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A

THE NEUROPSYCHOLOGY OF INSIGHT AND DISTRESS AMONG OUTPATIENTS WITH SCHIZOPHRENIA AND SCHIZOAFFECTIVE DISORDER

by

Bonnie Kathleen Creech

A dissertation submitted to the Graduate Faculty in Psychology in partial fulfillment of the requirements for the degree of Doctor of Philosophy, The City University of New York

2000

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ABSTRACT

THE NEUROPSYCHOLOGY OF INSIGHT AND DISTRESS AMONG OUTPATIENTS WITH SCHIZOPHRENIA AND SCHIZOAFFECTIVE DISORDER

by

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Adviser: Judith Jaeger, Ph.D.

Patients with schizophrenia often show lack of insight into their disease and display a striking lack of distress that seems inappropriate considering the serious, disabling, and incurable illness they have. This project investigated whether impaired insight and inappropriate distress regarding mental illness and its consequences were related to specific neuropsychological (NP) deficits in outpatients with schizophrenia or schizoaffective disorder.

The literature revealed a lack of consensus on the definition, conceptualization, and assessment of insight. An alternative conceptualization was proposed incorporating three distinct mental operations; intellect, volition, and affect. An existing instrument for rating judgment was adapted to encompass these components of insight and provide additional ratings of apparent and reported distress.

It was hypothesized that NP deficits, especially those involving frontal and executive systems, would be associated with impaired insight and inappropriate distress. Associations with psychiatric symptoms, medications and demographic characteristics were also explored.

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The hypothesis was essentially supported, however insight and distress related to NP differently in males than females and among patients with schizophrenia and schizoaffective disorder. The relationship between insight, distress and NP among the schizophrenia subgroup was non-significant, although the ability to detect a relationship was affected by restricted range and confounds with gender differences. In males, insight and apparent distress related to auditory working memory, apparent distress also related to dexterity. In females, insight and apparent distress related to ideational fluency and set-shifting. In schizoaffectives, apparent distress related to ideational fluency, set-shifting, and working memory, while reported distress related to verbal short-term memory. Inappropriate distress related to reduced psychiatric symptoms especially depression, anxiety, guilt, and tension.

NP deficits, especially those relating to executive functions, may play an important role in the poor insight observed in these patients. The findings uncover differences in the relationship between NP and insight as a function of diagnostic subgroup and gender. It is proposed that poor insight may be a result of impairments in intellectual, affective and volitional processes, as well as abnormal integration of these processes, and that the complex interaction of these processes requires intact frontal and executive functioning.

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INTRODUCTION

It is striking that many severely ill psychiatric patients will deny having an illness or appear not to have considered the meaning of mental illness in their lives. This may be seen even among patients who have suffered frightening symptoms of psychosis or repeated losses ranging from important relationships to vocational and educational life roles. Excellent descriptions concerning the phenomenon of poor insight have been available for almost 100 years. Kraepelin (1904), the father of modern scientific psychiatry and discoverer of the distinction between Dementia Praecox (a form of schizophrenia using more conservative criteria than the current diagnosis) and Manic Depressive illness, considered level and type of insight to be diagnostically significant. For example, Kraepelin indicated that full recovery with insight was an exclusion criterion for making a diagnosis of dementia praecox. On the other hand, Manic Depression could be associated with episodes of complete or near complete recovery with insight. In contrast to this emphasis on the diagnostic importance of insight, contemporary research has de-emphasized the diagnostic importance of insight and focused instead on its practical implications, for example the impact of insight on medication compliance. In addition, many studies have been published examining the relationship of insight to other dimensions of psychopathology.

Thus, insight is an important aspect of mental illness for several reasons. First, it may assist us in refining our diagnostic classifications among patients with psychiatric disorders. A second reason for studying insight is that impairments in insight can lead to increased risk to the patient. For example, a patient may attempt to function at a level at which they are incapable without supports in place leading to negative consequences for

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the patient and community. In addition, certain patients with lack of insight tend to refuse treatment, which can lead to increased rehospitalization (Smith et al., 1999; Lysacker et al., 1992; Kemp & David, 1996). In sum, lack of insight is important from scientific, clinical, and societal perspectives.

The Concept of Insight

The concept of insight described most often in the contemporary psychiatric literature entails the patient's acknowledgement that s/he has a mental illness and acceptance of the need for treatment. One important conceptual division is between motivated denial and lack of awareness of having a mental illness due to neuropathological processes. This difference may have both diagnostic and treatment implications

Concepts relating to insight have developed separately in the neurology and neuropsychology literature. For example, the term anosagnosia coined by Babinski (1914) refers to a lack of awareness of a hemiplegia (immobilized limb) following a stroke. It was expanded to encompass lack of awareness of other cognitive dysfunction and was often associated with a phenomenon called anosodiaphoria (lack of concern about the condition). A dissociation between lack of awareness of perceptual deficits (one's external viewpoint) and awareness of deficits relating to the self (one's internal viewpoint) was proposed by Stuss (1991). He posited that damage relating to posterior brain systems produced lack of awareness for perceptual dysfunction, while damage relating to the frontal lobes produced lack of awareness of things pertaining to the self (e.g., impaired social functioning). This may have considerable importance in terms of schizophrenia, as patients seem to have lack of awareness of things pertaining to the self

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(e.g., poor social judgment) along with neuropsychological (NP) deficits relating to the subcortical and frontal lobes.

Because of the different perspectives brought to the phenomenon, it is important to review conceptualizations of insight and awareness across disciplines.

Classical Descriptions of Insight in Psychiatric Disorders

In Dementia Praecox and Paraphrenia (1919), Kraepelin described lack of insight among patients in later stages of dementia praecox as a weakness in judgment (p.190). Describing the patient's view of his own disorder, Kraepelin writes:

> Understanding of the significance of the morbid phenomena is at the same time often very defective. The patient perhaps admits that he has been confused, has been suffering from his nerves, but considers the illness that he has passed through quite harmless, and himself quite well.....Also in other directions a distinct weakness of judgment appears as a rule. The patients have become incapable of taking a general view of more complicated relations, of distinguishing the essential from side issues, of foreseeing the consequences of their own or other people's actions.

His definition of insight and its nosological value is clarified in his discussion of mania patients in Manic Depressive Insanity and Paranoia (1921, p.21-22):

> A clear understanding of the morbidity of the state is as a rule present only in the slightest states of depression; nevertheless here also (referring to delusions among manic patients) it takes on a hypochondriacal colouring with the idea of hopelessness of the malady. Very commonly it is asserted that the disease is a greater torture than any other . . . When the delusions are more pronounced, consciousness of the illness is generally lost, even when former and similar attacks are regarded correctly. . . . In manic states the patients mostly reject with emphasis the suggestion of mental disease. . . At most they allow that they have been rather excited, or make fun of ideas they had afterwards.

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Thus in the manic depressive patient, Kraepelin noted a more rigorous denial and minimization of symptoms associated with the manic cycle of the disease while the depressive cycle was associated with affectively charged judgments about the illness. Regarding a hospitalized patient with hypomania:

> Of this there is no question, even by reminder of former attacks, of which during depression the patient formed a quite correct opinion, he cannot for a moment be convinced of the real nature of his state. On the contrary, he feels himself healthier and more capable than ever. The restriction of his freedom he regards as a bad joke, or as an unpardonable injustice which he connects with the perverse ongoings of his relatives or of persons otherwise inimical to him. (1921, p.55)

The rigorous denial, minimization of symptoms, anger, and blame directed at relatives seen in mania patients, are features which require more intact (albeit misdirected) affective and volitional functioning than is typically seen in patients with dementia praecox. Although Kraepelin did not explicitly state this notion, it makes intuitive sense that volition would be required to carry out the process of thinking through the idea of having a mental illness, and the process of developing and expressing an argument against this idea (however wrong it may be).

For Kraepelin, impaired insight in the dementia praecox patient is a result of loss of intellectual capacity that increasingly impairs the patient's judgment. His observations in the case of the manic patient cited in the previous paragraph, suggest that Kraepelin also recognized a volitional component to the denial of illness. Finally, Kraepelin wrote about an affective aspect to the understanding of impaired insight, as when the patient's accurate characterization of his or her own predicament is accompanied by an inappropriate absence of grief.

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Kraepelin's concept of mental operations centered on an evaluation of the integrity of three distinct factors: intellect, affect, and volition. Through empirical study of the impairments within and among these three spheres of mental operations in thousands of patients over time, Kraepelin was able to differentiate, for the first time, the existence of two distinct psychotic illnesses, dementia praecox and manic depressive insanity. In the case of dementia praecox, all three spheres of emotional life were significantly destroyed at a relatively early age. Manic-depressive patients would suffer dysfunction in some or all of the three spheres over time, but they would usually recover.

This vital distinction still forms the basis of modern psychiatric nosology. However, there are several fundamental differences between Kraepelin's diagnostic concepts and those articulated in the Diagnostic and Statistical Manual-IV Handbook of Differential Diagnosis (First, Francis, and Pincus, 1995). The DSM-IV category of schizophrenia has its historical origins in Kraepelin's dementia praecox, although the diagnostic criteria used are very different. In particular, his concept that mental operations should be studied along three spheres (intellect, volition and affect) has been entirely lost to modern psychopathologists. Diagnostic criteria typically consist of readily observable symptoms and signs, selected with an emphasis on maximizing inter-rater agreement. Furthermore, it should be noted that the diagnosis of "Schizoaffective Disorder" did not exist for Kraepelin. As currently defined, this group probably includes some individuals who would have been diagnosed by Kraepelin as having dementia praecox as well as individuals who would have been diagnosed as suffering from manic-depressive insanity. According to DSM-IV, schizoaffective disorder can be distinguished from schizophrenia on the basis of mood symptoms that are present for a substantial

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portion of the total duration of the active and residual periods of the illness. Thus, it would be reasonable to suppose that individuals with schizoaffective disorder may have more intact insight than those individuals with schizophrenia. It is possible that to the degree that the affective sphere is dysfunctional in schizoaffective disorder (as opposed to its having been completely destroyed in schizophrenia), the patient's ability to gain insight and experience an appropriate level of distress about the impact of mental illness may be somewhat preserved. Relatively few studies of insight have included schizoaffective patients.

Contemporary Views of Insight in Psychiatric Disorders

One contemporary researcher who has revisited the problem of impaired insight in patients with schizophrenia is Joseph McEvoy, has defined insight along the single dimension of impaired judgement (1989):

> "Patients with insight judge some of their perceptual experiences, cognitive processes, emotions, or behaviors to be pathological in a manner that is congruent with the judgment of involved mental health professionals, and that these patients believe that they need mental health treatment, at times including hospitalization and pharmacotherapy."

McEvoy was among the first contemporary investigators to develop a rating scale permitting quantitative study of the phenomenon in psychiatric patients. His measure, the Insight and Treatment Attitudes Questionnaire (ITAQ; 1989), includes 11 items which include the acknowledgment of illness at the time of hospitalization, as well as predictions for post discharge mental problems, need for follow-up treatment, and efficacy of medications. Factor analysis reveals the ITAQ measures one factor that relates to treatment compliance.

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In general, studies using the ITAQ have found no relationship between symptoms, as measured by the Brief Psychiatric Rating Scale (BPRS; Overall and Gorham, 1988), and poor insight. One study revealed a relationship between insight and outcome defined as treatment compliance and rehospitalization rates (McEvoy, 1989). McEvoy et al., (1996) demonstrated relationships between current awareness of illness and neuropsychological test variables such as right-left orientation (Benton and Hamsher, 1976), Block Design (from the Wechler Adult Intelligence Scale Revised; WAIS-R, Wechler, 1981), and number of categories achieved on the Wisconsin Card Sort Test (WCST; Heaton, 1981). Impairments on right-left orientation and block design are generally attributed to parietal lobe dysfunction, while WCST impairments are purported to tap "frontal" executive functions. All three require higher level processing and mental manipulations that may require adequate working memory, a function attributed to the executive system.

A recent study using the ITAQ (Davidoff, Forester, Ghaemi and Bodkin, 1998), sought to examine whether insight impairments are intractable or whether they are amenable to intervention. These investigators interviewed 18 acutely psychotic inpatients using the BPRS at intake. Six weeks later, subjects were randomly assigned to either viewing a videotape of their intake interview, or being shown a "placebo videotape." Patients were re-interviewed within 24 hours of viewing the videotapes, again using the ITAQ and BPRS. Those patients who had viewed themselves during the intake interview showed significantly greater improvement on insight and had reduced delusions as measured by the BPRS. There was no difference between groups in terms of overall psychopathology as measured by the BPRS. It is not known how long this effect

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lasts or whether the patients have the ability to generalize this learning experience to future episodes.

Another contemporary investigator who has studied insight in schizophrenia is David (1990) who proposed a three-dimensional definition of insight based on patient attitudes:

> "Insight is composed of three distinct, overlapping dimensions:
> 1) recognition that one has a mental illness, 2) treatment compliance,
> 3) ability to relabel psychotic events as pathological."

He developed a semi-structured interview, the Schedule to Assess Insight (SAI; David, 1990) to capture these three dimensions. A later version of this instrument, the SAI-E (Scale to Assess Insight-Expanded; Kemp and David, 1996) attempts to broaden the definition of insight to include awareness of change in mental functioning and of the psychosocial consequences of illness. However, these authors have been criticized for failing to properly discern the discrete concepts of psychosis, insight, and treatment compliance while trying to study the effect of one on the other. Using the SAI-E, poor insight was observed both in patients who actively refused medications and those who always accepted it. Poor insight as measured by the SAI-E was found to correlate significantly with severity of negative symptom ratings on the Positive and Negative Syndrome Scale (PANSS; Kay, Opler and Fiszbein, 1986), as well as with illness chronicity and education (MacPherson et al., 1996). The significant correlation of insight ratings with negative symptoms contrasts with McEvoys' observation that these two dimensions were not correlated (1996).

Amador (1991) defined insight as a multidimensional phenomenon which includes the following: 1) awareness of signs, symptoms, and consequences of illness; 2)

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general attribution about illness and specific attribution about symptoms and consequences; 3) self-concept, and; 4) psychological defensiveness. According to Amador (1993), insight can be modality specific (meaning that one can have insight for specific symptoms and not others) and comprises the processes of awareness and attribution. In this conceptualization, awareness is the recognition of signs or symptoms of illness, while attribution refers to explanations about the cause or source of these signs or symptoms.

Presumably based on this concept of insight, Amador constructed his measure of insight, the Scale to Assess Unawareness of Mental Disorder (SUMD; Amador, 1993), which is becoming widely used in studies of insight among psychiatric patients. Amador has indicated (1993) that the scale rests on the following assumptions: 1) insight has a number of component dimensions; 2) assessment must consider the extent to which the views expressed by the patient are consistent with their culture; 3) the component dimensions of insight are continuous rather than dichotomous (partial insight); 4) insight into a mental disorder may be modality-specific; and 5) previous exposure to information regarding the nature of illness must be taken into consideration.

Amador contends that the symptom of delusion can be separated from the process of insight. He notes that patients with fixed delusions can allow that an idea is not shared by others, is implausible, or violates the laws of nature (i.e., have insight about a delusion while nevertheless persisting in a belief that it is true). He also notes that awareness can vary with the particular delusion, as patients can reveal varying degrees of awareness about a delusion while maintaining that other false beliefs are true.

