

Brief Cognitive Assessment in Schizophrenia

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Brief Cognitive Assessment in Schizophrenia

- An Overview

Cognitive impairment is a core feature of schizophrenia, and has been found to be associated with an individual's ability to function independently in the community. This thesis will be by reviewing the existing literature in this area. This will cover general features of the cognitive impairment that is associated with schizophrenia, as well as the three-way relationship between cognitive impairment, ability to function in the community and psychotic symptomatology. Because of the role that cognitive deficits have been found to play in determining an individuals functional outcome, it will be argued that these deficits need to be routinely assessed for all patients with schizophrenia.

The empirical paper describes a study that involved looking at the relationship between performance on a brief measure of cognitive functioning, the Brief Cognitive Assessment (BCA) (Velligan et al., 2004), and ability to function in the community in a sample of patients with schizophrenia. The use of the BCA as a measure of cognitive impairment in this population was explored, and contributions of both symptoms and cognitive deficits to functional outcome were investigated.

In the final part of this thesis, the critical review, the importance of routine cognitive assessment for individuals with schizophrenia will be restated, based on the findings of the literature review and the empirical study. This section will include a personal reflection on the experience of both the research process and the use of the BCA with this population, and a summary of the strengths and weakness of this measure.

Brief Cognitive Assessment in Schizophrenia

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Part 1

Brief Cognitive Assessment in Schizophrenia:

A Review of the Literature

Abstract

Cognitive functioning is receiving more attention as an important feature of schizophrenia. In the past, research efforts have concentrated on attempting to understand and treat the signs and symptoms of this condition. However, in recent years researchers and clinicians have begun to realise the enormous significance of the cognitive impairment that is associated with schizophrenia. One of the main reasons for this increased interest in the nature of cognitive impairment is due to a growing awareness of the functional implications of these deficits. This paper reviews what is currently known about cognitive impairment in schizophrenia, and explores the relationship between this impairment, psychotic symptoms and ability to function in the community. It will conclude by arguing for the need for routine cognitive assessment in this population.

Key Words

Schizophrenia, Cognitive Deficits, Community Functioning, Psychotic Symptomatology

Introduction

This review consists of three parts. The first part will review what is currently known about cognitive impairment in schizophrenia generally. Findings relating to the natural history and time course of cognitive impairment in individuals, the prevalence of cognitive deficits in this population, and the actual nature of the cognitive impairment itself will be discussed. The impact of medication on cognition will also be considered, as will the costs associated with this impairment for individuals, their families and society at large.

The second part of the review will consider the relationship between cognitive impairment, the symptoms of schizophrenia, and the functional difficulties associated with this condition. Much controversy surrounds this complex triadic relationship, particularly regarding the issue of causality between these three factors. Though significant advances have been made in recent years in terms of delineating these relationships, much remains to be established.

The final part of this review will argue for the need for routine neuropsychological assessment for individuals with schizophrenia, based on the literature discussed in the two initial parts of the review. One particular example of a brief cognitive assessment will be reviewed: The Brief Cognitive Assessment (BCA)(Velligan et al., 2004).

Before continuing with this review, a brief point must be made about the controversial nature of the concept of schizophrenia as a psychiatric diagnosis. For

the purpose of this review, the term 'schizophrenia' will be used and will refer to individuals meeting the criteria for a diagnosis of schizophrenia as described by DSM-IV (APA, 1994). For methodological reasons, this term is customarily used in research studies in this area, in preference to less specific terms such as individuals with 'chronic mental health problems' or 'severe and enduring mental illness'. Despite this, the controversy surrounding the concept of schizophrenia as a unitary concept and the complexity of its phenomenology must be acknowledged (Bentall, 2003), and in routinely using the term 'schizophrenia', this review does not fail to appreciate the controversial nature of this term.

Cognitive Impairment in Schizophrenia

Impaired cognition is a fundamental aspect of schizophrenia (Gold & Harvey, 1993). This section will begin by summarising three general principles relating to this impairment that emerge on reviewing the literature in this field, before going on to consider in more detail the actual nature of this impairment.

