than a week without taking medications.  
04 = Poor – Takes medication inconsistently and not as prescribed, has prolonged periods (2-3 weeks) when no medications are taken.  
05 = Non-compliant – Refuses to take psychiatric medications  
06 = Mixed – Has periods of compliance that would be rated at least 2 (Good) and other periods that would be rated 4 (Poor) or lower.  
09 = Unknown
Current Outpatient Therapy

Rate period prior to entry into the study.

<table>
<thead>
<tr>
<th>Therapy</th>
<th>Type</th>
<th>Date began</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Therapy 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Therapy 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Therapy 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Therapy 4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Types:

01 = Somatic: almost completely medication oriented
02 = Talk: supportive counseling, problem solving therapy, etc., where the focus is not medication
03 = Behavioral (almost exclusively)
04 = Psychotherapy; distinguish from 2 if a specific therapeutic approach (e.g. psychodynamic, cognitive behavioral) is noted
05 = Group therapy
06 = Case management
07 = Other
08 = IPCC
09 = Unknown

Frequency codes:

01 = once per week or more often
02 = at least once per month, but less than once per week
03 = less than once per month

History of ECT:

Use these codes for type of ECT. These are organized by courses of ECT in which an interruption of two weeks or more in a series of ECT divided the series into two courses.

<table>
<thead>
<tr>
<th>ECT 1 Type</th>
<th>Date began</th>
<th>Date ended</th>
<th>Number of treatments</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECT 2 Type</td>
<td>Date began</td>
<td>Date ended</td>
<td>Number of treatments</td>
</tr>
<tr>
<td>ECT 3 Type</td>
<td>Date began</td>
<td>Date ended</td>
<td>Number of treatments</td>
</tr>
<tr>
<td>ECT 4 Type</td>
<td>Date began</td>
<td>Date ended</td>
<td>Number of treatments</td>
</tr>
<tr>
<td>ECT 5 Type</td>
<td>Date began</td>
<td>Date ended</td>
<td>Number of treatments</td>
</tr>
<tr>
<td>ECT 6 Type</td>
<td>Date began</td>
<td>Date ended</td>
<td>Number of treatments</td>
</tr>
</tbody>
</table>

Current Treatment

See attached list for drug codes.
Has patient's treatment regimen been stable for the two months prior to entry into the study? Yes ___ No ___

Last date when psychotropic medication was changed prior to entry into the study: ____

If medication is taken more than once per day, calculate to get mg. per day.

What was changed?

| From: Code: | Dose: ___ mg/day | Route: ___ |
| To: Code:  | Dose: ___ mg/day | Route: ___ |

| From: Code: | Dose: ___ mg/day | Route: ___ |
| To: Code:  | Dose: ___ mg/day | Route: ___ |

| From: Code: | Dose: ___ mg/day | Route: ___ |
| To: Code:  | Dose: ___ mg/day | Route: ___ |

| From: Code: | Dose: ___ mg/day | Route: ___ |
| To: Code:  | Dose: ___ mg/day | Route: ___ |

| From: Code: | Dose: ___ mg/day | Route: ___ |
| To: Code:  | Dose: ___ mg/day | Route: ___ |

Was a decanoate drug changed? Code in weeks.

| From: Code: | Dose: ___ mg per injection | Weeks ___ |
| To: Code:  | Dose: ___ mg per injection | Weeks ___ |

**Route/Interval**

If NOT decanoate, enter route codes as follows

01 = Oral
02 = IV (intravenous)
03 = IM (intramuscular)
04 = Other (specify)
05 = Unknown

If coding decanoate, code the interval at which injections are received in weeks.
**Record of Hospitalizations**

<table>
<thead>
<tr>
<th>Admitted</th>
<th>Discharged</th>
<th>Days</th>
<th>Location</th>
<th>Presenting Issues</th>
<th>Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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Appendix C

Examples of the Six Communication Failures from the Communication Disturbances Index (CDI)

Examples from the Communication Disturbances Index (CDI)

Six types of communication failure were determined to exist in the speech samples of persons with schizophrenia. These types are described below, and examples are given. Unclear references are boldfaced (from Docherty, DeRosa, & Andreason (1996), pp 359-360.):

1. Vague references are words or phrases that are unclear because they are overinclusive. They are scored only if their lack of specificity is important and significantly diminishes the meaning communication by the utterance. They are not usually blatantly deviant, but they leave the listener with an amorphous and questionable impression rather than a clearly communicated meaning.
   1.1 I'm hoping they don't get caught up in some of the ills of our life, of our society.

2. Confused references are unclear because they could refer to one of at least two clear-cut alternative referents, and the correct choice is not obvious. Confused references are often but not always, pronouns.
   2.1 He stabbed the dude and I kicked him. I thought he punched him. I thought he was on the ground just acting like he was hurt.

   2.2 My son has two children and my daughter has three. The kids have counted on me for a lot.

3. Missing information references seem to assume that the listener has prior information that he or she does not have and should not be expected to have. Unqualified references to persons, places, or things unknown to the listener are classified here, as well as comparative references for which the basis of comparison is unknown.
   3.1 I like to work all right. Some of those shops were filthy. I liked the bakeries, some of the shops are clean. (No prior mention of any shops or bakeries.)

   3.2 They let George go home. so why not me? (No prior mention of George, and listener does not know him.)

   3.3 I love the place best in the winter. It's just a total opposite then. (missing information comparison; "opposite" in what way? Listener does not know the basis of comparison.)

4. Ambiguous word meanings are instances in which a word or phrase is used in such a way that its intended definitional meaning is uncertain. This does not include instances in which it seems that the wrong word has been chosen, but rather the word used could have a number of different meanings in its current context, and the correct meaning is not obvious.
   4.1 He was a man that was pow in a minute. (*Pow* is unclear because the intended definitional meaning is uncertain. Does it mean that he became violent easily, or he was a man of action, or...?)
4.2 Those people don't belong on the earth. God will get them.

4.3 I had a chance to grow with him but I got a divorce because I couldn't.

5. Wrong word references are unclear because of a seemingly incorrect choice of word or phrase. The meaning of the utterance seems clear, but doubt is case because of the use of an odd of apparently inappropriate word or expression.

5.1 We've had our qualms about me bowling, but I've always won out. (Does she mean 'quarrels'?)

5.2 I used to sit in the cafe, have something to eat, and just glare out into the night. (Does he mean “stare”?)

6. Structural unclarities are instances in which meaning is unclear due to a breakdown or inadequacy of grammatical structure. Incorrect grammar is not scored unless it results in a loss of clarity of meaning.

6.1 I got a sister in Buffalo, New York. I've been there...must have been about twice since I was up there.

6.2 We went to Arizona. We stopped off lots of towns between Chicago.

(Spoken by a person living in Connecticut.)
Appendix D

First Contact Script for Participants Known to Meet Criteria for Participation

Patient First-Contact Script
(by phone or in person)
10/25/00

Hello, this is (research staff's name) from the Minneapolis VA Medical Center. I'm contacting you to invite you to participate in a study. If you choose to participate, you will be asked to complete the procedures of the study and will be paid for your time. I'm wondering if this is a good time for you to talk with me about it.

Our research is about cognition and brain functioning. This study examines brain wave activity in order to determine which parts of the brain are affected when someone has mental or emotional difficulties. This study may help us to better understand why some individuals develop these types of problems, and why others, even from within the same family, do not. As a part of this study we will ask your permission to contact members of your immediate family and ask if they are willing to participate as well. We will talk to one of your family members about your childhood and early adulthood. We will also ask to speak with someone who currently knows you well and can describe your social, work, and emotional functioning.

If you participate, you would spend about ten to twelve hours with us at the Minneapolis VA Medical Center, and some additional time talking with us on the phone. We will arrange days and times for you to come to the VA based on what fits your schedule. As soon as you have completed the study, you will be paid $130 for your time.

As part of the study we will measure your brain waves while you are at rest and when you are performing a number of tasks. Measuring brain waves involves attaching sensors to your body and head. We also ask you to participate in a set of interviews about your mental and emotional functioning during your life. These interviews will touch on areas many people see as sensitive and personal. You will also complete an assessment of thinking abilities, allow us to draw a small amount of blood, and undergo a neurological exam.

Because we ask you to do so many things, I want to emphasize that any information you tell us about yourself or your family members is kept strictly confidential. We assign a study number to you and use that number to identify your information rather than your name. Also, none of the information you tell us will be accessible to medical personnel and will in no way affect any benefits you may receive from the VA or any other military or governmental organization.

Do you have any questions?

I'd like to ask you a couple questions to make sure you understand the nature of the study.

- What is this project studying?
- Will we ask to contact your relatives about them participating in the study?
- Will we ask one of your relatives about your childhood and early adulthood?
- Will we ask to contact someone who knows you well about your social, work, and emotional functioning?
Does this sound like something you would be interested in doing?

Then let me ask you a few questions before we go on. (DEMOGRAPHICS QUESTIONS)

Let's schedule you to come in to begin the study. (ASK ABOUT TRANSPORTATION.)

SCHEDULE APPOINTMENT

When you arrive we will review the content of the study. You'll also have time to ask questions.

We'd like to get more information about getting in touch with your immediate family members when you come in to see us. Please bring your address book when you come to your appointment. Also, I would like to get the name and phone number of a person who knows you well right now who would be able to tell us about you. Who would be a good person for us to contact (GET CURRENT INFORMANT'S NAME, NUMBER, AND RELATIONSHIP TO PATIENT).

Before coming in we will mail you a confirmation letter and a short questionnaire for you to fill out. This letter will have additional information about the study schedule and the location of your appointments within the VA. Could I get your address so that I can send this letter out to you? (PUT ON FIRST PAGE) Also, I need to get your social security number so that we can fill out the paperwork so that you can get paid for your participation. (PUT ON FIRST PAGE)

Finally, I want to explain one part of the study in greater detail. For the EEG portion, you will be in a laboratory working on different listening and computer tasks for about 4-5 hours. You will be given several opportunities for breaks throughout the session. While in the lab, you will wear an elastic cap, much like a swimming cap, that holds a set of sensors in place on your head while we record your brain activity. Wearing this cap may leave small red marks on the scalp. For most people, these marks disappear in several hours. We suggest that you bring along a hat to wear home after we are finished (like a baseball cap or something). Also, it can get a bit chilly in the lab, and we recommend that people bring a sweater or a sweatshirt in case they get cold.

Do you have any questions? If you have any questions that come up in the meantime, please call me at (612)725-2000 extension 3914 ask for (name of caller) or (other contact person on study).

