Understanding Depressive Symptoms in Individuals with Schizophrenia: Analyses Using the Resident Assessment Instrument – Mental Health (*RAI*-MH)

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Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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Abstract

Objective: The primary aim of this study was to better understand the role of depressive and negative symptoms in patients with schizophrenia. As such, two specific research questions guide this analysis: (1) What factors are associated with depressive and negative symptoms at Time 1 across four major psychiatric diagnoses (patients with schizophrenia, mood disorder, both schizophrenia and mood disorders, and patients whose primary diagnosis is neither schizophrenia nor mood disorder)? (2) To what extent do depressive and negative symptoms improve over time among individuals with schizophrenia? More specifically, what variables predict an improvement in these symptoms?

Methods: The study involved analysis of secondary data from 3269 in-patients from 15 psychiatric facilities in the Province of Ontario, Canada. Patients were assessed using the Resident Assessment Instrument – Mental Health (*RAI*-MH). Bivariate analyses were performed examining demographic, clinical, social, and other factors as independent variables and depressive and negative symptom scores among each of the four diagnostic groups: schizophrenia, mood disorder, both schizophrenia and mood disorder, and neither schizophrenia nor mood disorder. Logistic regression of depressive and negative symptoms, as dependent variables, were performed on demographic, psychiatric, clinical, social, and other variables, as the independent variables.

Results: Variables associated with depressive and negative symptoms did not necessarily predict an improvement of depressive and negative symptoms over time. Findings from logistic regression models showed that statistically significant predictors of improvement in

depressive and negative symptoms included the following variables: (1) not having a diagnosis of schizophrenia; (2) insight into one's condition; (3) fewer number of recent psychiatric admissions (over the last two year period); and (5) being administered both atypical and typical antipsychotic medications.

Conclusions: Depressive and negative symptoms are prevalent in schizophrenia and are associated with demographic, psychiatric, and social variables. Depressive and negative symptoms do not share the same pattern across diagnoses, suggesting that these symptoms represent a unique profile within each diagnostic group. Moreover, both atypical and typical antipsychotic medications, in combination, were shown to be more effective at treating depressive and negative symptoms than either typical or atypical medications alone.

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1. Introduction

Schizophrenia impacts upon behaviour, perception, and cognition, and seriously impairs activities of daily living. The severity and chronicity of schizophrenia has led to a detailed examination of the socio-demographic and clinical variables that predict improved outcome. Similarly, it is important to clarify the antecedents of poor outcome amongst individuals with schizophrenia (Kay & Murrill, 1990). As such, the presence of depression is an important predictor of the outcome and clinical course in schizophrenia. Since depressive symptoms are common among patients with schizophrenia, it is important to note that it is often difficult to distinguish some of the clinical features of schizophrenia from depression. This is because the initial stage of schizophrenia (i.e., the prodrome of schizophrenia) may resemble depression (Birchwood, Iqbal & Upthegrove, 2005; Siris, 2000; Wassink, Flaum, Nopoulos, & Andreasen, 1999). Unfortunately, depression still remains poorly understood in schizophrenia even if it is common among patients with schizophrenia.

The presence of depressive symptoms in schizophrenia was first reported by Kraepelin in 1971 (Howells, 1991). Even though there is strong support for the concept of depression in schizophrenia, there is great difficulty in consistently measuring depression in schizophrenia. In a review conducted by Fleischhacker (2002), prevalence studies report widely varying numbers in rates of depression in those with schizophrenia, ranging from as low as 7% to as high as 75%, depending on the diagnostic criteria used and the research sample studied, with a modal prevalence rate of 25% (Siris, 2000). To compare, 7.9 to 8.6% of Canadian adults will have major depression in their lifetime (Health Canada, 2007). The divergence in

reported rates is most commonly attributed to the numerous, diagnostic criteria available to assess symptoms, the frequency of follow-up, and the variations in the patient's environment (Birchwood, Iqbal & Upthegrove, 2005). Moreover, the use of depression rating scales blur the distinction between the symptoms of depression and the negative symptoms of schizophrenia (Peralta, Cuesta, Martinez-Larrea & Serrano, 2000). Another reason for the inconsistency in rates of depression is because there is a problem of using scales in populations for which they were not designed (Addington, 1996). Moreover, the divergence in depression rates is also due to different diagnostic criteria (i.e., DSM-IV, RDC, or ICD-10). Furthermore, it is important to note that many patients who go on to develop schizophrenia "pass through" the diagnosis of a mood disorder early on in their illness (Wassink, Flaum, Nopoulos, & Andreasen, 1999). Wassink and colleagues (1999) believe that this reflects a clinical bias when facing uncertainty, and that it is better to diagnose depression than schizophrenia because of more favourable prognosis and response to treatment, and the lesser stigmatization of affective illness.

Despite the frequency of depressive features in schizophrenia, less is known about the precise nature and course of these symptoms. The cluster of symptoms that are common in these individuals include negative symptoms, extrapyramidal symptoms, and cognitive changes. It is therefore important to understand depressive symptoms in schizophrenia as it has been associated with increased personal stress (Kay, 1991), poorer functional performance (Kay, 1991; Whitehead, Moss, Cardno & Lewis, 2003), high rates of relapse (Collins, Remington, Coulter & Birkett, 1996; Whitehead, Moss, Cardno & Lewis, 2003), and increased mortality through suicide (Escamilla, 2001; Kaneda, 2006; Pinikahana &

Happell, 2003; Rocca et al., 2005) compared to individuals with schizophrenia with no depressive symptoms.

Many studies have illustrated that the course of the schizophrenic illness differs between men and women, but other studies have found no difference (Siegel, Irani, Brensinger, Kohler, Bilker, Ragland, et al., 2006). Kay and Murrill (1991) identified several clinical predictors for better outcome in individuals with schizophrenia. For example, good response to treatment has been related to a healthy premorbid adjustment, a sudden and clearly precipitated onset of illness, duration of less than two years, and a psychiatric profile of atypical and catatonic symptoms with the absence of emotional blunting. The previous course of illness and the absence of depression are of crucial importance for prognosis (Maj, Starace & Kemali, 1987). Moreover, Glick and colleagues (2001) noted that adherence was an especially important challenge in the treatment of schizophrenia because paranoid symptoms can lead to mistrust of the treating physician, as well as the family. These same authors also acknowledged the importance of individual psychotherapy to help the person cope with the illness.

It is well recognized that there is a challenge in differentiating between depressive symptoms, negative symptoms, and extrapyramidal symptoms (EPS) because they all share common features. The term “negative symptoms” refers to problems such as poverty of speech, impoverished ability to express emotion, and lack of motivation. Extrapyramidal symptoms are often produced because of prolonged use of antipsychotic medication; the symptoms include tremors, muscle rigidity, drooling, eyes rolling upwards toward the forehead, blurred vision, dry mouth, odd motions of the hands and tongue, and a shuffling

gait (Noll & Nayer, 2000). Escamilla (2001) notes that a diagnosis of depression in the context of a chronic psychotic disorder is not easy because several of the symptoms that typically constitute a depressive disorder may actually be negative symptoms of schizophrenia or side effects of an antipsychotic medication. For example, social withdrawal, apathy, and anhedonia often represent the clinical profile of someone with major depression, but these symptoms are also seen in the context of negative symptoms and drug-induced side effects. Therefore, there are considerable problems in attempting to define symptoms of depression in schizophrenia because: (1) there is the possibility of confusing negative symptoms, such as apathy, blunted affect, and withdrawal, as seen in schizophrenia, with depression; and (2) EPS and other side effects of antipsychotic medications mimic signs and symptoms of depression (See Table 1).

Despite the inconsistencies in measuring depressive symptoms in schizophrenia because of the varying definitions employed, depressive symptoms are still prevalent and more research needs to be done to better understand the course of these symptoms in individuals with schizophrenia. Anhedonia, the diminished capacity to experience pleasant emotions, is a frequent, treatment-resistant feature of schizophrenia that is often included among the negative symptoms of the disorder (Horan et al., 2006). When depression is present in an individual afflicted with one of the psychotic disorders it is considered a dangerous sign. For example, suicide is far more likely to result from depression in psychotic individuals. Indeed, about 10% of all individuals with bipolar disorder (manic-depressive psychosis) and an equal percentage of those diagnosed with schizophrenia commit suicide (Noll & Nayer, 2000). Strikingly, 25% of individuals diagnosed with schizophrenia

who also suffer from depression, commit suicide (Siris, 2000). Moreover, studies have shown individuals with schizophrenia are most likely to commit suicide within the first 10 years of the onset of the disease. This depression may be caused by the "underlying schizophrenic disease process, the realization by the person that his or her mental capacities are deteriorating, or as a side effect of antipsychotic medication" (Noll & Nayer, 2000). Forty percent of patients with schizoaffective disorder commit suicide at some time in their lives (Potkin et al., 2003). The percentage of those who commit suicide is strikingly higher in the schizoaffective population than the schizophrenia group because of the presence of more severe mood-related symptoms.

Depression and schizophrenia are both common psychiatric illnesses that severely interfere with one's livelihood and require intensive treatment. It is even more debilitating for individuals diagnosed with schizophrenia, who also suffer from depression. As such, the goal of this paper is to better understand depressive and negative symptoms in those individuals diagnosed with schizophrenia.

1.1 Depression in schizophrenia: Affect, symptom, or syndrome?

An important issue in the literature is the confusion and inconsistency in using the term "depression" in schizophrenia. Many use the term depression to denote an affect, but some use it to denote a symptom or a syndrome. Unfortunately, it is not always clear which definition is employed in research studies. Siris (2000) makes a distinction between the three different states. Depression as an affect is related to a subjective experience of sadness, caused by interaction with the internal or external environment. The symptom of depression is a low mood state that can cause distress in an individual. Depressive symptoms may wax

and wane so it does not warrant a diagnosis of depression. In order to receive a diagnosis of depression, the person must experience depressed mood, or lack of interest or pleasure, and also have other symptoms associated with depression for at least 2 weeks. The DSM-IV criteria for major depressive disorder are further explained in the next section.

1.2 Diagnosis of major depressive disorder and schizophrenia

Current research in the diagnosis of depression has focused on special populations and on identifying subtypes that may respond differently to treatment (Glick, Suppes, Debattista, Hu, & Marder, 2001). Major depression is defined as having at least five symptoms during the same 2-week period, with marked changes in function [Diagnostics and Statistical Manual of Mental Disorders (DSM-IV), 1994]. Moreover, at least one of the symptoms must be depressed mood or loss of interest or pleasure. At least three of the following must also be observed: weight, sleep, activity level, energy, ability to think or concentrate, or suicidal ideation. A major task for clinicians is to differentiate major depression from depressed states caused by secondary factors, such as life stress, alcohol or medications, medical or psychiatric illness, or bereavement (DSM-IV, 1994; Glick et al., 2001).

According to the DSM-IV, there are two types of bipolar disorder: bipolar I and II. Patients with bipolar I have a history of depression and mania, whereas those with bipolar II have depression and hypomania. Mania is defined as a distinct period of abnormally elevated mood lasting at least 1 week, with symptoms of grandiosity, decreased need for sleep, racing thoughts, or excessive involvement in activities that have negative consequences. Hypomania is mood elevations that are abnormal for the individual but do not

seriously impair functioning or require hospitalization. Patients with bipolar I may also experience psychotic symptoms during unstable mood. Differential diagnosis of bipolar disorder includes personality disorders, major depression, schizophrenia, and substance abuse disorders (Glick et al., 2001).

The current understanding of schizophrenia emphasizes an underlying biological cause (Jeste, 1996; Noll & Nayer, 2000). The DSM-IV defines schizophrenia as having two or more of the following symptoms during a 1-month period: delusions, hallucinations, disorganized speech, grossly disorganized or catatonic behaviour, and negative symptoms. The DSM-IV continues to emphasize the presence of psychotic symptoms (delusions and hallucinations) as well as social and vocational impairment, but has also broadened to include negative symptoms and cognitive deficits as seen in patients with schizophrenia. Many authors acknowledge the importance of cognitive and negative symptoms because they have greater impact on long-term prognosis than psychotic symptoms alone (Glick et al., 2001; Jeste, 1996; Noll & Nayer, 2000). Common differential diagnoses include bipolar disorder and substance abuse disorders.

1.3 Bipolar Continuum Theory

Many concepts have been suggested to explain the appearance of depression in schizophrenia. Depression has been viewed as a post-psychotic phase, as part of the psychotic process, or medication induced. Recently, it has become accepted to view depression on the same spectrum as other mood disorders; namely on a continuum of symptom severity, ranging from features of relatively mild depression and brief hypomania to debilitating patterns of rapid cycling or frequent mania with psychotic features (Möller,

2003). Kraepelin's (Howell's, 1991) assumption that manic-depression and schizophrenia are two distinct disorders is also being challenged, although many experts continue to support this theory. Proponents of the bipolar continuum theory support the concept of an expanded psychiatric continuum ranging from unipolar to bipolar disorder, to schizoaffective psychosis, to schizophrenia (Möller, 2003). In addition, schizophrenia and bipolar disorder share certain epidemiologic characteristics, such as age of onset, lifetime risk, course of illness, worldwide distribution, risk of suicide, genetic influence, and genetic susceptibility (Möller, 2003; Noll & Nayer, 2000). Therefore, there may be a subset of bipolar cases that represents a unique disease entity, while many cases fit into a bipolar-schizophrenia continuum. However, the well-recognized diagnosis of schizoaffective disorder, which falls between schizophrenia and mood disorder, tends to add support for the continuum theory of mental illnesses.

Schizophrenia and bipolar disorder do share many common features, but patients with schizophrenia primarily manifest disorders of thought rather than mood and have lower levels of social and vocational functioning between episodes (Glick, Suppes, DeBattista, Hu, & Marder, 2001). Specifically, patients with bipolar disorder can have delusions during manic periods, but their delusions tend to be grandiose to match their mood, and thus, should resolve when the mania resolves (Glick et al., 2001). Although schizophrenia and bipolar disorder share many common features, they are indeed separate disease entities, as classified under the Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition (DSM-IV, 1994). The Bipolar Continuum Theory is an interesting perspective in explaining the presence of depressive symptoms in schizophrenia, but the DSM-IV is still the dominant

classification system for mental disorders. Until the DSM-IV classifies schizophrenia and bipolar disorder as a related disease, the Bipolar Continuum Theory should be viewed as merely an interesting concept, and thus more research is needed to support this theory.

1.4 "Revealing depression" or post-psychotic depression in schizophrenia

The occurrence of depressive symptoms during the chronic phase of schizophrenia has received much attention in recent years. As such, Knights and Hirsch (1981) have coined the term "revealed depression" or post-psychotic depression to describe the unmasking of depression through the fading out of psychotic symptomatology. It is evident that symptoms of psychosis may actually mask depressive symptoms that persist, and are later "revealed" when the psychosis is successfully treated. Unfortunately, Siris (2000) has argued that the term "post-psychotic depression" has been used to describe three similar, but clinically distinct, groups of patients. In the first definition, depressive symptoms are clearly evident during an acute psychotic episode and resolve as the positive psychotic symptoms resolve, although sometimes more slowly. These depressive symptoms only become apparent as the positive symptoms resolve, and the term "revealed depression" is sometimes applied. The second definition overlaps somewhat with the first, but describes patients who develop depressive symptoms as their positive psychotic symptoms resolve. The third definition states that depressive symptoms appear after the acute episode has resolved. As such, the different definitions in the literature have blurred the concept of "revealed depression" in schizophrenia.

Regardless, the concept of post-psychotic depression has now been incorporated into the ICD–10 classification system and in the appendix of DSM–IV (Mulholland & Cooper,

2000). The DSM-IV (1994) now suggests the term “postpsychotic depression” be used to describe depression that occurs at any time after a psychotic episode in schizophrenia – even after a prolonged interval.

1.5 The Stress-Vulnerability Model of depression

Stress-vulnerability models of schizophrenia propose that stressful life events may act as triggers of onset or relapse of psychotic symptoms in schizophrenia (Siris, 2000). The stress vulnerability model presumes a genetic vulnerability to schizophrenic psychosis, which is clinically apparent if triggered by a stressor. Siris also argues that depression could be such a stressor which is strong enough to induce a psychotic relapse. This assumption also explains why depression as a prodromal syndrome leads to psychosis. It is now apparent that the prodromal and early stages of psychosis are antecedents for the development of the long-term illness trajectories and disabilities, as seen in schizophrenia; emotional dysfunction and depression are a key part of these early symptoms (Birchwood, Iqbal & Upthegrove, 2005). Depression is a highly stressful state psychologically; as such, depression could act as a sufficient stressor to precipitate psychosis in people with schizophrenia. The stress in the model can also be biological or psychosocial, such as viral infection or substance abuse.

1.6 Psychotic depression, non-psychotic depression, and schizophrenia

The clinical characteristics of individuals with psychotic depression, non-psychotic depression, and schizophrenia are different. Individuals with psychotic depression show symptoms of depression during an episode of psychosis, whereas those with non-psychotic depression show depressive symptoms in the absence of psychosis. In patients with

schizophrenia, the clinical course of depressive symptoms is unclear. Many researchers have presented evidence that psychotic depression is clinically and biologically distinct from non-psychotic depression (Jeste, Heaton, Paulsen, Ercoli, Harris, et al., 1996). They conclude that psychotic depression and non-psychotic depression should be separate diagnoses; but, the DSM-IV still classifies the two disorders under major depression, with or without psychotic features. Similarly, psychotic depression and non-psychotic depression are separate from the diagnosis of schizophrenia.

1.7 Role of antipsychotic medications in observed depression

Previously, the primary goal in the treatment of schizophrenia is successfully managing and controlling positive symptoms. However, researchers have acknowledged the importance of controlling all symptom domains, such as improving compliance and preventing relapse, reducing side effects, and improving functional outcomes (De Nayer et al., 2003). While antipsychotic drugs are very effective for the positive symptoms of schizophrenia, the treatment of negative symptoms is still unclear (Möller, 2004; Rummel, Kissling & Leucht, 2005). As a result, atypical antipsychotics were introduced to treat the symptoms of schizophrenia because these drugs caused significantly fewer extrapyramidal symptoms (EPS) than traditional drugs and are more effective in treating both the negative and cognitive symptoms (Möller, 2004; De Nayer et al., 2003).

Another controversial issue is whether or not antipsychotics induce a depressive mood or predispose recipients to depressive states among patients with schizophrenia. Antipsychotics, especially traditional compounds, may induce syndromes which mimic depression, called drug-induced parkinsonism. Depressive-like states occur in association

with extrapyramidal side-effects of akinesia[1] and akathisia[2]. Specifically, the touchstone of whether these symptoms are due to parkinsonism rather than to depression is the presence or absence of akinesia, or extrapyramidal symptoms (Escamilla, 2001).

Atypical antipsychotics are a relatively new class of drugs, which are often used to treat the symptoms of psychosis. According to Noll and Nayer (2000), these drugs are called "atypical" because: (1) they are less likely to cause the serious neurological side effects (i.e., extrapyramidal side effects or EPS) than the older class of conventional antipsychotics; and (2) they significantly reduce both the positive, and to some extent, the negative symptoms of schizophrenia. There is growing evidence to suggest that many patients with schizophrenia now report a more positive attitude toward atypical antipsychotics than the conventional antipsychotics (Möller, 2005a). Specifically, there are fewer side effects, such as depression and apathy. These authors suggest that atypical antipsychotics should be preferred to traditional ones to: (1) avoid pharmacogenic depression and (2) treat depressive features of schizophrenia (Möller, 2005a). However, in a recent meta-regression analysis, there is no clear evidence that atypical antipsychotics are more effective or are better tolerated than conventional antipsychotics (Geddes, Freemantle, Harrison, & Bebbington, 2000; Kapur & Remington, 2001).

Controlled studies on depression in patients with schizophrenia involving treatment with the atypical antipsychotic risperidone found that patients scored better on depression

[1] Impaired body movement; without movement (or without much movement).
[2] A movement disorder characterized by a feeling of inner restlessness and a compelling need to be in constant motion as well as by actions such as rocking, crossing the legs while sitting, etc. People with akathisia are unable to sit or keep still, complain of restlessness, fidget, rock from foot to foot, and pace.

scales than those treated with the conventional antipsychotic haloperidol (Azorin, 1995; Ceskova & Svestka, 1993). Moreover, the atypical antipsychotic olanzapine was found to be superior to risperidone with respect to scores on depression scales and rate of suicide attempts (Tran et al., 1997; Tollefson, 1999). However, no difference in depressive symptoms were found between risperidone- (atypical) and haloperidol- (traditional) treated patients in other studies (Moller et al., 1995; Peuskens, 1995).