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The SUMD was designed to measure the following dimensions of insight: 1) awareness of illness including general and specific symptoms as measured by the Scale to Assess Positive (SAPS) and the Scale to Assess Negative Symptoms (SANS) (Andreasen, 1981); 2) attribution of illness and symptoms; 3) acknowledgment of the achieved effects of medication; 4) awareness of social consequences of having a mental disorder. Amador separated the SUMD into the following "dimensions": current awareness, current attributions, past awareness, and past attributions. Factor Analysis revealed that current and past seem to be independent dimensions while attribution and awareness of current and past illness were strongly intercorrelated ($r = .55$ and $r = .67$ respectively).

Studies using the SUMD to understand the nature of insight (which he terms awareness), and its relationship to psychopathology have had contradictory results. In general, these studies tend to analyze a multitude of variables using small numbers of patients from mixed diagnostic samples. One study seeking to characterize the prevalence of impaired awareness and its relationship to psychopathology studied a large number of subjects with schizophrenia and schizoaffective disorder, using a brief version of the SUMD (Amador et al., 1994). Results showed that 57% of schizophrenia patients studied (N=221) had moderately to severely impaired awareness into having a mental disorder and that those patients who were "in remission" did not differ from those with acute exacerbation. Among schizophrenia patients, lack of awareness into: having a mental disorder; the social consequences of that disorder; the efficacy of treatment; and of hallucinations and delusions; was significantly correlated with severity of delusions, formal thought disorder, and disorganized behavior as measured by the SAPS and SANS

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(Andreasen, 1981). They found no effect of illness course or number of hospitalizations on insight. Forty-nine subjects with schizoaffective disorder were then compared to the patients with schizophrenia, the two groups did not differ in terms of disability as measured by the Global Assessment Scale (GAS), however schizoaffective patients were significantly more aware of having a mental disorder. Further, patients with schizoaffective disorder were significantly more aware of suffering hallucinations, delusions, anhedonia and asociality than patients with schizophrenia.

In contrast to Amador's findings, Young et al., (1993) found only 29% of their sample of chronic schizophrenic outpatients in long stay facilities had lack of awareness of mental disorder using the SUMD. These patients were quite ill, with 68% experiencing hallucinations at the time. Current lack of awareness was significantly related to average symptom severity. Interestingly, 84% of those patients with lack of awareness could be discriminated from the remainder of the sample using Wisconsin Card Sorting Task (WCST) number of perseverative errors and categories achieved. These are measures of executive functioning. In contrast, WAIS-R Block Design performance, a measure of visual spatial reasoning and constructional praxis, failed to discriminate those having a lack of awareness of mental disorder. These findings support the hypothesis that NP tests of executive functioning thought to tap into abilities requiring frontal functions are related to "self-awareness" while other NP measures are not.

Markova and Berrios (1995) provided an important critique of the insight literature in psychiatry. Their major criticism is that instruments claiming to measure insight were developed without solid conceptual foundation. A result of this is that

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findings among researchers using different measures often conflict. They are particularly critical of Amador pointing out that the empirical definition of insight on which his assessment instrument is based differs from the author's own theoretical definition.

Markova and Berrios raise the following concerns about the insight literature in general: 1) Different terms have been used in the discussion of insight with different meanings and implicating different processes (such as awareness, attribution, denial, etc.). 2) Whether researchers use multidimensional or unitary notions of insight, they tend to focus on awareness of illness or symptoms and need for treatment. (The concept of insight is not defined in the construction of instruments, and if it is, the translation into the empirical definition is not explicitly discussed). 3) Instruments designed to address specific symptoms of particular disorders should not be used (as they have been) to study different psychiatric disorders, but rather should only be used for the patients for whom they were designed. 4) Prior to drawing conclusions from correlational studies using such instruments, further study of the concept of insight is needed.

Markova and Berrios (1992) have studied the concept of insight from a philosophical perspective and proposed a broader conceptualization of insight:

> "A subcategory of self-knowledge, which individuals hold not only about the disorder affecting them but also about how the disorder affects their interaction with the world. By this definition insight is a dynamic process, not a symptom which is either present or absent."

Raven, Mullen and Capstick (1992) criticized the conceptual definition offered by Markova and Berrios as being over-inclusive without offering clinically useful guidelines to the measurement of insight. Markova and Berrios (1992), have published a pilot study using a measure translating their conceptual definition to an empirical one, however, the

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study has many weaknesses and further attempts to refine the measure have not been published to date.

To summarize, contemporary studies of insight in the psychiatric literature have suffered from conceptual confusion which render conclusions about the phenomenon of insight problematic. Beyond the crucial issues of conceptual validity as discussed by Markova and Berrios (1995), another issue emerges in the examination of some of the relationships between poor insight and psychiatric symptoms: The examination of relationships between individual symptoms and insight about those symptoms may not really shed further light on the phenomenon of insight. In the case of delusions, judgment is by definition impaired. That patients begin to question the veracity of some of their delusions during a less acute phase of illness simply indicates that judgment is more impaired when one is more psychotic.

The measurement of insight regarding individual psychopathological symptoms is therefore problematic. The assessment of psychopathology involves the examination of both signs (which are by definition observable to the clinician) and symptoms (which by definition require patient self-report since they cannot be directly observed). Thus, awareness of symptoms is necessary for the patient to report them to the examiner. For this reason, the evaluation of awareness of symptoms cannot take place independently of the determination of the presence of those symptoms. Despite these difficulties, one interesting finding from examining the relationship between specific symptoms and insight using the SUMD (Amador, 1994), is that patients with schizophrenia, who typically have very poor insight, generally do not deny all of their symptoms. This supports the distinction between impaired insight and denial of illness motivated by some

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kind of gain (e.g., maintaining a healthy self-concept or promoting a healthy image to others). In addition, bipolar patients appear to distinguish themselves from schizophrenia patients by minimizing the symptoms they do acknowledge

Several important questions about insight remain unanswered. Why do some patients have impaired insight into the impact of their illness on their lives? How does this impaired insight impact their illness and treatment? Is insight a valid prognostic indicator? Are there qualitative differences in the presentation of lack of insight by different diagnostic groups? If so, can these differences aid us in improving nosology?

Surprisingly, no studies were found in the psychiatric literature that attempted to measure the affective response to having a mental illness and its consequences, or that discussed distress in relation to insight.

The Interface Between Neurology and Psychiatry

Studies of impaired insight in brain-damaged patients may provide some methodological or conceptual direction for studies of insight in psychiatric disorder. "Anosognosia," a syndrome first observed and named by Babinski (1914), is one particular manifestation of impaired insight into illness seen in neurologic patients. Babinski defined anosognosia as the lack of knowledge, awareness, or recognition of disease observed among patients with hemiplegia attributable to stroke. Much contemporary neuropsychological research has been focused on determining the etiology of anosognosia. Such models may be useful for generating hypotheses about the etiology of impaired insight among patients with schizophrenia.

Prigitano and Schacter (1991) view anosognosia as a "symptom of a brain lesion disrupting a single set of cognitive activities within a circumscribed domain." They

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argue against the psychoanalytic view of anosognosia as a defense mechanism. Instead, they emphasize that anosognosia relates to a highly selective cognitive disorder, in which a patient can be agnosic for one deficit and not another. They base this argument on the observation that anosognosia often relates to functions ascribed to one side of the brain and not the other (e.g., a patient can be aware of deficits associated with non-verbal behaviors and unaware of deficits associated with verbal behaviors). They have also observed patients who are fully aware of their impairments due to lesions involving motor or primary sensory pathways while unaware of deficits involving higher cognitive functions. Another observation in support of the existence of true lack of awareness of deficit (distinguishable from motivated denial) is that impaired insight among brain injured patients, usually begins to resolve early in the course of illness (Altman, 1996). When confronted, such patients usually suffer "a combination of indifference, confusion, and bewilderment," as opposed to patients who are further along in the rehabilitation phase and are suspected of motivated denial who become increasingly agitated to questioning.

In general, anosognosia is thought to result from a dysfunction of integrative cortical areas (e.g., parietal and frontal lobes) underlying multi-modal information processing. For example, lesions of the parietal lobe can produce unilateral neglect of visual, auditory, and somatosensory stimulation on the side of the body and/or space opposite the lesion. Neglect has also been observed in patients with lesions to the frontal lobe including cingulate cortex, as well as subcortically in the superior colliculus and lateral hypothalamus, which underlie higher–level sensory-motor processing (Kolb and Whishaw, 1989). Thus, a deficit in the primary motor cortex will produce a motor

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impairment, but for the patient to have impaired insight they must also have deficits involving areas essential to higher-level integrative processing.

Regarding schizophrenia patients, Prigitano and Schacter (1991) propose that impaired insight reflects disturbed processes in the prefrontal cortex as opposed to the posterior mechanisms implicated in sensory awareness. This is because patients with schizophrenia, like neurology patients with frontal lobe deficits, have a lack of awareness of things pertaining to the self. This leads to impaired social judgment that requires the patient to make judgments about how he or she is perceived by others and the ability to anticipate change.

Stuss (1991) offers an expanded explanation regarding the involvement of the frontal lobes in impaired self-awareness (his term) which he views as a deficit in self-monitoring. He posits two frontal functional systems that interact with posterior systems and provide the dorsolateral frontal cortex with the capacity to sequence and integrate information. The posterior systems work at an over-learned, automatic level and are involved primarily in, and relate to more primary systems such as attention and alertness, visual spatial processing, autonomic/emotional, memory, sensory perception, language, and motor systems. Executive functions such as anticipation, goal selection, pre-planning, and monitoring form the basis for self-awareness and are necessary when a new activity is being learned and active control is required. Drive and sequencing are important underlying inputs to those functions. The medial frontal system functions as an integrative component for drive or motivation and executive functions. Stuss' hierarchical system allows the frontal systems underlying self-awareness or

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reflectiveness, to utilize and interact with posterior brain processes involved in the evaluation of stimuli.

Goldberg and Barr (1991) proposed that the breakdown of awareness of deficit reflects the breakdown of the error monitoring process. The process of error monitoring rests on three components: 1) internal representation of desired cognitive product; 2) feedback regarding one's own input; and 3) comparison between the content of the feedback and the representation of the desired cognitive product.

They proposed that the comparator function is disturbed following lesions to the prefrontal and upper brain stem systems, producing global and specific error monitoring deficits. They cite the following as evidence for this proposal:

> Unawareness of specific errors in one's own performance can be demonstrated by local error-monitoring deficits such as field dependency (impaired stability or maintaining set) and perseveration (impaired plasticity, or shifting set). Perseveration, can be elicited in a task requiring patients to draw easily namable symbols following a rapid sequence of commands. The initial productions are good, so it is clear that the internal representation is intact. It can also be demonstrated that the sensory feedback is intact, because the patient can identify the symbols in a multiple-choice format. Nevertheless, the patient continues to repeat erroneous productions. Field dependency can be elicited by Luria's technique of asking the patient to show either a finger or fist, to the examiner's opposite. In rapid alternations, they lose set and start copying the examiner (echopraxia), even while they claim to be raising their finger when the examiner is has his fist raised, they actually raise their fist. Verbal field dependency occurs when the patient is asked to tell a story, and embellishes by incorporating objects in the room.
>
> Global error monitoring refers to general lack of appreciation of or concern for devastating cognitive, vocational, and personal handicaps, even though they can demonstrate technical knowledge of the changes in their lives consequent to brain damage. (Goldberg and Barr, 1991, p. 156).

Goldberg and Barr have indicated that cognitive self-monitoring and comparison of the outcome of one's cognitive operations with the objective at hand are central

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elements of the executive control provided by the prefrontal cortex. Breakdown of this control produces both global and specific deficits in personal insight.

McGlynn and Kasniak (1989) demonstrated that while amnestic patients with frontal lobe damage do show unawareness of memory deficit, amnestic patients with damage restricted to the temporal lobes do not. Observing patients with dementia, they found that early in the disease process the patients are acutely aware of, and openly express, anxiety about changes in their cognitive functioning. They indicated that intellectual deterioration plays a role in unawareness, due to a decline of the ability to assess difficulties. This would not be expected in the case of denial of deficits motivated by the protection of the patient's self-concept or by some other type of secondary gain. Finally, the dementia patients with poor self-awareness have a general self-monitoring deficit that renders them unable to maintain awareness of numerous disabilities, rather than specific of deficits seen among patients with impairments involving posterior systems.

McGlynn and Kasniak (1989) measured lack of awareness of deficits by requiring patients and relatives to estimate the degree to which the patients would have difficulty on several motor and memory tasks, given the average for normals. The more intact the patients were in terms of their dementia, the more impaired they rated themselves. The patients' predictions of their own difficulties were significantly lower than the relatives' predictions of the patients' performance. No difference was observed between patients' predictions of their relatives' performance or relatives' predictions of their own performances. Thus, the patients' inability to predict their own performance on these tasks does not reflect a general impairment in judgment.

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In summary, there are several sources of evidence that implicate frontal and or subcortical processes as being important for intact self-awareness. Findings from this literature can be translated into testable hypotheses regarding insight in schizophrenia. Despite the widely ranging and seemingly general deficits found among schizophrenic patients, patterns of impairment have been observed which suggest the presence of specific bilateral frontal and temporal lobe dysfunction, without impaired performance on tests sensitive to parietal functions (Kolb and Whishaw, 1983; Taylor and Abrams, 1984).

A review of longitudinal studies of neuropsychological functioning among schizophrenia patients (Rund, 1998) determined that patients with schizophrenia tend to have relatively stable impairments relating to prefrontal and temporal-limbic connections thought to develop fully during adolescence (which may have impaired development in schizophrenic patients). One measure thought to tap prefrontal functioning is the Wisconsin Card Sorting Test (WCST; Heaton, 1981), a test which measures working memory, set-shifting, abstract reasoning, tendency to perseverate, and the ability to use and maintain learning strategies. Impaired performance on this measure has been consistently demonstrated in schizophrenic patients, and has been found to be predictive of social dysfunction among patients with schizoaffective disorder and schizophrenia (Lysaker, 1985).

Patients with schizophrenia also show stable impairments on measures of verbal skill, verbal fluency, memory (poor retrieval due to inefficient use of strategies and mild encoding deficits similar to patients with sub-cortical dementias; Paulsen et al., 1995) and pre-attentional information processing (Rund, 1998). Patients with schizoaffective

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disorder tend to have less severe deficits, but show a similar pattern in terms of performance on NP tests (Bornstein et al., 1990).

Fronto-temporal dysfunction in schizophrenic patients has also been observed using positron emission tomography (PET) which reveals reduced frontal metabolic activity (Weinberger and Berman, 1988). A significant inverse correlation has been observed among chronically ill schizophrenic patients between performance on NP measures involving executive, attention, and abstraction ability and area of the dorsolateral prefrontal cortex (DLPFC) as measured by magnetic resonance imaging (MRI; Seidman et al., 1994). Specifically, all NP performance indices correlated significantly with reduced DLPFC area on the left, except Continuous Performance Task (CPT) errors. This test, which measures attentional functioning, correlated inversely with reductions in DLPFC right hemisphere volume.

Few researchers have examined the relationship between brain pathology and impaired insight in schizophrenia. Takai, Uematsu, Ueki, Sone, and Kaiya (1992) used an item from the Present State Exam to rate insight (i.e., whether they admitted to having a "nervous condition") from 0-3. Using MRI, they found that chronic schizophrenia patients ($N = 22$) with poor insight had ventricular enlargement, especially around the third ventricle ($r = .50$, $p = .025$). Poor insight was also correlated with enlarged lateral ventricles ($r = .40$, $p < .05$).

The integration of theory from classical psychiatry with that of neurology can help us develop a clearer concept of what insight is and what substrates might be required in its development. The development of instruments that are theoretically informed can

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then clarify the determinants of insight among patients with schizophrenia and schizoaffective disorder.