Thank you very much. We look forward to seeing you on the _____ at ______ o'clock.
Appendix E

Participant Demographic Information Form

Demographic Information Form

Subject ID __________________________
Subject initials. __________________________

Interview date __________________________
Interviewer initials __________________________

1. Gender: Male / Female

2. Birth date: ______/____/________

3. Current Age

4. Current Marital Status (circle one):
   1 = Married, never divorced
   2 = Divorced and not remarried
   3 = Divorced and remarried
   4 = Separated
   5 = Widowed
   6 = Never Married / Annulled

5. How many times have you been married? ______

6. Have you ever been widowed? Yes / No

7. How many children do you have? ______

8. What are your current living arrangements?
   1 = Alone
   2 = With partner, not legally married
   3 = With spouse and/or children
   4 = With parents or adult children
   5 = With siblings or other relatives
   6 = With friends / roommates
   7 = In a residential treatment facility

9. Where were you born? City and Country of Birth: __________________________

10. Are you aware of any complications that occurred during your birth? Yes / No
    If yes, describe:

11. Is English your primary language? Yes / No

What is the ethnic background of your biological parents? (Code up to four ethnicities if possible. See list on next page)

12. Father’s country of birth / Ethnic background: __________________________

13. Mother’s country of birth / Ethnic background: __________________________
1 = Anglo Saxon
2 = Northern European (e.g., Norwegian)
3 = West European (e.g., French, German)
4 = East European, Slavic
5 = Russian
6 = Mediterranean
7 = Ashkenazi Jew
8 = Sephardic Jew
9 = Hispanic (not Puerto Rican)
10 = Puerto Rican Hispanic
11 = Mexican Hispanic
12 = Asian
13 = Arab
14 = Native American / Alaska Native
15 = African American, not of Hispanic Origin
16 = Other, Specify ______________________
99 = Unknown

14. Education: Highest completed grade/degree:
   a) subject ____ b) father ____ c) mother ____ d) spouse ____
   1 = 7th grade or less
   2 = Between 7th and 9th grade
   3 = Between 10th and 12th, but not graduated.
   4 = High school graduate (includes GED)
   5 = Partial college (includes business school, vocational/technical, RN)
   6 = 4 year college/university graduate
   7 = Graduate degree (M.A., Ph.D., M.D., J.D., etc.)
   9 = Unknown

14. Usual Work Status:
   a) subject ____ b) father ____ c) mother ____ d) spouse ____
   1 = full time (40 hrs/week or more)
   2 = half-time (approx 20 hours/week)
   3 = quarter time (approx 10 hours/week)
   4 = unemployed
   5 = retired
   6 = homemaker
   7 = student
   8 = volunteer work -full time
   9 = volunteer work -part time
   10 = disabled
   11 = never worked at least 30% time
   12 = other (specify)
   99 = unknown

15. Have you been working or going to school in the past month? Y / N

15a. (If unemployed) How long have you been unemployed?

   (Code length in months. Use as anchor point either last job of at least two
   months duration or last period in school. Use age 18 if subject has never
   been employed. Do not code as unemployment scheduled vacations from school or voluntary
   homemakers.)
   Length of unemployment in months: _______
16. What is your present occupation? (Code occupation using chart below.)

Record response: ____________________________

17. What is the most responsible job you have ever held? (Code occupation using chart below.)

Record response: ____________________________

18. (IF SUBJECT IS NOT HEAD OF HOUSEHOLD:) What is/was the occupation of the head of household during most of their working career? (Code occupation using chart below.)

Record response: ____________________________

**Managerial and Professional Specialty Occupations**
1 = Executive, administrative, and managerial occupations
2 = Professional specialty occupations
3 = Writers, artists, entertainers, and athletes

**Technical, Sales, and Administrative Support Occupations**
4 = Technicians and related support occupations
5 = Sales occupations
6 = Administrative support occupations, including clerical

**Service Occupations**
7 = Private household occupations
8 = Protective service occupations
9 = Service occupations except protective and private household

**Farming, Forestry, And Fishing Occupations**
10 = Farm operators and managers
11 = Other farming, forestry, and fishing occupations

**Precision Production, Craft, and Repair Occupations**
12 = Mechanics and repairers, construction trades, extractive occupations, precision production occupations

**Operators, Fabricators, and Laborers**
13 = Machine operators, assemblers, and inspectors
14 = Transportation and material-moving occupations
15 = Handlers, equipment cleaners, helpers, and laborers

**Other**
16 = Armed Services
17 = Disabled
18 = Housewife / homemaker
19 = Never worked
20 = Full time student
21 = Unemployed
22 = Retired
99 = Unknown

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19. Annual Income: Average annual household income in past 5 years. (Gross income based on tax returns.)
1 = Under $10,000
2 = $10,000 - $20,000
3 = $20,000 - $30,000
4 = $30,000 - $50,000
5 = $50,000 - $95,000
6 = $95,000 and up
Appendix F

First Contact Script for Participants Undetermined to Meet Criteria for Participation

Unscreened Patient First-Contact Script
(by phone)
3/20/01

Hello, this is [research staff's name] from the Minneapolis VA Medical Center. I'm contacting you because you expressed an interest in finding out more about our research study. If you choose to participate, you will be asked to complete the procedures of the study and will be paid for your time. I'm wondering if this is a good time for you to talk with me about it.

Our research is about cognition and brain functioning. This study examines brain wave activity in order to determine which parts of the brain are affected when someone has mental or emotional difficulties. This study may help us to better understand why some individuals develop these types of problems, and why others, even from within the same family, do not. As a part of this study we will ask your permission to contact members of your immediate family and ask if they are willing to participate as well. Immediate family members include parents under the age of 70, full brothers and sisters or adult children. Do you have anyone who fits that description who lives in the area? We will talk to one of your family members about your childhood and early adulthood. We will also ask to speak with someone who currently knows you well and can describe your social, work, and emotional functioning right now.

If you participate, you would spend about twelve to fifteen hours with us at the Minneapolis VA Medical Center. We will arrange days and times for you to come to the VA based on what fits your schedule. As soon as you have completed the study, you will be paid $130 for your time.

As part of the study we will measure your brain waves while you are at rest, just sitting in a chair, and when you are performing a number of tasks on a computer. Measuring brain waves involves attaching sensors to your body and head; it's like having an EEG, if you've had one of those done before. We also ask you to participate in a set of interviews about your mental and emotional functioning during your life. These interviews will touch on areas many people see as sensitive and personal. You will also complete an assessment of thinking abilities, allow us to draw a small amount of blood (less than a teaspoon), and undergo a neurological exam. That's when the doctor looks at your reflexes, watches the way you walk, looks to see if there's any tremor in your hands, and asks you to do a few simple tasks on a computer.

Because we ask you to do so many things, I want to emphasize that any information you tell us about yourself or your family members is kept strictly confidential, and that begins now with anything you say to me on the phone. We assign a study number to you and use that number to identify your information rather than your name. Also, none of the information you tell us will be accessible to medical personnel and will in no way affect any benefits you may receive from the VA or any other military or governmental organization.

Do you have any questions?
I'd like to ask you a couple questions to make sure you understand the nature of the study.

What is this project studying?
Will we ask to contact your relatives about them participating in the study?
Will we ask one of your relatives about your childhood and early adulthood?
Will we ask to contact someone who knows you well about your social, work, and emotional functioning?

Does this sound like something you would be interested in doing?

In order to determine if you would be eligible to participate in this study, I would need to go through a short interview with you. I will ask you some questions about your physical health, background, and life experiences. Do you have time to do that now? (IF AGREES TO INTERVIEW NOW): At this time I would like to make sure that I have your permission to ask you a series of personal questions about your background over the phone today, for the purpose of determining if you fit our requirements for participating in this study.

(VERBAL CONSENT IS REQUIRED BEFORE PROCEEDING. ANSWER ANY QUESTIONS THEY HAVE.)

Do I have your permission?
(If YES PROCEED TO "HEALTH HISTORY SCREEN" AND "DEMOGRAPHIC INFORMATION FORM")

If caller is excluded at any point during screening interview, skip to excluded / wait list script (last page).
ACCEPTED SUBJECTS:
Let’s schedule you to come in to begin the study. (ASK ABOUT TRANSPORTATION.)

SCHEDULE APPOINTMENT

When you arrive we will review the content of the study. You’ll read and sign a consent form and we’ll make a copy for you to take. You’ll also have time to ask questions.

We’d like to get more information about getting in touch with your immediate family members when you come in to see us. Please bring your address book when you come to your appointment. Also, I would like to get the name and phone number of a person who knows you well right now who would be able to tell us about you. Who would be a good person for us to contact (GET CURRENT INFORMANT’S NAME, NUMBER, AND RELATIONSHIP TO PATIENT).

Before coming in we will mail you a confirmation letter and a short questionnaire for you to fill out. This letter will have additional information about the study schedule and the location of your appointments within the V.A. Could I get your address so that I can send this letter out to you? (PUT ON FIRST PAGE) Also, I need to get your social security number so that we can fill out the paperwork so that you can get paid for your participation. (PUT ON FIRST PAGE)

We would also like to have your permission to review your medical records so that we can get more information about your background and the treatment you have received. We will ask you to sign a release of information to document that it’s okay with you for us to look at these records. I will put this in with your confirmation letter along with a return envelope. Please sign the release and send it back right away so that we have time to look at your records in advance before you come in for the study.

Finally, I want to explain one part of the study in greater detail. For the EEG portion, you will be in a laboratory working on different listening and computer tasks for about 4-5 hours. You will be given several opportunities for breaks throughout the session. While in the lab, you will wear an elastic cap, much like a swimming cap, that holds a set of sensors in place on your head while we record your brain activity. Wearing this cap may leave small red marks on the scalp. For most people, these marks disappear in several hours. We also use a substance that looks like hair gel or vaseline so that the sensors work properly. It gets in your hair and gets a bit messy. We do have shampoo if you’d like to wash your hair when you’re done. Otherwise, we suggest that you bring along a hat to wear home after we are finished (like a baseball cap or something). Also, it can get a bit chilly in the lab, and we recommend that people bring a sweater or a sweatshirt in case they get cold. Finally, we ask that the day before you come in for the lab you not drink any alcohol and that you do your best to get a good night’s sleep so you will be well rested and not sleepy during the testing.

Do you have any questions? If you have any questions that come up in the meantime, please call me at (612)725-2000 extension 3914 ask for (name of caller) or (other contact person on study).

Thank you very much. We look forward to seeing you on the _____ at _____ o clock.
IF CALLER WAS EXCLUDED OR LIKELY TO BE EXCLUDED:
I want to thank you for completing this interview. Unfortunately, we are looking for people with a slightly different background than your own to participate in the study, so we cannot schedule you at this time. Would you be interested in keeping your name on a waiting list in case this changes? (circle YES ' NO) If we do not call you back about participating in this study, would you like us to keep your name and possibly contact you about other studies we may do in the future? (circle YES ' NO) Thank you again for taking an interest in our research.

IF CALLER MIGHT BE APPROPRIATE FOR STUDY:
I want to thank you for completing this interview. I would like to double check on the backgrounds of the current group of people who are already in the study. If we need people with backgrounds like yours, we would call you back within two weeks. When would be a good time to reach you? May I leave a message for you? Thank you again for taking an interest in our research.
Health History Screen

*If English is not the subject’s primary language, they are excluded – you can ask at any point if you suspect they are not a native English speaker.*

**General Note:** Conditions that are *ALWAYS* exclusions are underlined. For conditions that *MAY OR MAY NOT* be exclusions, ask follow-up questions to get more information (use the ones provided plus your own if necessary), then go to the “Might be appropriate” wait list script. We will discuss these cases and call them back to let them know if we will include them or not.