Patients treated with 10-15 mg/day of olanzapine improved significantly more than the placebo-treated patients on depression and anxiety scales, whereas patients treated with haloperidol or a lower dose of olanzapine did not (Beasley et al., 1996; Tollefson et al., 1998). The atypical antipsychotic ziprasidone was also found to be more effective in treating depression than placebo-controlled participants (Keck et al., 1998; Tandon et al., 1997; Daniel et al., 1999). In addition, after treatment with the atypical antipsychotic clozapine, suicide rate fell from 25% to 3.5% in neuroleptic resistant patients. (Meltzer & Okayli, 1995). Mortality rate from suicide was also lower in current clozapine users than in past users (Walker et al., 1998).

In another study conducted by Haro and Salvador-Carulla (2006), the investigators collected data from 10 European countries, involving 10, 972 patients changing or initiating antipsychotic medications. Findings show that patients in whom treatment was initiated with the atypical antipsychotic medications olanzapine or clozapine or who started on more than one antipsychotic of any class at baseline tended to have somewhat greater improvement than patients treated with atypical (i.e., olanzapine or clozapine) or typical antipsychotics (in terms of symptoms and quality of life). Moreover, atypical antipsychotics appear to decrease

negative symptoms to a greater extent than the typical agents, either by reducing secondary negative symptoms or by a direct effect on the primary negative symptoms. Overall, the researchers showed: (1) atypicals confer a lower risk for tardive dyskinesia; (2) EPS are a predictor of later tardive dyskinesia, providing opportunities for risk reduction in the population exposed to antipsychotics (see Haro & Salvador-Carulla, 2006; Jeste, 2004). There appears to be support for both atypical and typical antipsychotic medications; as such, additional research needs to be done, especially controlled studies, in order to test the hypothesis of whether atypical antipsychotic medications are related to less EPS or whether atypical antipsychotic medications are related to less negative symptoms.

1.8 Differentiating between symptoms of depression and negative symptoms of schizophrenia

Negative symptoms of schizophrenia are often referred to as the "deficit syndrome" (Howells, 1991). Lately, attempts have been made to incorporate the idea of primary versus secondary negative symptoms. Recent studies of negative symptoms in schizophrenia involve the deficit syndrome has focused on uncovering the symptoms that are primary to the disease rather than secondary to the psychotic process (Kelley, van Kammen, & Allen, 1999). A primary negative feature of schizophrenia is anhedonia. To recapitulate, anhedonia is the diminished capacity to experience pleasant emotions (Horan, Kring, & Blanchard, 2006). However, the negative symptoms of schizophrenia overlap with the syndrome of depression in a number of important respects (Siris, 2000). For example, loss of interest or pleasure, lack of motivation and energy, psychomotor retardation, and lack of concentration are relevant overlapping features. Siris also noted that other symptoms may be more

distinguishing. For example, blunted affect suggests negative symptoms, whereas a low mood or cognitive features such as guilt or suicidal thoughts suggest depression. Stones and Kirkpatrick (2003) argue that depression can present itself in three ways. The individual can show symptoms of anhedonia, dysphoria (a depressed mood), or both. The authors illustrate that dysphoria is often easy to detect because symptoms include negative statements, frequent complaints, sad thoughts, and unhappy behaviour or facial expression. However, anhedonia is not as easy to detect because their symptoms are often overlooked by caregivers (e.g., loss of interest or pleasure). The interest in negative forms of schizophrenia has risen recently due to the fact that these subtypes have been associated with worse prognosis and poorer global adaptation than non-deficit forms of schizophrenia (Penadés, Gastó, Boget, Catalán, & Salamero, 2001).

Kulhara and Chadda (1987) conducted one of the first studies assessing the occurrence of negative symptoms in patients with major depression and compared them with a group of patients with schizophrenia. Two findings emerged from this study: (1) not all patients with schizophrenia have negative symptoms; and (2) even patients with schizophrenia who were identified on the basis of severity of negative symptoms cannot be differentiated from patients with major depression on the basis of total negative symptom scores. Since then, several authors have noted that although anhedonia and depression may be difficult to differentiate clinically, many factor analytic studies indicate that they form separate factors in patients with schizophrenia (Blanchard & Cohen, 2006; Horan et al., 2006). However, differentiating between the negative and depressive state can often be

difficult if the patient lacks the interpersonal communication skills to properly articulate their internal subjective states (Siris, 2000).

1.9 Treatment of schizophrenia with depressive symptoms

Many different types of medications have been offered to treat depressive symptoms associated with schizophrenia. They include:

Antipsychotics (Neuroleptics). Antipsychotic medications have shown improvements in treating depressive symptoms in patients with schizophrenia (Dufresne, Valentino, & Kass, 1993; Kramer et al., 1989; Dufresne, Kass, & Kecker, 1988).

Atypical antipsychotics. More recently, atypical antipsychotic medications have been used in this population. To recapitulate the findings in this literature, patients treated with olanzapine had greated improvements in depressive symptoms than those treated with haloperidol (Tollefson et al., 1998). Marder and colleagues (1997) reported that in patients with chronic schizophrenia, olanzapine was more effective than haloperidol in improving all symptom factors, including depression and anxiety. Melzer and Okayli (1995) reported that patients with a history of suicidal ideation experienced a decrease in suicidal and depressive ideation when treated with olanzapine.

Antidepressants. Kramer and colleagues (1989) found no difference between combinations of antidepressants and neuroleptics compared to neuroleptics alone in treating depression in patients with schizophrenia. However, others have found that antidepressants combined with neuroleptics improved depressive symptoms (Hogarty et al., 1995; Prusoff et al., 1980; Singh et al., 1978).

Lithium. Lerner and colleagues (1988) found that lithium combined with haloperidol were related to improvements on scores of depression than those given haloperidol with a placebo.

Although many different medications have been used to treat depressive symptoms in individuals with schizophrenia, this paper will only focus on atypical and typical antipsychotic medications because they are predominantly used in the schizophrenia population, whereas lithium and antidepressants are commonly used to treat mood-related disorders.

2. Common Tools Used for Measuring Depression

Many depression scales have been employed without considering whether their content relates to the accepted definitions of depressive disorder (Addington, Addington, & Atkinson, 1996). There is great concern in using depression scales in populations for which they were not designed, such as schizophrenia (Addington & Addington, 1996). Despite the concern, common depression scales will be reviewed in order to better understand the psychometric properties and items within each scale, which will assist in determining the appropriateness of each scale in the schizophrenia population. Since the analyses in this paper are guided by the Depression Rating Scale (DRS) and Negative Symptom Scale (NSS) in the Resident Assessment Instrument – Mental Health (*RAI*-MH), it is therefore important to examine the scales that the DRS and NSS were validated against. Moreover, there are no published reports on the validity of the NSS; as such, this section will provide only an overview of the tools in which the DRS was validated against. It is also important to note that these tools are used in *screening* for and measuring the frequency and severity of depression, not in making a *diagnosis* of depression.

2.1 Beck Depression Inventory (BDI)

Description

The patient checks 21 four-choice statements presented on a single page for the choice or choices most appropriate to him or her (See Appendix 2). The statements refer to the following areas: sadness, pessimism/discouragement, sense of failure, dissatisfaction, guilt, expectation of punishment, self-dislike, self-accusation, suicidal ideation, crying,

irritability, social withdrawal, indecisiveness, unattractiveness, work inhibition, insomnia, fatigability, loss of appetite, weight loss, somatic preoccupation, and loss of libido. Scores range from 0-63; scores between 0-9 indicate no depression; 10-15 indicate minimal depression; 16-19 mild to moderate depression; 20-29 moderate to severe depression; and 30-63 severe depression (Spreen & Strauss, 1998, p. 605).

Comment

Test-retest reliability with 38 patients was above .90, and changes in scores tended to follow changes in depth of depression for the individual patient (Beck, 1988). Spearman-Brown reliability was .93 and internal consistency for test items .86 (Spreen & Strauss, 1998).

Depression has been recognized as a multidimensional disorder. Spreen & Strauss (1998), for example, extracted three factors (ideation depression, physiological depression, behavioural depression) from the BDI, and Brown et al. (1995) found five (i.e., negative self-focus, anhedonia, sleep, weight loss, decreased libido).

One disadvantage of this test is its obvious face validity, which is also apparent to the patient and hence makes dissimulation or feigning easy. However, it is not clear whether self-administration or administration by an examiner leads to different results. For use in a neuropsychological setting, it should be noted that the BDI is not specifically designed to evaluate depression in elderly populations, and its value for the differential diagnosis of dementia versus depression has not been established.

The BDI is just one of several depression scales developed to detect depression in routine screening or research. It was selected for review here because of its simplicity of

administration, scoring, and interpretation. Brink and colleagues (1982) recommends the use of the Geriatric Depression Scale for elderly patients instead of the BDI.

2.2 Geriatric Depression Scale (GDS)

Description

The GDS consists of 30 Yes/No questions designed for self-administration (See Appendix 3). The directionality of answers scored for depression changes randomly. The purpose of the scale is partially disguised by the title "Mood Assessment Scale" at the top of the questionnaire. The GDS has been tested and used extensively with the older population. Score ranges from 0 to 30; scores of 0 to 9 are considered normal, 10 to 19 indicate mild depression, and 20 to 30 indicate severe depression.

Comment

The GDS may be used with healthy, medically ill and mild to moderately cognitively impaired older adults. It has been extensively used in community, acute and long-term care settings. The GDS was found to have a 92% sensitivity and a 89% specificity when evaluated against diagnostic criteria (Spreen & Strauss, 1998). The validity and reliability of the tool have been supported through both clinical practice and research. The GDS is not a substitute for a diagnostic interview by mental health professionals. It is a useful screening tool in the clinical setting to facilitate assessment of depression in older adults especially when baseline measurements are compared to subsequent scores.

Spreen and Strauss (1998) found the GDS to be useful in elderly subjects with physical illness. Moreover, discrimination between mildly demented depressed and non-depressed subjects was satisfactory in three studies. Discriminant validity for dementia

versus depression was also investigated; depressed demented elderly scored higher on the scale than non-depressed demented elderly (Spreen & Strauss, 1998).

The GDS was developed specifically for elderly subjects. It deliberately omits items dealing with guilt, sexuality, and suicide, which the authors considered inappropriate for elderly subjects. It includes items dealing with perceived locus of control that makes this test more suitable for hospitalized and long-term care subjects. The Yes/No format makes fewer demands on the cognitive skills of the patient and leads to better completion rates than point-scales like the BDI in clinical populations with cognitive impairment (Dunn & Sacco, 1989).

2.3 Cornell Scale of Depression in Dementia (CSDD)

Description

The Cornell Scale for Depression in Dementia (CSDD) was developed specifically to assess signs and symptoms of major depression in dementia on the basis of a semi-structured interview of a qualified informant (See Appendix 4). The CSDD evaluates a broad spectrum of depressive signs and symptoms and includes items from other depression scales. This is a 19-item clinician-administered instrument that uses information obtained from interview of a caregiver (a method suitable for patients with dementia) as well as from direct observation and interview of the patient. Scores range from 0-38, with <6, >10, and >18 indicating normal, probable major depression, and definite major depression, respectively.

Comment

The scale has high inter-rater reliability (0.67), internal consistency (coefficient alpha = 0.84), and sensitivity (Alexopoulos, 1988). The CSDD was developed for use in demented populations, and uses outside informants (e.g., caregivers, nursing home staff) to provide

history and reliable symptom reporting. Because negative symptoms of schizophrenia are related to the cognitive deficits, this scale is often used in the schizophrenia population (Harvey, Koren, Reichenberg, & Bowie, 2005). Studies have suggested that information gathered by outside sources reveals more depressive symptoms than dementia patients admit themselves (Spreen & Strauss, 1998). One community survey study instructed caregivers to fill out traditional depression scales to show that caregivers are reliable reporters of depressive symptoms in patients with Alzheimer's disease. The CSDD is an interviewer-administered scale that uses information both from the patient and an outside informant. The scale has correlated well with depression as classified by the Research Diagnostic Criteria (RDC) [Spreen & Strauss]. Factor structure analysis reveals 4 to 5 factors that are assessed by the CSDD, including general depression, biologic rhythm disturbances, agitation/psychosis, and negative symptoms. However, even the CSDD has been better validated in patients with mild to moderate dementia, compared with patients with severe dementia.

2.4 Hamilton Depression Rating Scale (HAMD)

Description

The HAMD is a 17-item clinician administered scale that evaluates depressed mood, vegetative and cognitive symptoms of depression, and comorbid anxiety symptoms (See Appendix 5). Some items are defined in terms of a series of categories of increasing intensity, while others are defined by a number of equal-valued terms (Hamilton, 1960). The variables are measured either on a 3-point or a 5-point scale. In general, the 5-point scale items use a rating of 0=absent; 1=doubtful to mild; 2=mild to moderate; 3=moderate to

severe; 4=very severe. The 3-point scale items use a rating of 0=absent; 1=probable to mild; 2=definite. Also, there is no distinction between frequency or intensity of symptom; the rater has to consider both when making a judgment (Hamilton, 1960). Scores range from 0 to 54, with 10-13, 14-17, and 17+ indicating mild, mild to moderate, and moderate to severe, respectively.

Comments

The HAMD was one of the first scales developed to measure the severity of depressive symptoms. The psychometric properties of the scale have been well documented. It is often helpful to have more than one rater administer this scale for the purpose of reliability (Hamilton, 1960). The scale has high inter-rater reliability (0.90) (Hamilton). However, many studies have been conducted since then that criticized the psychometric properties of the HAMD. Bagby and colleagues (2004) conducted a thorough systematic review of the HAMD since 1979. Although the internal, inter-rater, and retest reliability estimates of the HAMD are good (as are convergent, discriminant, and predictive validity); however, at the item level inter-rater and retest coefficients show that the items may be problematic, which lead to poor content validity (Bagby, Ryder, Schuller & Marshall, 2004). Since the scale items do not adequately measure the severity of depression, the authors concluded that the HAMD is psychometrically and conceptually flawed and should not be considered the "gold-standard depression scale". As such, the DRS is being validated against the BDI (Hirdes et al., in press).

2.5 The Minimum Data Set Depression Rating Scale (MDSDRS or DRS for short)

Description

The DRS is a clinical indicator of possible depression, based on the following 7 items: negative statements, persistent anger, expressions of unrealistic fears, repetitive health complaints, repetitive anxious complaints, facial expression, and crying or tearfulness. DRS score is a summed score of the 7 items, and may vary between 0 and 14, where a score of 3 or more is considered to be indicative of possible depression, and a score of 6 or more to indicate more severe depression (Burrows et al., 2000) (See Appendix 6a).

Comment

In a study between DRS and GDS, the correlation was 0.13 (Anderson et al., 2003). These authors suggested that the DRS may be of limited clinical value to identify depression among older adults living in nursing homes. However, in another study conducted by Koehler and colleagues (2005) suggest that the Minimum Data Set depression items and GDS identify different elements of depression. Moreover, the GDS is a self-administered scale, whereas the Minimum Data Set depression scale is observer-rated; there may be inherent differences in the reporting nature between the two sources. In another study conducted by Burrows and colleagues (2000), they showed that a cut-point score of 3 on the DRS maximized sensitivity (94% for Hamilton Depression Scale, 78% for CSDD) with minimal loss of specificity (72% for Hamilton Depression Scale, 77% for CSDD) when tested against cut-offs for mild to moderate depression in the derivation sample. Koehler and colleagues (2005) concluded that the DRS and GDS may identify different elements of depression, which may be due to differences in the "manifest symptom content and/or the self-report nature of the GDS compared to the observer-rated DRS. However, Burrows and colleagues (2000) concluded that the DRS performed favorably with the GDS and should be

used to screen for depression in nursing home residents. Moreover, the DRS has been validated in the schizophrenia population (Chalis, unpublished).

In reviewing these depression scales, several researchers have found limitations in the DRS. For example, Stones and colleagues (2003) have found that anhedonic symptoms are equally important to the dysphoric symptoms of depression. As such, it is important to measure both depressive and negative symptoms because it provides valuable information on not only symptoms of dysphoria, but the anhedonic features as well.

3. Study Rationale

The previous discussion has shown that depressive symptoms are common in individuals with schizophrenia. However, little is known about the course of illness in these individuals. Therefore, in order to better understand depressive symptoms in patients with schizophrenia, both depressive and negative symptoms need to be assessed not only in individuals with schizophrenia, but must also be compared across other diagnoses. What factors are associated with depressive and negative symptoms at Time 1 across four major psychiatric diagnoses (patients with schizophrenia, mood disorder, both schizophrenia and mood disorders, and patients whose primary diagnosis is neither schizophrenia nor mood disorder)? Moreover, research to date has lacked information on whether depressive and negative symptoms change over time in this population. Since one of the datasets provides information on patients at two points in time, a trajectory of change (i.e., improvement) can be monitored for these individuals. To what extent do depressive and negative symptoms improve over time among individuals with schizophrenia? More specifically, what variables predict an improvement in these symptoms? Lastly, the literature has shown inconsistencies in the relationship between atypical antipsychotic use and observed rates of depression. Many researchers believe that atypical antipsychotic medications should be preferred to avoid pharmacogenic depression and to treat depressive features of schizophrenia (e.g., Möller, 2005b). However, other researchers have found no clear evidence that atypical antipsychotic medications are more effective or better tolerated than traditional antipsychotics (e.g., Geddes, Freemantle, Harrison, & Bebbington, 2006; Kapur & Remington, 2001). It is therefore necessary to consider whether atypical or typical

antipsychotic medications are better associated with an improvement in depressive and negative symptoms over time.

4. Methods

This study is an analysis of secondary data and was based upon cross-sectional and longitudinal data derived from the *RAI*-MH instrument. The analyses were computed on SAS 9.1 version for Windows.

4.1 Sample

The sample is comprised of *RAI*-MH data collected from three projects funded by the Primary Health Care Transition Fund (PHCTF) in Ontario. The PHCTF was funded by the Ontario Ministry of Health, from March 2004 to July 2006. The goal of the projects was threefold: (1) Refinement of mental health quality indicators (MHQIs); (2) Refinement of mental health assessment protocols (MHAPs); and (3) Derivation and/or validation of outcome measures based on the *RAI*-MH (validation). All samples for the three projects were based on consecutive admissions (or those scheduled for routine re-assessment) of adults aged 18 and over in a designated psychiatric bed in the participating hospitals/units. Participating facilities were asked to contribute 100 assessments on average. Participating units included those with acute, long-term, forensic, and geriatric psychiatry patients. Based on the current literature, poor cognitive function can have an effect on depression rating and negative symptom scores (Harvey et al., 2006; Penades et al., 2001). As such, individuals with Cognitive Performance Scale (CPS) score of 3 or more are excluded from all analyses in this paper [See CPS in section 4.5(c)].

The subjects in these studies were inpatients of 15 psychiatric facilities (see Appendix 7), and consisted of 3269 individuals with a *RAI*-MH assessment. Patients who had cognitive

impairment were excluded from the present study sample for the reason of sample homogeneity. Each patient was assessed by a single mental health professional (e.g., nurses, social workers, psychiatrists, psychologists, family physicians, recreational or occupational therapists). Each assessor received formal training on the use of the *RAI*-MH prior to the project's initiation.

4.2 What is the RAI-Mental Health?

The Resident Assessment Instrument – Mental Health (*RAI*-MH) is a standardized and comprehensive instrument for evaluating psychiatric patient's needs, strengths, and preferences in institutionalized settings (See Appendix 9; Hirdes et al., 2003; Hirdes et al., 2002). The *RAI*-MH has been a mandatory assessment system for all adult in-patient psychiatric beds in Ontario since October 2005. The *RAI*-MH encompasses the Minimum Data Set for Mental Health (MDS-MH) and Mental Health Assessment Protocols (MHAPs). According to Hirdes and colleagues (2003), the MDS-MH is a brief screening instrument that assesses key areas of function, including mental and physical health, social support, and service use. Specifically, MDS-MH items identify patients who may benefit from additional evaluation of problems and risks for decline in health, well-being, or function (Hirdes et al., 2003). The MHAPs are "general guidelines for additional assessment and individualized care planning for patients who have the problematic trigger conditions" (Hirdes et al., 2003). Previous research has shown the RAI-MH to be a valid and reliable assessment instrument (Hirdes et al., 2002).