1. Cognitive Impairment is a Core Feature of Schizophrenia

Some researchers have argued that the cognitive impairment associated with schizophrenia is a symptom domain in its own right, and should afford the same importance in terms of understanding and treating this disorder as positive or negative behavioural symptoms (Gold & Harvey, 1993). Research evidence suggests that these deficits are not simply a result of psychotic symptoms or of the effects of medication. Nor are they thought to be simply a consequence of institutionalisation or of illicit drug use. These deficits cannot be explained either as simply a by-product of the emotional difficulties associated with this condition. Though all of these

factors may further increase the degree of cognitive impairment over and above that which occurs as a result of the illness, a substantial proportion of these deficits are argued to be an integral part of the phenomenon of schizophrenia itself.

Evidence that cognitive impairment is a core feature of schizophrenia is based on a number of findings. First, antipsychotic treatments, which have been shown to have a marked effect on the psychotic symptoms of schizophrenia, have much less effect on cognitive impairment, if any (Harvey & Keefe, 01). This illustrates that cognitive deficits are not simply a consequence of psychotic symptoms, as when the symptoms are reduced, the cognitive deficits largely remain. This discrepancy also suggests that antipsychotic medications that reduce the psychotic symptoms of schizophrenia, may act on different neural systems from those that underlie the cognitive impairment.

Second, cognitive impairment in schizophrenia appears to have its own unique profile that differs from the pattern seen in dementia (Welsh, Butters, Hughes, Mohs & Heyman, 1992), bipolar disorder (Fleck, Sax & Strakowski, 2001) or depression (Zakzanis, Leach & Kaplan, 1998). This suggests that the pattern seen in schizophrenia is specific to this particular condition, rather than being a generalized pattern of impairment that might be associated with any form of psychopathological disorder, and that this profile of deficits is mediated by a particular pattern of changes occurring at the neuropsychological level.

2. Cognitive Deficits are Common in Schizophrenia

Some degree of cognitive impairment can be detected in nearly every case of schizophrenia. Even for patients whose performance on cognitive tests appears to be within the normal range, their scores are likely to represent a significant decline from

pre-morbid levels (Gold & Harvey, 1993). 85% of stable outpatients with schizophrenia, in other words the least functionally impaired subgroup of patients, are estimated to be *substantially* cognitively impaired (Khanna & Varghese, 2003). This suggests that in the schizophrenia population as a whole, the proportion of cognitively impaired individuals is higher. Another study found that 90% of patients have ‘clinically meaningful deficits’ in at least one cognitive domain, and 75% have deficits in at least two (Palmer et al., 1997).

3. Cognitive Deficits are a Stable Feature of Schizophrenia

As mentioned above, cognitive impairment appears to some extent to be independent of symptoms. The consensus in the research literature suggests that cognitive deficits do not remit between acute episodes as behavioural symptoms subside, but continue to be present to a similar extent during periods of both relapse and remission (Asarnow & MacCrimmon, 1978).

A more controversial issue is how the pattern of cognitive impairment develops over the longer term and whether schizophrenia should be conceptualised as a neurodegenerative disorder or not. Some researchers have argued that cognitive deficits are present in patients with a first-episode of schizophrenia and that these deficits are similar to those of patients with a much longer history of schizophrenia (Addington & Addington, 2002). Further support for the idea that cognitive impairment remains relatively static throughout the course of the disorder comes from cross-sectional studies that have shown no differences in the cognitive functioning of young patients with a short duration of illness, old patients with a short duration of illness, and old patients with a long duration of illness (Heaton et al., 1994). Another study found that a sample of 25 geriatric inpatients (mean age = 75

years), who were clinically rated as non-demented, performed identically on measures of memory and attention to younger patients in previously published studies (Putnam et al., 1992).

Several studies have supported this idea that cognitive deficits are present right from the beginning, and some have shown evidence of impairment even before the onset of psychotic symptoms. One study found that cognitive impairment at age 12 was able to predict the risk of developing schizophrenia in the early 20's (Cornblatt, Lenzenweger, Dworkin & Erlenmeyer-Kimling, 1992). Substantial levels of impairment have also been found at illness onset within samples of drug-naïve patients (Saykin et al., 1994).

In contrast to these findings, some researchers have argued that there is a progressive cognitive decline associated with schizophrenia (Bilder et al., 1992). In this study, 51 first-episode and 50 chronic patients with schizophrenia were assessed. Though the two groups scored similarly on tests assessing pre-morbid intellectual ability, the chronic group performed worse on tests of cognitive functioning. In a review, Mohs (1999) argues that cross-sectional studies of the cognitive performance of patients with schizophrenia aged 20 to 90 years indicate that there is a gradual decline in cognitive function throughout the adult life span. However, this review acknowledges the complex interactions between aging, symptomatology, cognitive impairment, and factors associated with the illness including poor education, medication, institutionalisation and poor cooperation and motivation. The rate of decline is also acknowledged as being 'very slow' (Mohs, 1999).