1. **How old are you? _____** *Exclude if over 60 or under 18.*

2. **Are you adopted? Y / N**

3. **Since this is a family study, in order for you to participate you need to have family members who may be willing to participate as well. Which of your family members live in the area?**

4. **Do you have other family members that don’t live in the area but visit you on a regular basis?**

   *(THERE MUST BE AT LEAST TWO RELATIVES WHO WOULD BE ELIGIBLE FOR THE STUDY WHO LIVE CLOSE ENOUGH OR VISIT REGULARLY ENOUGH TO MAKE PARTICIPATION POSSIBLE.)*

   *(IF FAMILY MEMBERS ARE AVAILABLE, NEXT VERIFY THAT PATIENT HAS PSYCHOTIC SYMPTOMS.)*

5. **Are you currently receiving treatment for mental or emotional problems?**

   *Brief description (ensure that caller fits one of the patient groups):*

   *If patient does not spontaneously report psychotic symptoms, ask the following questions from the DIGS:*

   I would like to read you a list of experiences that other people have reported. Tell me which ones you have had.
Has there been a time when…

You heard voices? For example, some people have had the experience of hearing people’s voices whispering or talking to them, even when no one was actually present.

You had visions or saw things that were not visible to others?

You had beliefs or ideas that others did not share or you later found out were not true—like people being against you, people trying to harm you, or people talking about you?

You believed you were being given special messages (e.g. through the TV or the radio)?

You believed that you had done something terrible for which you should be punished?

You believed that you were especially important in some way, or that you had powers to do things that other people could not do?

You had the feeling that you were under the control of some force or power other than yourself?

You had a change in your body or in your physical appearance that others could not see?

6. Do you currently have any medical problems or conditions? Y / N
   6a. Specify _______________________________________________________________

7. Are you currently taking any kind of medication? Y / N
   7a. Specify _______________________________________________________________
   7b. (If taking medication that may potentially cause TD, ask): What side effects are you experiencing? _______________________________________________________________

8. Have you ever been hospitalized for a medical problem? Y / N
   8a - 8b. What for, and how long?
9. Have you ever had an injury to your head? Y / N
   9a. IF YES: Did you have to go to the hospital? Y / N

10. Have you ever been unconscious? Y / N
    10a. IF YES: For how long? _______

11. Have you ever had a seizure or convulsion? Y / N

12. Do you have any other kind of problem with your brain or spinal cord? Y / N
    12a. IF YES: Specify __________________________

Exclusions: Seizure, convulsion, hospitalization overnight for head injury, any significant problems with brain or other part of central nervous system.

13. Have you ever received ECT? Y / N

14. Do you have any problems with your eyes? Y / N (Exclusion: Visual problem not correctable with glasses or contacts that would interfere with doing study procedures.)

15. Do you wear a hearing aid? Y / N (Exclusion: interferes with EEG.)

16. Do you have any problems such as paralysis, serious arthritis, back pain (anything that would make it very difficult for them to perform tasks or tolerate sitting for long periods of time)?

17. What are your drinking habits like? (Frequency, amount, current problems or treatment.) (If you suspect current abuse or dependence, skip to SCID questions) (Exclude for current abuse or dependence. past abuse or dependence is acceptable.)

18. Are you currently using any street drugs? (Frequency, amount, current problems or treatment.) (If you suspect current abuse or dependence, skip to SCID questions) (Exclude for current abuse and for current or past dependence. Past abuse is acceptable.)

18a. When in your life were you using drugs the most? (Skip to SCID questions if past dependence seems possible.)
Let me check for some more specific medical problems:

19. Do you have any serious or chronic illnesses like cancer, diabetes, cerebral palsy, M.S. (Multiple Sclerosis), or HIV? Y N

19a. Specify ____________________________________________

(If yes to cerebral palsy or M.S., exclude. If yes to cancer, diabetes, or HIV, get more information.)

Follow-up questions:

For cancer, diabetes, and HIV:

19b. Have you noticed any changes in your thinking since being diagnosed? Y N

19c. Any problems with memory, concentration, or attention? Y N

19d. Has your doctor told you that your central nervous system (brain and spinal cord) has been affected in any way? Y N

Diabetes:

19e. How well-controlled is it? ________________________________

19f. What complications have you experienced? ________________

Cancer:

19g. What kind do you have? ________________________________

19h. Are you receiving treatment at the present time? ________________

19i. How is it affecting you physically and mentally? ________________

HIV:

19j. What symptoms are you having? ________________________________

19k. How is it affecting you physically and mentally? ________________

20. What about any endocrine diseases, thyroid disease, history of encephalitis, or epilepsy? Y N

(If yes to encephalitis or epilepsy, exclude. Endocrine, thyroid – more info)

Follow-up questions for endocrine or thyroid diseases:

20a. Which one do you have?

20b. Have you noticed any changes in your thinking since being diagnosed? Y N

20c. Any problems with memory, concentration, or attention? Y N

20d. Has your doctor told you that your central nervous system (brain and spinal cord) has been affected in any way? Y N

21. Do you have any heart or cardiovascular problems (history of heart attack, stroke, or T.I.A.)? Y N

(Exclude for stroke, TLA do not exclude for high blood pressure, angina, etc.)

Heart attacks may or may not be excluded – get more information.

Follow-up questions for heart attacks:

21a. When was it? ________________________________

21b. How serious was it? ________________________________

21c. Was blood flow to your brain interrupted at all during the attack? Y N

21d. If yes, for approximately how long? ________________________________

21e. Have you noticed any changes in your thinking since this happened? Y N

21f. Any problems with memory, concentration, or attention? Y N

21g. Has your doctor told you that your central nervous system (brain and spinal cord) was affected in any way? Y N
Attached questions from SCID are to be used as necessary to clarify problems. Skip if not needed. If subject has not been excluded, proceed to Demographic Information.

SUBSTANCE USE

Alcohol Abuse Criteria (Current Only):

Have you ever missed work or school because you were intoxicated or very hung over? (How often?)

Did you ever drink in a situation in which it might have been dangerous to drink at all? (Did you ever drive while you were really too drunk to drive?)

Has your drinking ever gotten you into trouble with the law? (How often?)

Has your drinking ever gotten you into trouble with other people, such as your family, friends, or people at work? (Have you ever gotten into physical fights or bad arguments because of your drinking? Did you keep drinking anyway?)

If YES to any one of the four above, this indicates alcohol abuse. Exclude if current (within the past month) abuse or dependence.

Drug Abuse and Dependence

Have you ever used street drugs? IF YES: What, when, and how often.

Have you ever gotten "hooked" on a prescribed medication, or taken a lot more of it than you were supposed to? IF YES: What, when, and how often.

For the following questions, focus on the drug used the most.

Drug Abuse Criteria (Current only):

Have you ever missed work or school because you were high or very hung over? (How often?)

Did you ever use drugs in a situation in which it might have been dangerous to use any drugs at all? (Did you ever drive while you were really too high to drive?)
Has your drug use ever gotten you into trouble with the law? (How often?)

Has your drug use caused problems with other people, such as your family, friends, or people at work? (Have you ever gotten into physical fights or bad arguments because of your drug use? Did you keep using anyway?)

If YES to any one of the four above, this indicates drug abuse. Exclude if current (within the past month). If past history of drug abuse, proceed to assess for dependence.

Drug Dependence Criteria (Any time in subject's life)

Have you often found that when you started using (drug) you ended up using much more than you were planning to? (IF NO: What about using it for a much longer period of time than you were planning to?)

Have you tried to cut down or stop using (drug)? (IF NO: Did you want to stop or cut down?)
(Evaluate whether there is a persistent desire or multiple unsuccessful attempts to reduce use.)

Have you spent a lot of time using (drug) or recovering from its effects?

Have you had times when you would drink so often that you used (drug) instead of doing other things, like working, spending time with family or friends, or spending time at hobbies?

Has your drug use ever caused you psychological problems like making you depressed or anxious, making it difficult to sleep, or causing blackouts? Has your drug use ever caused physical health problems, or made a physical problem worse? (IF YES TO EITHER: Did you keep using it anyway?)

Have you found that you needed to use a lot more of the (drug) to get the feeling you wanted than you did when you first started? (IF YES: How much more? IF NO: What about finding that when you used the same amount, it had much less effect than before?) (Indicates tolerance.)

Have you ever had any withdrawal symptoms when you cut down or stopped using (drug)? What about using some (drug) to keep yourself from getting sick?

(ASK IF UNKNOWN) Did these problems (review symptoms subject endorsed) all occur at the same time? (IF at least three of the above symptoms occurred within the same 1/2 month period, this indicates drug dependence, and subject is excluded.)
Appendix G

Participant Consent Form

INTRODUCTION
It is important that you read and understand the following explanation of the proposed research study before you agree to participate. This consent form describes:

• The purpose.
• The description of the study.
• The benefits.
• The risks and/or discomforts (including any potential for pain).
• Steps taken to decrease or eliminate the risks, discomforts, or possible pain.
• Any other treatments that may be available, and
• Confidentiality and use of research results.

Whether you decide to participate or not, treatment at the VA or the University of Minnesota for which you are eligible will not be affected.

This consent form may contain words that you do not understand. Please ask the study doctor or the study staff to explain any words or information that are unclear to you.

PURPOSE OF THE STUDY
The purpose of this study is to understand thinking functions in individuals with mental disorders and their relatives. By measuring your brain wave activity while you perform a number of tasks, this study may enhance the understanding of the brain mechanisms that account for mental disorders. The results of this study may lead to ways of treating problems that lead to mental disorders. You have been asked to participate in this study because you are a person who may suffer from a disturbance in thought processes. Your participation is expected to last about one month.