4.3 Study variables in the RAI-MH

The dependent variable for the first research question is depressive rating and negative symptom scale scores at Time 1[3]. The dependent variable for second research question is improvement of depressive and negative symptom scale scores from Time 1 to Time 2[4]. The following are independent variables used for descriptive and/or possible correlates of the dependent variables based on the current literature. The item in brackets represents where the item can be found in the *RAI*-MH instrument.

4.3.1 Demographic variables

Gender (BB1)[5] was coded as a categorical variable 1=male, 2=female. Age of patients was coded as a continuous variable for univariate analyses (e.g., means) in years, and was re-coded as a categorical variable for bivariate analyses (i.e., <25 vs. 25+ years of age).

4.3.2 Mental health service history variables

Psychiatric provisional diagnoses (Q1) were obtained via chart diagnoses and were coded as either primary, secondary or tertiary. Number of recent psychiatric admissions over the last two years prior to the RAI-MH assessment (DD1) was coded as a categorical variable as 0 = none, 1= 1-2, or 2 = 3 or more. Age at first hospitalization (DD6) was coded as a categorical variable as 1 = 0-14, 2= 15-24, 3 = 25-44, 4 = 45-64, or 5 = 65+.

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[3] Time 1 refers to the first *RAI*-MH assessment the patient received.
[4] Time 2 assessment refers to routine 3-month follow-up assessment, discharge assessment, or assessment based on a significant change in the patient's status (i.e., after a suicide attempt).
[5] Throughout this document, variables enclosed in brackets represent the item number as listed in the *RAI*-MH assessment form.

4.3.3 Social relation variables

Social relations and interpersonal conflict [patient reports having no confidant (O2a)] was coded as a categorical variable as 0 = no, or 1= Yes. Social relations and interpersonal conflict [family reports feeling overwhelmed with the patient (O2b)] was coded as a categorical variable as 0 = no, or 1= Yes. Social relationship [visit by a long-standing social relation/family member (O6b) was coded as a categorical variable as 0 = no, or 1, 2, or 3= Yes. Social relationship [telephone or email contact with a long-standing social relation/family member (O6c) was coded as a categorical variable as 0 = no, or 1, 2, or 3= Yes.

4.3.4 Discharge readiness variable

Patient has a support person who is positive towards discharge/maintaining residence in the community (P2b) is coded as a categorical variable as 0 = no, or 1 = yes.

4.3.5 Medication-related variables

Medications (R2 a–i) were coded as a categorical variable as either typical or atypical antipsychotic medication, or both. As such, there were 12 typical antipsychotic medications and 4 atypical antipsychotic medications. See Appendix 8 for a list of the antipsychotic medications. Medication refusal (K2) was coded as a categorical variable as 0 = no or 1 = yes.

4.3.6 Patient characteristic variables

Current in-patient status at time of assessment (A3) has 6 possible categories, but for the purposes of this study, this item was collapsed into two categories: 0 = voluntary or 1 =

involuntary. Involuntary in-patient status pertains to the following: application for psychiatric assessment (exclude forensics, informal, forensic, and other. Current patient type (Q5) is also coded as a categorical variable as 1 = acute care, 2 = longer-term patient, 3 = geriatric psychiatry patient, and 4 = forensic.

4.3.7 Therapy-related variables

The *RAI*-MH assessment contains a number of items indexing received therapies. For example, individual therapy (L3a), group therapy (L3b), family therapy (L3c), and self-help group (L3d) are coded as a categorical variable as 0 = no therapy received, or 1 = any therapy received. Adherence with treatment (L5) is coded as a categorical variable 0 = not adherent, and 1 = adherent. A person is adherent if a score of 0, 1, or 3 is given (refer to *RAI*-MH).

4.3.8 Insight into mental health variable

Degree of patient insight into his/her mental health problem (B2) is coded as a categorical variable as 0 = full, 1 = limited insight, or 3 = none.

4.3.9 ECT variable

Patient received Electroconvulsive Therapy (ECT)(L6) is coded as a categorical variable as 0 = no, and 1= yes. A person received ECT if a score of 2, 3, or 4 is given (refer to *RAI*-MH).

4.4 Variables created from the RAI-MH

(a) Depression Rating and Negative Symptom Scale. DRS and NSS scores are grouped into one of four categories in order to have a more holistic representation of depressive symptoms:

(1) **No depression/no negative symptoms** (i.e., DRS 0-2 and NSS = 0);

(2) **Negative symptoms only** (i.e., DRS 0-2 and NSS ≥ 1);

(3) **Depression only** (i.e., DRS ≥ 3 and NSS = 0); and

(4) **Both depression and negative symptoms** (i.e., DRS ≥ 3 and NSS ≥ 1).

(b) Trajectory of change. A trajectory of change in depressive rating and negative symptom scale variable was created and is computed by subtracting the DRS and NSS score at Time 1 from the DRS and NSS score at Time 2. As such, there will either be an improvement or a lack of improvement in depressive and negative symptom scores from Time 1 to Time 2. The coding for Time 1 is as follows:

(a) If DRS at Time 1 = 0, 1, or 2 AND NSS at Time 1 = 0, then DRS and NSS at Time 1 = 0

(b) If DRS at Time 1 = 0, 1, or 2 AND NSS at Time 1 ≥ 1, then DRS and NSS at Time 1 = 1

(c) If DRS at Time 1 ≥ 3 AND NSS at Time 1 = 0, then DRS and NSS at Time 1 = 2

(d) If DRS at Time 1 ≥ 3 AND NSS at Time 1 ≥ 1, then DRS and NSS at Time 1 = 3

The coding for Time 2 is as follows:

(a) If DRS at Time 2 = 0, 1, or 2 AND NSS at Time 2 = 0, then DRS and NSS at Time 2 = 0

(b) If DRS at Time 2 = 0, 1, or 2 AND NSS at Time 2 ≥ 1, then DRS and NSS at Time 2 = 1

(c) If DRS at Time 2 ≥ 3 AND NSS at Time 2 = 0, then DRS and NSS at Time 2 = 2

(d) If DRS at Time 2 ≥ 3 AND NSS at Time 2 ≥ 1, then DRS and NSS at Time 2 = 3

(1) **Lack of improvement** - A lack of improvement in DRS and NSS scores is possible in four circumstances:

(a) If DRS and NSS scores at Time 1 = 3 and DRS and NSS scores at Time 2 = 3;

(b) If DRS and NSS scores at Time 1 = 1 and DRS and NSS scores at Time 2 = 1, 2, or 3;

(c) If DRS and NSS scores at Time 1 = 2 and DRS and NSS scores at Time 2 = 2 or 3, and;

(d) If DRS and NSS scores at Time 1 = 2 and DRS and NSS scores at Time 2 =1

(2) **Improvement** - An improvement is noted in two circumstances:

(a) If DRS and NSS scores at Time 1 = 3 and DRS and NSS scores at Time 2 = 0, 1, or 2; and

(b) If DRS and NSS at Time 1 = 1 or 2 and DRS and NSS scores at Time 2 = 0.

4.5 Scales embedded in the RAI-MH

The outcome measures embedded in the *RAI*-MH cover a variety of domains relevant to clinicians and care providers. The domains provide valuable information on the patient's state and also provide additional information for care planning purposes. All inter*RAI* instruments contain several outcome measure scales: Cognitive Performance Scale (CPS) (Morris et al., 1994); Activities of Daily Living (ADL) Hierarchy Scale (Morris, Fries, Morris, 1999); Aggressive Behavior Scale (ABS); Pain Scale; Negative Symptom Scale (NSS), Depression Rating Scale (DRS) (Burrows et al., 2000), etc. (see www.interrai.org). For the purposes of the paper, only the DRS and NSS scales will be used.

(a) The **Depression Rating Scale** (DRS) has been validated against both the Hamilton Depression Rating Scale and the Cornell Scale for depression severity. The DRS is a clinical indicator of possible depression, based on the following items: negative statements, persistent anger, expressions of unrealistic fears, repetitive health complaints, repetitive anxious complaints, facial expression, and crying or tearfulness. If left as a continuous scale, the DRS scores may vary between 0 and 14, where a score of 3 or more is considered to be indicative

of possible depression, and a score of 6 or more to indicate more severe depression. As such, the DRS can also be coded as a categorical scale, where scores ranging from 0-2 indicate mild depression, 3-5 moderate depression, and 6+ severe depression.

(b) The **Negative Symptoms Scale** (NSS) is an indicator of withdrawal, and is based on the presence of anhedonia, loss of interest, lack of motivation, and reduced interaction. As a continuous scale, the NSS may vary between 0 and 8, where higher scores represent elevated levels of negative symptomatology.

(c) The **Cognitive Performance Scale** (CPS)

The CPS describes the individual's cognitive status based on short-term memory, decision-making, expression, and self-performance in eating. Based on these 4 items, an algorithm is used to compute a 7-point scale; from intact (score=0) and borderline intact (score=1), to mild (score=2), moderate (score=3), and moderate-severe impairment (score=4), to severe impairment (score=5) and very severe impairment (score=6).

4.6 Research Questions

4.6.1 What factors are associated with depressive and negative symptoms at Time 1 across four major psychiatric diagnoses (patients with schizophrenia, mood disorder, both schizophrenia and mood disorders, and patients whose primary diagnosis is neither schizophrenia nor mood disorder)?

Statistical method: chi-square analysis

Outcome Variable: DRS (absence vs. presence of depressive symptoms) and NSS (absence vs. presence of negative symptoms) scores at Time 1

Independent variables: Diagnosis

Sex (BB1)

Age (BB2)

Current in-patient status at time of assessment (A3)

Number of recent psychiatric admissions over the last two years (DD1)

Age at first hospitalization (DD6)

Insight into mental health (B2)

Therapies received in the last week (L3a-d)

Adherence to treatment (L5)

ECT treatment in the last week (L6)

Medication refusal (K2)

Patient reports having no confidant (O2a)

Family overwhelmed with patient (O2b)

Visit by a long-standing relation (O6b)

Telephone with a long-standing relation (O6c)

Patient has a support person (P2b)

Current patient type (Q5)

Receiving atypical antipsychotic medication

Receiving typical antipsychotic medication

Receiving both atypical and typical antipsychotic medication

Cognitive Impairment (as measured by the Cognitive Performance Scale)

Datasets: MHAPs, MHQI, and validation datasets

Depressive symptoms are assessed based on the DRS criteria and are classified under three groups of severity: mild (0-2), moderate (3-5), and severe (6+). In these analyses, the DRS is re-coded in one of two categories: <3 or ≥3 to indicate the absence or presence of depression. Negative symptoms are assessed with the Negative Symptom Scale (NSS). This scale is re-coded into two categories: 0 or 1+ to indicate the absence or presence of negative symptomatology. The analysis for this section is based upon four DRS and NSS categories: (1) DRS 0-2 and NSS = 0 (i.e., no depressive and no negative symptoms); (2) DRS 0-2 & NSS ≥ 1 (i.e., negative symptoms only); (3) DRS ≥ 3 and NSS = 0 (i.e., depressive symptoms only); and (4) DRS ≥ 3 and NSS ≥ 1 (i.e., both depressive and negative symptoms).

Individuals who have a psychiatric diagnosis of schizophrenia as measured by item Q1(e) in the *RAI*-MH will be compared with the following provisional diagnostic groups mood disorders (Q1f), both schizophrenia and mood disorders (Q1e and Q1f), and neither schizophrenia nor mood disorders (neither Q1e nor Q1f). By doing so, a typology of DRS and NSS scores is developed between the different diagnostic subgroups.

Each of the independent variables are cross-tabulated with the dependent variable of DRS and NSS scores at Time 1 in order to see if there is an association between the independent and dependent variables. As such, a typology can be developed for each

independent variable and its relation to DRS and NSS scores at Time 1 across the four diagnostic groups.

4.6.2 To what extent do depressive and negative symptoms improve over time among individuals with schizophrenia? More specifically, what variables predict an improvement in these symptoms?

Statistical method: Chi-square test for bivariate analysis and logistic regression for multivariate analysis

Outcome Variable: Improvement in DRS and NSS scores from Time 1 to Time 2

Independent variables:

Age (BB2)

Current in-patient status at time of assessment (A3)

Number of recent psychiatric admissions over the also two years (DD1)

Age at first hospitalization (DD6)

Insight into mental health (B2)

Therapies received in the last week (L3a-d)

Medication refusal (K2)

Patient reports having no confidant (O2a)

Patient has a support person (P2b)

Current patient type (Q5)

Receiving atypical antipsychotic medication

Receiving typical antipsychotic medication

Receiving both atypical and typical antipsychotic medication

Dataset: MHQI dataset

An "improvement in DRS and NSS scores from Time 1 to Time 2" variable is created. An improvement in DRS and NSS scores is obtained under two circumstances: (1) if DRS and NSS scores at Time 1 = 3 and DRS and NSS scores at Time 2 = 0,1, or 2; and (2) if DRS and NSS at Time 1 = 1 or 2 and DRS and NSS scores at Time 2 = 0. A decline in DRS and NSS scores is also possible in two circumstances: (1) if DRS and NSS scores at Time 1 = 3 and DRS and NSS scores at Time 2 = 0; and (2) if DRS and NSS scores at Time 1 = 1 or 2 and DRS and NSS scores at Time 2 = 1, 2, or 3. For the purposes of this research question, we will only look at the improvement in DRS and NSS scores.

Each of the independent variables will be cross-tabulated with the dependent variable of improvement in DRS and NSS scores in order to see if there is an association between the independent and dependent variables. Moreover, based on the results of the chi-square analyses, we can decide which variables to include in logistic regression models in order to answer this research question.

4.7 Analyses

(a) **Descriptive statistics** (e.g., frequency and percentage distributions; mean, and standard deviation) were used to describe the study sample.

(b) **Bivariate analyses** (e.g., t-tests, cross-tabulations) were used to compare depressive symptoms in those who were diagnosed with schizophrenia and those who were not. Depressive symptoms will also be compared for those who use atypical versus typical antipsychotics.

(c) **Multivariate analyses** (e.g., logistic regression) were used to test different independent variables and their relationship to the dependent variable of interest.

(d) **Regression diagnostics** and overall model-fit were performed according to standard procedures (i.e., Hosmer-Lemeshow goodness of fit test).

5. Results

Research Question 1: What factors are associated with depressive and negative symptoms at Time 1 across four major psychiatric diagnoses (patients with schizophrenia, mood disorder, both schizophrenia and mood disorders, and patients whose primary diagnosis is neither schizophrenia nor mood disorder)?

5.1 Univariate analyses

5.1.1 Sample demographics

Univariate analyses (mean, standard deviations, N, and percentages) were used to describe the study sample on diagnosis, demographic, psychiatric, and clinical characteristics.

Table 1 provides a basic summary of the sample characteristics of the patients who had a chart diagnosis of schizophrenia, mood disorder, both schizophrenia and mood disorder, and neither schizophrenia nor mood disorders. In terms of diagnosis, 29.5% had a chart diagnosis of schizophrenia, 47.8% had a diagnosis of mood disorder, 7.2% had a diagnosis of both schizophrenia and mood disorder, and 15.5% had neither a diagnosis of schizophrenia nor mood disorder.

The mean age in years and standard deviation (SD) for each of the four groups are as follows: 43.7 (17.2), 46.6 (16.4), 45.9 (17.4), and 49.4 (21.5). The percentage (n) of males in each diagnostic group is as follows: 62.1% (363), 42.9% (664), 47.2% (109), and 52.5%

(263). The largest proportion of males is in the schizophrenia group, and the lowest proportion of males is in the mood disorders group.

5.1.2 Depression Rating Scale and Negative Symptom Scale

In terms of scores on the depression rating scale (DRS), a score of 3 or more indicates the presence of depressive symptoms, 39.2% (378) with schizophrenia scored 3 or more on the DRS compared to 55.8% (869) with a mood disorder, 42.5% (99) with a mood disorder and schizophrenia, and 43.5% (219) with neither a mood disorder nor schizophrenia. On the negative symptom scale (NSS), a score of 1 or more indicates the presence of negative symptoms. Fifty percent (480) of individuals with schizophrenia scored 1 or more on the NSS compared to 54.8% (856) with mood disorders, 50.4% (118) with a mood disorder and schizophrenia, and 45% (227) with neither a mood disorder nor schizophrenia.

DRS and NSS scores were also categorized into four groups: (1) neither depressive nor negative symptoms; (2) negative symptoms only; (3) depressive symptoms only; and (4) both depressive and negative symptoms. Table 2 shows that for those who had a diagnosis of schizophrenia, 36.2% (349) had neither depressive nor negative symptoms, 24.6% (237) had negative symptoms only, 14.1% (136) had depressive symptoms only, and 25.2% (243) had both depressive and negative symptoms. Interestingly, the schizophrenia group had the highest percentage of negative symptoms only compared to the other three diagnostic groups.

5.1.3 DRS and NSS scores at Time 1 and Time 2

Table 3 shows the DRS and NSS scores at Time 1 and Time 2 for those who had a diagnosis of no schizophrenia. As illustrated, in those with negative symptoms only at Time 1, 57.7% improved to having neither depressive nor negative symptoms at Time 2. Similarly,

if the patient has both depressive and negative symptoms at Time 1, 44.6% improved to having neither of the symptoms at Time 2.

A similar trend is seen in individuals with schizophrenia. For example, if an individual had both depressive and negative symptoms at Time 1, 50.4% had neither of the symptoms at Time 2. Similarly, those who had either depressive or negative symptoms at Time 1, 51.7% and 51.8%, respectively had neither of the symptoms at Time 2 (See Table 4).

5.2 Bivariate analyses

Bivariate analyses (i.e., chi-square test) were performed to examine what characteristics determined depressive and negative symptom scores at Time 1. A total of 18 independent variables were used to test its association with the dependent variable (i.e., DRS and NSS scores at Time 1). There were two demographic variables (age and gender), two mental health service history variables (number of recent admissions and age at first hospitalization), two patient status variables (current in-patient status and current patient type), four social functioning variables (patient reports having no confidant, family reports feeling overwhelmed, visiting by a social relation, and telephone with a social relation), two therapy-related variables (therapy, and adherence with treatment), four medication-related variables (medication refusal, atypical antipsychotic medication, typical antipsychotic medication, and both atypical and typical antipsychotic medications), one item on insight, and one variable on cognitive functioning (i.e., CPS). A cut-off probability level of 0.10 was used to assess significance between the independent and dependent variables.

5.2.1 Demographic predictors

Table 5 shows the gender (BB1) distribution by the four DRS and NSS categories at Time 1, by the diagnosis of schizophrenia. For males, the majority of them had neither depressive nor negative symptoms, but 27.2% had negative symptoms only, 12.1% had depressive symptoms only and 23% had both depressive and negative symptoms. The majority of females (33.3%) also had neither of the symptoms, but 20.4% showed some negative symptoms, 17.6% showed depressive symptoms only, and 28.7% showed both depressive and negative symptoms. Males had more negative symptoms, whereas females showed predominately depressive symptoms. Chi-square analysis of gender and the four levels of DRS and NSS scores by the diagnosis of schizophrenia was significant at the 0.02 level.

Age (BB2) was also cross-tabulated with the four levels of DRS and NSS scores by schizophrenia, and chi-square analysis was significant at the 0.06 level. Age was classified as early (age 18-25) or late onset (age 25+). In those who had an early onset, 34.9% had neither of the symptoms, 32.9% had negative symptoms only, 12.3% had depressive symptoms only, and 19.9% had both symptoms. In those who had a late onset, 36.4% had neither of the symptoms, 23.0% had negative symptoms only, 14.6% had depressive symptoms only, and 26% had both symptoms. Some interesting patterns are proposed: (1) those who had an early onset appeared to have more negative symptoms only than those who had a late onset; and (2) those who had a late onset appeared to have more depressive and negative symptoms than those had an early onset.

Table 6 shows the gender and age cross-tabulations with the DRS and NSS categories, by the diagnosis of mood disorder. Across the DRS and NSS scores, females appeared to show more depressive and negative symptoms than males. Females also appeared to have more depressive symptoms only than males, whereas males appeared to show more negative symptoms only than females. In terms of age distribution, the pattern of depressive and negative symptoms is similar for both the early and late onset groups. The highest percentage is in the both symptom group, followed by depressive symptoms, and negative symptoms only.

Table 7 shows the DRS and NSS scores at Time 1 for age and gender, by the diagnosis of schizophrenia and mood disorder. Gender was significant at the 0.01 level, but age was not significant. Once again, this suggests that females might have more depressive symptoms, whereas males might have more negative symptoms.

Table 8 shows the DRS and NSS scores at Time 1 for age and gender, by the diagnosis of neither schizophrenia nor mood disorder. Gender was significant at the 0.005 level, but age was not significant. Males appeared to show more negative symptoms only and females appeared to show more depressive symptoms only. However, both males and females had a similar percentage of both symptoms.