The Present Study

The traditional understanding of impaired insight in schizophrenia is that it reflects an impairment of judgment about one's own illness circumstances. In addition to this impairment of *judgment*, impaired insight can be viewed as having two additional components, deriving from disturbances of *affect* and of *volition*. Thus it is hypothesized that there exists affective aspect of insight which, for purposes of this discussion will be called "distress" and which refers to the affective experience that is associated with the awareness of one's illness and its consequences. The third aspect of insight proposed here is a volitional aspect. This refers to the willful, sustained, thoughtful consideration of one's circumstances. While volitional disturbances are commonly thought of in psychiatry as disturbances of action, this restricted view is a modern invention. In Kraepelin's description of volitional operations of the mind, he includes the exertion of the will toward not only purposeful behaviors and actions, but also toward sustained, goal-directed thought. Thus, the mental act of determining to solve a mental problem and then executing that intention requires intact volition. Kraepelin's concepts can be extended to the development of insight as follows: volition underlies the process by which the patient integrates the knowledge of his mental disorder (insight), and his affective response to it (distress), into an appropriate response (formulating a complete understanding of the disease and its consequences). Thus, intact volition is required to integrate affect and intellect in order to generate the necessary mental process for the spontaneous formulation of insight.

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The study has two main objectives: 1) to introduce and explore the validity of this concept of insight and distress; 2) to explore the relationship of insight to NP functioning, psychopathology, and demographic characteristics, using an adequate sample size. The conception of impaired insight in patients with schizophrenia and schizoaffective disorder proposed here is based on Kraepelin's empirical investigations of impairments of intellect, affect, and volition among patients with dementia praecox and the observed association of lack of concern (anosodiaphoria) with lack of awareness in the neurology literature.

The Rating of Insight and Distress: Conceptual Basis and Operational Definitions

The operational definition of poor insight being employed for this investigation is derived from a single item on the PANSS. This item, providing a rating of "judgment" is defined as follows:

> Impaired awareness or understanding of one's own psychiatric condition and life situation. This is evidenced by failure to recognize past or present psychiatric illness or symptoms, denial of need for psychiatric hospitalization or treatment, decisions characterized by poor anticipation of consequences, and unrealistic short-term and long-range planning.

The basis for rating was the patient's thought content expressed during the interview (Kay, Fiszbein, and Opler, 1987).

A review of the literature yielded no previous attempt to distinguish and measure an affective aspect of insight. Thus, the rating of "distress" was operationally defined for the purposes of this investigation as follows:

> A negative emotional response to the predicament created by mental illness based upon an accurate understanding of the illness and its consequences. Negative emotional responses include anger, sadness and despair/hopelessness. Distress is most apparent when an individual spontaneously elaborates about the negative impact of their mental illness

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> or symptoms on life circumstances, while concurrently displaying appropriate facial expression and vocal tone. It would be appropriate for an individual who has recently been hospitalized due to a severe and disabling mental illness to experience extreme distress regarding the impact of illness on their life. Distress will be rated on the basis of both the apparent signs and content expressed during the interview.

The PANSS is a standardized rating instrument used to evaluate patients with schizophrenia and to rate, on a 7-point scale, the severity of a wide range of signs and symptoms of psychosis. In addition to providing item definitions and rating anchors, a semi-structured interview instrument has been developed to facilitate PANSS administration. For the purposes of this study, the interview questions guiding the rating of the PANSS Judgment item were modified to elicit responses that would allow for independent ratings of the level of insight and of distress. Kraepelin's conceptual framework of the "three spheres of intellectual life" is reflected in this modified interview in which indications of intellectual, affective, and volitional processes are elicited in the subject's responses to questions about the existence and impact of their illness. The measure which is referred to here as "Insight" (which in Kraepelin's terms reflects the operation of intellect) is the PANSS judgement item rated according to the standard PANSS rating scheme (a rating of 1 indicates intact insight, a rating of 7 indicates severe impairment).

Additional ratings based on the expanded interview reflect the processes of *affect* (indications of distress expressed both verbally and non-verbally) and *volition* (evidence that the individual has spontaneously considered the impact of illness at some depth, is able to spontaneously express that distress, and that the affective and verbal responses are unified and appropriately sustained). The latter rating is based on the observation that

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"volitionally competent persons make spontaneous and appropriate-conversation or ask questions" (Lezak, 1995).

In the presence of intact insight, one should expect an individual to be distressed about having been recently hospitalized for a severe illness, or at least about the loss of ability to engage in productive or meaningful activity (whether or not one believes it is due to having a mental illness). The experience of distress constitutes an affective response to the illness and its circumstances. An affective response is necessary to make these circumstances salient enough for the patient to lead to him to spontaneously consider the cause of the current circumstances. Thus, broadly conceived, an impairment of insight may result from 1) an intellectual impairment resulting in the inability to consider the situation in its entirety, 2) a lack of affective salience of a circumstance or 3) a volitional impairment leading to a lack of consideration regarding the cause or significance of one's circumstances. What becomes apparent is that, while it is possible to consider three distinct mental operations contributing to insight, it is not possible to construct entirely independent ratings of each of these spheres. For example, the affective response of distress about one's illness is only logically possible if the patient acknowledges the presence of an illness.

Thus, while the PANSS Judgment item will be used to represent the intellectual process of insight this is not to say that this insight rating is entirely unrelated to affective and volitional processes. However, these processes are less important in the rating of insight than in the ratings of distress. The two distress ratings, each incorporating two of the three hypothesized mental operations (e.g., intellect, affect, and volition), are derived from a modified PANSS interview (see Appendix). The first rating, reported distress

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evaluates the appropriateness of the subject's verbal report of distress on a scale from one to four (1 = appropriate; 4 = denies feeling distressed about their mental illness or symptoms and their impact). This rating is intended to tap into the affective/intellectual dimension of insight, as it requires access to affective processing as well as verbal expression. The second rating, apparent distress, evaluates expressions of distress that are apparent to the clinician. The rating is based on the subject's spontaneity of verbal and facial expression, tone of voice, depth of thought, ability to sustain the expression of distress, and whether the expression of distress is consistent with the content of the subject's speech. The latter component of apparent distress can be considered an indicator of the congruence of affect and intellect. For the purposes of our investigation, these components of apparent distress are separately rated, so that their contributions to the hypothesized relationship with NP can be assessed. Apparent distress is intended to tap into the affective /volitional dimensions of insight, because it includes components relating to intact affective and volitional processes, such as spontaneity, carrying through one's thought processes to some depth, and the sustenance of emotional expression. Table 1 below summarizes the three ratings and the component mental operations they are designed to assess:

Table 1: Three Dimensions of Insight and Distress

Variable rated:	**Insight**	**Reported Distress**	**Apparent Distress**
Primary Mental Operations:	Intellect	Affect/Intellect	Volition/Affect
Basis for rating:	PANSS Judgement Item: Impaired awareness or understanding of one's own psychiatric condition and life situation.	Appropriateness of the subject's verbal report of distress.	Spontaneity of verbal and facial expression, tone of voice, depth of thought, ability to sustain the expression of distress, and whether the expression of distress is consistent with the content of speech.

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In addition to the two distinct aspects of distress described above, a global rating of distress (global distress) was also constructed to incorporate both distress reported in response to questions regarding illness, and spontaneous expressions of distress. This global rating is also made on a scale from one to four. For example, a mildly inappropriate response (rated a 2) was anchored in the following way:

> Either the subject reports being distressed, but only expresses a single emotion relating to a negative issue and it is directed towards others (e.g., anger towards a family member or psychiatrist), **or** the subject requires prompting to elicit verbal reports about the emotional impact of their mental illness, **or** the subject will occasionally fail to express one of the elements of apparent distress (vocal tone/facial emotion) while discussing their illness and its impact.

Hypotheses

It has been posited that intact frontal lobe functioning may be responsible for self-awareness and the integration of higher level processes (Stuss, 1991). In addition, the frontal lobes and their interconnections serve as one possible substrate for the integration of intellectual, affective and volitional processing (Brodal, 1981). Schizophrenia patients exhibit both disordered insight and deficits in executive functioning that suggest the presence of inadequate frontal and subcortical processing. On this basis, it was hypothesized that NP impairments, especially those involving frontal and executive systems, would significantly relate to poor insight and inappropriate lack of distress.

METHOD

Subjects

Subjects (see Table 2) were consenting outpatients age 18-54, with a confirmed DSM-IV diagnosis of schizophrenia (N=70) or schizoaffective disorder (N=49). All had been discharged from a hospital within the past 12 months before study entry and had

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been mentally ill for at least one year. Subjects were recruited from among Hillside Hospital discharges and admissions to several outpatient programs in the Queens and Nassau County area. Subjects were excluded if they had a primary neurological illness, were diagnosed with mental retardation, or had a current risk of violent behavior.

Table 2: Demographic Data

Demographic	Total Sample	Schizophrenic Subgroup	Schizoaffective Subgroup
Number of Subjects	119	70 (58.8%)	49 (41.2%)
Race			
Caucasian	57 (48.0%)	25 (35.7%)	32 (65.3%)
African American	41 (34.5%)	32 (45.7%)	9 (18.4%)
Hispanic	16 (13.4%)	9 (12.9%)	7 (14.3%)
Asian	4 (3.4%)	3 (4.3%)	1 (2.0%)
Hand Preference			
Left	15 (11.8%)	8 (11.4%)	7 (14.3%)
Right	104 (87.4%)	62 (88.6%)	42 (85.7%)
Education(years)	M = 12.2(2.6)	M = 11.8 (2.5)	M = 12.8 (2.6)
Age (years)	M = 36.0 8.6)	M = 35.6 (8.9)	M = 36.7 (8.3)
Gender			
Male	74 (62.2%)	44 (62.9%)	30 (61.2%)
Female	45 (37.8%)	26 (37.1%)	19 (38.8%)
Age of Symptom Onset (years)	M = 19 (7.9)	M = 19.7 (7.9)	M = 17.9 (7.8)

Procedures

Consenting subjects were screened for exclusion criteria and underwent confirmatory diagnosis of either schizophrenia or schizoaffective disorder using the Structured Clinical Interview for DSM-IV (SCID; Spitzer, Williams, Gibbon and First, 1995). Written consent was obtained only after subjects were fully apprised of the nature of the study procedures, and could demonstrate their understanding of these procedures by correctly answering several "quiz" questions about the study. All subjects were paid $40.00 for participating in the study. Patient confidentiality was assured through code

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number assignments in place of names, controlled access to data with computer coding, and a secured file room.

One male and three female interviewers, who were previously trained to perform the PANSS, were trained by the author to make the insight and distress ratings. The interviewers were instructed to write down subject responses and to indicate their basis for making the ratings of distress immediately after the interview. Each interview and rating was checked by the author and discrepancies resulted in consultation with the rater. Final ratings were established based on the author's expertise. The author was blind to the subject's diagnosis, gender, NP, and symptom profile.

Materials

Table 3 lists the instruments used for evaluating and recording data used in this study. Diagnostic confirmation was conducted prior to administration of other measures.

Table 3: Instruments Used

Demographic Data	**Neuropsychological Assessment**
Hillside Neurorehabilitation History Form	Controlled Oral Word Association Test (COWAT)
Diagnostic Interview	Edinburgh Handedness Inventory
Structured Clinical Interview for the DSM-IV (SCID)	Finger Tapping Test (FTT)
	Grooved Pegboard Test (GPT)
Insight and Distress Measure	Letter Number Span (LNS)
Modified PANSS Judgment item with distress ratings (see Appendix)	Ruff Figural Fluency Test (RFFT)
	Wechsler Adult Intelligence Scale-Revised (WAIS-R)
Psychiatric Symptoms	
Positive and Negative Syndrome Scale (PANSS)	Wechsler Memory Scale Revised (WMS-R)
	Wisconsin Card Sort Test (WCST)

Clinical History and Demographic Information

The Hillside Neurorehabilitation History Form was used to obtain demographic data, age of onset of psychotic symptoms, and current medications. Information was

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obtained from the patient and at least one corroborating source (i.e., medical chart, family member, friend, or health professional) to ensure validity of the data.

Psychiatric Symptoms

Evaluation of psychiatric symptoms was made using the Positive and Negative Symptom Scale (PANSS; Kay, Fiszbein, and Opler, 1987) which provided global positive, negative, and general psychiatric symptoms ratings. The PANSS was chosen because it explores symptoms in detail producing several variables of interest for determining the relationships between psychiatric symptoms, insight, distress, and NP functioning. The PANSS has been found reliable in analyses of inter-rater, test-retest, stability, and internal consistency (Kay, Fiszbein, and Opler, 1987). It is also considered a valid measure having undergone content, criterion-related, construct (Kay, Opler, and Fiszbein, 1985-1986), factorial (Kay and Sevy, 1990), predictive (Kay and Lindenmayer, 1987), and discriminant validity analyses (Kay, Opler, and Fiszbein, 1986). The PANSS rating manual includes normative data and percentile ranks for 240 medicated schizophrenia patients (Kay, Opler, and Fiszbein, 1986). A structured clinical interview version is available (the SCI-PANSS) which provides recommended questions and probes, improving the standardization of PANSS use. In addition, detailed anchors are provided for each PANSS item, facilitating training and sustained inter-rater agreement. The scale is widely used by schizophrenia researchers internationally.

Neuropsychological Measures

All NP measures used in this study have adequate published normative data and wide usage in prior schizophrenia research.

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General Intelligence

The Wechsler Adult Intelligence Scale - Revised (WAIS-R; Wechsler, 1981) is the most widely used and well-standardized measure of intellectual functioning. Available normative data is based on a sample of 1,880 individuals. The WAIS-R consists of six verbal and five performance subtests, which assess attention, executive, language, and visuospatial functions. These subtests produce separate raw, scaled and age-corrected scaled scores, as well as Verbal, Performance, and Full-Scale intelligence quotients. Validity has been established through correlation with other intelligence tests such as the Stanford Binet, through factor analysis, and correlations with academic success. IQ and individual subtest score patterns have been validated in discriminating healthy controls from neurological and psychiatric samples (Lezak, 1983; McFie, 1975). Split-half coefficients are very high (.97, .93, .97, .96 for Verbal IQ, Performance IQ, Full Scale IQ, and the Vocabulary Subtest, respectively). In the present study, IQ scores were used to describe the sample and compare sub-samples. The Vocabulary Subtest was used in exploratory analyses. For patients with schizophrenia, vocabulary provides an excellent estimate of current verbal ability.

The Block Design Subtest was used in the main canonical correlation analyses based on prior reports of a relationship to insight (McEvoy, 1996). It consists of blocks that have red, white, and red/white sides. The task requires subjects to reproduce a design using up to 9 blocks. The task is timed and bonus points are given based on how quickly the design is reproduced. Factor analytic studies find this test to load highly on perceptual organization (ability to form a gestalt), and general mental ability. It also correlates highly with visual acuity, motor speed, and dexterity (Lezak, 1995).

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Memory

Three subtests from the Wechsler Memory Scale-Revised (WMS-R; Wechsler, 1984) were selected on the basis of prior literature regarding NP deficits that may relate to insight in schizophrenia. The WMS-R is well normed, validated, and widely used.

The Verbal Paired Associates I Subtest consists of a list of word-pairs that are read to the subject. The subject is then required to recall the correct associate word when the cue word is named. The task is repeated three times and the score is based on number of correctly paired associate words. There are eight word-pairs, four are easy to learn (e.g., baby-cries) and the other four are more difficult to associate with one another (e.g., obey-inch). The test is considered a measure of rote verbal learning ability that is "relatively separate from verbal skills" (Lezak, 1995).