DESCRIPTION OF THE STUDY
If you agree to be in this study, we would ask you to do the following things:

a) Clinical Interview. You will be asked a standard set of questions regarding your health, emotions, personal life, and mental health treatment. These procedures assess the degree to which any emotional disturbance is affecting your life and how to classify any emotional problems you might be having. You may have already completed portions of the interview by telephone.

b) Questionnaires. You will complete a set of questionnaires that ask about your health, emotions, personal life, opinions, and experiences.

c) Neuropsychological Assessment. You will complete a 3-hour testing session
Department of Veterans Affairs

VA RESEARCH CONSENT FORM

Protocol #2511

Subject Name: ____________________
Date: ____________________

Title of Study: Cognitive Deficits as Indicators of Genetic Liability in Schizophrenia

PATIENT

Principal Investigator: Scott R. Sponheim, Ph.D. VAMC: Minneapolis

with a research staff member that assesses your cognitive functioning. During the session you will be given tests of memory, attention, problem solving, reasoning, motor skills, and language.

d) Application of Electrodes and Psychophysiological Session. You will be asked to sit in a comfortable chair while your head size is measured with a measuring tape and electrodes are applied to your body and an electrode cap is fitted to your head. The electrode cap is a close-fitting cloth cap. It has recording electrodes embedded in its surface. The first step is to simply put it on your head. Each electrode site is then rubbed briefly to establish a secure contact between the electrode and scalp. In addition, a small dab of gel, similar to Vaseline, is applied to the scalp where each electrode is located. The gel makes it easier for the electrical signals from your brain to be measured. We will also place electrodes behind or on each ear, near each eye, and on your arms and legs in order to measure your eye movements and other bodily electrical signals. The electrode cap is held firmly in place with a chinstrap or elastic strip that is placed around your chest. Once the electrodes are in place, you will complete several tasks that will be given by a computer. Some of these tasks may be mentally challenging and can last about 30 minutes. Other tasks are quite simple and last only several minutes. These tasks will be conducted while you are wearing the electrode cap and your brain electrical activity is recorded. The completion of the psychophysiological session will take between four and five hours.

e) Neurological Exam. You will complete a one-hour standard neurological exam where a trained researcher will make notes about your bodily features, ask you to perform various movements while you are being observed, and test your reflexes. The researcher will also examine your fingers under a microscope.

f) You will be asked to provide the name of someone who can give reliable information to study staff regarding your emotional and social functioning, and the name and location of a family member who can provide reliable information regarding your childhood development. You may have already provided some of this information by telephone.

g) You will be asked to provide the names, telephone numbers, and locations of individuals in your immediate family and family of origin. Your relatives may be contacted and invited to participate in the study.

h) You will have a small sample of blood (about 1 teaspoon) drawn by a vein stick and stored for possible future genetic analysis. The blood sample will be stored in a locked cabinet that only research staff can access. The blood sample and the DNA

Subject's Signature ____________________

Subject Social Security # ____________________

VA Form 10-1086 Consent form as of 3/20/01
obtained from the sample will be stored with a subject code for up to 20 years. Only the principal investigator and the project coordinator will have access to the code linking your name to your subject number. If genetic analyses are carried out on the blood sample or DNA, they will be done on a "research" basis. This means that the results may not ever be available to you. When the analyses are done the DNA sample will be retained by the study staff or the lab doing the tests. If for some reason you withdraw from the study the blood sample and DNA will be kept by the study unless you tell the study staff you don't want the sample kept. There is the possibility that you will be approached at a later date for follow-up information or a follow-up DNA sample. If you are contacted at a later date you have every right to refuse participation.

The total time of all study procedures is 10 to 15 hours.

Exclusion criteria. You are not eligible for the study if 1) English is not your or your family's primary language. 2) you have a measured IQ of less than 70 or a diagnosis of mental retardation. 3) you have a history of dependence on alcohol or drugs, or are currently abusing alcohol or drugs. 4) you have a history of central nervous system disease. 5) you have suffered a head injury with skull fracture or significant loss of consciousness. 6) you have a physical problem that would render study measures difficult or impossible to administer or interpret (e.g., blindness). 7) you are less than 18 years of age or older and 60 years, or 8) a history of electro-convulsive therapy.

As part of this study you will have a 10 to 15 minute sample of your speech recorded for data collection purposes, and may have responses to questions recorded on audio or videotape for data collection and educational purposes. The tapes and other study data will be kept for up to 20 years, with no information that directly identifies you.

RISKS AND/OR DISCOMFORTS
The study has several risks: First, you may become bored, tired, or uncomfortable while completing the computer tasks. Second, you may find the tasks mentally challenging. Third, use of the electrode cap requires that we rub the electrode sites once the cap is positioned on the head. This rubbing is scratchy which some people find uncomfortable. We will measure your brain waves while you are at rest and when you are performing a number of tasks. Although we will wash off gel from the electrode sites at the end of the session, you may find a small bit left in your hair when we are finished. This gel will wash out with shampoo. Some minor skin irritation is possible in reaction to the electrode cap application: however, reddening of the skin from the pressure of the cap typically resolves within 24 hours. Finally, as part of study interviews, questions may be
asked which touch on sensitive issues. Consequently, you may experience pleasant or unpleasant emotions during the interview process. You may refuse to answer any questions you do not wish to answer at any time; however, this may lead to the discontinuation of the study protocol. Finally, you may experience some pain when the blood draw is completed to obtain a small sample of blood from your body. Possible side effects from blood drawing include faintness, inflammation of the vein, bruising, or bleeding at the site of the puncture. There is also a slight possibility of infection.

BENEFITS
No benefit is guaranteed from your being in this study. The knowledge gained from this study may benefit others in the future.

COMPENSATION
After the completion of the study, you will receive a payment of $130 for your participation. Travel reimbursement will be provided to you at 17 cents a mile if you have to travel more than 40 miles to the Medical Center to participate in the study. If you withdraw your participation before finishing the study, you will be paid for the portion of the study you have completed on a pro-rated hourly basis ($10 per hour).

CONFIDENTIALITY AND USE OF RESEARCH RESULTS
The results of this study may be published or presented but your identity and records will not be revealed unless required by Federal Law. A Federal Law allows the U.S. Food and Drug Administration and the Institutional Review Board to review records. Because of the need for these inspections, absolute confidentiality cannot be guaranteed.

COSTS TO YOU FOR PARTICIPATING
There is no cost to you for taking part in this study. All the study costs, including any procedures related directly to the study, will be paid for by the VA Medical Center. Participants who must make a co-payment for their usual medications or treatments will continue to be required to make such a co-payment for non-study related drugs. There should be no additional medical costs to you for taking part in this study. However, study visits may result in transportation costs and possible wages lost due to time missed from work.

MEDICAL CARE IF YOU ARE INJURED
In case you are injured from this research study, treatment will be available, including first aid, emergency treatment and follow-up care, as needed. The VA Medical Center
Subject Name: ________________________ Date: ____________

Title of Study: Cognitive Deficits as Indicators of Genetic Liability in Schizophrenia

Principal Investigator: Scott R. Sponheim, Ph.D.  VAMC: Minneapolis

will provide necessary medical treatment for any injury or illness that may arise from your participation in this research study. The VA Medical Center will provide payment for necessary emergency medical treatment. However, the VA Medical Center must be contacted at (612) 725-2003 within 72 hours in the event of any non-VA treatment or else you may lose any eligibility for VA payment of emergency bills.

COMPENSATION FOR ANY INJURIES
You have not released the VA Medical Center for liability by signing this form. This includes but is not limited to, free medical care other than as described in this consent form, payment of lost wages, or compensation for pain and suffering. Compensation for those items from the VA may be available under applicable Federal Law. You should immediately report any injuries resulting from your participation in this study to Dr. Sponheim at (612) 725-2074 during the day during the evenings or weekends, by calling the Psychiatry Fellow on call at (612) 725-2000.

NEW INFORMATION
You will be given any new significant information that is discovered during the course of this study that may influence your willingness to continue the study.

OTHER INFORMATION
The researcher conducting this study is Dr. Scott R. Sponheim. You may ask any questions you have now. If you have questions later or study-related problems arise, you may contact him at the Psychology Service at the VA Medical Center in Minneapolis. Phone: (612) 725-2074.

If you have any questions or concerns regarding the study and would like to talk to someone other than the researcher(s), contact Patient Relations Department, B-310 Mayo Memorial Building, 420 Delaware Street S.E., Minneapolis, Minnesota 55455: telephone (612) 273-5050.

Your decision whether or not to participate will not affect your current or future relationships with the University of Minnesota or the Minneapolis VA Medical Center. If you decide to participate, you are free to withdraw at any time without affecting those relationships. When in the investigator's opinion, it would be detrimental for you to continue, your participation in the study will be terminated.

Subject’s Signature ________________________

Subject Social Security # ________________________

VA Form 10-1086

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Functioning in Schizophrenia 178

Department of Veterans Affairs VA RESEARCH CONSENT FORM
Protocol #2511 (HSC #0005M50901)
Subject Name: ________________________ Date: ______________
Title of Study: Cognitive Deficits as Indicators of Genetic Liability in Schizophrenia
PATIENT
Principal Investigator: Scott R. Sponheim, Ph.D. VAMC: Minneapolis

RESEARCH SUBJECT'S RIGHTS: I have read or have had read to me all of the above. Dr. Sponheim or one of his research staff has explained the study to me and answered all of my questions. I have been told of the risks or discomforts and possible benefits of the study.

I understand that I do not have to take part in this study and my refusal to participate will involve no penalty or loss of rights to which I am entitled. I may withdraw from this study at any time without penalty or loss of VA or other benefits to which I am entitled.

The results of possible future genetic analyses will not have an effect on my care. Therefore, neither my doctor nor I will receive results of this testing. No medical report will be added to my records. My medical records may be reviewed in the future for purposes of obtaining more information about my health but my name and address will remain confidential and will not be released.

The results of this study may be published but my identity and records will not be revealed unless required by law.

In case there are medical problems or questions, I have been told I can call Dr. Sponheim at (612) 725-2074 during the day and Psychiatry Fellow on call at (612) 725-2000 after hours. If any medical problems occur in connection with this study the VA will provide emergency care.

If I have any question about the rights of a research subject, I understand that I may contact the VA Patient Representative at (612) 725-2106.

My questions have been answered and I voluntarily consent to participate in this study. By signing this form, I have not given away any of my legal rights, which I have as a subject of this research study. I will receive a signed copy of this consent form.

Subject's Signature ________________________ Date ______________
Signature of Investigator ________________________ Signature of person obtaining consent if other than the investigator
Signature of Witness ________________________
Subject Social Security # ______________
VA Form 10-1086

Approved: 11/15/01
Approval expires: 11/15/02
Chair, ESS: ____________________________________________________
Consent form as of 3/20/01

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SUBJECT'S UNDERSTANDING OF THE STUDY:

Please answer each of the four questions below to confirm that you understand this study. As you answer these questions, you may look at other pages of this form and ask the research staff any questions you may have regarding the study.

1) What are two risks or discomforts involved in this research study?
   A. __________________________________________________________________________
   B. __________________________________________________________________________

2) Name two things you will be asked to do during this study.
   A. __________________________________________________________________________
   B. __________________________________________________________________________

3) What would you do if you decided that you no longer wanted to participate in the study?

4) What would you do if you were experiencing distress or discomfort in the study?

________________________________________________________________________________

Subject's Signature

__________________________
Date

Signature of person obtaining consent

Subject Social Security #

VA Form 10-1086

Consent form as of 3/20/01
Appendix H

Department of Veteran's Affairs Release of Information Form

DEPARTMENT OF VETERANS AFFAIRS
Medical Center
One Veterans Drive
Minneapolis MN 55417

To:

Patient Name:
SSN: DOB:

We would appreciate your cooperation in forwarding medical records or information to assist our medical staff in the examination and/or treatment of the patient named above:

☐ Final summary or report of hospitalization (Dates:)
☐ Brief report of examination or treatment (Dates:)
☐ X-ray films and report
☐ Other (specify):

Please use the preaddressed envelope/label as appropriate, for forwarding the requested information. X-ray films and laboratory slides will be returned after review.

Sincerely,

Chief, Medical Administration Service

Ends.

I authorize you to release the medical information requested above to the Veterans Administration.

I understand that I may revoke this authorization at any time except to the extent that action has already been taken to comply with it. Without my express revocation, this consent will automatically expire after the requested information has been supplied to the Veterans Administration.