5.2.2 Mental health service history

Table 9 shows DRS and NSS scores at Time 1 and mental health service history (number of recent psychiatric admissions [DD1] and age at first hospitalization [DD6]), by the diagnosis of schizophrenia. For those who had zero recent psychiatric admissions, 36.0% of these individuals had no depressive and no negative symptoms. Twenty-three percent

showed some negative symptoms only, 16.9% showed some depressive symptoms only, and 23.8% showed both depressive and negative symptoms. Interestingly, as the number of recent psychiatric admissions increases, the percentage of both depressive and negative symptoms also increases. Chi-square analysis was significant at the 0.04 level. Age at first hospitalization was also significant at the 0.06 level. Some patterns are proposed from the cross-tabulations: (1) Those that exhibited negative symptoms only, 52.9% are in the 15-24 age group, and 33.8% are in the 25-44 age group (2) The percentage of depressive symptoms only appear to be highest in the 15-24 and 25-44 age group; and (3) The percentage of depressive and negative symptoms appear to be highest in the 65+ age group. Therefore, from these results, negative symptoms only and depressive symptoms only appear to be most prominent when the person is hospitalized between 15-44 years of age. The presence of both symptoms seems to be most prominent when the person is hospitalized at age 65+.

Table 10 shows DRS and NSS scores at Time 1 and mental health service history (number of recent psychiatric admissions and age at first hospitalization), by the diagnosis of mood disorder. For those who had zero recent psychiatric admissions, 41.3% of individuals still presented both depressive and negative symptoms. For those who had one or two psychiatric admissions, a high percentage is still seen in the both depressive and negative symptom category (p=0.09). Age at first hospitalization was also cross-tabulated with DRS and NSS scores, but was insignificant (p=0.17).

Table 11 shows DRS and NSS scores at Time 1 and mental health service history (number of recent psychiatric admissions and age at first hospitalization), by the diagnosis of

both schizophrenia nor mood disorder. However, neither variables were predictors of DRS and NSS scores at Time 1.

Table 12 shows DRS and NSS scores at Time 1 and mental health service history (number of recent psychiatric admissions and age at first hospitalization), by the diagnosis of neither schizophrenia nor mood disorder. Chi-square analysis of recent psychiatric admission and DRS and NSS was significant (p=0.03). In those with zero recent psychiatric admissions, 39.7% had no depressive and no negative symptoms. In those with one or two recent psychiatric admissions, 41.4% had no depressive and no negative symptoms. However, in those with three or more psychiatric admissions, 34.4% had both depressive and negative symptoms. Age of first hospitalization and DRS and NSS scores was also significant (p=0.02). Interestingly, both depressive and negative symptoms are prominent in the 25-44 age groups.

5.2.3 Current inpatient status (A3)

Table 13 shows the percentage of involuntary and voluntary admissions across DRS and NSS scores by the diagnosis of schizophrenia. For those who had no depressive and no negative symptoms, 46.4% were admitted on an involuntary basis. For those who showed some negative symptoms only, 55.9% were admitted on an involuntary basis. For those who showed some depressive symptoms only, 64% were admitted on an involuntary basis. For those who showed both depressive and negative symptoms, 51.9% were admitted on an involuntary basis. Chi-square analysis for inpatient status and DRS and NSS scores, by the diagnosis of schizophrenia was significant at the 0.004 level.

Table 14 shows the percentage of involuntary and voluntary admissions across DRS and NSS scores by the diagnosis of mood disorder. For those who had no depressive and no negative symptoms, 30.5% were admitted on an involuntary basis. For those who showed some negative symptoms only, 41.3% were admitted on an involuntary basis. For those who showed some depressive symptoms only, 38.0% were admitted on an involuntary basis. For those who showed both depressive and negative symptoms, 32.4% were admitted on an involuntary basis. Chi-square analysis for inpatient status and DRS and NSS scores, by the diagnosis of schizophrenia was significant at the 0.002 level. The percentage for the presence of depressive and negative symptoms is higher for the patients diagnosed with schizophrenia than patients diagnosed with mood disorder.

Chi-square analysis of DRS and NSS scores at Time 1 and current inpatient status, by the diagnosis of schizophrenia and mood disorder was insignificant (p=0.16) (See Table 14). Similarly, chi-square analysis of DRS and NSS scores at Time 1 and current inpatient status, by the diagnosis of neither schizophrenia nor mood disorder was also insignificant (p=0.16) (See Table 16).

5.2.4 Current patient type (Q5)

Table 17 summarizes the DRS and NSS scores at Time 1 and current patient type by the four diagnostic groups. Chi-square analysis showed current patient type to be associated with DRS and NSS scores in three diagnostic groups: schizophrenia, mood disorder, and neither schizophrenia nor mood disorder (p<.0001). Acute patients in the schizophrenia group had mostly depressive and negative symptoms. Most of the longer-term, geriatric, and forensic patients with schizophrenia had no depressive and no negative symptoms. In those

patients with a mood disorder, most acute types had both depressive and negative symptoms, most longer-term and geriatric patients had no depressive and no negative symptoms, and most forensic patients had negative symptoms only. In those patients with both schizophrenia and a mood disorder, most acute patients had both depressive and negative symptoms, whereas the longer-term, geriatric, and forensic patients had mostly none of the symptoms. In those patients with neither schizophrenia nor a mood disorder, most acute patients had both depressive and negative symptoms, whereas the longer-term, geriatric, and forensic patients had mostly none of the symptoms.

5.2.5 Social functioning

Table 18 displays a summary of cross-tabulations of DRS and NSS scores and four variables associated with social functioning in patients with schizophrenia: (1) patient reports having no confidant (O2a); (2) family reports feeling overwhelmed (O2b); (3) visit by a long-standing relation (O6b); and (4) telephone with a social relation (O6c). Chi-square analysis for each of the social functioning predictors was significant. Specifically, for those who reported having no confidant, they also showed more depressive and/or negative symptoms than those who reported having a confidant. Similarly, when the family reports feeling overwhelmed, the presence of depressive and/or depressive symptoms are also more prominent. Although the visit by a social relation item was significant at the 0.08 level, no clear pattern across DRS and NSS scores are evinced. When the patient did not have telephone contact with a social relation, negative symptoms only are higher than those who did have telephone contact.

Table 19 displays a summary of cross-tabulations of DRS and NSS scores and four variables associated with social functioning in patients with a mood disorder. Three social predictors are important: (1) patient reports having no confidant; (2) family reports feeling overwhelmed; and (3) telephone contact with a social relation. When the patient reports having no confidant, the percentage of depressive and negative symptoms are much higher than those who have a confidant (49.9% vs. 37.5%). When the family reports feeling overwhelmed, depressive and/or negative symptoms are also higher than when the family did not report feeling overwhelmed. When the patient did not have telephone contact with a social relation, negative symptoms only and both depressive and negative symptoms are higher than when others who had telephone contact with a social relation.

Table 20 displays a summary of cross-tabulations of DRS and NSS scores and four variables associated with social functioning in patients with both schizophrenia and a mood disorder. Only one social predictor was important here: family reports feeling overwhelmed (p=0.03). As such, DRS and NSS scores are related to the family reports feeling overwhelmed item. When the family is overwhelmed, the patient shows much more depressive and negative symptoms.

Table 21 displays a summary of cross-tabulations of DRS and NSS scores and four variables associated with social functioning in patients with neither schizophrenia nor a mood disorder. Three variables are predictors of DRS and NSS scores: (1) patient reports having no confidant; (2) family reports feeling overwhelmed; and (3) visit by a social relation. When the patient reports having no confidant, negative symptoms only and depressive and negative symptoms are higher than when the patient reports having a confidant. When the

family reports feeling overwhelmed, the percentage of both depressive and negative symptoms are much higher than when the item was not endorsed (31.5% vs. 22.9%). Visit by a social relation was also related to DRS and NSS scores. Negative symptoms only and both depressive and negative symptoms are higher when the patient had not been visited by a social relation.

5.2.6 Treatment modalities (L3a-d) and adherence with treatment (L5)

Table 22 shows DRS and NSS scores at Time 1, treatment modalities, and adherence with treatment by the diagnosis of schizophrenia. As seen, treatment modalities are associated with DRS and NSS scores, where adherence to treatment was not. If any of the following treatments: individual therapy, group therapy, family therapy, and self-help group were received, then treatment modality is scored as a "Yes". Although treatment modalities are associated with DRS and NSS scores, there does not appear to be a positive benefit of treatment (i.e., those who received treatment had more depressive and negative symptoms than those who did not receive treatment). Perhaps, the depressive and negative symptoms are more severe for those who receive therapy; therefore, more depressive and negative symptoms are seen.

Table 23 shows DRS and NSS scores at Time 1, treatment modalities, and adherence with treatment by the diagnosis of a mood disorder. As seen, treatment modalities are associated with DRS and NSS scores, where adherence to treatment was not. For those who received treatment, the negative symptoms only and depressive symptoms only scores are lower than those who did not receive treatment.

Table 24 shows DRS and NSS scores at Time 1, treatment modalities, and adherence with treatment by the diagnosis of schizophrenia and a mood disorder. As seen, treatment modalities are associated with DRS and NSS scores, where adherence to treatment was not. For those who received treatment, the negative symptoms only and depressive symptoms only scores are lower than those who did not receive treatment.

Table 25 shows DRS and NSS scores at Time 1, treatment modalities, and adherence with treatment by the diagnosis of neither schizophrenia nor mood disorder. As seen, treatment modalities and adherence with treatment are both associated with DRS and NSS scores. For those who were adherent to treatment, their depressive and/or negative symptom scores were lower than those who were not adherent with the treatment. Once again, although chi-square analysis showed therapy to be related to DRS and NSS scores, there does not appear to be a positive benefit (i.e., more depressive and negative symptom scores are seen when the patient received therapy).

5.2.7 Medication refusal (K2) and antipsychotic medications

Medication refusal is associated with DRS and NSS scores for those diagnosed with schizophrenia (See Table 26). Those who refused their medications had more depressive and/or negative symptoms than those who did not. Medication and DRS and NSS scores were not significant for patients diagnosed with a mood disorder (See Table 27). In patients who were diagnosed with both schizophrenia and a mood disorder, DRS and NSS scores were associated with medication refusal. Specifically, those who refused their medications presented with more depressive symptoms only and both negative and depressive symptoms than those who did not (See Table 28). Last, in patients who were diagnosed with neither

schizophrenia nor a mood disorder, chi-square analysis also showed an association between DRS and NSS scores and medication refusal. Specifically, those who refused their medications showed more depressive symptoms only than those who did not (See Table 29).

Atypical antipsychotic medication was also cross tabulated with DRS and NSS scores across the four diagnostic groups. It is important to note that all patients who were given an atypical antipsychotic medication were also already on a typical antipsychotic medication. In contrast, those who were on a typical antipsychotic medication had not necessarily been prescribed an atypical antipsychotic medication. The results showed that atypical antipsychotic medication was only associated with DRS and NSS scores at Time 1 in individuals diagnosed with schizophrenia ($p<.0001$). Table 26 summarizes the results. In contrast, typical antipsychotic medications were not associated with DRS and NSS scores for any of the four diagnostic groups (See Table 26-29). When both atypical and typical medications are given to patients with schizophrenia, there appeared to be an association between DRS and NSS scores and both antipsychotic medications.

5.2.8 Insight (B2)

Table 30 shows DRS and NSS scores at Time 1 cross-tabulated with insight by the four diagnostic groups. Insight was associated with DRS and NSS scores for three diagnostic groups: schizophrenia, mood disorder, and neither schizophrenia nor a mood disorder. In the schizophrenia group, for those who had full insight, 59.6% had no depressive or negative symptoms, compared to 32.6% in the limited insight group, and 35.2% in the no insight group. Similarly, for those who had full insight, 16.2% had both depressive and negative symptoms, compared to 26.3% in the limited insight group, and 26.1% in the no insight

group. Insight appears to be related to less depressive and negative symptoms, and lack of insight appears to be related to more depressive and negative symptoms.

In the mood disorders group, for those who had full insight into their illness, approximately one-third falls into the no depressive and no negative symptoms category; however, one-third also falls into the depressive and negative symptoms category. For those with limited insight, the majority belongs to the depressive and negative symptoms category. A similar pattern is evinced in the no insight group.

For those who were diagnosed with neither schizophrenia nor a mood disorder and had full insight, the majority falls into the no depressive and negative symptoms category. In those with limited insight, one-third of whom are in the no depressive and negative symptom category, and the other one-third have both depressive and negative symptoms. Interestingly, in those with no insight, one-third showed no depressive or negative symptoms, but one-third also shows negative symptoms only.

5.2.9 Cognitive Performance Scale (CPS=0-3)

The sample comprised of individuals who had a CPS score of less than 3, which excluded individuals who have moderate to severe cognitive function. Cross-tabulations were done for CPS of less than 3 and DRS and NSS scores for each of the four diagnostic groups (See Table 31). Chi-square analysis showed that CPS and NSS and DRS scores were associated for three groups: schizophrenia, mood disorder, and neither schizophrenia nor a mood disorder. In the schizophrenia group, for those who have no cognitive difficulties (CPS=0), 42.4% have no depressive and no negative symptoms. For those who have mild cognitive difficulties (CPS=1), 36.3% have no depressive and no negative symptoms, but

25.7% have both depressive and negative symptoms. For those who have a CPS value of 2, 33.3% have both depressive and negative symptoms. For those who have a CPS value of 3, 31.9% have both depressive and negative symptoms. Therefore, as cognitive function worsens, depressive and negative symptoms also increase.

In the mood disorders group, regardless of CPS score, the majority of people either fall into the no depressive nor negative symptoms category or both depressive and negative symptoms category.

In patients who were diagnosed with neither schizophrenia nor a mood disorder, those who have a CPS value of 0, 1, or 2, the majority either fell into the no depressive nor negative symptoms category or both depressive and negative symptoms category. However, those who had a CPS score of 3, the majority fell into the no depressive and no negative symptoms category, but 26.6% also fell into the negative symptoms only category.

Research Question 2: To what extent do depressive and negative symptoms improve over time among individuals with schizophrenia? More specifically, what variables predict an improvement in these symptoms?

5. 3 Bivariate analyses

Chi-square analysis was carried out to determine the variables that predicted an improvement in DRS and NSS scores from Time 1 to Time 2 in each of the four diagnostic groups: schizophrenia, mood disorder, both schizophrenia and mood disorder, and neither schizophrenia nor mood disorder. A total of 12 variables were tested to see if they predicted an improvement of DRS and NSS scores from admission to discharge. They included

diagnosis, one demographic variable (age), two mental health service history items (number of recent psychiatric admissions, and age at first hospitalization), one social support variable (patient reports having no confidant), four patient characteristic items (current in-patient status, discharge readiness, insight, and current patient type), four medication-related items (medication refusal, atypical antipsychotic medication, typical antipsychotic medication, and both atypical and typical antipsychotic medications), and one treatment item (therapy). A cut-off probability level of 0.10 was used to assess significance between the independent and dependent variables. Bivariate analyses were also done to determine variables to be included in multivariate analyses.

5.3.1 Diagnosis

Bivariate analysis was used to test the relationship between each diagnostic group and improvement in DRS and NSS scores from Time 1 to Time 2. For those with a diagnosis of schizophrenia, 58.1% had an improvement in DRS and NSS scores, compared to 65% for mood disorders, 68.1% for both schizophrenia and mood disorders, and 62% for neither schizophrenia nor mood disorders. However, diagnosis was not related to improvement of DRS and NSS scores (p=0.2379) (See Table 32).

5.3.2 Demographic

Age (14-25 or 25+) was not related to improvement of DRS and NSS scores from Time 1 to Time 2 of the four diagnostic groups (See Table 33).

5.3.3 Mental health service history

Number of recent psychiatric admissions (DD1) was associated with improvement of DRS and NSS scores only for the mood disorders group (p=0.09). For those who had zero recent psychiatric admissions, 69.5% had an improvement in DRS and NSS scores. For those who had one or two recent psychiatric admissions, 61.4% had an improvement in DRS and NSS scores. For those who had three or more recent psychiatric admissions, 57.5% had an improvement in DRS and NSS scores. Therefore, as the number of recent psychiatric admissions increase, improvement of DRS and NSS scores appear to decrease (See Table 34).

Age at first hospitalization (DD6) was associated with improvement of DRS and NSS scores for those with schizophrenia, and both schizophrenia and mood disorders. For those diagnosed with schizophrenia, a higher percentage of individuals in the 15-24 and 25-44 age groups had improvements in DRS and NSS scores (58.1% and 71.1%), compared to 33.3% in the 0-14 age group, 37.5% in the 45-54 age group, and 16.7% in the 65+ age group. Thus, the most improvement in individuals with schizophrenia is seen in the young and middle adulthood groups. For those with a comorbid diagnosis of schizophrenia and a mood disorder, improvement of DRS and NSS scores are also evident in the age groups, but since the sample size within this group is small, any trends are noted with caution (See Table 35).

5.3.4 Social support

The patient reports feeling overwhelmed (O2a) item was not related to an improvement of DRS and NSS scores for the four diagnostic groups (See Table 36).

5.3.5 Patient characteristics

Current in-patient status (A3) was related to an improvement of DRS and NSS scores for the schizophrenia group only (p=0.004). In those who had a voluntary admission, 71.1% had improvements in DRS and NSS scores. For those who had an involuntary admission, only 51.8% had an improvement in DRS and NSS scores. Therefore, improvement of DRS and NSS scores appear to be related to whether the patient was admitted to the hospital on a voluntary basis or not (See Table 37).

Current in-patient type (Q5) was related to an improvement of DRS and NSS scores for the mood disorders group only (p=0.10). The majority of acute and longer-term patients both had improvements in DRS and NSS scores (64.2% and 76.6% respectively). The sample size in the geriatric psychiatry and forensic groups are too small to warrant any generalizations (See Table 38).

Insight (B2) was unrelated to improvement of DRS and NSS scores for the four diagnostic groups (See Table 39).

Discharge readiness (P2b) was also not associated with an improvement of DRS and NSS scores for the four diagnostic groups (See Table 40).

5.3.6 Medication-related items

Medication refusal (K2) was associated with an improvement in DRS and NSS scores for the schizophrenia group only (p=0.06). For those who did not refuse their medications, 61.3% had an improvement in depressive and negative symptoms. For those who did refuse their medications, only 47.2% had improvements in depressive and negative symptoms.

Therefore, medication refusal appears to be related to improvement in DRS and NSS scores (See Table 41).

Atypical antipsychotic medications are related to improvement in DRS and NSS scores ($p<.0001$) in those diagnosed with schizophrenia. Atypical antipsychotic medications are also related to improvement in DRS and NSS scores ($p<0.006$) in those diagnosed with both schizophrenia and a mood disorder. Atypical antipsychotic medications appear to be related to improvements in depressive and negative symptoms for those with schizophrenia or comorbid schizophrenia and mood disorder (See Table 42).

Typical antipsychotic medications are also related to an improvement in DRS and NSS scores, but to a lesser extent than atypical antipsychotic medications ($p=0.05$) in those diagnosed with schizophrenia (See Table 43).

Both typical and atypical antipsychotic medications are related to an improvement in DRS and NSS scores for those with schizophrenia ($p=0.007$), both schizophrenia and mood disorder ($p=0.08$), and neither schizophrenia nor mood disorder ($p=0.01$). For those with schizophrenia who were treated with both atypical and typical antipsychotic medications, 70.0% of these individuals had an improvement in depressive and negative symptoms. The sample size for the latter two groups was relatively small, so the significance of the findings is questioned (See Table 44).

5.3.7 Therapy

Therapy (individual therapy, group therapy, family therapy, or self-help group) was associated with an improvement in DRS and NSS scores for the schizophrenia group only ($p=0.02$). For those who received some form of therapy, 63.3% showed improvements in

depressive and negative symptoms. For those who did not received any therapy, only 47.6% showed improvements in depressive and negative symptoms. Thus, therapy appears to be related to an improvement in depressive and negative symptoms (See Table 45).