The Visual Paired Associates I Subtest was included for comparison, as the associated stimuli are visually, as opposed to aurally, presented. It consists of abstract line figures that must be paired with a color over three trials. Studies of patients with neurologic deficits performing this subtest reveal that this test can be verbally mediated, and does not reliably discriminate between left and right-sided lesions (Lezak, 1995).

Logical Memory I is a test of the immediate recall of a story. Story recall requires the subject to select and recall information while they are provided more information than they can process. In this subtest, a story is read to the subject once, then subject must repeat the story remembering as many ideas as possible. Full points are given for verbatim responses and ½ points are given for getting the gist of an idea. For some individuals, the addition of context can be used to assist in the memory of ideas, however patients with frontal-temporal impairment tend not to use such strategies.

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Working Memory and Executive Functions

Auditory Working Memory

Auditory working memory was assessed using the Letter-Number Span Test (LNS) developed by Gold et al. (1997). Each item consists of a series of numbers and letters in alternating sequence (e.g., "7m8b") which is read to the subject. The subject is required to repeat the elements of the series in a sequence beginning with numbers in ascending order followed by letters in ascending order (e.g., "78bm"). There are 24 such items in all and the string length ranges from 2 to 7 elements. There are four different items of each string length. When the subject fails all items at the same string length, the test is discontinued. The score used for statistical analyses was longest item (as opposed to total number correct) to reduce the influence of fluctuations in attention and effort, known to occur in this population. This test is found to have a high degree of internal consistency (Cronbach coefficient $\alpha = .85$).

Working memory processing allows items from memory to stay on-line while additional mental operations are generated. It is generally accepted that this processing requires frontal lobe functioning (Baddeley, 1993). To this end the LNS can assist in the interpretation of performances on the WCST, which requires working memory to maintain the rule while performing the task. Impairments on the WCST beyond those that can be explained by working memory dysfunction may then be interpreted as difficulty in flexibly shifting-set (Gold, Carpenter, Randolph, Goldberg, and Weinberger, 1997).

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Abstract Reasoning and Set-Shifting

The Wisconsin Card Sorting Test (WCST; Heaton, 1981), focuses on the ability to impose internal structure on an ambiguous stimulus and to establish and flexibly switch response sets by sorting stimulus cards on the basis of color, form, and number. The sorting rule is changed after ten consecutive correct responses. Testing is discontinued when the subject has completed six correct categories or reached the maximum number of 128 trials. The only feedback provided by the administrator is whether each response is correct or incorrect.

Number of perseverative errors is used in the statistical analyses as representative of error-monitoring/set shifting ability. Number of categories achieved was also used in the analysis, reflecting the ability to understand the principal or goal behind the sorting test. Factor analysis revealed that it loads most highly on "complex intelligence" (similar to the Block Design Subtest), and "planning-organization" (Lezak, 1995). Understanding abstract verbal principals, goal maintenance, sequencing response sets, error monitoring, and set shifting are functions commonly ascribed to frontal lobe systems. Goldberg et al., (1987a) demonstrated that schizophrenia patients have persistent deficits on the WCST, even after explicit instruction.

Fluency of Response Generation

Phonemic fluency was measured using the Controlled Oral Word Association Test (of the Boston Diagnostic Aphasia Examination BDAE; Goodglass and Kaplan, 1983). The goal of this test is to generate as many words as possible beginning with the letters C-F-L, within a restricted time limit. Phonemic (letter) fluency is posited to tap into old knowledge (spelling). Semantic (category) fluency was measured using the

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Animal Naming Test of BDAE (Goodglass and Kaplan, 1983). Retrieving animal names requires further semantic processing than phonemes (Lezak, 1995). Verbal fluency requires the organization of output into categories and working memory in order to avoid repeating words already generated and is posited to require frontal and left temporal lobe functioning (Spreen and Strauss, 1991). In a prior study (Gourovitch et al., 1996), schizophrenics were better at phonemic fluency, while controls matched for premorbid IQ, performed better on the semantic fluency test.

Visuo-motor fluency (or "design fluency") was assessed using the Ruff Figural Fluency Test (RFFT, Evans et al., 1985). This test requires subjects to generate as many unique designs as possible within a time limit, by connecting dots within a square. There are 40 squares on a page and subsequent trials have "interfering" lines and shapes in the background. The subject is told they must connect at least two dots to make a design. Successful completion of the tasks requires motor speed, self-monitoring, working memory (to ensure they do not repeat the design), and strategy development (Lezak, 1995). Impairments in design fluency are particularly notable among patients with frontal lobe damage, especially those with right frontal lesions (Lezak, 1995).

Motor Control/Response Preparation

Fine motor skills were assessed using the Grooved Pegboard Test (GPT), a widely used component of the Wisconsin Neuropsychological Test Battery (Matthews and Klove, 1964). It requires that the subject place key-shaped pegs into a 5 x 5 grid of slotted holes. The peg has to be rotated for correct insertion. The task is timed and assesses fine motor control, speed, and motor planning using both the preferred and non-preferred hand. There is also a component of mental flexibility to this test, as some

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patients pick up a new peg if they have difficulty using the one in their hand, despite being explicitly told each peg is identical. The scores used in the main analyses were the time to insert the 25 pegs with each hand. Impaired motor control among psychiatric patients may relate to dysfunction at the level of subcortical, premotor, and prefrontal functioning.

Motor Speed

Motor speed was assessed using the Finger Tapping Test (FTT; Halstead, 1947; Spreen and Strauss, 1991). The most widely used test of its kind, the FTT requires subjects to "tap" a key that is connected to a counter during five 10-second trials, or until three trials are within 5 taps. Hands are switched between trials to avoid fatigue. Total number of taps averaged for both hands, were used in the analyses.

Handedness

A modified version of the Edinburgh Handedness Inventory described by Oldfield (1971) was used to determine hand preference. In this version, subjects are asked to perform a variety of actions with imagined objects. The scores for right and left-hand responses are totaled separately and are converted to a laterality quotient. The results were used to determine the dominant hand for the GPT and FTT.

Insight and Distress Measure

Kemp and Lambert (1995) found high correlations (ranging from .58 to .81) between the PANSS Judgment item and each of the SUMD measures of insight among patients with schizophrenia, both on admission to the hospital and on discharge. The SUMD is an extensive instrument which has demonstrated reliability and validity across large samples (Amador, 1994). In light of the fact that this single PANSS item so

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effectively captured the variance of the rather extensive SUMD, and in light of the criticisms of the SUMD summarized in the Introduction (above), it was determined that the PANSS Judgment item should be used to measure insight in the present study.

In addition to this standard PANSS rating, the PANSS interview was modified by this author as described in the introduction in order to capture the dimension of distress. The purpose of this interview modification was to elicit the patients' spontaneous expressions of their thoughts and feelings about having a mental illness and their thoughts and feelings about the impact of this illness on their work and social roles (see Appendix). This interview modification was then used as the basis for making ratings of Reported Distress, Apparent Distress and Global Distress.

RESULTS

Measures of Insight and Distress

The PANSS has already been established as a valid and reliable measure. Inter-rater reliability coefficients (ICC) range from .83 - .87 (Kay, Opler, & Lindenmayer, 1988). Correlations between the PANSS Judgment item (insight), and the new measures of apparent, reported, and global distress, are shown in Table 4. It can be seen that these are highly, but not completely interrelated concepts.

Table 4: Correlations among Insight and Distress Ratings

	Insight	Reported Distress	Apparent Distress	Global Distress
Insight	1.00	.59	.52	.71
Reported distress	*	1.00	.73	.76
Apparent Distress	*	*	1.00	.69
Global Distress	*	*	*	1.00

N=119, All values are significant at the .01 level, two-tailed.

A factor analysis using varimax rotation was conducted including all the PANSS items with the addition of the distress and insight items (see Table 5). Nine factors were

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extracted with eigenvalues greater than one. Each of the factors reflected a known dimension of psychopathology, consistent with other published factor analysis studies of the PANSS. The exception to this was Factor 1, which included all of the insight and distress items, providing further evidence of their construct validity. In addition, each of the insight and distress items contributed independently and substantially to Factor 1. This provides a further indication that the distress measures are not orthogonal with the dimension of insight. None of the other factors included insight or distress items with factor loadings above .18.

Table 5: Factor Analysis of Insight, Distress, and PANSS Items

Variables	Factor 1 Eigenvalue = 6.6 20% var.
Global distress	.89
Reported distress	.85
Apparent distress	.81
Insight	.81
PANSS Symptoms	
Grandiosity	.40
Guilt	-.32
Difficulty with Abstract Thinking	.28
Depression	-.26

*only factor loadings $\geq$ .25 are reported.

Factor 1 accounts for a large part (20%) of the variance in the sample N = 119. It appears that although insight and distress are not identical concepts, they are more highly related to each other than to psychiatric symptoms.

Demonstration of the criterion validity of the distress measure was not possible, as this construct has not been studied before and is new to this investigation. In addition, there have been no prior attempts to study insight with respect to Kraepelin's three spheres of psychological operations (affect, intellect, and volition) to which the measure can be compared.

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Validation of the three separate dimensions of insight should come from independent relationships with NP functions. Specifically, one might expect that either the ability to appropriately sustain the distress response or facial spontaneity would relate to motor functioning. One might also expect the congruence between affect and intellect to relate to executive measures, especially fluency or set-shifting, as these abilities require fluid shifting between different response sets. It is difficult to predict how the affective/intellectual dimension might be differentiated from the intellectual dimension of insight using NP performance.

Description of Sample Performance on Symptom, Insight/Distress and NP Measures

Comparisons in terms of insight, distress, symptoms, and NP performance across diagnostic and gender subgroups are summarized in the Tables below. A high rating on the PANSS Judgment item (on a scale from 1 – 7) indicates severely impaired insight. Higher ratings (on a scale from 1 - 4) on the distress items indicate an inappropriate distress response. As can be seen in Table 6, the sample had generally poor insight and inappropriate distress ratings regarding having a mental illness and its consequences.

Table 6: Insight, Distress, and Symptoms among the Complete Sample

Item	Mean	SD	Min-Max
PANSS N=119 Judgment item	3.6	1.41	1-7
Positive Symptoms	2.7	.84	1-5
Negative Symptoms	2.8	.78	1-4.7
General Symptoms	2.3	.56	1.2-3.4
Reported Distress N=119	2.9	.94	1-4
Apparent Distress N=119	3.1	.90	1-4

Tables 7 and 8 indicate insight and apparent distress ratings among males and females.

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Table 7: Insight, Distress, and Symptoms among Male Subjects

Item	Mean	SD	Min-Max
PANSS n = 74 Insight	3.6	1.5	1-7
Positive Symptoms	2.7	.82	1.3-5
Negative Symptoms	2.9	.77	1.4-4.4
General Symptoms	2.3	.58	1.3-3.4
Reported Distress n =74	3.0	.99	1-4
Apparent Distress n =74	3.1	.90	1-4

Table 8: Insight, Distress, and Symptoms among Female Subjects

Item	Mean	SD	Min-Max
PANSS n = 45 Insight	3.6	1.3	1-6
Positive Symptoms	2.6	.88	1-4.7
Negative Symptoms	2.65	.80	1-4.7
General Symptoms	2.3	.53	1-3.4
Reported Distress n = 45	2.9	.87	1-4
Apparent Distress n = 45	3.1	.89	1-4

Tables 9 and 10 display insight and distress ratings among schizoaffective and schizophrenic subjects.

Table 9: Insight, Distress, and Symptoms among Schizoaffective Subjects

Item	Mean	SD	Min-Max
PANSS n = 49 Insight	3.3	1.32	1-6
Positive Symptoms	2.5	.81	1.3-4.9
Negative Symptoms	2.7	.78	1.1-4.4
General Symptoms	2.3	.56	1.25-3.4
Reported Distress n = 49	2.8	.93	1-4
Apparent Distress n = 49	3.1	.89	1-4

In general, patients with schizophrenia had poor insight (Table 10).

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Table 10: Insight, Distress, and Symptoms among Schizophrenic Subjects

Item	Mean	SD	Min-Max
PANSS n = 70 Insight	3.8	1.43	1-7
Positive Symptoms	2.8	.85	1-5
Negative Symptoms	2.9	.78	1-4.7
General Symptoms	2.3	.56	1.25-3.4
Reported Distress n = 70	3.0	.95	1-4
Apparent Distress n = 70	3.0	.91	1-4

Table 11 displays results of NP testing for the complete sample. The sample average IQ (WAIS-R) was 86 (SD=11), a level which falls at the 16th percentile relative to published norms and is classified as a low-average range of intelligence. The sample performed at or below the 10th percentile on verbal STM as measured by the WMS-R. Subjects were strikingly impaired on the WCST, performing at the 1st percentile on categories achieved. They also had severe motor dexterity impairments as measured by the GPT.

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Table 11: NP Performance of Complete Sample

Measure	Mean	SD	Min-Max	z-score
WAIS-R N=118**				
FSIQ	86	11	64-115	>-1.0
VIQ	89	13	64-143	-.8
PIQ	85.5	11.5	66-124	-1.0
Block Design	22	10	2-49	-1.0
Vocabulary	36	15	9-64	-1.0
WMS-R N=117**				
Verbal Paired Assoc.-I	16	4	4-24	-1.52
Visual Paired Assoc. -I	11.6	4.6	2-22	-1.04
Logical Memory -I	17.3	6.5	3-31	-1.28
WCST N=119				
Categories Achieved	3.5	2.3	0-6	-2.4
Perseverative Errors	26.3	20.5	4-93	-.9
Letter Number Span N=117**				
Longest Item	4.6	1.3	2-7	-1.7
Grooved Pegboard N=119				
Time to complete	106 sec	63 sec	50-532 sec	-2.7
Finger Tapping Test N=118**				
Number of Taps	43	10	16-59	-.74
COWAT N=119				
CFL (letter fluency)	31	12	5-66	-.56
Animal Naming	17	4.6	7-33	.06
RUFF Figural Fluency				
Total Unique Designs N=117**	66.5	23	18-131	-.86

***z-scores were produced from normative data for individuals with 12 years education and between the ages of 25-39 years of age.**
****variation in sample sizes reflect incomplete data for some participants.**

Tables 12 and 13 display the level of NP performance broken down by gender. The males tend to have reduced phonemic fluency compared to female subjects

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Table 12: NP Performance among Male Subjects

Measure	Mean	SD	Min-Max	z-score
WAIS-R n = 73**				
FSIQ	86	10	64-111	>-1.0
VIQ	89	14	64-143	-.8
PIQ	84	10	67-117	-1.0
Block Design	21	9	2-44	-1.0
Vocabulary	36	16	9-63	-1.0
WMS-R n = 72**				
Verbal Paired Assoc.-I	16	4	4-24	-1.52
Visual Paired Assoc. -I	11	4.7	2-22	-1.22
Logical Memory -I	17	7	3-31	-1.33
WCST n = 74				
Categories Achieved	3.5	2.3	0-6	-2.4
Perseverative Errors	26.5	20.5	4-92	-.9
Letter Number Span n = 73**				
Longest Item	4.6	1.3	2-7	-1.7
Grooved Pegboard n = 74				
Time to complete	101 sec	46 sec	55-408 sec	-2.0
Finger Tapping Test n = 73**				
Number of Taps	45	11	16-59	-.50
COWAT n = 74				
CFL (letter fluency)	30	11.5	5-66	-.66
Animal Naming	17	5	7-33	.06
RUFF Figural Fluency				
Total Unique Designs n = 72**	67	25	18-131	-.82

***z-scores were produced from normative data for males with 12 years education and between the ages of 25-39 years of age.**

****variation in sample sizes reflect incomplete data for some participants.**

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Table 13: NP Performance among Female Subjects

Measure	Mean	SD	Min-Max	z-score
WAIS-R n = 45				
FSIQ	86.5	12	71-115	>-1.0
VIQ	88	11	71-118	-.8
PIQ	86	14	66-124	-1.0
Block Design	23	13	3-49	-1.0
Vocabulary	37	15	11-64	-.8
WMS-R n = 45				
Verbal Paired Assoc.-I	17	4	4-24	-1.42
Visual Paired Assoc. -I	13	4	4-18	-.76
Logical Memory -I	17.4	5.8	5-30	-1.28
WCST n = 45				
Categories Achieved	3.7	2.2	0-6	-2.0
Perseverative Errors	26	21	4-93	-.9
Letter Number Span n = 44**				
Longest Item	4.8	1.2	3-7	-1.0
Grooved Pegboard n = 45				
Time to complete	114 sec	84 sec	53-532 sec	-3.0
Finger Tapping Test n = 45				
Number of Taps	40	9	24-58	-1.0
COWAT n = 45				
CFL (letter fluency)	34	12	6-61	-.06
Animal Naming	17	3.75	10-25	.06
RUFF Figural Fluency				
Total Unique Designs n = 45	66	20	35-114	-.82

***z-scores were produced from normative data for females with 12 years education and between the ages of 25-39 years of age.**
****variation in sample sizes reflect incomplete data for some participants.**

Tables 14 and 15 display NP performance scores broken down by diagnostic subgroup (schizophrenia versus schizoaffective disorder). Examination of these tables reveals that WAIS-R VIQ and Vocabulary scores were within the average range among subjects with schizoaffective disorder, while verbal ability was at the low-average range among subjects with schizophrenia. In general, the subjects with schizophrenia had poorer scores than did subjects with schizoaffective disorder on the WCST (both in fewer categories achieved and greater perseverative errors), and RFFT (having poorer design fluency).