Signature of Patient or Authorized Representative

Date

NOTE: The information requested on this form letter is solicited under Title 38, U.S.C. and will authorize the addressee to disclose the information you specify to the Veterans Administration. The information will be used to assist our medical staff in your examination and treatment. Your disclosure of the information requested is voluntary. However, your failure to give your consent may result in incomplete information on which to base your treatment.
Table 1

Description of Novel and Conventional Antipsychotic Medications, Average Daily Dosages, and Chlorpromazine Equivalents for Each

<table>
<thead>
<tr>
<th>Medication(^a)</th>
<th>Generic Name</th>
<th>Trade Name</th>
<th>Average Dosage (mg/day)</th>
<th>Apparent Chlorpromazine Equivalence (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novel Agents</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clozapine</td>
<td>Clozaril</td>
<td></td>
<td>468.75</td>
<td>100</td>
</tr>
<tr>
<td>Olanzapine</td>
<td>Zyprexa</td>
<td></td>
<td>14.17</td>
<td>4</td>
</tr>
<tr>
<td>Quetiapine</td>
<td>Seroquel</td>
<td></td>
<td>225.00</td>
<td>150</td>
</tr>
<tr>
<td>Risperidone</td>
<td>Risperdal</td>
<td></td>
<td>6.27</td>
<td>2</td>
</tr>
<tr>
<td>Conventional Agents</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chlorpromazine(^b)</td>
<td>Thorazine</td>
<td></td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>Haloperidal</td>
<td>Haldol</td>
<td></td>
<td>19.57</td>
<td>4</td>
</tr>
<tr>
<td>Loxapine</td>
<td>Loxitane</td>
<td></td>
<td>200.00</td>
<td>25</td>
</tr>
<tr>
<td>Perphenazine</td>
<td>Trilafon</td>
<td></td>
<td>40.00</td>
<td>8</td>
</tr>
<tr>
<td>Thiothixene</td>
<td>Navane</td>
<td></td>
<td>40.00</td>
<td>10</td>
</tr>
<tr>
<td>Trifluoperazine</td>
<td>Stelazine</td>
<td></td>
<td>40.00</td>
<td>6</td>
</tr>
</tbody>
</table>


\(^a\) The medication list refers only to those medications that were prescribed to participants in the current study. This is not a complete list of antipsychotic medications. \(^b\) No participants were
prescribed Chlorpromazine, however this is included in the table for comparison purposes as medications are reported as Chlorpromazine equivalents.
Table 2

*Interrater Reliabilities for Ratings of Communication Disturbances*

<table>
<thead>
<tr>
<th>CDI Communication Disturbance</th>
<th>Intraclass r</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vague References</td>
<td>.93</td>
</tr>
<tr>
<td>Confused References</td>
<td>.58</td>
</tr>
<tr>
<td>Missing Information References</td>
<td>.80</td>
</tr>
<tr>
<td>Ambiguous Word Meanings</td>
<td>.92</td>
</tr>
<tr>
<td>Wrong Word References</td>
<td>.64</td>
</tr>
<tr>
<td>Structural Unclarities</td>
<td>.78</td>
</tr>
<tr>
<td>Total Communication Disturbances</td>
<td>.90</td>
</tr>
</tbody>
</table>

*Note.* Intraclass correlations across three raters who independently scored a randomly selected 16% of the speech samples from the current study.
Table 3

Selected Demographic and Clinical Characteristics: Frequency and Percentage of Participants

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Number of Participants</th>
<th>Percentage of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>47</td>
<td>85.5</td>
</tr>
<tr>
<td>Female</td>
<td>8</td>
<td>14.5</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>48</td>
<td>87.3</td>
</tr>
<tr>
<td>African American</td>
<td>3</td>
<td>5.5</td>
</tr>
<tr>
<td>Native American</td>
<td>2</td>
<td>3.6</td>
</tr>
<tr>
<td>Asian</td>
<td>1</td>
<td>1.8</td>
</tr>
<tr>
<td>Hispanic</td>
<td>1</td>
<td>1.8</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single, never married</td>
<td>36</td>
<td>65.5</td>
</tr>
<tr>
<td>Married</td>
<td>10</td>
<td>18.2</td>
</tr>
<tr>
<td>Divorced or widowed</td>
<td>9</td>
<td>16.3</td>
</tr>
<tr>
<td>Living Arrangements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alone</td>
<td>27</td>
<td>49.1</td>
</tr>
<tr>
<td>Spouse/significant other</td>
<td>10</td>
<td>18.2</td>
</tr>
<tr>
<td>Other family member</td>
<td>7</td>
<td>12.7</td>
</tr>
<tr>
<td>Roommate</td>
<td>6</td>
<td>10.9</td>
</tr>
<tr>
<td>Residential Treatment</td>
<td>5</td>
<td>9.1</td>
</tr>
<tr>
<td>Employment Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Working full-time</td>
<td>9</td>
<td>16.4</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
<th>Functioning in Schizophrenia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working part-time</td>
<td>12</td>
<td>21.8</td>
</tr>
<tr>
<td>Unemployed</td>
<td>5</td>
<td>9.1</td>
</tr>
<tr>
<td>Disability</td>
<td>24</td>
<td>43.6</td>
</tr>
<tr>
<td>Student</td>
<td>2</td>
<td>3.6</td>
</tr>
<tr>
<td>Retired</td>
<td>3</td>
<td>5.5</td>
</tr>
</tbody>
</table>

### Annual Income

<table>
<thead>
<tr>
<th>Income Range</th>
<th>Count</th>
<th>Functioning in Schizophrenia</th>
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<tbody>
<tr>
<td>Under $10,000</td>
<td>14</td>
<td>25.5</td>
</tr>
<tr>
<td>$10-20,000</td>
<td>28</td>
<td>50.9</td>
</tr>
<tr>
<td>$20-30,000</td>
<td>4</td>
<td>7.3</td>
</tr>
<tr>
<td>$30-50,000</td>
<td>8</td>
<td>14.5</td>
</tr>
<tr>
<td>$50-95,000</td>
<td>1</td>
<td>1.8</td>
</tr>
</tbody>
</table>

### Diagnosis

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Count</th>
<th>Functioning in Schizophrenia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schizophrenia</td>
<td>45</td>
<td>81.8</td>
</tr>
<tr>
<td>Schizoaffective Disorder</td>
<td>10</td>
<td>18.2</td>
</tr>
</tbody>
</table>

### Current Medications

<table>
<thead>
<tr>
<th>Medication</th>
<th>Count</th>
<th>Functioning in Schizophrenia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antipsychotics</td>
<td>53</td>
<td>96.4</td>
</tr>
<tr>
<td>Antidepressants</td>
<td>30</td>
<td>54.5</td>
</tr>
<tr>
<td>Mood Stabilizers</td>
<td>16</td>
<td>29.1</td>
</tr>
<tr>
<td>Antiparkinsonians</td>
<td>15</td>
<td>27.3</td>
</tr>
</tbody>
</table>

### Current Treatment

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Count</th>
<th>Functioning in Schizophrenia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medication</td>
<td>53</td>
<td>96.4</td>
</tr>
<tr>
<td>Therapy/Supportive</td>
<td>19</td>
<td>34.4</td>
</tr>
<tr>
<td>Group Therapy</td>
<td>12</td>
<td>21.8</td>
</tr>
<tr>
<td>Other Treatment</td>
<td>5</td>
<td>9.1</td>
</tr>
</tbody>
</table>
a Income data collected only in these ranges, so averages are not available. b Numerous participants were prescribed multiple medications, so totals are greater than 100%. c Numerous participants were involved in multiple medications, so totals are greater than 100%.
Table 4

**Selected Demographic and Clinical Characteristics: Means, Standard Deviations, and Ranges**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>46.84</td>
<td>8.07</td>
<td>24 – 59</td>
</tr>
<tr>
<td>Years of Education</td>
<td>14.25</td>
<td>2.18</td>
<td>8 – 19</td>
</tr>
<tr>
<td>Age at Onset of Symptoms</td>
<td>23.76</td>
<td>6.04</td>
<td>13 – 47</td>
</tr>
<tr>
<td>Age at First Hospitalization</td>
<td>25.43</td>
<td>7.60</td>
<td>13 – 50</td>
</tr>
<tr>
<td>Number of Hospitalizations</td>
<td>6.87</td>
<td>5.73</td>
<td>0 – 32</td>
</tr>
<tr>
<td>Current GAF score(^a)</td>
<td>48.07</td>
<td>9.84</td>
<td>25 – 68</td>
</tr>
<tr>
<td>Chlorpromazine Equivalents(^b)</td>
<td>416.50</td>
<td>320.50</td>
<td>16.6 – 1825.0</td>
</tr>
</tbody>
</table>

Note. GAF = Global Assessment of Functioning.

\(^a\) Possible scores ranged from 0 to 100. \(^b\) Measured in milligrams.
Table 5

*Means, Standard Deviations and Ranges for the 4-Factor Model of the Brief Psychiatric Rating Scale (BPRS): Items and Scales*

<table>
<thead>
<tr>
<th>BPRS Scale/Item</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Positive Symptoms</strong></td>
<td>2.37</td>
<td>0.96</td>
<td></td>
</tr>
<tr>
<td>Suspiciousness</td>
<td>2.80</td>
<td>2.08</td>
<td>1 – 7</td>
</tr>
<tr>
<td>Hallucinations</td>
<td>2.75</td>
<td>1.86</td>
<td>1 – 7</td>
</tr>
<tr>
<td>Unusual Thought Content</td>
<td>3.15</td>
<td>1.66</td>
<td>1 – 6</td>
</tr>
<tr>
<td>Bizarre Behavior</td>
<td>1.80</td>
<td>1.28</td>
<td>1 – 5</td>
</tr>
<tr>
<td>Disorientation</td>
<td>1.35</td>
<td>0.67</td>
<td>1 – 3</td>
</tr>
<tr>
<td><strong>Negative Symptoms</strong></td>
<td>1.95</td>
<td>0.83</td>
<td></td>
</tr>
<tr>
<td>Self-Neglect</td>
<td>1.82</td>
<td>1.11</td>
<td>1 – 5</td>
</tr>
<tr>
<td>Blunted Affect</td>
<td>2.47</td>
<td>1.37</td>
<td>1 – 6</td>
</tr>
<tr>
<td>Emotional Withdrawal</td>
<td>2.00</td>
<td>1.05</td>
<td>1 – 5</td>
</tr>
<tr>
<td>Motor Retardation</td>
<td>1.53</td>
<td>0.98</td>
<td>1 – 5</td>
</tr>
<tr>
<td><strong>Manic-Excitement</strong></td>
<td>1.54</td>
<td>0.77</td>
<td></td>
</tr>
<tr>
<td>Hostility</td>
<td>1.84</td>
<td>1.21</td>
<td>1 – 5</td>
</tr>
<tr>
<td>Elevated Mood</td>
<td>1.22</td>
<td>0.74</td>
<td>1 – 5</td>
</tr>
<tr>
<td>Grandiosity</td>
<td>2.11</td>
<td>2.03</td>
<td>1 – 7</td>
</tr>
<tr>
<td>Excitement</td>
<td>1.33</td>
<td>1.09</td>
<td>1 – 6</td>
</tr>
<tr>
<td>Distractibility</td>
<td>1.51</td>
<td>0.88</td>
<td>1 – 4</td>
</tr>
<tr>
<td>Motor Hyperactivity</td>
<td>1.25</td>
<td>0.88</td>
<td>1 – 5</td>
</tr>
<tr>
<td>Depression-Anxiety</td>
<td>1.80</td>
<td>0.85</td>
<td></td>
</tr>
<tr>
<td>Anxiety</td>
<td>2.07</td>
<td>1.32</td>
<td>1 – 5</td>
</tr>
</tbody>
</table>
### Functioning in Schizophrenia