5.4 Multivariate analyses

From the results of the bivariate analyses, nine variables emerged as being significantly related to improvement of depressive and negative symptoms in any of the four diagnostic groups: number of recent psychiatric admissions (DD1), age at first hospitalization (DD6), current in-patient status (A3), therapy (L3a-d), medication refusal (K2), current patient type (Q5), atypical antipsychotic medication, typical antipsychotic medication, and both atypical and typical antipsychotic medication. When all of these variables were entered into a stepwise logistic model, the following emerged as being important predictors of improvement in DRS and NSS scores: (1) the diagnosis of schizophrenia; (2) number of recent psychiatric admissions; and (3) atypical antipsychotic medications. Atypical antipsychotic medications were positively related to improvement of DRS and NSS scores. Individuals with schizophrenia were less likely to improve. The diagnosis of schizophrenia was inversely related to improvement of DRS and NSS scores. Number of recent psychiatric admissions was also inversely related to DRS and NSS scores: a lower number of recent psychiatric admissions were related to a greater improvement in DRS and NSS scores. When the same nine variables were entered into a logistic regression model, the same three variables of fewer recent psychiatric admissions, receiving atypical antipsychotic medications and not having a diagnosis of schizophrenia were related to improvement in DRS and NSS scores.

Another logistic model was conducted using a manual method. All variables that were significant at the bivariate level were left in the model, they were then subsequently eliminated one by one until an optimal model was derived. For example, variables that were definitely insignificant (p=0.80) were eliminated first, then others were continuously eliminated in a similar manner. Variables that were close to significance were then entered into the model. As such, a manual method of variable elimination and addition was employed to obtain a model for improvement of DRS and NSS scores. The following predictors were obtained: (1) schizophrenia; (2) number of recent psychiatric admissions (DD1); (3) insight (B2); (4) patient reports having no confidant; and (5) both typical and atypical antipsychotic medications (See Table 46). According to this model, those who were diagnosed with schizophrenia compared to the other three diagnostic groups were less likely to show improvements in depressive and negative symptoms over time. Recent psychiatric admissions were also related to improvement in these symptoms; specifically, those who had more psychiatric admissions were less likely to improve. In addition, insight into one's condition was related to an improvement in DRS and NSS scores over time. Last, both atypical and typical antipsychotic medications were found to be associated with the improvement of depressive and negative symptom scores from Time 1 to Time 2. However, the item, patient reports having no confidant, failed to reach statistical significance. The Hosmer-Lemeshow test, which is a goodness-of-fit test, was employed to test whether the model yielded a good fit (x^2 = 9.61; df = 8, p = 0.29).

A final logistic regression model was undertaken, which was similar to the previous model, but excluded the patient reports having no confidant item (See Table 47). In these

analyses, four factors were significantly associated with an improvement in depressive and negative symptoms over time: (1) no diagnosis of schizophrenia; (2) fewer number of recent psychiatric admissions; (3) insight into one's illness; and (4) receiving both atypical and typical antipsychotic medications, in combination. According to the Hosmer-Lemeshow's goodness-of-fit test, this model also fitted the data ($x^2 = 3.31$; df = 6, $p = 0.77$).

6. Discussion

This study examined patients' characteristics; specifically the factors associated with depressive and negative symptoms at one point in time (Time 1) and the improvement of these symptoms over time (from Time 1 to Time 2) in individuals with schizophrenia, as well as three other psychiatric groups: mood disorders, both schizophrenia and mood disorders, and neither schizophrenia nor a mood disorder. Numerous studies have been undertaken on the predictors of poor outcome in patients with schizophrenia; the presence of depressive symptoms has been associated with poor outcome. However, less research has been done to identify those factors that are associated with depressive and negative symptoms across different psychiatric groups. As such, the first discussion will be geared towards comparing the different factors associated with DRS and NSS scores for the four psychiatric groups.

Secondly, given that depressive symptoms are common in schizophrenia, it is insufficient to simply measure the prevalence of depressive symptoms in this population. Instead, we need to address the question of whether these symptoms improve over time and identify the variables that are related to improvement. Next, a section on limitations, implications, and contributions of this research will be discussed, followed by suggestions for future research directions.

6.1 Comparison of factors associated with depressive and negative symptoms across major psychiatric groups

6.1.1 Demographic factors

This is one of the first studies to consider such a broad range of variables (e.g., social, clinical, and demographic) based upon a comprehensive and standardized instrument for psychiatry. The results from the comparison across the four psychiatric groups revealed many differences in patient characteristics. For example, in terms of gender and age group, these demographic variables were related to DRS and NSS scores at Time 1 for those with (1) schizophrenia, and (2) mood disorders. However, only gender was associated with DRS and NSS scores at Time 1 for the comorbid (both schizophrenia and mood disorder)and neither group (neither schizophrenia nor mood disorder). This finding is consistent with the current literature and provides further support that mood disorders appear to be more common in females and the suggested age group most likely to be affected is in mid-adulthood, whereas schizophrenia is more prevalent in younger males in psychiatric settings (Escamilia, 2001; Glick et al., 2001; Siris, 2000). Although comorbid schizophrenia and mood disorder is a common diagnosis, mood symptoms are often believed to be a manifestation of schizophrenia. Theories such as the Bipolar Continuum Theory support the idea that mood disorders and schizophrenia are on the same continuum of disorders, but they only differ by symptom severity (Möller, 2003). Therefore, it is not surprising that variables associated with DRS and NSS in schizophrenia and mood disorders are also important in the comorbid group.

6.1.2 Psychiatric history factors

Kay and Murrill (1990) identified several clinical predictors for improved outcomes in individuals with schizophrenia. For example, an illness duration of less than two years, and a psychotic psychiatric profile was found to be related with a better outcome. In the present study, four additional psychiatric history variables (age of first hospitalization, number of recent psychiatric admissions, current patient type, and current inpatient status) were tested for association with depressive and negative symptoms at Time 1 across the four psychiatric groups. Similarly, it was found that age of first hospitalization was associated with depressive and negative symptoms in individuals with schizophrenia. Specifically, individuals with an early onset had higher levels of depressive and negative symptoms. This study also found number of recent psychiatric admissions to be related to DRS and NSS scores for three groups: schizophrenia, mood disorders, and neither. Specifically, higher numbers of recent psychiatric admissions were related to increased levels of depressive and negative symptoms.

The findings on current-inpatient status also adds to the literature because there is minimal research on the association between depressive symptoms and patient status (i.e., whether a patient was admitted on a voluntary or involuntary basis). To compare, individuals with schizophrenia were more likely to be admitted on an involuntary basis than those with a mood disorder. Negative symptoms and insight have been reported to be correlated in patients with schizophrenia (Harvey et al., 2006), which helps to explain why patients with schizophrenia are more likely to be admitted to a psychiatric facility on an involuntary basis. Findings on type of patient (acute, longer-term, geriatric psychiatry, and forensic) also sheds

some new light with respect to its association with depressive and negative symptoms. Specifically, acute patients were less likely to show improvements in depressive and negative symptoms over time.

6.1.3 Social functioning factors

Social support as a resource for coping and adaptation is an important resource for individuals with schizophrenia (Saunders, 2003). Social support is believed to serve a protective factor in helping individuals with schizophrenia cope with stressors (Buchanan, 1995). According to the Stress Vulnerability Model, depression is believed to be a significant stressor to trigger a psychotic episode. As such, social support is important to help individuals cope with their illness. The research findings from the analyses in this study illustrate that social support is important in minimizing depressive symptoms over time.

6.1.4 Improvement of depressive and negative symptoms over time

From the results of the bivariate analysis, it was found that depressive and negative symptoms do improve from Time 1 to Time 2 in those with schizophrenia. This is important because treatment can be targeted to further minimize the depressive and negative symptoms over time. The majority of existing research has identified depressive symptoms as a factor related to poor outcome in individuals with schizophrenia. Since depressive and negative symptoms are so prevalent in individuals with schizophrenia, the aim should be on treating these symptoms in order to increase the quality of life in this population. To recapitulate, of those individuals with schizophrenia who had both depressive and negative symptoms at

Time 1, 50.4% of them had neither of the symptoms at Time 2. This is a remarkable improvement when half of these individuals experienced decreased symptomatology in depressive and negative symptoms from Time 1 to Time 2. Moreover, additional analyses were done to see what factors predicted an improvement in depressive and negative symptoms. The results from the logistic regression model showed that four variables best predicted an improvement in depressive and negative symptoms. They include: (1) not having a diagnosis of schizophrenia; (2) insight into mental health; (3) lower number of recent psychiatric admission; and (4) receiving both typical and atypical antipsychotic medications in combination.

Over the past two decades, there has been considerable research on atypical and typical antipsychotic medication use and their association with depressive symptoms. More recently, atypical antipsychotic medications have received more attention because they are associated with fewer side effects. However, the majority of these studies have been cross-sectional in nature (De Nayer, 2003; Möller, 2004). In the longitudinal analyses of the present study, it was evident that there was an improved side effect profile (i.e., less depressive and negative symptoms over time) in those individuals who were treated with both typical and atypical antipsychotic medications. Perhaps, both types of medications are useful in treating the depressive and negative symptoms over time.

6.1.5 Implications of findings on improvement rates for benchmarking purposes

An important finding of this study is that depressive and negative symptoms do improve over time and certain factors predict an improvement in these symptoms. However,

it is important to consider risk adjustment in order to make any fair comparisons across facilities. Risk-adjustment allows us to provide a reliable "benchmark" for evaluating performance across a broad range of clinically relevant populations. Risk adjustment requires defining specific outcomes, and measuring each risk factor accordingly. For example, in this study, it would have been beneficial to control for severity of schizophrenia. As such, severity of illness is a form of risk adjustment. Schizophrenia is a broad diagnosis that includes not only symptoms of psychosis and negative symptoms; individuals can also have catatonic symptoms, as well as poverty of speech problems. The improvement of depressive and negative symptoms over time is better understood if severity of illness was risk adjusted, and valid comparisons across different psychiatric facilities can be made. Similarly, there may be an association between number of recent psychiatric admissions and severity of illness.

6.2 Limitations

Despite the benefits of a large sample size and data collection based upon a standardized and comprehensive instrument, which provided information on a range of demographic, psychiatric, clinical, and social variables, nonetheless limitations still exist.

First, these findings are based upon an analysis of secondary data. As such, there may be some inherent constraints, for example, there is restricted use of the variables and scales in the instrument. For example, there is no information on type of medications that patients have tried before being placed on the current medication. Moreover, there is no information on how long the patient has been on a medication, which may affect whether a medication

has had enough time to reach therapeutic effectiveness. Although assessors were required to document the type and dosages of each medication the patient is currently taking, it does not provide any information on why the medication was administered.

Second, in the DRS, depressive symptoms are only coded if they are present within the last 3 days. However, according to the DSM-IV, a diagnosis of major depressive disorder is given only if symptoms are present within a 2-week period. On a similar note, in the *RAI*-MH, the diagnosis information is based on a provisional diagnosis. Provisional diagnoses are not based on a systematic diagnostic tool; as such, there may be errors in the diagnoses.

Third, many complications arise when conducting analyses around medications. Any significant finding can be confounded by dosages, drug interactions, or duration of the drug. Although, the present study attempts to study the relationship between antipsychotic use and depressive symptoms longitudinally, the results should be viewed with these limitations in mind

Fourth, the four categories of DRS and NSS scores were grouped for the purpose of studying how these symptoms compared across different diagnoses; this modeling attempts to address both the depressive and negative symptoms of schizophrenia, but this conceptualization has not been validated, so the results are suggestive and preliminary.

Fifth, depressive and negative symptoms were measured in the present study, but the literature shows that major depression is a comorbid syndrome in schizophrenia. The *RAI*-MH categorizes major depression under the mood disorders group; so unfortunately, the study of depression as a syndrome cannot be accomplished. Similarly, one was unable to

study the schizoaffective disorder group (a diagnosis between bipolar disorder and schizophrenia).

Sixth, although an improvement in depressive and negative symptoms was found, it is important to note that there were only two assessment periods (i.e., Time 1 and Time 2). A Time 2 assessment is done when a patient is discharged, at 3-month re-assessment, or when there is a change in patient status (e.g., a fall). Therefore, the Time 2 assessment is heterogeneous in that the purpose of the re-assessment is done for different reasons. However, given that we only have assessments at two points in time; the longitudinal nature of the data still provides us with some valuable information.

6.3 Contribution

Although there were some limitations to this study, there were also aspects that contributed to the current literature. As previously noted, the Depression Rating Scale (DRS) is a standardized instrument for measuring depression, and has been validated against the Hamilton Depression Rating Scale, the Cornell Depression Rating Scale (Burrows et al., 2000), and the Beck Depression Inventory (unpublished). As such, this study attempts to consistently measure depressive symptoms within the four diagnostic groups. After comparing the DRS with other standardized depression tools, it was found that the DRS did not include items that measure the anhedonic features of depression (or negative symptoms of schizophrenia). As such, the Negative Symptom Scale from the *RAI*-MH was incorporated into our analyses in order to take into account the importance of anhedonic features of depression. In addition, by grouping both the DRS and NSS subscales into four categories, it not only leads to a better representation of depressive and negative symptoms in individuals

with schizophrenia, but also allows us to compare across different diagnoses. This is one of the first studies to measure depressive symptoms in this manner.

This study also controlled for the potential confounding effect of poor cognition on depressive and negative symptoms. As such, the results of this study can be generalized to individuals with schizophrenia in psychiatric settings who have intact cognitive function.

The *RAI*-MH is a comprehensive instrument that allowed us to test for associations between many different factors (as independent variables) and DRS and NSS scores (as a dependent variable). Variables such as insight into one's mental health and fewer numbers of recent psychiatric admissions were shown to be related to depressive and negative symptoms; this adds to the current literature on predictors of depressive symptoms.

The present study also attempts to study the improvement of DRS and NSS scores over time for those diagnosed with schizophrenia. The majority of studies in this area have taken the cross-sectional approach; as such, the longitudinal nature of this study will contribute significantly to the mixed findings in this area.

This study also showed that both typical and atypical antipsychotic medications, in combination, are related to improvement of depressive and negative symptoms. Although, specific atypical or typical antipsychotic medications were not associated with an improvement in DRS and NSS scores, it is still a step in the right direction to guide future research.

6.4 Future Research

The focus of treatment was not discussed in this paper, primarily because there was insufficient information on the details of the therapy individuals had received. Any discussion of treatment strategies is incomplete without considering the type of intervention that was given to patients. There is mixed findings concerning the addition of antidepressants for depressive symptoms in patients with schizophrenia. It would be interesting to see if there is a relationship between both atypical antipsychotic medications and antidepressants and improvement of depressive and negative symptoms.

Depressive symptoms tend to be more prominent at life events or at the genetic predisposition end of the spectrum, so are associated with a more favourable outcome. In contrast, negative symptoms occur earlier in the life course, and therefore are associated with poor prognosis. Future research should study the prognostic effect of depressive and negative symptoms in those with schizophrenia.

In some recent studies, depressive symptoms appear to be more related to positive symptoms than with the negative symptoms of schizophrenia. So whether depressive symptoms are a core component of schizophrenia or are merely the result of living with persistent and severe psychosis (i.e., post-psychotic depression) should be further investigated.

6.5 Conclusion

In our analysis, depressive and negative symptoms in individuals with schizophrenia were mainly a function of demographic, psychiatric history, and social variables. Depressive

and negative symptoms did not share the same pattern across the four diagnostic groups, suggesting that these symptoms represent a different profile in each of the diagnostic groups. Moreover, depressive and negative symptoms did improve from admission to discharge in individuals with schizophrenia, and predictors of this improvement included the following variables: (1) not having a diagnosis of schizophrenia; (2) insight into mental health; (3) fewer number of recent psychiatric admissions; and (4) receiving both typical and atypical antipsychotic medications, in combination. Moreover, the results show that those who were given both types of medications were two times more likely to show improvements in depressive and negative symptoms over time.

In conclusion, depressive and negative symptoms in schizophrenia need continuing systematic investigation, particularly in view of their relevance for clinical treatment and rehabilitation.

Table 1. Demographics (age and sex), Depression Rating Scale (DRS), and Negative Symptom Scale (NSS) of sample (where Cognitive Performance Scale ≤ 3), by the four diagnostic groups

	All (n=3,269) **Mean (SD)**
Age	
*Szp	43.7 (17.2)
Mood	46.6 (16.4)
Both Szp and Mood	45.9 (17.4)
Neither Szp nor Mood	49.4 (21.5)
Sex (male)	**% (n)**
Szp	62.1 (363)
Mood	42.9 (664)
Both Szp and Mood	47.2 (109)
Neither Szp nor mood	52.5 (263)
Depression Rating Scale (DRS 3+)[1]	
Szp	39.2 (378)
Mood	55.8 (869)
Both Szp and Mood	42.5 (99)
Neither Szp nor mood	43.5 (219)
Negative Symptom Scale (NSS 1+)[2]	
Szp	49.7 (480)
Mood	54.8 (856)
Both Szp and Mood	50.4 (118)
Neither Szp nor mood	45.0 (227)

*Szp = schizophrenia
1 = DRS 3+ = presence of depressive symptoms
2 = NSS 1+ = presence of negative symptoms

Table 2. DRS and NSS scores by the four diagnostic groups

	Diagnosis [% (n)]			
DRS_NSS	**Szp***	**Mood**	**Szp & Mood**	**Neither Szp nor Mood**
DRS 0-2 & NSS = 0	36.2 (349)	29.7 (464)	35.5 (83)	37.8 (191)
DRS 0-2 & NSS ≥ 1	24.6 (237)	14.4 (225)	21.8 (51)	18.6 (94)
DRS ≥ 3 & NSS = 0	14.1 (136)	15.5 (242)	14.1 (51)	17.2 (87)
DRS ≥ 3 & NSS ≥ 1	25.2 (243)	40.4 (631)	28.6 (67)	26.3 (133)

*Szp = schizophrenia

Table 3. DRS and NSS scores at Time 1 and Time 2 by diagnosis of no schizophrenia

		DRS_NSS Time 2		
DRS_NSS Time 1	DRS 0-2 & NSS = 0	DRS 0-2 & NSS ≥ 1	DRS ≥ 3 & NSS = 0	DRS ≥ 3 & NSS ≥ 1
DRS 0-2 & NSS = 0	87.8 (165)	4.8 (9)	5.3 (10)	2.1 (4)
DRS 0-2 & NSS ≥ 1	57.7 (75)	33.9 (44)	0.8 (1)	7.7 (10)
DRS ≥ 3 & NSS = 0	55.2 (74)	1.5 (2)	36.6 (49)	6.7 (9)
DRS ≥ 3 & NSS ≥ 1	44.6 (143)	17.1 (55)	9.4 (30)	29.0 (93)

Table 4. DRS and NSS scores at Time 1 and Time 2 by diagnosis of schizophrenia

		DRS_NSS Time 2		
DRS_NSS Time 1	DRS 0-2 & NSS = 0	DRS 0-2 & NSS ≥ 1	DRS ≥ 3 & NSS = 0	DRS ≥ 3 & NSS ≥ 1
DRS 0-2 & NSS = 0	86.4 (133)	7.8 (12)	3.9 (6)	2.0 (3)
DRS 0-2 & NSS ≥ 1	51.8 (59)	36.8 (42)	2.6 (3)	8.8 (10)
DRS ≥ 3 & NSS = 0	51.7 (47)	3.3 (3)	38.5 (35)	6.6 (6)
DRS ≥ 3 & NSS ≥ 1	50.4 (59)	16.2 (19)	8.6 (10)	24.8 (29)

Table 5. DRS and NSS scores at Time 1 cross-tabulated with demographic predictors, by diagnosis of schizophrenia

DRS and NSS scores at Time 1	Percentage (n)		*p*-value
Gender (BB1)	**Male**	**Female**	
DRS 0-2 & NSS = 0	37.8 (225)	33.3 (121)	*0.02
DRS 0-2 & NSS ≥ 1	27.2 (162)	20.4 (74)	
DRS ≥ 3 & NSS = 0	12.1 (72)	17.6 (64)	
DRS ≥ 3 & NSS ≥ 1	23.0 (137)	28.7 (104)	
Age (BB2)	**Early onset[1]**	**Adult onset[2]**	
DRS 0-2 & NSS = 0	34.9 (51)	36.4 (290)	0.06
DRS 0-2 & NSS ≥ 1	32.9 (48)	23.0 (183)	
DRS ≥ 3 & NSS = 0	12.3 (18)	14.6 (116)	
DRS ≥ 3 & NSS ≥ 1	19.9 (29)	26.0 (207)	

1 = Early onset = age le 25
2 = Late onset = age ge 25
*Indicates significance at the p < .05 value

Table 6. DRS and NSS scores at Time 1 cross-tabulated with demographic predictors, by diagnosis of mood disorder