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Table 14: NP Performance among Schizoaffective Subjects

Measure	Mean	SD	Min-Max	z-score
WAIS-R n = 49				
FSIQ	87	11	64-115	>-1.0
VIQ	91	14	64-143	-0.5
PIQ	85	10.5	66-115	<-1.0
Block Design n = 48**	21	10	4-43	-1.0
Vocabulary n = 49	38	15	12-64	-.5
WMS-R n = 49				
Verbal Paired Assoc.-I n = 47**	16	4.9	4-24	-1.52
Visual Paired Assoc. –I n = 47**	11	4.7	4-18	-1.22
Logical Memory –I n = 49	18	6	3-30	-1.18
WCST n = 49				
Categories Achieved	4	2	0-6	-1.5
Perseverative Errors	23	21	4-92	-.7
Letter Number Span n = 49				
Longest Item	4.6	1.4	2-7	-1.9
Grooved Pegboard n = 49				
Time to complete	103 sec	45	53-310 sec	-2.5
Finger Tapping Test n = 49 Number of Taps	41.5 taps	11 taps	17-59 taps	-.99
COWAT n = 49				
CFL (letter fluency)	31	12	5-61	-.56
Animal Naming	17.4	4.6	7-27	.15
RUFF Figural Fluency n = 49				
Total Unique Designs	69	23	18-115	-.72

***z-scores were produced from normative data for individuals with 12 years education and between the ages of 25-39 years of age.**
****variation in sample sizes reflect incomplete data for some participants.**

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Table 15: NP Performance among Schizophrenic Subjects

Measure	Mean	SD	Min-Max	z-score
WAIS-R n = 69				
FSIQ	85.5	11	67-113	-1.0
VIQ	87	11	69-118	>-1.0
PIQ	85.5	12	67-124	-1.0
Block Design n = 68**	22	11	2-49	-1.0
Vocabulary n = 69	35	15	9-64	-1.0
WMS-R n = 69				
Verbal Paired Assoc.-I n = 69**	16.5	4	6-24	-1.36
Visual Paired Assoc. -I n = 69**	12	4.5	2-22	-.92
Logical Memory -I n = 68**	17	7	5-31	-1.33
WCST n = 70				
Categories Achieved	3	2.4	0-6	-3.1
Perseverative Errors	28	20	4-93	-1.06
Letter Number Span n = 68**				
Longest Item	4.7	1.2	2-7	-1.65
Grooved Pegboard n = 70				
Time to complete	109 sec	74	55-532 sec	-2.85
Finger Tapping Test n = 69				
Number of Taps	44 taps	9taps	16-59 taps	-.58
COWAT n = 70				
CFL	32	11	6-66	-.45
Animal Naming	16.4	4.65	7-33	-.06
RUFF Figural Fluency n = 68**				
Total Unique Designs	64.5	23	20-131	-.96

***z-scores were produced from normative data for individuals with 12 years education and between the ages of 25-39 years of age.**
****variation in sample sizes reflect incomplete data for some participants.**

Insight, Distress, and Neuropsychological Functioning

Preliminary Analyses

A two-way analysis of variance (ANOVA) procedure was conducted to examine whether the complete sample was heterogeneous with respect to insight and distress. It is possible that subject characteristics acted as mediating independent variables in the relationship between insight, distress, and NP. Gender and diagnostic subgroup (schizophrenia and schizoaffective disorder) were posited as possible mediating variables

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due to possible differences in illness characteristics, cognitive functioning, and affective response to illness. ANOVA was also performed to examine the possible effects of race, due to the larger number of African Americans in the group with schizophrenia than schizoaffective disorder. Type III SS, which tests the unique contribution of each of the independent variables and their interaction, was used to interpret the analyses.

Insight

There was a significant effect of diagnostic group on insight ratings ($F = 6.40$, $p = .01$). Inspection of means revealed that the group with schizophrenia had significantly poorer insight ($M = 3.8$, $SD = 1.4$) than the schizoaffective subgroup ($M = 3.2$, $SD = 1.3$).

Distress

There was a significant interaction between gender and diagnostic group for levels of apparent distress ($F = 4.06$, $p = .05$). Inspection of means revealed that schizophrenic females ($n = 26$; $M = 3.3$, $SD = .84$) received poorer ratings for apparent distress than schizophrenic males ($n = 44$; $M = 3.0$, $SD = .94$) and males with schizoaffective disorder ($n = 30$; $M = 3.2$, $SD = .85$). In contrast, the schizoaffective females ($n = 19$; $M = 2.9$, $SD = .94$) had the best ratings on apparent distress (i.e., they conveyed distress while discussing their illness and its consequences).

In contrast to the findings with *apparent* distress, there were no significant effects of gender and diagnostic group on *reported* distress ratings.

A second two-way ANOVA revealed a significant overall model for the effect of race and diagnostic group on insight ($F=2.7$, $p=.02$). However, tests of the main effect of race or a race by diagnosis interaction were non-significant. Inspection of means indicates that African Americans diagnosed with schizophrenia had the poorest insight

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ratings (M=4.2, SD=.24) while Caucasians diagnosed with schizoaffective disorder had the best insight ratings (M=3.1, SD=.24). Table 16 reveals the mean insight rating for each racial and diagnostic subgroup. In each racial sub-group the mean for those with schizophrenia was higher than for those with schizoaffective disorder, indicating greater impairment of insight, regardless of race.

Table 16: Mean Insight Ratings For Each Racial and Diagnostic Subgroup

Schizophrenia	Mean (SD)	Schizoaffective D.O.	Mean (SD)
Caucasian N=25	3.2 (.27)	Caucasian N=31	3.1 (.24)
African American N=32	4.2 (.24)	African American N=9	3.3 (.45)
Hispanic N=9	4.0 (.45)	Hispanic N=7	3.7 (.50)

Summary

There were significant differences among diagnostic and gender subgroups on ratings of insight and apparent distress corresponding to the hypothesized intellectual and volitional/affective dimensions of distress, respectively. Schizophrenic subjects had the poorest insight and conveyed the least distress. Female subjects with schizophrenia were the most inappropriate on apparent distress, especially on spontaneously reporting distress about having a mental illness and its consequences. In contrast, female subjects with schizoaffective disorder conveyed the most apparent distress, often spontaneously reporting their distress about having a mental illness and its consequences. No differences emerged between diagnostic or gender groups for reported distress. There is a tendency for Caucasions to have lower ratings of impairment on insight. The trend for schizophrenics to be the most impaired on insight holds across racial subgroups.

In light of the significant impact of gender and diagnostic category on measures of insight and apparent distress, subsequent analyses were run separately for each gender and diagnostic group.

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Primary Analysis

Canonical Correlation Analysis (CCA) was used to examine the associations between a set of insight and distress variables (Set 1) and a set of NP measures (Set 2). Canonical correlation enables the examination of multivariate associations between the two sets of variables, allowing for the multidimensional examination of the neuropsychological correlates of impaired insight and inappropriate distress (Silverstein, Fogg, and Harrow, 1991). Like factor analysis, canonical correlation forms orthogonal factors. However, it can form these factors (referred to as canonical variates) simultaneously in more than one set of variables. This allows one to obtain as high a correlation as possible between the canonical factor pairs that are derived from the set of insight/distress variables and the set of NP variables. Thus, orthogonal factors are derived from among the insight and distress measures and from among the NP measures and then the associations between each of the newly derived sets of factors can be determined.

The initial CCA examined the relationship between insight, apparent distress, and reported distress (Set 1) and twelve NP variables (Set 2) for the entire sample. Despite the preliminary findings of gender and diagnostic differences, the sample was not separated into sub-samples for the primary analysis, because there was not an a priori hypothesis regarding gender and diagnostic differences. Few (if any) reports of such differences were indicated in the prior literature. Global distress was not used in this or subsequent analyses because it is a composite rating of apparent and reported distress. The variables used in the analysis are shown in Table 17. The overall model failed to

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reach significance ($\underline{R}$ = .44, Wilks' Lambda = .64, $\underline{F}$ = 1.21, df1 = 36, df2 = 272, $\underline{p}$ > .20). Thus, the main hypothesis was not confirmed using the complete sample.

Table 17: List of Variables Used For the Initial Statistical Analyses

Explanatory Set	Outcome Set
1. Insight 2. Reported Distress 3. Apparent Distress	1. Grooved Pegboard Test (GPT) average seconds 2. Finger Tapping Test (FTT) average number of taps 3. Wisconsin Card Sorting Test (WCST) categories achieved 4. WCST perseverative errors 5. Letter-Number Span (LNS) longest item 6. Ruff Figural Fluency Test (RFFT) total unique designs 7. Controlled Oral Word Association Test (COWAT) total words 8. Semantic Fluency: total animals named 9. WMS-R Logical Memory-I 10. WMS-R Visual Paired Associates-I 11. WMS-R-Verbal Paired Associates-I 12. WAIS-R Block Design raw score

Effect of Gender on Insight, Distress, and NP Functioning

Since levels of insight and the conveyance of distress were found to vary between males and females, identical canonical correlation analyses were conducted separately for males and females. Among the 64 (ten cases excluded due to missing cells) males analyzed , the association between insight and distress ratings (Set 1) and NP performance (Set 2) was not significant ($\underline{R}$ = .65, Wilks' Lambda = .44, $\underline{F}$ = 1.30, df1 = 36, df2 = 145; $\underline{p}$ = .14). However, the magnitude of the canonical correlation (.65) is large enough to warrant further investigation of the results. Therefore, the standardized coefficients are presented in Table 18. The standardized canonical coefficients derived from the explanatory set loaded highly with all three variables [insight (-.85), reported (-.68) and apparent distress (.91)], while the coefficients derived from the outcome set

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loaded highly with motor dexterity as measured by the GPT (.61) and auditory working memory as measured by LNS longest item (.52).

Table 18: Males: Standardized Canonical Coefficients for Insight, Distress and NP

Explanatory Set-Insight/Distress Variable	Coefficient	Outcome Set-NP Variable	Coefficient
Insight	**-.85**	**Grooved Pegboard Test averaged total seconds**	**.61**
Reported Distress	**-.68**	Finger Tapping Test average number of taps	.16
Apparent Distress	**.91**	WCST	
		categories achieved	.35
		perseverative errors	.18
		Letter-Number Span longest item	**.52**
		Ruff Figural Fluency Test total unique designs	.16
		Controlled Oral Word Association Test	
		total words beginning with CFL	-.42
		total animals named	.08
		WMS-R	
		Logical Memory-I	.08
		Visual Paired Associates-I	.07
		Verbal Paired Associates-I	.46
		WAIS-R Block Design raw total	-.07

Thus, male subjects with relatively intact insight (e.g., who received low ratings on severity of impairment) who tended to report distress, yet conveyed less distress (e.g., received high ratings for inappropriateness on apparent distress), had more difficulty performing the motor dexterity task and less difficulty with auditory working memory. Those males with relatively poor insight, who reported less distress, yet received relatively more appropriate ratings on apparent distress, performed better on the motor dexterity task, but they had relatively poorer auditory working memory.

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Identical canonical correlation analyses were conducted separately for the females (n = 43, 2 cases excluded due to missing cells). A significant association was found between insight and distress ratings (explanatory set) and NP performance (outcome set) (R = .81, Wilks' Lambda = .21, F = 1.61, df1 = 36, df2 = 83; $p < .04$). The standardized coefficients are shown in Table 19.

The standardized canonical coefficients from the explanatory set loaded highly with all three variables [insight (.74), reported (-.62) and apparent (.85) distress], while the coefficients from the outcome set loaded highly with phonemic verbal fluency (as measured by COWAT;-.60).

Females with poorer insight, who reported distress but conveyed less distress, tended to have poorer phonemic fluency than females who had better insight, reported relatively less distress, yet conveyed distress regarding having a mental illness and its consequences.

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Table 19: Females: Standardized Canonical Coefficients for Insight, Distress and NP

Explanatory Set-Insight/Distress		**Outcome Set-NP**	
Variable	**Coefficient**	**Variable**	**Coefficient**
Insight	.74	Grooved Pegboard Test averaged total seconds	.17
Reported Distress	-.62	Finger Tapping Test average number of taps	-.31
Apparent Distress	.85	WCST	
		categories achieved	-.14
		perseverative errors	.41
		Letter-Number Span longest item	.35
		Ruff Figural Fluency Test total unique designs	-.03
		Controlled Oral Word Association Test	
		total words beginning with CFL	**-.60**
		total animals named	-.27
		WMS-R	
		Logical Memory -I	.43
		Visual Paired Associates -I	.17
		Verbal Paired Associates -I	-.09
		WAIS-R Block Design raw total	-.38

Exploratory Analyses

Examination of the raw data assisted with the interpretation of the CCA results, which indicated differences between the reported and apparent distress ratings. Thirty-eight percent of the complete sample had verbal report ratings that differed by one or two points from the apparent distress rating. Of those, most (84%) were discrepant by one rating point, while 16% were discrepant by two points on the four point scale. Most of the discrepant responders (80%) reported having more distress about the illness and it's impact than what was apparent to the clinician. The remaining 20% of discrepant responders conveyed more distress than they reported.

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Pearson's R correlation analyses were performed to further explore the relationships between the three insight and distress ratings and the 12 NP measures. Thirty-six correlations between insight, reported distress, and apparent distress with NP were performed for each gender. For males, two correlation coefficients were significant at the .01 level (two-tailed) with insight, [Verbal Paired Associates-I ($r = -.30$, $p = .013$) and Letter-Number Span longest item ($r = -.31$, $p = .007$)]. This indicates that among males, intact verbal short-term and auditory working memory is associated with better insight about having a mental illness and its consequences.