With these considerations in mind, Mohs argues that rather than conceptualising this decline as that of a progressive dementing illness, the decline in cognitive

impairment in schizophrenia can be explained by age-associated changes superimposed on ‘static abnormalities’ associated with the illness. In summary, research in this area suggests that cognitive deficits are present from the very earliest stages of the illness, and perhaps even before the onset of symptoms, and remain relatively stable over time. Any deterioration in cognitive functioning is argued to occur as a consequence of age-related cognitive changes or other mediating factors such as institutionalisation, rather than as a result of the worsening of the original deficits associated with the syndrome of schizophrenia.

In a recent review of the literature in this area, Wykes & van der Gaag (2001) distinguish between trait, acquired and state deficits. They conceptualise trait deficits as being mild cognitive deficits that are present long before the first episode and are reflected in ‘mild academic performance decrements’ and evidence of developmental delay in reaching cognitive milestones. State deficits are conceptualised as being transient deficits that are strongly associated with symptoms and that emerge during the first-episode and improve as symptoms remit. Acquired deficits are conceptualised as being moderate to severe deficits that emerge in the months before and during the first episode and remain stable thereafter. The differences between these deficits can be summarised in the following table:

Table 1. The Natural History of Differing Types of Cognitive Deficit

	Premorbid	During Episode	In Remission
Trait Deficit	Mild	Mild	Mild
State Deficit	Absent or Mild	Severe	Absent or Mild
Acquired Deficit	Absent or Mild	Severe	Moderate to Severe

The Nature of Cognitive Impairment in Schizophrenia

So far this review has considered quite generally the concept of cognitive impairment in relation to schizophrenia. The precise nature of these deficits will now be considered in more detail. This discussion will initially consider the global nature of impairment before moving onto an exploration of the concept of differentially impaired cognitive functions, including a brief consideration of the concept of Theory of Mind impairment in schizophrenia as a form of differential cognitive impairment.

'A Generalised Performance Deficit'

Patients with schizophrenia perform at lower levels than do normal controls on many tests of cognitive functioning. This leads to what has been termed 'a generalized performance deficit'. This is reflected in the finding that the average IQ of patients with schizophrenia is 90 (Frith, Leary, Cahill & Johnstone, 1991). This pattern of global deficit was demonstrated in a study where patients with schizophrenia performed at least one standard deviation below normal controls on all 10 cognitive factor scores derived from a large battery of tests, ranging from tests of verbal intelligence and semantic memory, to tests of motor performance and auditory processing and attention (Saykin et al., 1991). This study demonstrated that the nature of cognitive impairment in schizophrenia extends across cognitive domains thought to be served by different anatomically localised systems. This suggests a diffuse pattern of change at the neuropsychological level across numerous systems, rather than a more specific and localised pattern of change.

One possible explanation for this generalised performance deficit is that it is due to reductions in the speed of cognitive and perceptual processing, often known as psychomotor speed. Several studies have found patients with schizophrenia to have slower information processing than healthy controls (Riley et al., 2000). Van Beilen et al. (2004) have argued that reduced psychomotor speed is a crucial factor in cognition, and its influence on cognitive test performance should be taken into account in schizophrenia research. Van Hoof, Jogems-Kosterman, Sabbe, Zitman & Hulstijn (1998) investigated the nature of this psychomotor retardation and found it to be distinct from the slowing seen in patients with depression. Patients with depression were found to be slowed in both motor and cognitive components of a neuropsychological task. Patients with schizophrenia however were only impaired on the cognitive aspect of this task. Their findings fit with Widlöcher and Hardy-Bayle's (1989) hypothesis that psychomotor slowness in depression is a result of a dysfunction in activation manifested at both cognitive and motor levels, whereas in schizophrenia this slowness is primarily a planning disorder that leads to cognitive slowing only. In their study, Van Hoof et al. (1998) also found evidence to suggest that this reduction in the speed of processing is not a side effect of medication, and that performance on the motor aspect of the task was not significantly slower than that of controls.