DRS and NSS scores at Time 1	Percentage (n)		*p*-value
Gender (BB1)	**Male**	**Female**	
DRS 0-2 & NSS = 0	32.1 (213)	27.8 (245)	*<.0001
DRS 0-2 & NSS ≥ 1	18.8 (125)	11.0 (97)	
DRS ≥ 3 & NSS = 0	13.6 (90)	17.0 (150)	
DRS ≥ 3 & NSS ≥ 1	35.5 (236)	44.3 (391)	
Age (BB2)	**Early onset[1]**	**Adult onset[2]**	
DRS 0-2 & NSS = 0	38.6 (51)	28.9 (392)	*0.04
DRS 0-2 & NSS ≥ 1	12.1 (16)	14.5 (197)	
DRS ≥ 3 & NSS = 0	18.2 (24)	15.3 (208)	
DRS ≥ 3 & NSS ≥ 1	31.1 (41)	41.3 (561)	

1 = Early onset = age le 25
2 = Late onset = age ge 25
*Indicates significance at the p < .05 value

Table 7. DRS and NSS scores at Time 1 cross-tabulated with demographic predictors, by diagnosis of schizophrenia and mood

DRS and NSS scores at Time 1	Percentage (n)		*p*-value
Gender (BB1)	**Male**	**Female**	
DRS 0-2 & NSS = 0	41.3 (45)	30.3 (37)	*0.01
DRS 0-2 & NSS ≥ 1	26.6 (29)	16.4 (20)	
DRS ≥ 3 & NSS = 0	11.9 (13)	16.4 (20)	
DRS ≥ 3 & NSS ≥ 1	20.2 (22)	36.9 (45)	
Age (BB2)	**Early onset[1]**	**Adult onset[2]**	
DRS 0-2 & NSS = 0	39.3 (11)	35.7 (71)	0.70
DRS 0-2 & NSS ≥ 1	25.0 (7)	21.6 (43)	
DRS ≥ 3 & NSS = 0	7.1 (2)	15.6 (31)	
DRS ≥ 3 & NSS ≥ 1	28.6 (8)	27.1 (54)	

1 = Early onset = age le 25
2 = Late onset = age ge 25
*Indicates significance at the p < .05 value

Table 8. DRS and NSS scores at Time 1 cross-tabulated with demographic predictors, by diagnosis of neither schizophrenia nor mood

DRS and NSS scores at Time 1	Percentage (n)		*p*-value
Gender (BB1)	**Male**	**Female**	
DRS 0-2 & NSS = 0	35.1 (92)	40.1 (95)	*0.005
DRS 0-2 & NSS ≥ 1	24.4 (64)	12.7 (30)	
DRS ≥ 3 & NSS = 0	14.5 (38)	20.7 (49)	
DRS ≥ 3 & NSS ≥ 1	26.0 (68)	26.6 (63)	
Age (BB2)	**Early onset[1]**	**Adult onset[2]**	
DRS 0-2 & NSS = 0	43.3 (26)	37.8 (151)	0.31
DRS 0-2 & NSS ≥ 1	13.3 (8)	19.6 (78)	
DRS ≥ 3 & NSS = 0	11.7 (7)	17.8 (71)	
DRS ≥ 3 & NSS ≥ 1	31.7 (19)	24.8 (99)	

1 = Early onset = age le 25
2 = Late onset = age ge 25
*Indicates significance at the p < .05 value

Table 9. DRS and NSS scores at Time 1 cross-tabulated with mental health service history, by diagnosis of schizophrenia

DRS and NSS scores at Time 1		Percentage (n)				*p*-value
Number of recent psychiatric admissions	**(DD1)**	**0[1]**	**1[2]**	**2[3]**		
DRS 0-2 & NSS = 0		36.0 (130)	38.4 (154)	32.0 (65)		*0.04
DRS 0-2 & NSS ≥ 1		23.3 (84)	26.7 (107)	22.7 (46)		
DRS ≥ 3 & NSS = 0		16.9 (61)	9.7 (39)	17.7 (36)		
DRS ≥ 3 & NSS ≥ 1		23.8 (86)	25.2 (101)	27.6 (56)		
Age at first hospitalization	**(DD6)**	**0-14**	**15-24**	**25-44**	**45-54**	**65+**	
DRS 0-2 & NSS = 0		8.5 (28)	49.7 (164)	30.3 (100)	7.0 (23)	4.6 (15)	0.06
DRS 0-2 & NSS ≥ 1		4.4 (10)	52.9 (119)	33.8 (76)	7.6 (17)	1.3 (3)	
DRS ≥ 3 & NSS = 0		10.3 (13)	39.7 (50)	38.9 (49)	18.2 (12)	6.9 (2)	
DRS ≥ 3 & NSS ≥ 1		16.4 (10)	25.0 (111)	27.4 (85)	21.2(14)	31.0 (90)	

*Indicates significance at the p < .05 value
1 = no recent psychiatric admission
2 = 1-2 recent psychiatric admission
3 = 3 or more recent psychiatric admissions

Table 10. DRS and NSS scores at Time 1 cross-tabulated with mental health service history, by diagnosis of mood disorder

DRS and NSS scores at Time 1		Percentage (n)					*p*-value
Number of recent psychiatric admissions	**(DD1)**	**0[1]**	**1[2]**	**2[3]**			
DRS 0-2 & NSS = 0		28.3 (219)	33.5 (181)	25.8 (64)			0.09
DRS 0-2 & NSS ≥ 1		14.4 (111)	15.3 (83)	12.5 (31)			
DRS ≥ 3 & NSS = 0		16.0 (124)	12.9 (70)	19.4 (48)			
DRS ≥ 3 & NSS ≥ 1		41.3 (319)	38.3 (207)	42.3 (105)			
Age at first hospitalization	**(DD6)**	**0-14**	**15-24**	**25-44**	**45-54**	**65+**	
DRS 0-2 & NSS = 0		7.6 (30)	27.0 (107)	39.4 (156)	29.8 (88)	3.8 (15)	0.17
DRS 0-2 & NSS ≥ 1		7.3 (15)	25.2 (52)	39.3 (81)	22.8 (47)	5.3 (11)	
DRS ≥ 3 & NSS = 0		10.2 (22)	25.6 (55)	45.1 (97)	14.9 (32)	4.2 (9)	
DRS ≥ 3 & NSS ≥ 1		8.4 (48)	20.1 (115)	43.1 (247)	22.3 (128)	6.1 (35)	

1 = no recent psychiatric admission
2 = 1-2 recent psychiatric admission
3 = 3 or more recent psychiatric admissions

Table 11. DRS and NSS scores at Time 1 cross-tabulated with mental health service history, by diagnosis of schizophrenia and mood disorder

DRS and NSS scores at Time 1		Percentage (n)					*p*-value
Number of recent psychiatric admissions	**(DD1)**	**0[1]**	**1[2]**	**2[3]**			
DRS 0-2 & NSS = 0		35.0 (28)	33.7 (32)	39.0 (23)			0.70
DRS 0-2 & NSS ≥ 1		17.5 (14)	25.3 (24)	22.0 (13)			
DRS ≥ 3 & NSS = 0		17.5 (14)	14.7 (14)	8.5 (5)			
DRS ≥ 3 & NSS ≥ 1		17.5 (24)	26.3 (25)	30.5 (18)			
Age at first hospitalization	**(DD6)**	**0-14**	**15-24**	**25-44**	**45-54**	**65+**	
DRS 0-2 & NSS = 0		4.0 (3)	44.0 (33)	34.7 (26)	16.0 (12)	1.3 (1)	0.37
DRS 0-2 & NSS ≥ 1		0.0 (0)	53.0 (26)	36.7 (18)	8.2 (4)	2.0 (1)	
DRS ≥ 3 & NSS = 0		9.7 (3)	29.0 (9)	51.6 (16)	9.7 (3)	0.0 (0)	
DRS ≥ 3 & NSS ≥ 1		6.3 (4)	32.8 (21)	45.3 (29)	14.1 (9)	1.6 (1)	

1 = no recent psychiatric admission
2 = 1-2 recent psychiatric admission
3 = 3 or more recent psychiatric admissions

Table 12. DRS and NSS scores at Time 1 cross-tabulated with mental health service history, by diagnosis of neither schizophrenia nor mood disorder

DRS and NSS scores at Time 1		Percentage (n)					*p*-value
Number of recent psychiatric admissions	**(DD1)**	**0[1]**	**1[2]**	**2[3]**			
DRS 0-2 & NSS = 0		39.7 (118)	41.4 (60)	19.7 (12)			*0.03
DRS 0-2 & NSS ≥ 1		17.2 (51)	16.6 (24)	31.2 (19)			
DRS ≥ 3 & NSS = 0		18.2 (54)	15.9 (23)	14.8 (9)			
DRS ≥ 3 & NSS ≥ 1		24.9 (74)	26.2 (38)	34.4 (21)			
Age at first hospitalization	**(DD6)**	**0-14**	**15-24**	**25-44**	**45-54**	**65+**	
DRS 0-2 & NSS = 0		9.9 (14)	26.1 (37)	23.9 (34)	46.8 (29)	19.7 (28)	*0.02
DRS 0-2 & NSS ≥ 1		12.0 (9)	29.3 (22)	29.3 (22)	10.7 (8)	18.7 (14)	
DRS ≥ 3 & NSS = 0		7.5 (5)	35.8 (24)	31.3 (21)	10.5 (7)	14.9 (10)	
DRS ≥ 3 & NSS ≥ 1		7.0 (8)	26.3 (30)	43.9 (50)	15.8 (18)	7.0 (8)	

*Indicates significance at the p < .05 value
1 = no recent psychiatric admission
2 = 1-2 recent psychiatric admission
3 = 3 or more recent psychiatric admissions

Table 13. DRS and NSS scores at Time 1 cross-tabulated with current inpatient status (A3), by diagnosis of schizophrenia

DRS and NSS scores at Time 1	Percentage (n)		*p*-value
	Involuntary	**Voluntary**	
DRS 0-2 & NSS = 0	46.4 (160)	53.6 (185)	*0.004
DRS 0-2 & NSS ≥ 1	55.9 (132)	44.1 (104)	
DRS ≥ 3 & NSS = 0	64.0 (87)	36.0 (49)	
DRS ≥ 3 & NSS ≥ 1	51.9 (126)	48.2 (117)	

*Indicates significance at the $p < .05$ value

Table 14. DRS and NSS scores at Time 1 cross-tabulated with current inpatient status (A3), by diagnosis of mood disorder

DRS and NSS scores at Time 1	Percentage (n)		*p*-value
	Involuntary	**Voluntary**	
DRS 0-2 & NSS = 0	30.5 (141)	69.6 (322)	*0.02
DRS 0-2 & NSS ≥ 1	41.3 (93)	58.7 (132)	
DRS ≥ 3 & NSS = 0	38.0 (92)	62.0 (150)	
DRS ≥ 3 & NSS ≥ 1	32.4 (204)	67.6 (425)	

*Indicates significance at the $p < .05$ value

Table 15. DRS and NSS scores at Time 1 cross-tabulated with current inpatient status (A3), by diagnosis schizophrenia and mood disorder

DRS and NSS scores at Time 1	Percentage (n)		*p*-value
	Involuntary	**Voluntary**	
DRS 0-2 & NSS = 0	38.6 (32)	61.5 (51)	0.16
DRS 0-2 & NSS ≥ 1	40.0 (20)	60.0 (30)	
DRS ≥ 3 & NSS = 0	60.6 (20)	39.4 (13)	
DRS ≥ 3 & NSS ≥ 1	46.3 (31)	53.7 (36)	

Table 16. DRS and NSS scores at Time 1 cross-tabulated with current inpatient status (A3), by diagnosis of neither schizophrenia nor mood

DRS and NSS scores at Time 1	Percentage (n)		*p*-value
	Involuntary	**Voluntary**	
DRS 0-2 & NSS = 0	29.3 (55)	70.7 (133)	0.16
DRS 0-2 & NSS ≥ 1	36.3 (33)	63.7 (58)	
DRS ≥ 3 & NSS = 0	43.0 (37)	57.0 (49)	
DRS ≥ 3 & NSS ≥ 1	34.1 (45)	65.9 (87)	

Table 17. DRS and NSS scores at Time 1 cross-tabulated with current patient type (Q5), by the 4 diagnostic groups

DRS and NSS scores at Time 1	Percentage (n)				*p*-value
Szp	**Acute**	**Longer-term**	**Geriatric psychiatry**	**Forensic**	
DRS 0-2 & NSS = 0	29.8 (188)	47.6 (88)	51.8 (44)	44.6 (29)	**<.0001
DRS 0-2 & NSS ≥ 1	25.1 (158)	24.9 (46)	21.2 (18)	23.1 (15)	
DRS ≥ 3 & NSS = 0	16.0 (101)	12.4 (23)	7.1 (6)	9.2 (6)	
DRS ≥ 3 & NSS ≥ 1	29.1 (183)	15.1 (28)	20.0 (17)	23.1 (15)	
Mood					
DRS 0-2 & NSS = 0	23.2 (278)	55.3 (145)	45.0 (36)	26.3 (5)	**<.0001
DRS 0-2 & NSS ≥ 1	14.5 (174)	11.8 (31)	16.3 (13)	36.8 (7)	
DRS ≥ 3 & NSS = 0	15.7 (188)	12.6 (33)	21.3 (17)	10.5 (2)	
DRS ≥ 3 & NSS ≥ 1	46.6 (559)	20.2 (53)	17.5 (14)	26.3 (5)	
Both szp and mood					
DRS 0-2 & NSS = 0	30.6 (45)	42.9 (18)	46.7 (14)	40.0 (6)	0.31
DRS 0-2 & NSS ≥ 1	21.8 (32)	14.3 (6)	23.3 (7)	40.0 (6)	
DRS ≥ 3 & NSS = 0	15.7 (23)	11.9 (5)	13.3 (4)	6.7 (1)	
DRS ≥ 3 & NSS ≥ 1	32.0 (47)	31.0 (13)	16.7 (5)	13.3 (2)	
Neither szp nor mood					
DRS 0-2 & NSS = 0	24.1 (63)	55.8 (67)	51.0 (50)	50.0 (11)	**<.0001
DRS 0-2 & NSS ≥ 1	19.5 (51)	12.5 (15)	23.5 (23)	13.6 (3)	
DRS ≥ 3 & NSS = 0	19.1 (50)	14.2 (17)	14.3 (14)	22.7 (5)	
DRS ≥ 3 & NSS ≥ 1	37.4 (98)	17.5 (21)	11.2 (11)	13.6 (3)	

**Indicates significance at the p < .0001 value

Table 18. DRS and NSS scores at Time 1 cross-tabulated with social functioning, by diagnosis of schizophrenia

DRS and NSS scores at Time 1	Percentage (n)		*p*-value
Patient reports having no confidant (O2a)	**No**	**Yes**	
DRS 0-2 & NSS = 0	38.9 (304)	24.6 (45)	*0.002
DRS 0-2 & NSS ≥ 1	23.4 (183)	29.5 (54)	
DRS ≥ 3 & NSS = 0	14.1 (110)	29.5 (54)	
DRS ≥ 3 & NSS ≥ 1	23.7 (185)	31.7 (58)	
Family reports feeling overwhelmed (O2b)			
DRS 0-2 & NSS = 0	40.3 (255)	28.3 (94)	*0.003
DRS 0-2 & NSS ≥ 1	23.4 (148)	26.8 (89)	
DRS ≥ 3 & NSS = 0	12.6 (80)	16.9 (56)	
DRS ≥ 3 & NSS ≥ 1	23.7 (150)	28.0 (93)	
Visit by social relation/family member (O6b)			
DRS 0-2 & NSS = 0	40.3 (94)	34.8 (255)	0.08
DRS 0-2 & NSS ≥ 1	26.2 (61)	24.0 (176)	
DRS ≥ 3 & NSS = 0	9.4 (22)	15.6 (114)	
DRS ≥ 3 & NSS ≥ 1	24.0 (56)	25.6 (187)	
Telephone with social relation/family member (O6c)			
DRS 0-2 & NSS = 0	38.3 (82)	35.6 (267)	*0.02
DRS 0-2 & NSS ≥ 1	30.8 (66)	22.8 (171)	
DRS ≥ 3 & NSS = 0	11.2 (24)	14.9 (112)	
DRS ≥ 3 & NSS ≥ 1	19.6 (42)	26.8 (201)	

*Indicates significance at the $p < .05$ value

Table 19. DRS and NSS scores at Time 1 cross-tabulated with social functioning variables, by diagnosis of mood disorder

DRS and NSS scores at Time 1	Percentage (n)		*p*-value
Patient reports having no confidant (O2a)	**No**	**Yes**	
DRS 0-2 & NSS = 0	32.2 (384)	21.6 (80)	*<.0001
DRS 0-2 & NSS ≥ 1	14.1 (168)	15.4 (57)	
DRS ≥ 3 & NSS = 0	16.2 (193)	13.2 (49)	
DRS ≥ 3 & NSS ≥ 1	37.5 (446)	49.9 (185)	
Family reports feeling overwhelmed (O2b)			
DRS 0-2 & NSS = 0	32.3 (303)	25.8 (161)	*0.05
DRS 0-2 & NSS ≥ 1	14.1 (132)	14.9 (93)	
DRS ≥ 3 & NSS = 0	14.7 (138)	16.7 (104)	
DRS ≥ 3 & NSS ≥ 1	38.9 (365)	42.6 (266)	
Visit by social relation/family member (O6b)			
DRS 0-2 & NSS = 0	25.4 (48)	30.3 (416)	0.18
DRS 0-2 & NSS ≥ 1	13.8 (26)	14.5 (199)	
DRS ≥ 3 & NSS = 0	13.2 (25)	15.8 (217)	
DRS ≥ 3 & NSS ≥ 1	47.6 (90)	39.4 (541)	
Telephone with social relation/family member (O6c)			
DRS 0-2 & NSS = 0	22.6 (31)	30.4 (433)	*0.04
DRS 0-2 & NSS ≥ 1	16.8 (23)	14.2 (202)	
DRS ≥ 3 & NSS = 0	11.0 (15)	15.9 (227	
DRS ≥ 3 & NSS ≥ 1	49.6 (68)	39.5 (563)	

*Indicates significance at the $p < .05$ value

Table 20. DRS and NSS scores at Time 1 cross-tabulated with social functioning variables, by diagnosis of schizophrenia and mood disorder

DRS and NSS scores at Time 1	Percentage (n)		*p*-value
Patient reports having no confidant (O2a)	**No**	**Yes**	
DRS 0-2 & NSS = 0	38.8 (71)	23.5 (12)	0.15
DRS 0-2 & NSS ≥ 1	21.9 (40)	21.6 (11)	
DRS ≥ 3 & NSS = 0	13.7 (25)	15.7 (8)	
DRS ≥ 3 & NSS ≥ 1	25.7 (47)	39.2 (20)	
Family reports feeling overwhelmed (O2b)			
DRS 0-2 & NSS = 0	44.0 (59)	24.0 (24)	*0.03
DRS 0-2 & NSS ≥ 1	22.4 (30)	21.0 (21)	
DRS ≥ 3 & NSS = 0	9.0 (12)	21.0 (21)	
DRS ≥ 3 & NSS ≥ 1	24.6 (33)	34.0 (34)	
Visit by social relation/family member (O6b)			
DRS 0-2 & NSS = 0	26.8 (15)	38.4 (68)	0.44
DRS 0-2 & NSS ≥ 1	23.2 (13)	20.9 (37)	
DRS ≥ 3 & NSS = 0	17.9 (10)	13.0 (23)	
DRS ≥ 3 & NSS ≥ 1	32.1 (18)	27.7 (49)	
Telephone with social relation/family member (O6c)			
DRS 0-2 & NSS = 0	30.4 (14)	36.7 (69)	0.53
DRS 0-2 & NSS ≥ 1	21.7 (10)	21.8 (41)	
DRS ≥ 3 & NSS = 0	10.9 (5)	14.9 (28)	
DRS ≥ 3 & NSS ≥ 1	37.0 (17)	26.6 (50)	

*Indicates significance at the $p < .05$ value

Table 21. DRS and NSS scores at Time 1 cross-tabulated with social functioning variables, by diagnosis of neither schizophrenia nor mood disorder