Among females, seven of the 36 Pearson's R correlations were significant using the .01 criterion. WCST Perseverative errors, was related to apparent distress ($r = .45$, $p = .002$) and insight ($r = .41$, $p = .006$). Design fluency as measured by the RFFT, was related to apparent distress ($r = -.42$, $p = .004$), reported distress ($r = -.38$, $p = .011$) and insight ($r = -.49$, $p = .001$). Phonemic fluency was related to apparent distress ($r = -.46$, $p = .002$) and insight ($r = -.39$, $p = .007$). This indicates that among females, the ability to shift set and monitor errors, as well as ideational fluency, are related to better insight and the conveyance of greater distress about mental illness and its consequences. Another dimension underlying the NP measures that may relate to mental fluency and flexibility is the ability to perform novel tasks, as semantic fluency was not related to insight and distress.

These results in conjunction with those of the CCA, suggest that the relationship between insight, distress, and NP may be different among males than among females. Among males, auditory working memory, and to a lesser extent, verbal STM are associated with better insight. The CCA suggested that males with good insight who are

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distressed yet convey less distress, have impairments in motor dexterity, yet relatively intact auditory working memory. Less commonly, males with poor insight that report less distress have greater auditory working memory impairments and relatively intact motor dexterity.

Among females, it appears that ideational fluency, set-shifting, and error-monitoring are highly related to appropriate apparent distress and better insight. The CCA results indicated that females with poor insight who verbally admit some distress, yet convey less distress, have poor phonemic fluency. However, this relationship with verbal fluency appears to be limited to apparent distress. Pearson's R correlations showed no significant association between phonemic fluency and reported distress. Also, there were negative relationships between design fluency and inappropriate reported and apparent distress (e.g., design fluency is associated with appropriate distress responses). Thus, those females with relatively intact insight and appropriate ratings on apparent distress also had relatively good phonemic fluency. In general, appropriate distress is related to ideational fluency among females.

Effect of Diagnostic Group on Insight, Distress and NP Performance

Since levels of insight and distress had been found to differ between schizophrenia and schizoaffective disorder subgroups, identical canonical correlation analyses were conducted separately for subjects in each of these two subgroups. Among the 62 schizophrenics available for analysis (8 cases excluded due to missing cells), the CCA failed to reach significance ($R = .56$, Wilks' Lambda = .51, $F = 1.06$, df1 = 36, df2 = 148, $p = .39$).

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For the 40 subjects with schizoaffective disorder who were included in the analyses (5 cases excluded due to missing cells), the association between the insight/distress variables and the neuropsychological variables was substantial and statistically significant ($R = .76$, Wilks' Lambda = .21, $F = 1.57$, df1 = 36, df2 = 80, $p = .05$). Standardized canonical coefficients can be seen in Table 20.

The standardized canonical coefficients from the explanatory set loaded highly with reported (-1.46) and apparent distress (1.40)], while the coefficients from the outcome set loaded highly with verbal STM (as measured by WMS-R Logical Memory I; .63). Thus, those subjects with schizoaffective disorder who reported more distress about having a mental illness and its consequences, yet conveyed less distress, had better verbal STM than those few who reported less distress, yet conveyed more distress.

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Table 20: Schizoaffective Subjects: Standardized Canonical Coefficients for Insight, Distress and NP

Explanatory Set-Insight/Distress		Outcome Set-NP	
Variable	**Coefficient**	**Variable**	**Coefficient**
Insight	.11	Grooved Pegboard Test averaged total seconds	.03
Reported Distress	**-1.46**	Finger Tapping Test average number of taps	-.40
Apparent Distress	**1.40**	WCST categories achieved perseverative errors	 -.05 .35
		Letter-Number Span longest item	.09
		Ruff Figural Fluency Test total unique designs	-.31
		Controlled Oral Word Association Test total words beginning with CFL total animals named	 -.01 .05
		WMS-R **Logical Memory -I** Visual Paired Associates -I Verbal Paired Associates -I	 **.63** -.10 .16
		WAIS-R Block Design raw total	-.21

Exploratory Analyses

Pearson's R correlation analyses were performed in order to explore the relationships between the insight and distress measures with the 12 NP measures for the sample of schizoaffective subjects. Thirty-six correlations between NP performance, insight, reported and apparent distress were performed and five coefficients were significant at the .01 criterion. Among subjects with schizoaffective disorder, WCST perseverative errors was associated with apparent distress ($r = .40$, $p = .005$). This indicates that the ability to shift set is related to appropriateness of apparent distress among schizoaffective subjects. Performance on LNS longest item was associated with insight ($r = -.39$, $p = .007$) and apparent distress ($r = -.38$, $p = .007$), indicating auditory

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working memory is related to intact insight and the conveyance of distress. Performance on the RFFT was associated with apparent distress ($r = -.37$, $p = .009$), indicating that design fluency is also related to the conveyance of distress among schizoaffective subjects. Performance on the WMS-R Logical Memory-I Subtest was associated with reported distress ($r = -.38$, $p = .007$), indicating that verbal STM is related to verbally expressed distress about illness and its consequences among subjects with schizoaffective disorder.

To summarize the results of the analyses, a significant relationship between insight, distress and NP was not found among the subset of subjects with schizophrenia. Among schizoaffective subjects, appropriateness of apparent distress was related to the ability to shift-set, auditory working memory, and design fluency. Insight is related to auditory working memory. The ability to appropriately report distress about having a mental illness and its consequences is related to verbal STM (as measured by the Logical Memory Subtest - I). Those subjects with schizoaffective disorder who reported distress about having a mental illness and its consequences yet conveyed less distress, had better verbal STM than those few who did not report distress. Tables 21 and 22 summarize the results of the analyses for each subgroup.

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Table 21: Comparision of Gender and Diagnostic Subgroups on Insight and Distress: Main Canonical Correlations & Descriptive Data

	Males n = 74		Females n = 45		SAD n = 49	
CC/ p	.65, p = .14		.81, p < .04		.76, p < .05	
	Coef	M (SD)	Coef	M (SD)	Coef	M (SD)
Insight	-.85	3.6 (1.5)	.74	3.6 (1.3)	.11	3.3 (1.3)
Reported Distress	-.68	3.0 (.99)	-.61	2.9 (.87)	**-1.46**	**2.8 (.93)**
Apparent Distress	**.91**	**3.1 (.90)**	**.85**	**3.1 (.89)**	1.40	3.1 (.89)

CC=Canonical Correlation for entire model with NP variables.
SAD=schizoaffective disorder

Table 22: Comparison of Gender and Diagnostic Subgroups on NP Performance Using High Canonical Coefficients (>.50) and Descriptive Data

NP Variable	Males Coef.	Males M (SD)	Females Coef.	Females M (SD)	SAD Coef.	SAD M (SD)	SZ M (SD)
WAIS-R							
FSIQ		86 (10)		86.5 (12)		87 (11)	85.5 (11)
VIQ		89 (14)		88 (11)		91 (14)	87 (11)
PIQ		84 (10)		86 (14)		85 (10.5)	85.5 (12)
Block Design		21 (9)		23 (13)		21 (10)	22 (11)
Vocabulary		36 (16)		37 (15)		38 (15)	35 (15)
WMS-R							
VRPAI		16 (4.3)		17 (4)		16 (4.9)	16.5 (4)
VSPAI		11 (4.7)		13 (4)		11 (4.7)	12 (4.5)
LMI		17 (7)		17 (6)	**.63*r**	18 (6)	17 (7)
WCST							
cat achieved		3.5 (2.3)		3.7 (2.2)		4 (2)	3 (2.4)
persev. errors		26 (20)	**i,a**	26 (21)	**a**	23 (21)	28 (20)
Letr/num. span	**.52*i**	4.6 (1.3)		4.7 (1.2)	**i,a**	4.6 (1.4)	4.7 (1.2)
Grooved Peg.	**.61***	101 (46)		114 (84)		103 (45)	109 (74)
Finger Tapping		45 (11)		40 (9)		41.5 (11)	44 (9)
COWAT							
CFL		30 (11.5)	**-.60*i,a**	34 (12)		31 (12)	32 (11)
Animals		16.6 (5)		17 (3.8)		17.4 (4.6)	16.4 (4.6)
Ruff fig. fluency		67 (25)	**i,a**	66 (20)	**a**	69 (23)	64.5 (23)

had a large coefficient (≥.50) in main CCA.
i=had a sig. corr. (Pearson's R, p = .01 only) for the entire sub-sample with insight.
r=had a sig. corr. for the entire sub-sample with reported distress.
a=had a sig. corr. for the entire sub-sample with apparent distress.
Sz=schizophrenia, SAD=schizoaffective disorder

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Insight, Distress and Psychiatric Symptoms

One of the objectives of this study was to explore the relationship between insight and distress about having a mental illness and its consequences and other psychiatric symptoms. A second set of canonical correlation analyses was performed to examine the associations between psychiatric symptoms (PANSS General, Positive, and Negative Symptoms ratings) and measures of insight and distress for the complete sample and within each diagnostic and gender category. The General Symptoms score on the PANSS includes the Judgment item, which constituted the insight measure for this study. Therefore, this item was removed from the General Symptoms score for subsequent analyses. The PANSS symptom ratings are scaled in the same way as insight and distress (using a 7 point Likert scale in which a lower rating indicates less severe symptoms).

A significant association was found between the distress (Set 1) and the psychiatric symptom (Set 2) variables ($R = .42$, Wilks' Lambda = .76, $F = 3.68$, df1 = 9, df2 = 273, $p = .0002$) for the complete sample.

Table 23: Standardized Canonical Coefficients for Insight, Distress and Psychiatric Symptoms for the Complete Sample N = 119

Set 1-Insight/Distress		Set 2-Psychiatric Symptoms (PANSS)	
Variable	**Coefficient**	**Variable**	**Coefficient**
Insight	**.69**	Positive Symptoms Total	.05
Reported Distress	-.45	Negative Symptoms Total	-.33
Apparent Distress	**-.86**	**General Symptoms Total**	**1.07**

The standardized canonical coefficients (see Table 23) from Set 1 loaded highly with insight (.69) and apparent distress (-.86), while the coefficients from Set 2 loaded highly with PANSS General Symptoms (1.07). Thus, subjects with poor insight yet relatively appropriate ratings on apparent distress received higher symptom ratings within the General Symptoms Total of the PANSS. Those subjects with relatively intact insight,

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yet who conveyed less distress about having a mental illness, tended to receive lower ratings on the General Symptoms Total of the PANSS.

Pearson's R correlation analyses were performed to reveal which of 15 General Symptoms were related to the three insight and distress ratings. Depression, anxiety, guilt, and tension were significantly and negatively related to apparent and reported distress (see Table 24). Thus, those with high ratings on these (principally affective) symptoms tended to report and convey distress about having a mental illness and its consequences. Those who had low ratings on these symptoms tend not to report and convey distress. Insight was not significantly related to any specific General Symptoms using the criterion of $p \leq .01$.

Table 24: PANSS General Psychopathology Symptom Items with Correlations At or Above a Significance Level of .01.

PANSS Symptom Items	Apparent Distress	Reported Distress
Depression	-.38**	-.43**
Anxiety	-.36**	-.28**
Tension	-.36**	-.35**
Guilt	-.31**	-.27**

****significant at .01, two-tailed**

Effect of Gender on Insight, Distress and Psychiatric Symptoms

The CCA for male subjects (n = 74) failed to reach significance (R = .35, Wilks' Lambda = .83, F = 1.48, df1 = 9, df2 = 163, p = .16). Thus for males, no significant association was found between the distress and symptom variables.

Among the 43 female subjects (two subjects excluded due to missing cells), a significant association was found between the distress (Set 1) and the psychiatric symptom (Set 2) variables (R = .59, Wilks' Lambda = 57, F = 2.77, df1 = 9, df2 = 95; p =

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.006). See Table 25 for a listing of the standardized canonical coefficients resulting from this analysis.

Table 25: Standardized Canonical Coefficients for Insight, Distress and Psychiatric Symptoms Among Female Subjects (n = 43*)

Set 1-Insight/Distress		Set 2- Symptoms (PANSS)	
Variable	**Coefficient**	**Variable**	**Coefficient**
Insight	**.73**	Positive Symptom Total	.19
Reported Distress	-.34	Negative Symptom Total	-.07
Apparent Distress	**-.79**	**General Symptom Total**	**.91**

***2 cases excluded due to missing cells.**

The standardized canonical coefficients from Set 1 loaded highly with apparent distress (-.79) and insight (.73), while the coefficients from Set 2 loaded highly on the General Symptoms Total (.91). Thus, female subjects with relatively poor insight but more apparent distress had higher ratings on General Symptoms. Those female subjects with relatively intact insight but who conveyed less distress about having a mental illness had lower General Symptom ratings.

Follow-up Pearson's R correlation analyses (see Table 26) revealed that apparent distress was significantly related ($p \leq .01$) to four of 15 General Symptoms. However, insight was not significantly related to any of the General Symptoms using the $p \leq .01$ criterion.

Table 26: Relationships between Apparent Distress and General Symptoms among Female Subjects

General Symptoms	Apparent Distress
Anxiety	-.40**
Tension	-.43**
Guilt	-.39**
Depression	-.59**

****significant at .01 level, two-tailed.**

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Among female subjects, high levels of anxiety, tension, guilt, and depression were negatively related to apparent distress. This indicates that females rated as having greater anxiety, tension, guilt, and depression conveyed more distress about their illness and its consequences.

Effect of Diagnostic Group on Insight, Distress, and Psychiatric Symptoms

Among the 69 subjects with schizophrenia who were included in the analyses (1 case excluded due to missing cells), a significant association was found between the insight and distress (Set 1) and psychiatric symptom (Set 2) variables (R = .44, Wilks' Lambda = .76, F = 2.02, df1 = 9, df2 = 156, p = .04). The largest standardized canonical coefficients (see Table 27) from Set 1 were apparent distress (-1.10) and insight (.69), while the highest loading coefficient in Set 2 was the PANSS General Symptoms rating (1.19).

Table 27: Standardized Canonical Coefficients for Insight, Distress, and Psychiatric Symptoms Among Subjects with Schizophrenia (n = 69*)

Set 1-Insight/Distress		Set 2-Symptoms (PANSS)	
Variable	**Coefficient**	**Variable**	**Coefficient**
Insight	**.69**	Positive Symptoms Total	-.20
Reported Distress	-.18	Negative Symptoms Total	-.31
Apparent Distress	**-1.10**	**General Symptoms Total**	**1.19**

***1 case excluded due to missing cells.**

Thus, schizophrenic subjects with relatively better insight who conveyed less distress had less severe PANSS General Symptoms ratings. Those schizophrenic subjects had relatively poorer insight yet conveyed more distress, had more severe General Symptom ratings.

Pearson's R correlations were conducted to examine the association between the 15 PANSS General Symptoms items and the three distress and insight ratings. The only

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significant coefficients (using an alpha set at the .01 level, two-tailed) occurred for depression, anxiety, and tension (see Table 28) with *apparent distress*. None of the PANSS General Symptoms were significantly related to *insight* using the $p \leq .01$ criterion.

Table 28: PANSS General Symptoms Correlating With Apparent Distress at Significance Levels of At Least .01 Among Subjects with Schizophrenia

General Symptoms	Apparent Distress
Tension	-.42**
Anxiety	-.42**
Depression	-.41**

significant at .01 level, two-tailed.