<table>
<thead>
<tr>
<th>Category</th>
<th>Rating (Mean)</th>
<th>Rating (SD)</th>
<th>Scale Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depressed Mood</td>
<td>2.22</td>
<td>1.47</td>
<td>1 – 6</td>
</tr>
<tr>
<td>Suicidality</td>
<td>1.15</td>
<td>0.52</td>
<td>1 – 3</td>
</tr>
<tr>
<td>Guilt Feelings</td>
<td>1.76</td>
<td>1.47</td>
<td>1 – 6</td>
</tr>
<tr>
<td><strong>Other Items</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Somatic Concern</td>
<td>1.47</td>
<td>0.79</td>
<td>1 – 4</td>
</tr>
<tr>
<td>Conceptual Disorganization</td>
<td>2.11</td>
<td>1.09</td>
<td>1 – 5</td>
</tr>
<tr>
<td>Tension</td>
<td>1.62</td>
<td>1.03</td>
<td>1 – 5</td>
</tr>
<tr>
<td>Uncooperativeness</td>
<td>1.49</td>
<td>1.30</td>
<td>1 – 7</td>
</tr>
<tr>
<td>Mannerisms and Posturing</td>
<td>1.11</td>
<td>0.50</td>
<td>1 – 4</td>
</tr>
<tr>
<td><strong>Total (average)</strong></td>
<td>1.83</td>
<td>0.53</td>
<td></td>
</tr>
</tbody>
</table>

*Note. Ratings were made on a 7-point scale (1 = Not Present, 7 = Extremely Severe).*
Table 6

Means and Standard Deviations for Quality of Life Interview (QOLI) Scales

<table>
<thead>
<tr>
<th>QOLI Subscale</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective Scales</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily Activities</td>
<td>4.60</td>
<td>1.62</td>
</tr>
<tr>
<td>Family Contact</td>
<td>3.46</td>
<td>1.18</td>
</tr>
<tr>
<td>Social Contact</td>
<td>3.08</td>
<td>0.84</td>
</tr>
<tr>
<td>Financial Adequacy</td>
<td>0.89</td>
<td>0.18</td>
</tr>
<tr>
<td>Spending Money</td>
<td>275.65</td>
<td>415.76</td>
</tr>
<tr>
<td><strong>Subjective Scale – Satisfaction</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Life</td>
<td>4.55</td>
<td>1.34</td>
</tr>
<tr>
<td>Living Situation</td>
<td>5.01</td>
<td>1.41</td>
</tr>
<tr>
<td>Daily Activities</td>
<td>4.61</td>
<td>1.26</td>
</tr>
<tr>
<td>Family Relations</td>
<td>4.66</td>
<td>1.46</td>
</tr>
<tr>
<td>Social Relations</td>
<td>4.67</td>
<td>1.25</td>
</tr>
<tr>
<td>Finances</td>
<td>4.42</td>
<td>1.74</td>
</tr>
<tr>
<td>Work</td>
<td>5.35</td>
<td>0.92</td>
</tr>
<tr>
<td>Legal and Safety</td>
<td>5.42</td>
<td>1.16</td>
</tr>
<tr>
<td>Health</td>
<td>4.58</td>
<td>0.95</td>
</tr>
</tbody>
</table>

*Note.* Satisfaction ratings were made on 7-point scales (1 = terrible, 7 = delighted).

a Out of a possible total of 8 activities. b Values range from 1 = not at all, to 5 = at least once per day. c Values represent percentile out of 5 costs that can be adequately covered by available...
Functioning in Schizophrenia 191

finances. d Values represent reported spending money available. e For this group (participants currently working), n = 22.
Table 7

Correlations between Subscales/Other Indicators and Global Life Satisfaction (GLS) on the Quality of Life Interview (QOLI)

<table>
<thead>
<tr>
<th>Subscale/Indicator</th>
<th>GLS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective</strong></td>
<td></td>
</tr>
<tr>
<td>Daily Activities</td>
<td>.139</td>
</tr>
<tr>
<td>Family Contact</td>
<td>-.040</td>
</tr>
<tr>
<td>Social Contact</td>
<td>.340**</td>
</tr>
<tr>
<td>Financial Adequacy</td>
<td>.176</td>
</tr>
<tr>
<td>Spending Money</td>
<td>.031</td>
</tr>
<tr>
<td>Victim of Crime</td>
<td>.195</td>
</tr>
<tr>
<td>Arrested in Last Year</td>
<td>.146</td>
</tr>
<tr>
<td><strong>Subjective – Satisfaction</strong></td>
<td></td>
</tr>
<tr>
<td>Living Situation</td>
<td>.438**</td>
</tr>
<tr>
<td>Daily Activities</td>
<td>.627**</td>
</tr>
<tr>
<td>Family Relations</td>
<td>.272*</td>
</tr>
<tr>
<td>Social Relations</td>
<td>.349**</td>
</tr>
<tr>
<td>Finances</td>
<td>.508**</td>
</tr>
<tr>
<td>Work(^a)</td>
<td>.353</td>
</tr>
<tr>
<td>Legal and Safety</td>
<td>.258*</td>
</tr>
<tr>
<td>Health</td>
<td>.528**</td>
</tr>
</tbody>
</table>

\(^a\) For this group (those who are currently working), \(n = 22\).

\(^p < .05. \quad **p < .01.\)
Table 8

Means, Standard Deviations, and Ranges of Social Adjustment Scale-II (SAS-II) Global Ratings

<table>
<thead>
<tr>
<th>Global Rating</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3.74</td>
<td>1.68</td>
<td>0 - 6</td>
</tr>
<tr>
<td>Household Member&lt;sup&gt;b&lt;/sup&gt;</td>
<td>2.18</td>
<td>1.09</td>
<td>0 - 5</td>
</tr>
<tr>
<td>External Family</td>
<td>2.78</td>
<td>1.31</td>
<td>1 - 6</td>
</tr>
<tr>
<td>Social Leisure</td>
<td>3.22</td>
<td>1.06</td>
<td>1 - 5</td>
</tr>
<tr>
<td>General Adjustment</td>
<td>3.11</td>
<td>0.79</td>
<td>2 - 5</td>
</tr>
</tbody>
</table>

Note. Global ratings were made on a 7-point scale (0 = excellent adjustment, 6 = severe maladjustment), therefore, lower scores reflect higher adjustment.

<sup>a</sup> This score refers to functioning in school or accomplishing daily responsibilities if the participant is not currently employed. <sup>b</sup> For this group (living with others), n = 28.
### Table 9

*Means and Standard Deviations of Scales on the Communication Disturbances Index (CDI)*

<table>
<thead>
<tr>
<th>CDI Scale</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vague References</td>
<td>.42</td>
<td>.30</td>
</tr>
<tr>
<td>Confused References</td>
<td>.36</td>
<td>.28</td>
</tr>
<tr>
<td>Missing Information References</td>
<td>.58</td>
<td>.36</td>
</tr>
<tr>
<td>Ambiguous Word Meanings</td>
<td>.86</td>
<td>.56</td>
</tr>
<tr>
<td>Wrong Word References</td>
<td>.34</td>
<td>.20</td>
</tr>
<tr>
<td>Structural Unclearities</td>
<td>.32</td>
<td>.24</td>
</tr>
<tr>
<td>Total Communication Disturbances</td>
<td>2.88</td>
<td>1.24</td>
</tr>
</tbody>
</table>

*Note.* Scores represent number of disturbances per 100 words of speech.
Table 10
Pearson Product Moment Correlations between Scales on the Communication Disturbances Index (CDI)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Vague References</td>
<td>(-.072)</td>
<td>(.284^*)</td>
<td>(.320^{**})</td>
<td>(.308^*)</td>
<td>(.379^{**})</td>
<td>(.396^{**})</td>
<td>(.378^{**})</td>
</tr>
<tr>
<td>2. Confused References</td>
<td>(-.072)</td>
<td>(\ldots)</td>
<td>(.054)</td>
<td>(\ldots)</td>
<td>(.175)</td>
<td>(.378^{**})</td>
<td>(\ldots)</td>
</tr>
<tr>
<td>3. Missing Information References</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
</tr>
<tr>
<td>4. Ambiguous Word References</td>
<td>(.308^*)</td>
<td>(.175)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
</tr>
<tr>
<td>5. Wrong Word References</td>
<td>(.320^{**})</td>
<td>(.379^{**})</td>
<td>(.378^{**})</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
</tr>
<tr>
<td>6. Structural Unclarities</td>
<td>(.284^*)</td>
<td>(.054)</td>
<td>(.175)</td>
<td>(.378^{**})</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
</tr>
<tr>
<td>7. Total Communication Disturbances</td>
<td>(.308^*)</td>
<td>(.175)</td>
<td>(.378^{**})</td>
<td>(.378^{**})</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
</tr>
</tbody>
</table>

* \(p < .05\). ** \(p < .01\).
Table 11

*Score Conversions for Neurocognitive Measures: Standard Score, Age Scaled Score, T score, z score, and Percentile Equivalents*

<table>
<thead>
<tr>
<th>Standard Score</th>
<th>Age Scaled Score</th>
<th>T score</th>
<th>z score</th>
<th>Percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>55</td>
<td>1</td>
<td>20</td>
<td>-3</td>
<td>.30</td>
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<tr>
<td>60</td>
<td>2</td>
<td>23</td>
<td>.80</td>
<td></td>
</tr>
<tr>
<td>65</td>
<td>3</td>
<td>26</td>
<td>1.00</td>
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<tr>
<td>70</td>
<td>4</td>
<td>30</td>
<td>-2</td>
<td>2.00</td>
</tr>
<tr>
<td>75</td>
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<td>33</td>
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<td>80</td>
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<td>85</td>
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<td>25.00</td>
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<td>16</td>
<td>70</td>
<td>2</td>
<td>98.00</td>
</tr>
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<td>99.00</td>
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<td>80</td>
<td>3</td>
<td>99.70</td>
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<tr>
<td>150</td>
<td>20</td>
<td>83</td>
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<td>Raw Scores</td>
<td>Percentile</td>
<td>Subjects Impaired</td>
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<tr>
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<td>SD</td>
<td>Mean</td>
<td>SD</td>
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<td>Vocabulary</td>
<td>43.60</td>
<td>10.64</td>
<td>51.07</td>
<td>27.45</td>
</tr>
<tr>
<td>Digit Symbol – Total</td>
<td>54.78</td>
<td>12.32</td>
<td>23.56</td>
<td>20.90</td>
</tr>
<tr>
<td>Digit Symbol – Pairing</td>
<td>10.44</td>
<td>4.63</td>
<td>33.30a</td>
<td>--</td>
</tr>
<tr>
<td>Digit Symbol – Free recall</td>
<td>6.56</td>
<td>1.38</td>
<td>25.00a</td>
<td>--</td>
</tr>
<tr>
<td>Block Design</td>
<td>33.85</td>
<td>10.29</td>
<td>42.36</td>
<td>24.64</td>
</tr>
<tr>
<td>Digit Span</td>
<td>15.60</td>
<td>3.16</td>
<td>40.84</td>
<td>23.35</td>
</tr>
<tr>
<td>COWAT</td>
<td>32.67</td>
<td>10.81</td>
<td>31.46</td>
<td>29.10</td>
</tr>
<tr>
<td>Trail Making Test – Trails A (time)</td>
<td>34.63</td>
<td>11.05</td>
<td>32.91</td>
<td>26.07</td>
</tr>
<tr>
<td>Trail Making Test – Trails B (time)</td>
<td>94.70</td>
<td>41.97</td>
<td>32.00</td>
<td>25.78</td>
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</table>
WCST