DRS and NSS scores at Time 1	Percentage (n)		*p*-value
Patient reports having no confidant (O2a)	**No**	**Yes**	
DRS 0-2 & NSS = 0	40.5 (168)	24.7 (22)	0.10
DRS 0-2 & NSS ≥ 1	17.6 (73)	23.6 (21)	
DRS ≥ 3 & NSS = 0	17.8 (74)	14.6 (13)	
DRS ≥ 3 & NSS ≥ 1	24.1 (100)	37.1 (33)	
Family reports feeling overwhelmed (O2b)			
DRS 0-2 & NSS = 0	41.1 (124)	33 (67)	0.06
DRS 0-2 & NSS ≥ 1	20.2 (61)	16.3 (33)	
DRS ≥ 3 & NSS = 0	15.9 (48)	19.2 (39)	
DRS ≥ 3 & NSS ≥ 1	22.9 (69)	31.5 (64)	
Visit by social relation/family member (O6b)			
DRS 0-2 & NSS = 0	27.6 (21)	39.5 (169)	0.10
DRS 0-2 & NSS ≥ 1	25.0 (19)	17.5 (75)	
DRS ≥ 3 & NSS = 0	14.5 (11)	17.8 (76)	
DRS ≥ 3 & NSS ≥ 1	32.9 (25)	25.2 (108)	
Telephone with social relation/family member (O6c)			
DRS 0-2 & NSS = 0	35.7 (25)	38.0 (164)	0.88
DRS 0-2 & NSS ≥ 1	21.4 (15)	18.1 (78)	
DRS ≥ 3 & NSS = 0	18.6 (13)	17.1 (74)	
DRS ≥ 3 & NSS ≥ 1	24.3 (17)	26.9 (116)	

Table 22. DRS and NSS scores at Time 1 cross-tabulated with treatment modalities [therapy (L3a-d)] and adherence with treatment (L5), by diagnosis of schizophrenia

DRS and NSS scores at Time 1	Percentage (n)		*p*-value
Therapy (L3a-d)	**No**	**Yes**	
DRS 0-2 & NSS = 0	43.8 (157)	31.6 (192)	*<.0001
DRS 0-2 & NSS ≥ 1	24.0 (86)	24.9 (151)	
DRS ≥ 3 & NSS = 0	15.6 (56)	13.2 (80)	
DRS ≥ 3 & NSS ≥ 1	16.5 (59)	30.3 (184)	
Adherence with treatment (L5)			
DRS 0-2 & NSS = 0	30.7 (54)	37.4 (295)	0.11
DRS 0-2 & NSS ≥ 1	29.6 (52)	23.5 (185)	
DRS ≥ 3 & NSS = 0	11.4 (20)	14.7 (116)	
DRS ≥ 3 & NSS ≥ 1	28.4 (50)	24.5 (193)	

*Indicates significance at the p < .05 value

Table 23. DRS and NSS scores at Time 1 cross-tabulated with treatment modalities [therapy (L3a-d)] and adherence with treatment (L5) by diagnosis of mood disorder

DRS and NSS scores at Time 1	Percentage (n)		*p*-value
Therapy (L3a-d)	**No**	**Yes**	
DRS 0-2 & NSS = 0	34.1 (124)	28.4(340)	*0.001
DRS 0-2 & NSS ≥ 1	18.1 (66)	13.3 (159)	
DRS ≥ 3 & NSS = 0	15.7 (57)	15.4 (185)	
DRS ≥ 3 & NSS ≥ 1	32.1 (117)	42.9 (514)	
Adherence with treatment (L5)			
DRS 0-2 & NSS = 0	27.2 (40)	30.0 (424)	0.53
DRS 0-2 & NSS ≥ 1	18.4 (27)	14.0 (198)	
DRS ≥ 3 & NSS = 0	15.7 (23)	15.5 (219)	
DRS ≥ 3 & NSS ≥ 1	38.8 (57)	40.6 (574)	

*Indicates significance at the $p < .05$ value

Table 24. DRS and NSS scores at Time 1 cross-tabulated with treatment modalities [therapy (L3a-d)] and adherence with treatment (L5), by diagnosis of schizophrenia and mood disorder

DRS and NSS scores at Time 1	Percentage (n)		*p*-value
Therapy (L3a-d)	**No**	**Yes**	
DRS 0-2 & NSS = 0	43.6 (34)	31.4 (49)	*0.006
DRS 0-2 & NSS ≥ 1	29.5 (23)	18.0 (28)	
DRS ≥ 3 & NSS = 0	10.3 (8)	16.0 (25)	
DRS ≥ 3 & NSS ≥ 1	16.7 (13)	34.6 (54)	
Adherence with treatment (L5)			
DRS 0-2 & NSS = 0	24.0 (12)	38.6 (71)	0.12
DRS 0-2 & NSS ≥ 1	20.0 (10)	22.3 (41)	
DRS ≥ 3 & NSS = 0	22.0 (11)	12.0 (22)	
DRS ≥ 3 & NSS ≥ 1	34.0 (17)	27.2 (50)	

*Indicates significance at the $p < .05$ value

Table 25. DRS and NSS scores at Time 1 cross-tabulated with treatment modalities [therapy (L3a-d)] and adherence with treatment (L5), by diagnosis of neither schizophrenia nor mood disorder

DRS and NSS scores at Time 1	Percentage (n)		*p*-value
Therapy (L3a-d)	**No**	**Yes**	
DRS 0-2 & NSS = 0	42.0 (58)	36.2 (133)	*0.02
DRS 0-2 & NSS ≥ 1	13.0 (18)	20.7 (76)	
DRS ≥ 3 & NSS = 0	23.2 (32)	15.0 (55)	
DRS ≥ 3 & NSS ≥ 1	21.7 (30)	28.1 (103)	
Adherence with treatment (L5)			
DRS 0-2 & NSS = 0	24.1 (14)	39.6 (177)	*0.03
DRS 0-2 & NSS ≥ 1	19.0 (11)	18.6 (83)	
DRS ≥ 3 & NSS = 0	29.3 (17)	15.7 (70)	
DRS ≥ 3 & NSS ≥ 1	27.6 (16)	26.2 (117)	

*Indicates significance at the $p < .05$ value

Table 26. DRS and NSS scores at Time 1 cross-tabulated with medication refusal (K2), atypical antipsychotic medications, typical antipsychotic medications, and both atypical and typical antipsychotic medications, by diagnosis of schizophrenia

DRS and NSS scores at Time 1	Percentage (n)		*p*-value
Medication refusal (K2)	**No**	**Yes**	
DRS 0-2 & NSS = 0	38.6 (306)	25.0 (43)	*0.006
DRS 0-2 & NSS ≥ 1	23.2 (184)	30.8 (53)	
DRS ≥ 3 & NSS = 0	13.4 (106)	17.4 (30)	
DRS ≥ 3 & NSS ≥ 1	24.8 (196)	26.7 (46)	
Atypical antipsychotic medication			
DRS 0-2 & NSS = 0	42.9 (190)	30.5 (159)	*<.0001
DRS 0-2 & NSS ≥ 1	21.4 (95)	27.2 (142)	
DRS ≥ 3 & NSS = 0	16.5 (73)	12.1 (63)	
DRS ≥ 3 & NSS ≥ 1	19.2 (85)	30.3 (158)	
Typical antipsychotic medication			
DRS 0-2 & NSS = 0	37.2 (309)	29.6 (40)	0.20
DRS 0-2 & NSS ≥ 1	23.5 (195)	31.1 (42)	
DRS ≥ 3 & NSS = 0	14.2 (118)	13.3 (18)	
DRS ≥ 3 & NSS ≥ 1	25.1 (208)	25.9 (35)	
Both atypical and typical antipsychotic medication			
DRS 0-2 & NSS = 0	43.0 (177)	26.0 (27)	*0.005
DRS 0-2 & NSS ≥ 1	20.6 (85)	30.8 (32)	
DRS ≥ 3 & NSS = 0	17.2 (71)	15.4 (16)	
DRS ≥ 3 & NSS ≥ 1	19.2 (79)	27.9 (29)	

*Indicates significance at the $p < .05$ value

Table 27. DRS and NSS scores at Time 1 cross-tabulated with medication refusal (K2), atypical antipsychotic medications, typical antipsychotic medications, and both atypical and typical antipsychotic medications, by diagnosis of mood disorder

DRS and NSS scores at Time 1	Percentage (n)		*p*-value
Medication refusal (K2)	**No**	**Yes**	
DRS 0-2 & NSS = 0	29.5 (421)	30.9 (42)	0.40
DRS 0-2 & NSS ≥ 1	14.7 (209)	11.8 (16)	
DRS ≥ 3 & NSS = 0	15.1 (215)	19.9 (27)	
DRS ≥ 3 & NSS ≥ 1	40.7 (580)	37.5 (51)	
Atypical antipsychotic medication			
DRS 0-2 & NSS = 0	31.4 (324)	26.4 (140)	0.22
DRS 0-2 & NSS ≥ 1	13.9 (143)	15.5 (82)	
DRS ≥ 3 & NSS = 0	14.9 (154)	16.6 (88)	
DRS ≥ 3 & NSS ≥ 1	39.8 (411)	41.5 (220)	
Typical antipsychotic medication			
DRS 0-2 & NSS = 0	29.8 (445)	28.8 (19)	0.99
DRS 0-2 & NSS ≥ 1	14.4 (216)	13.6 (9)	
DRS ≥ 3 & NSS = 0	15.4 (231)	16.7 (11)	
DRS ≥ 3 & NSS ≥ 1	40.4 (604)	40.9 (27)	
Both atypical and typical antipsychotic medication			
DRS 0-2 & NSS = 0	31.2 (314)	23.1 (9)	0.64
DRS 0-2 & NSS ≥ 1	13.8 (139)	12.8 (5)	
DRS ≥ 3 & NSS = 0	15.0 (151)	20.5 (8)	
DRS ≥ 3 & NSS ≥ 1	39.9 (401)	43.6 (17)	

*Indicates significance at the $p < .05$ value

Table 28. DRS and NSS scores at Time 1 cross-tabulated with medication refusal (K2), atypical antipsychotic medications, typical antipsychotic medications, and both atypical and typical antipsychotic medications, by diagnosis of schizophrenia and mood disorder

DRS and NSS scores at Time 1	Percentage (n)		*p*-value
Medication refusal (K2)	**No**	**Yes**	
DRS 0-2 & NSS = 0	37.9 (69)	26.9 (14)	*0.005
DRS 0-2 & NSS ≥ 1	25.3 (46)	9.6 (5)	
DRS ≥ 3 & NSS = 0	11.5 (21)	23.1 (12)	
DRS ≥ 3 & NSS ≥ 1	25.3 (46)	40.4 (21)	
Atypical antipsychotic medication			
DRS 0-2 & NSS = 0	33.3 (37)	37.4 (46)	0.57
DRS 0-2 & NSS ≥ 1	24.3 (27)	119.5 (24)	
DRS ≥ 3 & NSS = 0	16.2 (18)	12.2 (15)	
DRS ≥ 3 & NSS ≥ 1	26.1 (29)	30.9 (38)	
Typical antipsychotic medication			
DRS 0-2 & NSS = 0	35.3 (73)	37.0 (10)	0.74
DRS 0-2 & NSS ≥ 1	21.3 (44)	25.9 (7)	
DRS ≥ 3 & NSS = 0	15.0 (31)	7.4 (2)	
DRS ≥ 3 & NSS ≥ 1	28.5 (59)	29.6 (8)	
Both atypical and typical antipsychotic medication			
DRS 0-2 & NSS = 0	34.2 (36)	42.9 (9)	0.62
DRS 0-2 & NSS ≥ 1	21.9 (23)	14.3 (3)	
DRS ≥ 3 & NSS = 0	17.1 (18)	9.5 (2)	
DRS ≥ 3 & NSS ≥ 1	26.7 (28)	33.3 (7)	

*Indicates significance at the $p < .05$ value

Table 29. DRS and NSS scores at Time 1 cross-tabulated with medication refusal (K2), atypical antipsychotic medications, typical antipsychotic medications, and both atypical and typical antipsychotic medications, by diagnosis of neither schizophrenia nor mood disorder

DRS and NSS scores at Time 1	Percentage (n)		*p*-value
Medication refusal (K2)	**No**	**Yes**	
DRS 0-2 & NSS = 0	38.8 (178)	25.0 (10)	*0.05
DRS 0-2 & NSS ≥ 1	18.5 (85)	17.5 (7)	
DRS ≥ 3 & NSS = 0	15.9 (73)	32.5 (13)	
DRS ≥ 3 & NSS ≥ 1	26.8 (123)	25.0 (10)	
Atypical antipsychotic medication			
DRS 0-2 & NSS = 0	40.5 (142)	31.8 (49)	0.31
DRS 0-2 & NSS ≥ 1	18.0 (63)	20.1 (31)	
DRS ≥ 3 & NSS = 0	16.8 (59)	18.2 (28)	
DRS ≥ 3 & NSS ≥ 1	24.8 (87)	29.9 (46)	
Typical antipsychotic medication			
DRS 0-2 & NSS = 0	37.9 (177)	36.8 (14)	0.11
DRS 0-2 & NSS ≥ 1	18.4 (86)	21.1 (8)	
DRS ≥ 3 & NSS = 0	16.3 (76)	29.0 (11)	
DRS ≥ 3 & NSS ≥ 1	27.4 (128)	13.2 (5)	
Both atypical and typical antipsychotic medication			
DRS 0-2 & NSS = 0	40.9 (137)	40.9 (9)	0.57
DRS 0-2 & NSS ≥ 1	17.9 (60)	22.7 (5)	
DRS ≥ 3 & NSS = 0	15.8 (53)	22.7 (5)	
DRS ≥ 3 & NSS ≥ 1	25.4 (85)	13.6 (3)	

*Indicates significance at the $p < .05$ value

Table 30. DRS and NSS scores at Time 1 cross-tabulated with insight (B2), by the 4 diagnostic groups

DRS and NSS scores at Time 1	Percentage (n)			*p*-value
Szp	**Full**	**Limited**	**None**	
DRS 0-2 & NSS = 0	59.6 (59)	32.6 (182)	35.2 (108)	*0.0001
DRS 0-2 & NSS ≥ 1	16.2 (16)	25.4 (142)	25.7 (79)	
DRS ≥ 3 & NSS = 0	8.1 (8)	15.7 (88)	13.0 (40)	
DRS ≥ 3 & NSS ≥ 1	16.2 (16)	26.3 (147)	26.1 (80)	
Mood				
DRS 0-2 & NSS = 0	33.2 (211)	27.2 (219)	28.1 (34)	*0.005
DRS 0-2 & NSS ≥ 1	13.7 (87)	15.5 (125)	10.7 (13)	
DRS ≥ 3 & NSS = 0	14.0 (89)	15.0 (121)	26.5 (32)	
DRS ≥ 3 & NSS ≥ 1	39.1 (248)	42.2 (340)	34.7 (42)	
Both szp and mood				
DRS 0-2 & NSS = 0	43.2 (19)	34.0 (51)	32.5 (13)	0.51
DRS 0-2 & NSS ≥ 1	25.0 (11)	20.7 (31)	22.5 (9)	
DRS ≥ 3 & NSS = 0	15.9 (7)	12.7 (19)	17.5 (7)	
DRS ≥ 3 & NSS ≥ 1	15.9 (7)	32.7 (49)	27.5 (11)	
Neither szp nor mood				
DRS 0-2 & NSS = 0	44.3 (66)	35.1 (97)	35.0 (28)	*0.0003
DRS 0-2 & NSS ≥ 1	14.8 (22)	17.4 (48)	30.0 (24)	
DRS ≥ 3 & NSS = 0	18.8 (28)	14.5 (40)	23.8 (19)	
DRS ≥ 3 & NSS ≥ 1	22.2 (33)	33.0 (91)	11.3 (9)	

Szp = schizophrenia
*Indicates significance at the $p < .05$ value

Table 31. DRS and NSS scores at Time 1 cross-tabulated with Cognitive Performance Scale (CPS 0-3), by the 4 diagnostic groups

DRS and NSS scores at Time 1	Percentage (n)				*p*-value
Szp	**0**	**1**	**2**	**3**	
DRS 0-2 & NSS = 0	42.4 (171)	36.3 (103)	23.6 (17)	28.4 (58)	*0.005
DRS 0-2 & NSS ≥ 1	23.8 (96)	24.3 (69)	23.6 (17)	27.0 (55)	
DRS ≥ 3 & NSS = 0	14.1 (57)	13.7 (39)	19.4 (26)	12.8 (26)	
DRS ≥ 3 & NSS ≥ 1	19.6 (79)	25.7 (73)	33.3 (24)	31.9 (65)	
Mood					
DRS 0-2 & NSS = 0	31.6 (343)	25.6 (76)	31.2 (19)	22.0 (26)	*0.007
DRS 0-2 & NSS ≥ 1	13.8 (150)	12.5 (37)	18.0 (11)	22.9 (27)	
DRS ≥ 3 & NSS = 0	15.6 (169)	13.8 (41)	11.5 (7)	21.2 (25)	
DRS ≥ 3 & NSS ≥ 1	39.0 (424)	48.2 (143)	39.3 (24)	33.9 (40)	
Both szp and mood					
DRS 0-2 & NSS = 0	39.2 (40)	34.4 (22)	31.8 (7)	30.4 (14)	0.72
DRS 0-2 & NSS ≥ 1	20.6 (21)	18.8 (12)	36.4 (8)	21.7 (10)	
DRS ≥ 3 & NSS = 0	14.7 (15)	17.2 (11)	4.6 (1)	13.0 (6)	
DRS ≥ 3 & NSS ≥ 1	25.5 (26)	29.7 (19)	27.3 (6)	34.8 (16)	
Neither szp nor mood					
DRS 0-2 & NSS = 0	37.0 (110)	33.3 (24)	48.2 (13)	40.4 (44)	*0.02
DRS 0-2 & NSS ≥ 1	17.5 (52)	11.1 (8)	18.5 (5)	26.6 (29)	
DRS ≥ 3 & NSS = 0	16.8 (50)	19.4 (14)	7.4 (2)	19.3 (21)	
DRS ≥ 3 & NSS ≥ 1	28.6 (85)	36.1 (26)	25.9 (7)	13.8 (15)	

Szp = schizophrenia
*Indicates significance at the $p < .05$ value

Table 32. Improvement of DRS and NSS scores by the four diagnostic groups

Improvement of DRS and NSS scores	Percentage (n)		*p*-value
	No	**Yes**	
Szp	41.9 (106)	58.1 (147)	0.24
Mood	35.0 (167)	65.0 (310)	
Both Szp and mood	31.9 (22)	68.1 (47)	
Neither szp nor mood	38.0 (41)	62.0 (67)	

Szp = schizophrenia

Table 33. Improvement of DRS and NSS scores cross-tabulated with age group, by the four diagnostic groups

Improvement of DRS and NSS scores	Percentage (n)		*p*-value
	Early onset	**Adult onset**	
Szp			
No	40.0 (16)	42.8 (85)	0.81
Yes	60.0 (24)	57.9 (117)	
Mood			
No	29.3 (12)	37.2 (146)	0.31
Yes	70.7 (29)	62.8 (246)	
Both Szp and mood			
No	33.3 (3)	31.5 (17)	0.91
Yes	66.7 (6)	68.5 (37)	
Neither szp nor mood			
No	40.0 (4)	41.1 (30)	0.95
Yes	60.0 (6)	58.9 (43)	

Szp = schizophrenia

Table 34. Improvement of DRS and NSS scores cross-tabulated with number of recent psychiatric admissions, by the four diagnostic groups

Improvement of DRS and NSS scores	Percentage (n)			*p*-value
	0[1]	**1**[2]	**2**[3]	
Szp				
No	37.8 (37)	42.9 (42)	47.4 (27)	0.49
Yes	62.2 (61)	57.1 (56)	52.6 (30)	
Mood				
No	30.5 (75)	38.6 (61)	42.5 (31)	*0.09
Yes	69.5 (171)	61.4 (97)	57.5 (42)	
Both Szp and mood				
No	36.4 (8)	26.5 (9)	38.5 (5)	0.63
Yes	63.6 (14)	73.5 (25)	61.5 (8)	
Neither szp nor mood				
No	38.6 (22)	32.3 (10)	45.0 (9)	0.65
Yes	61.4 (35)	67.7 (21)	55.0 (11)	

Szp = schizophrenia
*Indicates significance at the $p < .05$ value
1 = no recent psychiatric admission
2 = 1-2 recent psychiatric admission
3 = 3 or more recent psychiatric admissions

Table 35. Improvement of DRS and NSS scores cross-tabulated with age at first hospitalization, by the four diagnostic groups