These findings indicate that among subjects with schizophrenia, those who were rated high on tension, anxiety, and depression conveyed more distress about having a mental illness than those who were rated low on these symptoms.

Among the 48 subjects with schizoaffective disorder included in the analyses (1 case excluded due to missing cells), the canonical correlation analysis revealed no significant association between insight or distress and symptoms as measured by the PANSS ($R = .45$, Wilks' Lambda = .68, $F = 1.92$, df1 = 9, df2 = 102, $p = .06$).

Relationship of Age and Age at Onset to Insight and Distress

In light of the possibility that insight or appropriate distress about illness might change in relation to years of experience with the illness or decline as a result of the illness, the relationship of age at time of assessment and age of onset (age during earliest symptoms) was explored. Using ANOVA, age was not significantly related to any of the distress measures or insight ($F = 1.18$, $p = .26$).

Age of onset of psychiatric symptoms was significantly related to ratings on insight and distress ($F = 2.18$, $p = .00$). Specifically, apparent distress ($F = 3.52$, $p =.02$)

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and insight ($F = 4.25$, $p = .00$) were significantly related to age of onset. With regard to insight, mean age of onset was six years younger for those with relatively good insight [$n = 54$; $M = 18(7.1)$] compared to those with poor insight [$n = 61$; $M = 24(7.8)$] (4 cases excluded due to missing cells). Subjects who conveyed more distress also had earlier age at onset of psychiatric symptoms [$n = 33$; $M = 17.5(10.6)$] compared to those who conveyed less distress [$n = 83$, $M = 19.5(7.4)$] (3 cases excluded due to missing cells). Follow-up comparisons of diagnostic and gender subgroups on the relationships between insight, apparent and reported distress, with age of onset were performed using two-way ANOVA. None were significant at the .01 criterion.

Effect of Neuroleptic Dose and Vocabulary on Insight, Distress, and NP Functioning

Neuroleptic level (NL) and Vocabulary may act as intervening variables in the relationships studied here between insight variables and NP and psychopathology variables. It may be that NL's selectively impact particular NP or symptom measures and in this way affect the relationships between these measures and insight. It may also be that NL's directly impact insight. To properly study the impact of NL on insight, distress, and NP, one would have to randomly assign subjects to different NL levels. However, the naturalistic approach employed here does not preclude the possibility of exploring such relationships.

Furthermore, it may be that among all cognitive functions, verbal abilities play a unique (and possibly decisive) role in the development or assessment of insight, since they might affect a patient's ability to express their views of the illness and its impact on their experience of distress regarding their illness. Vocabulary also correlates with education and "old learning" which may have been achieved prior to the onset of the

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illness. Thus, vocabulary may be an important mediating factor in understanding the relationship between measures of insight and distress with measures of NP functioning.

At the time of assessment, current daily NL dose was rated based on published methods (Davis, 1976). Ratings of none (0), low (1), moderate (2), moderately high (3), and high (4) were used in the analysis. Using Haloperidol HCl as an example, a rating of "1" is given if the dose is less than 5mg., "2" for 6 – 20 mg, "3" for 21 – 49mg, and "4" is given if the dose is greater than 50mg per day. Because NL is an ordinal variable, non-parametric tests were used to analyze the relationship between dosage level, the three insight and distress ratings, 12 NP variables, the WAIS-R Vocabulary Subtest, and 15 General Symptoms of the PANSS. In this case, Kruskal-Wallis rank procedures using chi-square tests to explore systematic relationships between the level of neuroleptic dose and other variables were used.

For the complete sample of subjects on neuroleptic medications (N = 105, 14 cases were not taking any NL at assessment), there was a systematic relationship between NL and insight ($\chi^2 = 9.1$, df = 3, $p < .03$). There was also a systematic relationship between NL and motor dexterity as measured by the GPT ($\chi^2 = 9.8$, df = 3, $p < .03$) and verbal STM as measured by the WMS-R Verbal Paired Associates Subtest ($\chi^2 = 8.2$, df = 3, $p < .04$). Examination of mean ranks at each NL indicated that subjects with lower NL had poorer insight (see Table 29). Individuals with high NL had poorer motor dexterity yet better verbal STM performance. There was no significant relationship between NL and PANSS General Symptoms.

Table 29: Mean Ranks at Each Level of Neuroleptic Dosage for Complete Sample (N = 105*)

Neuroleptic	Insight	Grooved	WMS-R

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Level		Pegboard	Verbal Paired Associates
low (n = 31)	60.5	42.3	39.5
moderate (n = 38)	56.7	59.8	52.9
mod. high (n = 19)	37.5	46.1	59.6
high (n = 16)	44.8	66.2	61.7

***14 cases were not taking any NL at assessment**

An ANOVA comparing vocabulary scores at each level of insight and distress revealed no significant relationship between performance on the WAIS-R Vocabulary Subtest and insight or distress (N=117 [2 cases excluded due to missing cells], F=1.26, df = 40, p = .19).

Effect of Benzotropine on Insight, Distress and NP Functioning

Benzotropine is an anticholinergic drug that is prescribed to treat the motor side effects of neuroleptic medications. Benzotropine and other anticholinergic drugs have been implicated in some degree of cognitive impairment (Syndulko et al, 1981). A relatively large number of subjects in this sample (29%) were prescribed benzotropine. ANOVA was used to explore whether subjects taking benzotropine differed from the remaining subjects on variables used in prior analyses.

Subjects taking benzotropine (n = 34) did not significantly differ on insight or distress ratings from the rest of the sample (n = 81, 5 cases excluded due to missing cells). They also did not differ significantly on PANSS General, Positive, or Negative Symptom Total ratings. In terms of NP performance (see Table 30), subjects taking benzotropine had significantly shorter maximum working memory spans (F = 5.0, p = .00; as measured by LNS longest item) compared to those who did not [M = 4.1(1.3) vs. 4.9(1.2)]. They also had significantly poorer verbal ability, as measured by the WAIS-R Vocabulary Subtest (M = 29.5; F = 5.9, p = .00), than the remainder of the sample (M =

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39.4). Finally, subjects taking benzotropine had a greater number of perseverative errors on the WCST [$\underline{M}$ = 33(22); $\underline{F}$ = 4.0, $\underline{p}$ = .01] compared to the rest of the sample [$\underline{M}$ = 22(18)].

Table 30: Relationship between Benzotropine and NP in the Complete Sample

NP Test	Benzotropine	Mean(SD)
Letter-Number Span (Longest Item)	Yes	4.1(1.3)
	No	4.9(1.2)
WAIS-R Vocabulary	Yes	29.5
	No	39.4
WCST Perseverative Errors	Yes	33(22)
	No	22(18)

In order to determine whether the effects of benzotropine were different among the two subgroups, post-hoc comparisons using t-tests were performed for those six NP tests associated with insight, reported and apparent distress. None of the tests were significant at the .01 criterion.

DISCUSSION

The hypothesis that measures presumed to tap frontal and executive functions would be significantly related to inappropriate lack of distress and poor insight regarding mental illness and its consequences was essentially supported. One of the most interesting and original findings of the present study was that the relationship between insight, distress, and NP performance differed among diagnostic and gender subgroups. Specifically, schizophrenic subjects had poorer insight and less apparent distress than schizoaffective subjects did. A similar finding with regard to insight in a study with over 400 subjects using the SUMD (Amador, 1994) supports the validity of this result. What has not been reported prior to the present study is a gender within diagnostic group interaction. Specifically, female subjects with schizophrenia were the least likely to

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spontaneously report distress and received the least appropriate ratings for apparent distress, while female subjects with schizoaffective disorder were the most likely to spontaneously report distress and convey distress. Thus, it was not surprising that the first CCA with all subgroups combined was non-significant. In light of the significant impact of gender and diagnostic category on insight and apparent distress, analyses had to be run separately for each gender and diagnostic group.

Relationship between Insight, Distress, and NP among Gender Samples

Male Subjects

A non-significant CCA with a large effect size (R = .65) extracted a pattern among male patients that associated insight and distress with performance on the GPT and LNS longest item. Male subjects with better insight and who reported more distress, but conveyed less distress, had poorer dexterity, but better auditory working memory. Those males with relatively poor insight and less distress had better dexterity and relatively poorer auditory working memory. Examination of the raw data suggests that most of these subjects fit into the first category. This suggests a relationship between poor dexterity and lack of apparent distress. It also suggests a relationship between poor insight, lack of distress, and auditory working memory impairments among some subjects. The results of the Pearson's R correlations indicate that the strongest relationship occurs between insight and working memory. This pattern of relationships among the insight and distress measures makes intuitive sense: if someone has poor insight into having a mental illness and its consequences they are less likely to report being distressed about them. However, some patients report distress about the consequences of their "problems" without complete insight into their true nature. In this

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case, they do not appear appropriately distressed to the clinician. These patients also have auditory working memory impairments, suggesting that intact working memory might be necessary for reasoning out the association between the consequences of illness and its origin.

The relationship between poor motor dexterity and lack of apparent distress may be due to an underlying volitional impairment. It is important to note that the CCA extracted males who reported being distressed, but tended not to appear appropriately distressed. It is possible that these male patients were distressed about the consequences of their mental illness and that those consequences related to poor dexterity. Psychomotor control is an important predictor of the ability to work (Bihm & McCarron, 1988). Male patients may feel more pressure from family members and society to work and may find psychomotor impairments especially distressing because most entry-level jobs require speed and accuracy in terms of motor control.

Female Subjects

A significant CCA extracted a pattern among some female subjects who had relatively poor insight and conveyed less distress, yet they did admit to some distress. These subjects had poorer phonemic verbal fluency than those few females who had relatively intact insight yet reported less distress. Follow-up Pearson's R correlations for the complete sample of females clarified the results of the CCA. Phonemic fluency and the ability to shift-set (as measured by WCST perseverative errors) were significantly related to both insight and apparent distress. Thus among female subjects, mental flexibility is associated with the ability to achieve insight and convey distress.

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In terms of the difference in findings for males and females, it should be noted that the findings for females were more robust statistically. It is possible that this is due to the wider range of performance we observed within the female sample for insight, distress and NP (e.g., females with schizophrenia had the poorest insight while females with schizoaffective disorder had the best). Nevertheless, males and females with impairments in either the affective, volitional or intellectual dimensions of insight also tended to have impairments in measures of executive functioning. The differences that occurred between the genders had to do with the particular tests that tap into executive functions. Perhaps more global processes underlying intact performance on these specific tests of executive functioning (e.g., the use of working memory, the ability to process information in novel ways, mental flexibility, or even volition itself), are what actually relate to this more complete concept of insight. If that is the case, the gender difference could be due to which test taps that global process best for that gender group. Further study is necessary in order to clarify what specific type of "executive dysfunction" might be at work here and whether gender differences truly exist relating to the concept of insight. On the other hand, with three dimensions of insight that require proper integration, there are several ways in which poor insight might develop. It would make sense to have different subjects with different types of executive dysfunction relating to insight.

Effect of Diagnostic Group on Insight, Distress, and NP

A significant CCA among subjects with schizoaffective disorder revealed that those who were distressed by self-report, but conveyed less distress had better verbal STM than those few who reported less distress. Follow-up Pearson's R correlations

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revealed that among schizoaffective subjects, reporting distress was associated with intact verbal STM (as measured by the Logical Memory Subtest). The conveyance of distress was associated with the ability to shift-set, design fluency, and working memory. Similar to the male subgroup only, schizoaffective subjects (male and female combined) having good insight had better working memory.

The CCA among subjects with schizophrenia was non-significant and had a small effect size. In light of the findings of this study, it is possible that this group was heterogenous in terms of the relationships between insight, distress and NP among male and female subjects. Future studies with adequate sample size should subdivide diagnostic groups by gender in order to test this hypothesis. It is also possible that schizophrenic subjects were too impaired with respect to insight and the ability to express or feel distress, to produce enough range for fruitful exploration of relationships with NP functioning. The subjects with schizophrenia were the most impaired on measures of insight, distress, and most NP functions.

Summary of the Relationship between NP, Insight, and Distress

Insight into having a mental illness and its consequences was related to having adequate auditory working memory among males (both diagnostic subgroups) and among schizoaffective subjects (both genders). Insight is also related to ideational fluency and the ability to shift-set (in other words mental flexibility) among female subjects. Thus, executive functioning is strongly implicated in the ability to consider one's overall circumstances in the present, perhaps relating it to the past, to then consider causation, and finally, to make an adequate judgment about having a mental illness and its consequences.

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The fact that many subjects did not appear to have considered the impact of the illness is interesting in itself. The Apparent Distress rating was designed to capture the appearance of a spontaneous emotional response that is well integrated with the verbal response and that reveals some depth of thought regarding the issues of mental illness in the patient's life. This factor was associated with mental flexibility, ideational fluency, and auditory working memory among schizoaffective subjects. Among females this factor was related to ideational fluency and the ability to shift-set (mental flexibility).

Male subjects who were distressed but did not convey distress to clinicians also revealed motor dexterity impairments. Poor dexterity was related to levels of neuroleptic dosage among the complete sample, however it was not significantly related to apparent distress among males or any of the other subgroups. These males may have impairments related to pre-motor functioning that might possibly underlie both the inability to perform the dexterity test in sufficient time and to spontaneously express distress in a way that is well integrated with the affective state and verbal response. It is also possible that males with dexterity impairments are especially distressed about the impact of their illness on the ability to work. This may create enough affective salience for them to overcome the deficits related to the ability to feel distressed so they were able to report being distressed.

With regard to self-reported distress among subjects in general, for an appropriate response, a patient is required to look back on their experience of mental illness. They must also look forward to consider its current impact in terms of social and work roles. Meanwhile, one must monitor oneself regarding feelings about the experience. This would require some verbal memory processing (thinking to oneself), especially if these issues were not spontaneously delved into prior to the interview. The results of this study

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reveal that the ability to report being distressed about having a mental illness and its consequences is related to verbal STM, among schizoaffective subjects.

Overall, it appears that executive functions including working memory, ideational fluency, mental flexibility especially during novel mental operations, motor planning/coordination along with verbal STM, are required to develop insight and effectively coordinate an appropriate affective response to having a mental illness and its consequences. These abilities represent an admixture of auditory, verbal, motoric, executive, and memory functions. They also represent intellectual and volitional functions. In general, these functions relate to subcortical, frontal and temporal lobe systems known to be impaired among patients with schizophrenia and schizoaffective disorder. This appears to be a specific finding as the relationship between insight, distress, and NP did not include visual STM, category fluency, Block Design performance, or finger tapping speed. The relationship is not mediated by verbal ability, as performance on the WAIS-R Vocabulary Subtest was not significantly related to insight or distress in follow-up correlation analyses.

Prior research lends some support for the validity of these findings. For example, lack of awareness of illness among schizophrenic patients as measured by both the ITAQ and SUMD have been associated with poor performance on the WCST (Young et al., 1993 and McEvoy 1996). The findings are also in line with theories regarding the etiology of impaired self-awareness in the neurology literature. For example, Stuss (1991) posited deficits in self-monitoring lead to impairments in self-awareness and implicated the medial frontal system as the integrating system for drive, motivation, and executive functions. This system allows active monitoring leading to the ability to reflect

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on complex ideas, rather than automatic processing of information. It also may partially sub-serve the processing necessary for the integration of intellect, affect, and volition, which Kraepelin posited as the three spheres of mental life. Prigitano and Schacter (1991) also considered the prefrontal cortex to be a key component to the executive processing system and necessary to the ability to develop awareness of things pertaining to the self, while posterior systems (which interact with the frontal system) relate to awareness of precepts outside the self.