<table>
<thead>
<tr>
<th></th>
<th>22.37</th>
<th>13.57</th>
<th>23.35</th>
<th>22.83</th>
<th>27</th>
<th>49.1</th>
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<tbody>
<tr>
<td>Perseverative Errors</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Failure to Maintain Set</td>
<td>1.31</td>
<td>1.34</td>
<td>&gt;16b</td>
<td>--</td>
<td>15</td>
<td>27.3</td>
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<tr>
<td>Categories Completed</td>
<td>4.24</td>
<td>1.94</td>
<td>11-16b</td>
<td>--</td>
<td>31</td>
<td>56.4</td>
</tr>
</tbody>
</table>

CVLT

<table>
<thead>
<tr>
<th></th>
<th>41.27</th>
<th>11.67</th>
<th>13.81</th>
<th>20.32</th>
<th>40</th>
<th>72.7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recall Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recall List 1</td>
<td>5.22</td>
<td>1.65</td>
<td>17.34</td>
<td>20.76</td>
<td>23</td>
<td>41.8</td>
</tr>
<tr>
<td>Recall List 5</td>
<td>9.73</td>
<td>2.88</td>
<td>17.75</td>
<td>24.64</td>
<td>27</td>
<td>49.1</td>
</tr>
<tr>
<td>Short Delay Recall</td>
<td>8.20</td>
<td>3.11</td>
<td>23.28</td>
<td>27.97</td>
<td>22</td>
<td>40.0</td>
</tr>
<tr>
<td>Long Delay Recall</td>
<td>8.56</td>
<td>3.38</td>
<td>24.74</td>
<td>28.56</td>
<td>25</td>
<td>45.5</td>
</tr>
<tr>
<td>Recognition Total</td>
<td>13.40</td>
<td>2.71</td>
<td>30.76</td>
<td>29.92</td>
<td>16</td>
<td>29.1</td>
</tr>
</tbody>
</table>


a Standard scoring procedures report these values as cumulative percentages associated with given raw scores, which range from 1 to >50 percent. Therefore percentiles based on individual performance cannot be calculated and descriptive statistics cannot be obtained. Values in the table represent the median percentile value across participants. It is possible to determine if an individual score is one standard deviation below the mean (<16%) thus impairment on the measure can still be determined. Pairing percentiles ranged from <1% to >50%. Free recall percentiles
ranged from 1.5% to >50%. Standard scoring procedures report these values as percentile ranges rather than discrete percentiles. Values in the table represent the median percentile value across subjects. Failure to Maintain Set percentiles ranged from <1% to >16%. Categories completed percentiles ranged from ≤1% to >16%. It is possible to determine if an individual score is one standard deviation below the mean (≤16%), thus impairment on the measure can still be determined.
Table 13

*Pearson Product Moment Correlations among the Five Domains of Neurocognitive Abilities*

<table>
<thead>
<tr>
<th>Domain</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Attention</td>
<td>--</td>
<td>-.105</td>
<td>-.033</td>
<td>.023</td>
<td>.138</td>
</tr>
<tr>
<td>2. Verbal Fluency</td>
<td>--</td>
<td>253*</td>
<td>393**</td>
<td>287*</td>
<td></td>
</tr>
<tr>
<td>3. Higher Cognitive</td>
<td>--</td>
<td>260*</td>
<td></td>
<td>126</td>
<td></td>
</tr>
<tr>
<td>4. General Mental</td>
<td>--</td>
<td>200</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Verbal Memory</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* These domain summary scores were calculated by averaging across z scores converted from raw scores for each of the neurocognitive measures that contributed to the particular domain.

* *p < .05. ** *p < .01.
Table 14

Pearson Product Moment Correlations between Quality of Life Interview (QOLI) Scales and Psychiatric Status and Symptom Presentation

<table>
<thead>
<tr>
<th>QOLI Subscale</th>
<th>Total</th>
<th>Positive</th>
<th>Negative</th>
<th>Manic-Excitement</th>
<th>Depressive-Anxiety</th>
<th>GAF Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subjective Scales – Satisfaction</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Life</td>
<td>-.170</td>
<td>-.146</td>
<td>-.004</td>
<td>.048</td>
<td>-.554**</td>
<td>.123</td>
</tr>
<tr>
<td>Living Situation</td>
<td>-.063</td>
<td>-.034</td>
<td>.090</td>
<td>-.093</td>
<td>-.254*</td>
<td>.066</td>
</tr>
<tr>
<td>Daily Activities</td>
<td>-.102</td>
<td>-.094</td>
<td>-.139</td>
<td>.151</td>
<td>-.422**</td>
<td>.112</td>
</tr>
<tr>
<td>Family Relations</td>
<td>-.219</td>
<td>-.168</td>
<td>-.151</td>
<td>-.123</td>
<td>-.246*</td>
<td>.313**</td>
</tr>
<tr>
<td>Social Relations</td>
<td>-.349**</td>
<td>-.256*</td>
<td>-.371**</td>
<td>-.205</td>
<td>-.183</td>
<td>.416**</td>
</tr>
<tr>
<td>Finances</td>
<td>.034</td>
<td>.034</td>
<td>.045</td>
<td>.144</td>
<td>-.226*</td>
<td>-.143</td>
</tr>
<tr>
<td>Worka</td>
<td>.022</td>
<td>.055</td>
<td>-.178</td>
<td>.080</td>
<td>-.016</td>
<td>.031</td>
</tr>
<tr>
<td>Legal and Safety</td>
<td>-.170</td>
<td>-.135</td>
<td>-.168</td>
<td>.032</td>
<td>-.164</td>
<td>.241*</td>
</tr>
<tr>
<td>Health</td>
<td>-.059</td>
<td>-.149</td>
<td>-.025</td>
<td>.189</td>
<td>-.428**</td>
<td>.008</td>
</tr>
<tr>
<td><strong>Objective Scales</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily Activities</td>
<td>.112</td>
<td>.115</td>
<td>-.083</td>
<td>.152</td>
<td>.026</td>
<td>-.005</td>
</tr>
<tr>
<td>Family Contacts</td>
<td>-.046</td>
<td>-.101</td>
<td>-.194</td>
<td>.032</td>
<td>.109</td>
<td>.154</td>
</tr>
<tr>
<td>Social Contacts</td>
<td>-.118</td>
<td>-.040</td>
<td>-.091</td>
<td>-.073</td>
<td>-.141</td>
<td>.237*</td>
</tr>
<tr>
<td>------------------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>Financial Adequacy</td>
<td>-.169</td>
<td>-.119</td>
<td>-.068</td>
<td>-.114</td>
<td>-.124</td>
<td>.037</td>
</tr>
<tr>
<td>Spending Money</td>
<td>-.004</td>
<td>.132</td>
<td>-.031</td>
<td>-.018</td>
<td>-.011</td>
<td>.036</td>
</tr>
</tbody>
</table>

Note. BPRS = Brief Psychiatric Rating Scale. GAF = Global Assessment of Functioning.

* This rating was only made on those who were currently working, \( n = 22 \).

* \( p < .05 \). ** \( p < .01 \).
Table 15

**Pearson Product Moment Correlations between Scales on the Communication Disturbances Index (CDI) and Selected Psychiatric Status and Symptom Presentation Measures**

<table>
<thead>
<tr>
<th>CDI Score</th>
<th>BPRS Score</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Positive</td>
<td>Negative</td>
<td>Manic-Excitement</td>
<td>Depressive-Anxiety</td>
</tr>
<tr>
<td>Vague References</td>
<td>.086</td>
<td>.014</td>
<td>.038</td>
<td>.086</td>
<td>.166</td>
</tr>
<tr>
<td>Confused References</td>
<td>.084</td>
<td>.031</td>
<td>.049</td>
<td>.126</td>
<td>.025</td>
</tr>
<tr>
<td>Missing Information</td>
<td>.200</td>
<td>.261*</td>
<td>.031</td>
<td>.183</td>
<td>.097</td>
</tr>
<tr>
<td>Ambiguous Word Meanings</td>
<td>.015</td>
<td>-.043</td>
<td>-.082</td>
<td>-.030</td>
<td>.242*</td>
</tr>
<tr>
<td>Wrong Word References</td>
<td>.059</td>
<td>.020</td>
<td>.064</td>
<td>.033</td>
<td>.050</td>
</tr>
<tr>
<td>Structural Unclarities</td>
<td>-.072</td>
<td>.051</td>
<td>-.192</td>
<td>-.121</td>
<td>.034</td>
</tr>
<tr>
<td>Total Communication Disturbance</td>
<td>.100</td>
<td>.076</td>
<td>-.035</td>
<td>.070</td>
<td>.198</td>
</tr>
</tbody>
</table>

*Note. BPRS = Brief Psychiatric Rating Scale. GAF = Global Assessment of Functioning.*

* p < .05
Table 16

Pearson Product Moment Correlations between Neurocognitive Measures and Selected Brief Psychiatric Rating Scale (BPRS) Scores

<table>
<thead>
<tr>
<th>BPRS Score</th>
<th>Neurocognitive Score</th>
<th>Total</th>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WAIS-III</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vocabulary</td>
<td></td>
<td>-.133</td>
<td>-.053</td>
<td>-.162</td>
</tr>
<tr>
<td>Digit Symbol – Coding</td>
<td></td>
<td>-.228*</td>
<td>-.052</td>
<td>-.329**</td>
</tr>
<tr>
<td>Digit Symbol – Pairing</td>
<td></td>
<td>-.186</td>
<td>-.145</td>
<td>-.243*</td>
</tr>
<tr>
<td>Digit Symbol – Free Recall</td>
<td></td>
<td>-.098</td>
<td>-.022</td>
<td>-.163</td>
</tr>
<tr>
<td>Block Design</td>
<td></td>
<td>.024</td>
<td>.161</td>
<td>-.027</td>
</tr>
<tr>
<td>Digit Span</td>
<td></td>
<td>.080</td>
<td>.243*</td>
<td>-.069</td>
</tr>
<tr>
<td>COWAT</td>
<td></td>
<td>.050</td>
<td>.164</td>
<td>-.146</td>
</tr>
<tr>
<td>Trail Making Test – Part A</td>
<td></td>
<td>.112</td>
<td>-.034</td>
<td>.360**</td>
</tr>
<tr>
<td>Trail Making Test – Part B</td>
<td></td>
<td>-.062</td>
<td>-.139</td>
<td>.058</td>
</tr>
<tr>
<td>WCST</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perseverative Errors</td>
<td></td>
<td>-.125</td>
<td>-.044</td>
<td>-.094</td>
</tr>
<tr>
<td>Failure to Maintain Set</td>
<td></td>
<td>.030</td>
<td>-.095</td>
<td>-.046</td>
</tr>
<tr>
<td>Categories Completed</td>
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<td>.071</td>
<td>.087</td>
<td>.105</td>
</tr>
<tr>
<td>CVLT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recall Total</td>
<td></td>
<td>-.117</td>
<td>-.096</td>
<td>-.190</td>
</tr>
<tr>
<td>Recall List 1</td>
<td></td>
<td>-.017</td>
<td>-.061</td>
<td>-.023</td>
</tr>
<tr>
<td>Recall List 5</td>
<td></td>
<td>-.161</td>
<td>-.195</td>
<td>-.216</td>
</tr>
<tr>
<td>Short Delay Recall</td>
<td></td>
<td>-.128</td>
<td>-.077</td>
<td>-.162</td>
</tr>
<tr>
<td>Long Delay Recall</td>
<td></td>
<td>-.061</td>
<td>-.019</td>
<td>-.176</td>
</tr>
</tbody>
</table>

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| Recognition Total | -.009 | -.049 | .048 |


* Neurocognitive scores used for these correlations were z scores converted from raw scores for each of the.