Improvement of DRS and NSS scores	Percentage (n)					*p*-value
	0-14	**15-24**	**25-44**	**45-54**	**65+**	
Szp						
No	66.7 (16)	41.9 (49)	28.9 (26)	62.5 (10)	83.3 (5)	*0.0007
Yes	33.3 (16)	58.1 (68)	71.1 (64)	37.5 (6)	16.7 (1)	
Mood						
No	36.4 (24)	40.4 (44)	33.5 (63)	29.0 (27)	42.9 (9)	0.46
Yes	63.6 (42)	59.6 (65)	66.5 (125)	71.0 (66)	57.1 (12)	
Both Szp and mood						
No	100.0 (6)	30.8 (8)	20.7 (6)2	8.6 (2)	0.0 (0)	*0.005
Yes	0.0 (0)	69.2 (18)	79.3 (23)	71.4 (5)	100.0 (1)	
Neither szp nor mood						
No	40.0 (4)	51.6 (16)	25.6 (10)	26.7 (4)	53.9 (7)	0.13
Yes	60.0 (6)4	8.4 (15)	74.4 (29)	73.3 (11)	46.2 (6)	

Szp = schizophrenia
*Indicates significance at the p < .05 value

Table 36. Improvement of DRS and NSS scores cross-tabulated with patient reports having no confidant (O2a), by the four diagnostic groups

Improvement of DRS and NSS scores	Percentage (n)		*p*-value
	No	**Yes**	
Szp			
No	41.2 (80)	44.1 (26)	0.70
Yes	58.8 (114)	55.9 (33)	
Mood			
No	32.9 (114)	40.8 (53)	0.11
Yes	67.2 (233)	59.2 (77)	
Both Szp and mood			
No	27.7 (13)	40.9 (9)	0.27
Yes	72.3 (34)	59.1 (13)	
Neither szp nor mood			
No	37.5 (33)	40.0 (8)	0.84
Yes	62.5 (55)	60.0 (12)	

Szp = schizophrenia

Table 37. Improvement of DRS and NSS scores cross-tabulated with current in-patient status (A3), by the four diagnostic groups

Improvement of DRS and NSS scores	Percentage (n)		*p*-value
Szp	**Voluntary**	**Involuntary**	
No	28.9 (24)	48.2 (82)	*0.004
Yes	71.1 (59)	51.8 (88)	
Mood			
No	33.1 (90)	37.8 (77)	0.29
Yes	66.9 (182)	62.3 (127)	
Both szp and mood			
No	35.7 (10)	29.3 (12)	0.57
Yes	64.3 (18)	70.7 (29)	
Neither szp nor mood			
No	40.0 (26)	33.3 (14)	0.49
Yes	60.0 (39)	66.7 (28)	

Szp = schizophrenia
*Indicates significance at the $p < .05$ value

Table 38. Improvement of DRS and NSS scores cross-tabulated with current patient type (Q5), by the four diagnostic groups

Improvement of DRS and NSS scores	Percentage (n)				*p*-value
Szp	**Acute**	**Longer-term**	**Geriatric Psychiatry**	**Forensinc**	
No	39.8 (78)	47.6 (20)	60.0 (3)	50.0 (5)	0.60
Yes	60.2 (118)	52.4 (22)	40.0 (2)	50.0 (5)	
Mood					
No	35.8 (150)	23.4 (11)	60.0 (6)	0.0 (0)	0.10
Yes	64.2 (269)	76.6 (36)	40.0 (4)	100.0 (1)	
Both szp and mood					
No	25.9 (14)	45.5 (5)	100.0 (1)	66.7 (2)	0.13
Yes	74.1 (40)	54.6 (6)	0.0 (0)	33.3 (1)	
Neither szp nor mood					
No	37.8 (28)	30.0 (6)	46.2 (6)	100.0 (1)	0.47
Yes	62.2 (46)	70.0 (14)	53.9 (7)	0.0 (0)	

Szp = schizophrenia

Table 39. Improvement of DRS and NSS scores cross-tabulated with insight (B2), by the four diagnostic groups

Improvement of DRS and NSS scores	Percentage (n)			*p*-value
Szp	**Full**	**Limited**	**None**	
No	50.0 (8)	40.5 (60)	42.7 (38)	0.75
Yes	50.0 (8)	59.5 (88)	57.3 (51)	
Mood				
No	33.0 (66)	34.6 (84)	50.0 (17)	0.15
Yes	67.0 (134)	65.4 (159)	50.0 (17)	
Both szp and mood				
No	41.7 (5)	27.9 (12)	35.7 (5)	0.63
Yes	58.3 (7)	72.1 (31)	64.3 (9)	
Neither szp nor mood				
No	35.3 (12)	33.9 (20)	60.0 (9)	0.16
Yes	64.7 (22)	66.1 (39)	40.0 (6)	

Szp = schizophrenia

Table 40. Improvement of DRS and NSS scores cross-tabulated with discharge readiness (P2b[1]), by the four diagnostic groups

Improvement of DRS and NSS scores	Percentage (n)		*p*-value
Szp	**No**	**Yes**	
No	47.7 (51)	37.7 (55)	0.11
Yes	52.3 (56)	62.3 (91)	
Mood			
No	63.9 (57)	34.5 (110)	0.73
Yes	63.9 (101)	65.5 (209)	
Both szp and mood			
No	40.0 (12)	25.6 (10)	0.20
Yes	60.0 (18)	74.4 (29)	
Neither szp nor mood			
No	45.5 (15)	34.7 (26)	0.29
Yes	54.6 (18)	65.3 (49)	

[1]P2b = Patient has a support person who is positive towards discharge/maintaining residence in the community
Szp = schizophrenia

Table 41. Improvement of DRS and NSS scores cross-tabulated with medication refusal (K2), by the four diagnostic groups

Improvement of DRS and NSS scores	Percentage (n)		*p*-value
Szp	**No**	**Yes**	
No	38.7 (77)	52.8 (28)	*0.06
Yes	61.3 (122)	47.2 (25)	
Mood			
No	34.7 (153)	28.9 (14)	0.61
Yes	65.3 (288)	61.1 (22)	
Both szp and mood			
No	29.4 (15)	38.9 (7)	0.46
Yes	70.6 (36)	61.1 (11)	
Neither szp nor mood			
No	38.4 (38)	33.3 (3)	0.77
Yes	61.6 (61)	66.7 (6)	

Szp = schizophrenia
*Indicates significance at the $p < .05$ value

Table 42. Improvement of DRS and NSS scores cross-tabulated with atypical antipsychotic medications, by the four diagnostic groups

Improvement of DRS and NSS scores	Percentage (n)		*p*-value
Szp	**No**	**Yes**	
No	55.1 (70)	28.6 (36)	**<.0001
Yes	44.9 (57)	71.4 (90)	
Mood			
No	36.0 (129)	31.9 (38)	0.42
Yes	64.0 (229)	68.1 (81)	
Both szp and mood			
No	45.0 (18)	13.8 (4)	*0.006
Yes	55.0 (22)	86.2 (25)	
Neither szp nor mood			
No	34.7 (26)	45.5 (15)	0.29
Yes	65.3 (49)	54.6 (18)	

Szp = schizophrenia
*Indicates significance at the p < .05 value
*Indicates significance at the p < .0001 value

Table 43. Improvement of DRS and NSS scores cross-tabulated with typical antipsychotic medications, by the four diagnostic groups

Improvement of DRS and NSS scores	Percentage (n)		*p*-value
Szp	**No**	**Yes**	
No	44.4 (96)	27.0 (10)	*0.05
Yes	55.6 (120)	73.0 (27)	
Mood			
No	35.0 (164)	33.3 (3)	0.92
Yes	65.0 (304)	66.7 (6)	
Both szp and mood			
No	33.3 (21)	16.7 (1)	0.40
Yes	66.7 (42)	83.3 (5)	
Neither szp nor mood			
No	36.3 (37)	66.7 (4)	0.14
Yes	63.7 (65)	33.3 (2)	

Szp = schizophrenia
*Indicates significance at the $p < .05$ value

Table 44. Improvement of DRS and NSS scores cross-tabulated with both typical and atypical antipsychotic medications, by the four diagnostic groups

Improvement of DRS and NSS scores	Percentage (n)		*p*-value
Szp	**No**	**Yes**	
No	57.5 (69)	30.0 (9)	*0.007
Yes	42.5 (51)	70.0 (21)	
Mood			
No	36.1 (128)	33.3 (2)	0.89
Yes	63.9 (227)	66.7 (4)	
Both szp and mood			
No	44.7 (17)	0.0 (0)	*0.08
Yes	55.3 (21)	100.0 (4)	
Neither szp nor mood			
No	35.6 (26)	100.0 (4)	*0.01
Yes	64.4 (47)	0.0 (0)	

Szp = schizophrenia
*Indicates significance at the $p < .05$ value

Table 45. Improvement of DRS and NSS scores cross-tabulated with therapy (L3a-d = Individual therapy, group therapy, family therapy, and self-help group), by the four diagnostic groups

Improvement of DRS and NSS scores	Percentage (n)		*p*-value
Szp	**No**	**Yes**	
No	52.4 (44)	36.7 (62)	*0.02
Yes	47.6 (40)	63.3 (107)	
Mood			
No	34.2 (40)	35.3 (127)	0.83
Yes	65.8 (77)	64.7 (233)	
Both szp and mood			
No	30.0 (6)	32.7 (16)	0.83
Yes	70.0 (14)	67.4 (33)	
Neither szp nor mood			
No	29.2 (7)	40.5 (34)	0.31
Yes	70.8 (17)	59.5 (50)	

Szp = schizophrenia
*Indicates significance at the $p < .05$ value

Table 46. Logistic regression model #1 for improvement of DRS and NSS scores

Variables	Parameter estimate (SE)	p-value	OR (CI)
Intercept	0.93 (0.16)	**<.0001	
Szp[1]	-0.59 (0.21)	*0.006	0.56 (0.37-0.84)
Number of recent psychiatric admissions (DD1)[2]	-0.23 (0.11)	*0.04	0.80 (0.64-0.99)
Patient reports having no confidant[3]	-0.34 (0.19)	0.07	0.71 (0.49-1.03)
Insight (B2)[4]	-0.26 (0.13)	*0.05	0.77 (0.59-1.00)
Both typical and atypical antipsychotic medications[5]	0.81 (0.36)	*0.02	2.24 (1.12-4.50)

Model fit: $x^2 = 9.61$ $df = 8$ Hosmer-Lemeshow $p = 0.29$

Szp = schizophrenia
1 = schizophrenia was coded as a dummy variable (compared to the other three diagnostic groups: mood disorders, both schizophrenia and mood disorders, and neither schizophrenia nor a mood disorder)
2 = “number of recent psychiatric admissions” item was coded as a categorical variable: zero recent psychiatric vs. 1 or more recent psychiatric admission
3 = “patient reports having no confidant” item was coded as a categorical variable: no vs. yes
4 = “insight into mental health” item was coded as a categorical variable: no insight vs. some insight
5 = this was coded as a categorical variable (patients who were taking a combination of both typical and atypical antipsychotic medications were compared to those who were taking typical antipsychotic medications only)
*Indicates significance at the $p < .05$ level
**Indicates significance at the $p < .0001$ level

Table 47. Logistic regression model #2 for improvement of DRS and NSS scores

Variables	Parameter estimate (SE)	p-value	OR (CI)
Intercept	0.86 (0.15)	**<.0001	
Szp[1]	-0.57 (0.21)	*0.007	0.57 (0.37-0.85)
Number of recent psychiatric admissions (DD1)[2]	-0.25 (0.11)	*0.03	0.78 (0.63-0.97)
Insight (B2)[3]	-0.27 (0.13)	*0.04	0.76 (0.59-0.99)
Both typical and atypical antipsychotic medications[4]	0.84 (0.35)	*0.02	2.31 (1.15-4.63)

Model fit: $x^2 = 3.31$ $df = 6$ Hosmer-Lemeshow $p = 0.77$

Szp = schizophrenia
1 = schizophrenia was coded as a dummy variable (compared to the other three diagnostic groups: mood disorders, both schizophrenia and mood disorders, and neither schizophrenia nor a mood disorder)
2 = "number of recent psychiatric admissions" item was coded as a categorical variable: zero recent psychiatric vs. 1 or more recent psychiatric admission
3 = "insight into mental health" item was coded as a categorical variable: no insight vs. some insight
4 = this was coded as a categorical variable (patients who were taking a combination of both typical and atypical antipsychotic medications were compared to those who were taking typical antipsychotic medications only)
*Indicates significance at the $p < .05$ level
**Indicates significance at the $p < .0001$ level

Appendix 1. Examples of common depressive symptoms, negative symptoms, and extrapyramidal symptoms.

Depressive	Negative	Extrapyramidal
Social withdrawal	Affective flattening	Involuntary movements
Apathy	Poverty of Speech	Tremors and rigidity
Anhedonia	Loss of drive or interest	Body restlessness
Crying and tearfulness	Anhedonia	Muscle contraction
Negative statements	Reduced interaction	Changes in breathing and heart rate
Persistent anger	Lack of motivation	
Repetitive health complaints		

Appendix 2. Beck Depression Inventory

unavailable

Appendix 3. Geriatric Depression Scale

Geriatric Depression Scale

1. Are you basically satisfied with your life?		Y/N
2. Have you dropped many of your activities and interests?	Y/N	
3. Do you feel that your life is empty?		Y/N
4. Do you often get bored?	Y/N	
5. Are you hopeful about the future?		Y/N
6. Are you bothered by thoughts that you can't get out of your head?		Y/N
7. Are you in good spirits most of the time?		Y/N
8. Are you afraid that something bad is going to happen to you?	Y/N	
9. Do you feel happy most of the time?		Y/N
10. Do you often feel helpless?		Y/N
11. Do you often get restless and fidgety?	Y/N	
12. Do you prefer to stay home rather than go out and doing new things?	Y/N	
13. Do you frequently worry about the future?		Y/N
14. Do you feel you have more problems with memory than most?	Y/N	
15. Do you think it is wonderful to be alive now?	Y/N	
16. Do you often feel downhearted and blue?		Y/N
17. Do you feel pretty worthless the way you are now?		Y/N
18. Do you worry a lot about the past?		Y/N
19. Do you find life very exciting?	Y/N	
20. Is it hard for you to get started on new projects?	Y/N	
21. Do you feel full of energy?		Y/N
22. Do you feel that your situation is hopeless?		Y/N
23. Do you think that most people are better off than you are?		Y/N
24. Do you frequently get upset about little things?	Y/N	
25. Do you frequently feel like crying?		Y/N
26. Do you have trouble concentrating?		Y/N
27. Do you enjoy getting up in the morning?	Y/N	
28. Do you prefer to avoid social gatherings?		Y/N
29. Is it easy for you to make decisions?		Y/N
30. Is your mind as clear as it used to be?	Y/N	

Adapted from Spreen & Strauss (1998). A Compendium of Neuropsychological Tests: Administration, Norms, and Commentary, p. 612.

Appendix 4. Cornell Scale for Depression in Dementia

Cornell Scale for Depression in Dementia

Inpatient Nursing Home Resident Outpatient
Scoring System A = unable to evaluate 0 = absent 1 = mild or intermittent 2 = severe Ratings should be based on symptoms and signs occurring during the week prior to interview. No score should be given in symptoms result from physical disability or illness.

A. Mood-Related Signs

1. Anxiety: anxious expression, ruminations, worrying	A 0 1 2
2. Sadness: sad expression, sad voice, tearfulness	A 0 1 2
3. Lack of reactivity to pleasant events	A 0 1 2
4. Irritability: easily annoyed, short-tempered	A 0 1 2

B. Behavioral Disturbance

5. Agitation: restlessness, handwringing, hairpulling	A 0 1 2
6. Retardation: slow movement, slow speech, slow reactions	A 0 1 2
7. Multiple physical complaints (score 0 if GI symptoms only)	A 0 1 2
8. Loss of interest: less involved in usual activities	A 0 1 2
(score only if change occurred acutely, i.e. in less than 1 month)	

C. Physical Signs

9. Appetite loss: eating less than usual	A 0 1 2
10. Weight loss (score 2 if greater than 5 lb. in 1 month)	A 0 1 2
11. Lack of energy: fatigues easily, unable to sustain activities	A 0 1 2
(score only if change occurred acutely, i.e., in less than 1 month)	

D. Cyclic Functions

12. Diurnal variation of mood: symptoms worse in the morning	A 0 1 2
13. Difficulty falling asleep: later than usual for this individual	A 0 1 2
14. Multiple awakenings during sleep	A 0 1 2
15. Early morning awakening: earlier than usual for this individual	
A 0 1 2	

E. Ideational Disturbance

16. Suicide: feels life is not worth living, has suicidal wishes,	A 0 1 2
or makes suicide attempt	
17. Poor self esteem: self-blame, self-depreciation, feelings of failure	A 0 1 2
18. Pessimism: anticipation of the worst	A 0 1 2
19. Mood congruent delusions: delusions of poverty, illness, or loss	A 0 1 2

Adapted from http://www.emoryhealthcare.org/departments/fuqua/CornellScale.pdf

Appendix 5. Hamilton Rating Scale for Depression

Hamilton Rating Scale for Depression

1. Depressed Mood (Sadness, hopeless, helpless, worthless)	0 1 2 3 4
2. Feelings of Guilt	0 1 2 3 4
3. Suicide	0 1 2 3 4
4. Insomnia Early	0 1 2
5. Insomnia Middle	0 1 2
6. Insomnia Late	0 1 2
7. Work and Activities	0 1 2 3 4
8. Retardation: Psychomotor	0 1 2 3 4
9. Agitation	0 1 2 3 4
10. Anxiety (Psychological)	0 1 2 3 4
11. Anxiety Somatic	0 1 2 3 4
12. Somatic Symptoms (Gastrointestinal)	0 1 2
13. Somatic Symptoms General	0 1 2
14. Genital Symptoms	0 1 2
15. Hypochondriasis	0 1 2 3 4
16. Loss of Weight	0 1 2 3 4
17. Insight	0 1 2

Adapted from www.members.optusnet.com.au/bill54/depresstest.htm

Appendix 6. Depression Rating Scale and Negative Symptom Scale in the *RAI*-MH

A. Depression Rating Scale (DRS)

- Negative statements
- Persistent anger
- Expressions of unrealistic fears
- Repetitive health complaints
- Repetitive anxious complaints
- Facial expression
- Crying or tearfulness.

B. Negative Symptom Scale (NSS)

- Anhedonia
- Loss of interest
- Lack of motivation
- Reduced interaction

Coding for the Scales

- 0 - Indicator not exhibited in last 3 days
- 1 - Indicator not exhibited in last 3 days But is reported to be present
- 2 - Indicator exhibited 1-2 days in last 3 days
- 3 – Indicator exhibited daily in last 3 days

Appendix 7. Sites for the Primary Health Care Transition Fund Project

MHAP[1]	MHQI[2]	Validation[3]
▪ Centre for Addiction and Mental Health ▪ Credit Valley ▪ Grand River Hospital ▪ Grey Bruce Health Services ▪ Homewood Health Centre ▪ North Bay Psychiatric Hospital ▪ Queensway Carleton ▪ Quinte Health Centre ▪ Scarborough General ▪ Timmons and District ▪ Toronto East	▪ Brockville Psychiatric Hospital ▪ Centre for Addiction and Mental Health ▪ Chatham-Kent Mental Health ▪ Grand River Hospital ▪ Grey Bruce Health Services ▪ Homewood Health Centre ▪ Queensway Carleton ▪ Quinte Health Centre ▪ Timmons and District ▪ Toronto East ▪ Whitby Mental Health	▪ Centre for Addiction and Mental Health ▪ Chatham-Kent Mental Health ▪ Grand River Hospital ▪ Grey Bruce Health Services ▪ Homewood Health Centre ▪ North Bay Psychiatric Hospital ▪ Providence CCC ▪ Scarborough General ▪ Timmons and District ▪ Toronto East ▪ Whitby Mental Health

[1] Mental Health Assessment Protocol sub-project in the Primary Health Care Transition Fund.

[2] Mental Health Quality Indicator sub-project in the Primary Health Care Transition Fund.

[3] Derivation and/or validation of outcome measures sub-project in the Primary Health Care Transition Fund.

Appendix 8. List of Antipsychotic Medications Coded in the *RAI*-MH

Atypical

Clozapine
Olanzapine/Zyprexa
Risperidone/Risperdal
Seroquel

Typical

Haldol
Loxapine
Fluphenazine
Perphenazine
Nozinan/Methotrimeprazine
Fluanoxol
Clopixol
Navane
Pimozide/Orap
Triflouperazine/Stelazine
Stemetil
Chlorpromazine

Appendix 9. Resident Assessment Instrument – Mental Health (*RAI*-MH)

This instrument is available on the hard copy of thesis.

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