The relationship between insight, distress, and executive/verbal memory functioning does appear to be mediated to some extent by neuroleptic medication, as greater levels of neuroleptic medication related to better insight. Two possible interpretations can be given for the relationship between insight, distress and neuroleptic level. Perhaps those who are given more neuroleptic medications have improved insight. The other possibility is that those with poor insight and inappropriate distress about illness and its consequences tend not to communicate symptoms to their physicians, thus receiving lower dosages.

It is possible that the relationship between NL and insight is partially due to the relationship between NL and performance on NP measures. Among the complete sample, better insight was related to auditory working memory, mental flexibility, and ideational fluency. Higher NL was associated with better verbal STM among the complete sample which had a non-significant CCA, so it is not possible to determine whether NL was a mediating influence on the relationship between verbal STM and insight or distress. NL was also associated with poorer dexterity among the complete sample.

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The results provide only partial support for NL as mediating the relationship between insight and NP. The possibility of indirect influences of NL on insight and distress through its impact on NP functioning should be examined in a future study.

Benzotropine was not directly related to insight or distress, but was related to working memory impairment and perseverative errors among the complete sample. The relationship between benzotropine and NP was non-significant within the subgroups. The difference between gender and diagnostic groups in terms of the relationship between insight, distress, and NP performance, cannot be accounted for by NL or benzotropine, as their dosages were equivalent across subgroups.

Finally, age was not a mediating variable in the relationship between insight, distress, and NP performance. Age of onset may possibly have a small effect on the relationship, although it was only significant among the complete sample. Those who reported earlier onset reported more distress and had better insight. It is possible that they had more experience with the consequences of their illness and learned over time. It is also possible that these subjects did not actually have earlier onset, just better cognitive functioning. Thus, they were more accurate about reporting the age at onset of symptoms (and were possibly more distressed by them) than those patients who reported later onset. Those with poor insight, lack of distress, and associated NP deficits may not recall symptoms as they first occurred.

Overall, the only demographic variables explored in this study that may mediate the relationship between insight, distress, and NP performance are age of onset in the complete sample, and NL such that better insight and working memory may be associated with higher levels of NL.

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Summary of Insight, Distress and Psychiatric Symptoms

Significant CCA's extracted a similar pattern of relationships between reported and apparent distress and PANSS General Symptoms for the complete sample, female, and schizophrenic subgroups. Those subjects who reported distress and appeared distressed had higher levels of depression, anxiety and tension. Those subjects within the complete sample and the female subgroup who were distressed also had higher levels of guilt. There was not a significant relationship between insight, distress, or symptoms among male and schizoaffective subgroups, perhaps due to some mediating variable or reduced range of affective or volitional dysfunction. There was also no relationship between NL or benzotropine with General Symptoms, insight, or distress.

Thus, it appears that the ability to have and convey distress (and not insight) is related to high levels of anxiety, depression, tension, and in the case of females, guilt. It is important to note that all of these ratings, including apparent distress, are based on the subject's verbal report of symptoms and feelings, as well as the clinician's ratings of signs. For example, apparent distress evaluated the distress that was apparent to the clinician based on the subject's *spontaneity of verbal* and facial expression, tone of voice, *depth of thought*, ability to sustain the expression of distress, and whether the expression of distress *fit with the content of the subject's speech.*

Overall, subjects who do not appear or report being distressed about their illness and its consequences endorse and receive less severe ratings on depression, guilt, tension, and anxiety. Perhaps individuals without these particular symptoms are less distressed about their illness. However, it is difficult to believe that the absence of depression

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would be more important than the absence of hallucinations or paranoia in terms of distress about having a mental illness.

It appears that the subjects without the ability to appropriately express distress also do not express these (particularly affective) aspects of their illness. Such subjects tended not to spontaneously provide verbal or facial expressions of distress. They did not appear to have considered their mental illness or its impact at any depth. They tended not to sound distressed and their verbal responses were often incongruent with their appearance when questioned about the impact of their mental illness. These subjects are less likely to endorse ratings for depression, anxiety, and guilt and do not appear tense. It is possible that these patients actually do not feel distress abut their illness and they do not suffer from these affective symptoms. If this were indeed the case, they would have difficulty developing true insight into the devastating nature of their illness and its consequences.

Overall Summary

An integrative picture of the findings can now be summarized. Among males poor insight and inappropriate apparent distress were associated with working memory impairments. Apparent distress related to working memory and motor dexterity. Among females, insight related to phonemic fluency and the ability to shift-set. Apparent distress, related to ideational fluency and the ability to shift-set. Subjects with schizoaffective disorder showed the same relationships between insight and apparent distress and working memory, fluency and the ability to shift-set. An additional finding in this subgroup was the relationship between verbal STM and reported distress, posited to tap an affective/intellectual dimension. This sets it apart from the intellect and

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affective/volitional dimensions in terms of its relationship to NP, providing some evidence for the valid separation of these dimensions. Perhaps the affective salience of memories regarding the consequences of mental illness can overcome memory impairments in some patients, who have difficulty developing insight into the nature of their illness. In any case, these findings provide support for separate affective, volitional, and intellectual processes working together to produce an appropriate response to illness and its consequences.

There is also some indirect evidence that neuroleptic treatment may improve working memory, thus improving insight among some patients. It was also associated with improved verbal STM, so it may have an impact on the ability to report distress as well (although there were no direct relationships between reported distress and NL detected). Benzotropine on the other hand, related to working memory and set-shifting impairments. An interesting finding is that those subjects who convey distress are the ones who report and appear to suffer most from depression, anxiety, guilt, and tension. Perhaps, those who indicate lack of distress suffer fewer affective symptoms. Kraepelin (1909) distinguished between those with affective dysfunction, and those in whom the affective sphere of mental life is completely destroyed. One would expect such patients to have little insight into their illness.

Future Research

Further research is necessary to determine the reliability and validity of the distress measures. Until this is accomplished, the contributions of this project should be interpreted with caution. Nevertheless, the notion of a more complete concept of insight has been introduced and has some interesting implications.

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This study provides several contributions to future research on insight in psychiatric populations. First, it lends support to the notion that insight is a complex phenomenon that includes intellectual, affective and volitional dimensions. Furthermore, distress is an important variable to include in studies of insight, as it produces a more complete picture of the dysfunctional processes involved in poor insight into one's illness and its consequences.

Second, this study reveals that it is important to have a large enough sample to separate diagnostic subgroups by gender, when trying to look at the relationship between insight, distress, NP performance, and psychiatric symptoms. A future study might attempt to examine the underlying cause of differences between female and male subjects with schizophrenia and schizoaffective disorder in terms of insight, distress, NP and symptoms. Third, it reveals a relationship between levels of neuroleptic drug and insight that is clinically meaningful. A future study might wish to address the question: Are subjects with better insight being prescribed more neuroleptic because they are better able to communicate their symptoms? Or, are they developing better insight as a result of more neuroleptic drug, secondary to improved NP functioning?

An interesting question is how one would piece together a hypothetical model of the relationships between cognitive, affective, and volitional functions in the process of the development of insight. Future endeavors might make further attempts to tease apart the affective and volitional contributions to the process of insight. One possible model of the relationship between insight and distress is formulated here. In order to consider the impact of one's illness and its consequences (develop insight) it must become a salient question to the patient. Even with impairments in the ability to experience affect, one

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may experience discomfort in the moment. However, searching for the cause of this discomfort and contemplating its future impact requires an intentional intellectual exercise at the abstract level. Volitional impairments could prevent this kind of inner-exploration from occurring to begin with. Affective and volitional impairments (or their disunity) related to dysfunction in the frontal lobes and their inter-connections, might also prevent the fluid, unified, and spontaneous expression of distress even if some level of insight has been achieved. Finally, intellectual impairments, particularly those relating to executive and verbal STM deficits, may prevent the ability to process or recall experiences, to piece them together to make an adequate judgment, and to some extent, clearly express that judgment.

The understanding of the process underlying the development of insight goes beyond the ability to better understand the obstacles patients have to accepting their mental illness and need for treatment. This project, directed at increasing our understanding of insight through an analysis of the deficits in the mental operations (intellect, affect, and volition) posited 100 years ago by Kraepelin, opens up opportunities for further investigation into the nature of complex mental functions. It also underscores the value of integrating theory from a variety of sources or disciplines to better inform a method of inquiry.

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APPENDIX

The Modified PANSS Insight Measure

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MODIFIED PANSS INSIGHT MEASURE

INTERVIEW: [additional/modified material is in brackets]
[I am going to ask you some questions about the experience you have had at the hospital. I really need to know your true opinions and feelings about your experiences. If you don't feel comfortable giving me an honest answer at any point in the interview, just tell me and I will understand. Our research won't be accurate otherwise. <u>The information you provide will not be shared with your treatment team or doctors.</u> You can rest assured that nothing you say in this interview can effect your benefits or your treatment.]

[1. a) When speaking with mental health professionals or researchers, have you ever denied having a symptom or problem because you were too embarrassed?
b)Do you feel comfortable telling me about symptoms or problems today?]

<u>[Last Hospitalization]</u>
2. How long were you in the hospital this last time? [orig. items were in present tense]

3. Why did you come to the hospital?

4. Did you need to be in the hospital?
IF NO:
a. Did you have a problem that needed treatment? [Interviewer should determine whether the subject appears not to have thought in some depth about their circumstance versus attributes the entire reason for their problem/prior hospitalization to another person/force].
b. Did you actively refuse medicines?
IF YES or No:
a. Why?

5. Would you say that you had a psychiatric or mental problem at that time?
IF YES:
a. Why?...[Question whether the subject is repeating what someone else told them, or if they truly believe they were ill. Ask if they can generate their own reasoning or examples of behaviors/symptoms that indicated to them that they were ill; does the subject appear to have thought this out?]
b. Can you tell me about it and what it consisted of?

<u>[Current]</u>
[6. Are you currently receiving treatment of any kind?]
IF YES:
a. Are you ready yet for discharge from the [hospital/treatment/clinic]?
b Do you think you'll be taking medicine [or other treatments] for your problems after discharge?
IF NO:
a. Why?

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[b. Do you think you need to be in treatment?]

7. In your own opinion, do you need to be taking medicine now?
IF NO:
a. and medicated: Why then are you taking medicines?
b. if unmedicated and in some form of treatment: Why are you still in [hospital /treatment/clinic/taking alternative treatments]?
IF YES:
a. Why? Does the medicine help you in any way?

8. Would you say that you have any psychiatric or mental problems at this time?
IF NO and in treatment: For what reason are you still in [hospital/treatment/clinic]?
IF YES: Please explain.

[For the items below, if the subject denies current condition/problem but admits past, use past tense (e.g., were/did). Also, remember to note whether responses are spontaneous or require elicitation.]

9. Just how serious are your problems?

[10. Are you upset or do you worry a great deal about these problems?
IF no spontaneous elaboration beyond yes or no: Why?]

[11. Will this condition/problem interfere with your life in any way?
IF YES and no spontaneous elaboration:
a. Do you think this condition/problem prevents you from having a satisfactory social life?
b. Do you think this condition/problem prevents you from working?
After each yes: How do you feel about that?
What do you plan to do about it?
IF NO without spontaneous elaboration: Why not?]

12. What are your future plans?

13. Do you have long range goals?
[**IF YES:** Have you considered whether your problems/condition will impact these goals?
IF NO for either question: Why?]

RATINGS:
A. Lack of Judgment and Insight (unmodified PANSS item G12).
Definition: Impaired awareness or understanding of one's own psychiatric condition and life situation. This is evidenced by failure to recognize past or present psychiatric illness or symptoms, denial of need for psychiatric hospitalization or treatment decisions characterized by poor anticipation of consequences, and unrealistic short-term and

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long-range planning. Basis for rating: thought content expressed during the interview.

1=absent; definition does not apply.

2=minimal; questionable pathology; may be at the upper extreme of normal limits.

3=mild; recognizes having a psychiatric disorder but clearly underestimates its seriousness, the implications for treatment, or the importance of taking measures to avoid relapse. Future planning may be poorly conceived.

4=moderate; subject shows only a vague or shallow recognition of illness. There may be fluctuations in acknowledgment of being ill or little awareness of major symptoms which are present, such as delusions, disorganized thinking, suspiciousness, and social withdrawal. The subject may rationalize the need for treatment in terms of its relieving lesser symptoms, such as anxiety, tension, and sleep difficulty.

5=moderate-severe; acknowledges past but not present psychiatric disorder. If challenged, the subject may concede the presence of some unrelated or insignificant symptoms, which tend to be explained away by gross misinterpretation or delusional thinking. The need for psychiatric treatment similarly goes unrecognized.

6=severe; subject denies ever having had a psychiatric disorder. He or she disavows the presence of any psychiatric symptoms in the past or present and denies the need for treatment and hospitalization.

7=extreme; emphatic denial of past and present psychiatric illness. Current hospitalization and treatment are given a delusional misinterpretation (e.g., as punishment for misdeeds, persecution, etc.), and the subject may thus refuse to cooperate with therapists, medication, or other aspects of treatment.

B. Rating Distress About the Illness and Its Impact

Definition of distress: A negative emotional response to the predicament created by mental illness based upon an accurate understanding of the illness and its consequences. Negative emotional responses include anger, sadness, despair/hopelessness. Distress is most apparent when an individual spontaneously elaborates about the negative impact of their mental illness or symptoms on life circumstances, while concurrently displaying appropriate facial expression and vocal tone. It would be appropriate for an individual who has recently been hospitalized due to a severe and disabling mental illness to experience extreme distress regarding the impact of illness on their life. It is important to note that the distress being rated is strictly confined to the content elicited during the insight interview and must relate to the impact of illness in the subjects life (e.g., distress caused by a paranoid delusion which is frightening to the subject, should not be rated here).

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Verbal Report

Rate the degree of distress the subject has about their mental illness or symptoms and their impact as stated by the subject. ☐

1=subject reports severe distress
2=subject reports moderate distress
3=subject reports mild distress
4=subject denies feeling distressed

Apparent Distress

Place a 1 = yes or 2 = no in each box below.

☐spontaneous verbal expression of distress
☐spontaneous facial expression of distress
☐tone of voice reveals distress
☐verbal expression of distress indicates some depth of thought about the mental illness and its impact on the subject.
☐the expression of distress is appropriately sustained
☐the expression of distress fits with the content of speech

Rate the degree of apparent distress revealed by this subject. ☐

1=subject appears severely distressed
2=subject appears moderately distressed
3=subject appears mildly distressed
4=subject does not appear distressed

Global Rating of Distress ☐

1=appropriate. Subject spontaneously expresses a full range of negative emotions when asked about issues relating to their illness. The verbal report of distress reveals some depth of thought on the issues at hand and the facial expressions and vocal tone are appropriate to the content of speech.

2=mildly inappropriate. The subject reports being distressed, but only expresses a single emotion relating to a negative issue and it is directed towards others, (e.g., anger toward a family member or psychiatrist); **or** the subject requires prompting to elicit verbal reports about the emotional impact of their mental illness; **or** the subject will occasionally fail to express one of the elements of apparent distress (vocal tone/facial emotion) while discussing their illness and its impact.

3=inappropriate. When the subject discusses their condition they fail to spontaneously report or reveal signs of distress. When a report of distress is elicited by the interviewer, it either does not match with signs of apparent distress, or the signs of distress disappear rapidly. The subject appears not to have really considered the negative impact of their illness.

4=severely inappropriate. The subject denies feeling distressed and reveals no apparent distress when prompted.

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