* $p < .05$. ** $p < .01$. 

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Table 17

*Pearson Product Moment Correlations between Neurocognitive Domain Summary Scores and Selected Psychiatric Status and Symptom Presentation Measures*

<table>
<thead>
<tr>
<th>Neurocognitive Domain Summary Score</th>
<th>BPRS Score</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Positive</td>
<td>Negative</td>
<td>GAF Score</td>
</tr>
<tr>
<td>Verbal Memory</td>
<td>-.100</td>
<td>-.101</td>
<td>-.147</td>
<td>.335**</td>
</tr>
<tr>
<td>Attention</td>
<td>.166</td>
<td>.181</td>
<td>.252*</td>
<td>-.119</td>
</tr>
<tr>
<td>Verbal Fluency</td>
<td>.050</td>
<td>.164</td>
<td>-.156</td>
<td>.213</td>
</tr>
<tr>
<td>General Mental</td>
<td>-.070</td>
<td>.069</td>
<td>-.122</td>
<td>.152</td>
</tr>
<tr>
<td>Higher Cognitive</td>
<td>-.172</td>
<td>-.135</td>
<td>-.166</td>
<td>.244*</td>
</tr>
</tbody>
</table>

*Note. The domain summary scores were calculated by averaging across z-scores converted from raw scores for each of the neurocognitive measures that contributed to the particular domain.*

BPRS = Brief Psychiatric Rating Scale. GAF = Global Assessment of Functioning.

*p < .05. **p < .01.
Table 18

*Pearson Product Moment Correlations between Scales on the Quality of Life Interview (QOLI) and Global Ratings on the Social Adjustment Scale-II (SAS-II)*

<table>
<thead>
<tr>
<th>QOLI Scale</th>
<th>SAS-II Global Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Work</td>
</tr>
<tr>
<td>Subjective Scales – Satisfaction</td>
<td></td>
</tr>
<tr>
<td>General Life</td>
<td>-.143</td>
</tr>
<tr>
<td>Living Situation</td>
<td>-.125</td>
</tr>
<tr>
<td>Daily Activities</td>
<td>.018</td>
</tr>
<tr>
<td>Family Relations</td>
<td>-.180</td>
</tr>
<tr>
<td>Social Relations</td>
<td>-.125</td>
</tr>
<tr>
<td>Finances</td>
<td>-.184</td>
</tr>
<tr>
<td>Work&lt;sup&gt;b&lt;/sup&gt;</td>
<td>-.152</td>
</tr>
<tr>
<td>Legal and Safety</td>
<td>-.201</td>
</tr>
<tr>
<td>Health</td>
<td>-.023</td>
</tr>
<tr>
<td>Objective Scales</td>
<td></td>
</tr>
<tr>
<td>Daily Activities</td>
<td>.208</td>
</tr>
<tr>
<td>Family Contacts</td>
<td>-.066</td>
</tr>
<tr>
<td>Social Contacts</td>
<td>-.186</td>
</tr>
<tr>
<td>Financial Adequacy</td>
<td>-.293*</td>
</tr>
<tr>
<td>Spending Money</td>
<td>-.149</td>
</tr>
</tbody>
</table>

<sup>a</sup> This rating was made only on those participants with lived with others, n = 27. <sup>b</sup> This rating was made only on those participants who were currently working, n = 22.

* p < .05. ** p < .01.
Table 19

*Pearson Product Moment Correlations between Quality of Life Interview (QOLI) Scales and Selected Neurocognitive Domain Summary Scores*

<table>
<thead>
<tr>
<th>QOLI Subscale</th>
<th>Neurocognitive Domain</th>
<th>Memory</th>
<th>Verbal</th>
<th>Higher</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Subjective Scales – Satisfaction</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Global Life</td>
<td>.186</td>
<td>.222</td>
<td>.059</td>
<td></td>
</tr>
<tr>
<td>Living Situation</td>
<td>-.065</td>
<td>.197</td>
<td>-.114</td>
<td></td>
</tr>
<tr>
<td>Daily Activities</td>
<td>.172</td>
<td>.158</td>
<td>-.059</td>
<td></td>
</tr>
<tr>
<td>Family Relations</td>
<td>.065</td>
<td>.137</td>
<td>-.099</td>
<td></td>
</tr>
<tr>
<td>Social Relations</td>
<td>.199</td>
<td>-.059</td>
<td>-.095</td>
<td></td>
</tr>
<tr>
<td>Finances</td>
<td>.250*</td>
<td>.114</td>
<td>-.002</td>
<td></td>
</tr>
<tr>
<td>Work(^a)</td>
<td>.333</td>
<td>.252</td>
<td>-.093</td>
<td></td>
</tr>
<tr>
<td>Legal and Safety</td>
<td>.276*</td>
<td>.082</td>
<td>.183</td>
<td></td>
</tr>
<tr>
<td>Health</td>
<td>.129</td>
<td>.124</td>
<td>-.025</td>
<td></td>
</tr>
<tr>
<td><strong>Objective Scales</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily Activities</td>
<td>-.199</td>
<td>.042</td>
<td>-.212</td>
<td></td>
</tr>
<tr>
<td>Family Contacts</td>
<td>-.040</td>
<td>-.013</td>
<td>-.054</td>
<td></td>
</tr>
<tr>
<td>Social Contacts</td>
<td>.034</td>
<td>.268*</td>
<td>-.056</td>
<td></td>
</tr>
<tr>
<td>Financial Adequacy</td>
<td>.072</td>
<td>.157</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Spending Money</td>
<td>.025</td>
<td>.113</td>
<td>.089</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* Domain summary scores were calculated by averaging across z scores converted from raw scores for each of the neurocognitive measures that contributed to the particular domain.

\(^a\) This rating was made only for those participants who were currently working, \(n = 22\).

\(* p < .05.\)
Table 20

*Pearson Product Moment Correlations between Scales on the Communication Disturbances Index (CDI) and Selected Neurocognitive Domain Summary Scores*

<table>
<thead>
<tr>
<th>Neurocognitive Domain</th>
<th>Verbal Memory</th>
<th>Attention</th>
<th>Verbal Fluency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vague References</td>
<td>-.055</td>
<td>-.020</td>
<td>-.184</td>
</tr>
<tr>
<td>Confused References</td>
<td>.117</td>
<td>-.248*</td>
<td>.133</td>
</tr>
<tr>
<td>Missing Information</td>
<td>-.263*</td>
<td>-.013</td>
<td>-.163</td>
</tr>
<tr>
<td>Ambiguous Word Meanings</td>
<td>-.114</td>
<td>-.050</td>
<td>-.097</td>
</tr>
<tr>
<td>Wrong Word References</td>
<td>-.112</td>
<td>.070</td>
<td>-.016</td>
</tr>
<tr>
<td>Structural Unclarities</td>
<td>.064</td>
<td>-.228</td>
<td>.190</td>
</tr>
<tr>
<td>Total Communication Disturbances</td>
<td>-.120</td>
<td>-.118</td>
<td>-.073</td>
</tr>
</tbody>
</table>

*Note. These domain summary scores were calculated by averaging across z scores converted from raw scores for each of the neurocognitive measures that contributed to the particular domain.*

* p < .05.
Table 21

*Pearson Product Moment Correlations between Social Adjustment Scores and Neurocognitive Domain Summary Scores*

<table>
<thead>
<tr>
<th>SAS-II Rating</th>
<th>Neurocognitive Domain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Verbal Memory</td>
</tr>
<tr>
<td>Work Adjustment(a)</td>
<td>-.439**</td>
</tr>
<tr>
<td>Household Member Adjustment(b)</td>
<td>.000</td>
</tr>
<tr>
<td>External Family Adjustment</td>
<td>-.133</td>
</tr>
<tr>
<td>Social and Leisure Adjustment</td>
<td>-.132</td>
</tr>
<tr>
<td>Global Adjustment</td>
<td>-.258*</td>
</tr>
</tbody>
</table>

Note. SAS-II = Social Adjustment Scale – II. These domain summary scores were calculated by averaging across z scores converted from raw scores for each of the neurocognitive measures that contributed to the particular domain.

\(a\) Work Adjustment encompasses adjustment at work, education, and engaging in daily responsibilities. \(b\) This rating was made only for those participants who lived with others, \(n = 27\).

\* \(p < .05\). ** \(p < .01\).
Table 22

Summary of Hierarchical Regression Analysis for Variables Predicting the Quality of Life Interview (QOLI) Rating of Global Life Satisfaction (N = 51)

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE B</th>
<th>beta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depression-Anxiety</td>
<td>-.947</td>
<td>.187</td>
<td>-.581***</td>
</tr>
<tr>
<td>Model 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depression-Anxiety</td>
<td>-.975</td>
<td>.179</td>
<td>-.599***</td>
</tr>
<tr>
<td>Ambiguous Word Meanings</td>
<td>.849</td>
<td>.339</td>
<td>.275*</td>
</tr>
<tr>
<td>Model 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depressive-Anxiety</td>
<td>-.907</td>
<td>.171</td>
<td>-.557***</td>
</tr>
<tr>
<td>Ambiguous Word Meanings</td>
<td>.857</td>
<td>.321</td>
<td>.277**</td>
</tr>
<tr>
<td>Global Social Adjustment</td>
<td>-.470</td>
<td>.181</td>
<td>-.272*</td>
</tr>
</tbody>
</table>

Note. $R^2 = .338$ for Model 1. $\Delta R^2 = .075$ for Model 2. $\Delta R^2 = .072$ for Model 3.

* $p < .05$. ** $p < .01$. *** $p < .001$