From reviewing the literature, therefore, it appears that patients with schizophrenia are substantially cognitively impaired and that this pattern of impairment is global and leads to a generalised performance deficit, possibly attributable to a reduction in cognitive and perceptual processing speed. What is more controversial however is the idea that there are specific areas of cognition that are particularly impaired in people with schizophrenia, over and above that of the generalised level of deficit.

'Differentially Impaired Cognitive Functions'

The issue of identifying cognitive functions that are 'significantly differentially impaired' has a number of conceptual and methodological problems. Most neuropsychological and cognitive tests vary to some degree in terms of their difficulty, and in their sensitivity to the effects of brain damage (Chapman & Chapman, 1973). Therefore, it is difficult to say whether poor performance on a test of a particular cognitive function is because that measure is simply harder than the tests used to measure other cognitive functions, or because the measure is more sensitive to picking up on impairment, or indeed because that particular cognitive function is differentially impaired. In many ways therefore the issue of specific impairment remains a matter of clinical judgement.

In addition to this the literature is made up of studies that vary quite substantially in the way that they conceptualise different cognitive functions and the terms that they use to refer to them. For example, terms such as executive function, problem solving and abstraction refer to similar and overlapping areas of cognitive function, though at the same time they also refer to distinctly different ways of conceptualising a general area of cognition.

Another source of complexity in this area is the way in which the cognitive tests that are used in the studies that make up the literature do not correspond specifically to one area of cognitive function. For example a straightforward neuropsychological test such as the Trail Making Test (TMT) is well-established as being sensitive to impairment in multiple cognitive domains including attention, visual searching, motor coordination and speed, mental flexibility and concentration (Selnes et al.,1991). Other components include motivation, problem solving, and impulse

control. As with the TMT, performance on most neuropsychological tests involves several cognitive functions. This illustrates why it is not always possible to simply map one test score onto one particular domain of cognitive function. Poor performance on such a test could be attributable to impairment in any one, or perhaps even several, of these many domains. This conceptual hurdle has served to complicate the interpretation of test performance.

Due to these methodological and conceptual issues it is necessary to be cautious when considering the literature in this area, and when drawing general conclusions from it. Broadly speaking however, there appear to be a number of specific cognitive functions that have emerged from the literature as having particular significance for schizophrenia. These are memory, attention and executive functioning. Different studies vary in the way that they conceptualise these functions and the way in which they refer to them. The terms used in this review correspond to the most commonly used terms and the most frequently emerging conceptualisations of each function. These three cognitive constructs will each be considered in turn, before concluding with a brief consideration of the inclusion of Theory of Mind impairment as a fourth area of cognitive deficit.

Memory

Memory impairments have been one of the most reliable findings in patients with schizophrenia, with episodic and semantic memory being seen to be disproportionately impaired (Tamlyn et al., 1992) and with relative preservation of implicit memory and procedural learning (Clare, McKenna, Mortimer & Baddeley, 1993). These individuals have shown deficits in the acquisition of both verbal

material, for example list of words and stories, and visual material, for example pictures and designs.

The severity of this memory impairment varies between individuals, but in a large number of patients, memory is substantially impaired. One study showed that 50 out of 60 patients had impaired memory functioning, and that nearly 50% scored on the moderately-severely impaired range on a simple memory screening battery (McKenna et al., 1990). Another study (Gold, Randolph, Carpenter, Goldberg & Weinberg, 1992) found that 70% of patients obtained significantly lower scores on the Wechsler Memory Scale – Revised (WMS-R) than on the Wechsler Adult Intelligence Scale – Revised (WAIS-R) suggesting a differential memory impairment in these patients. A third study (Goldberg et al., 1990) found that in monozygotic twins, who were discordant for schizophrenia, ill twins scored on average 23 points lower on the WMS than their well counterparts. These studies therefore show consistent evidence of substantial memory impairment relative to normal controls, twin controls and also relative to the patient's own general intelligence level.

The realisation of this memory impairment led to the investigation of which particular memory processes were involved. Over the years different ideas have circulated regarding the roles of faulty encoding, retrieval and recognition processes and their various contributions to this impairment. Recent studies have suggested that all of these three processes are impaired to some extent in patients with schizophrenia (Gold, Randolph, Carpenter, Goldberg & Weinberger, 1992a). The contribution of attentional abnormalities to the memory impairment has also been explored. As will be discussed in the following section, patients with schizophrenia have been consistently shown to have significant attentional difficulties. However, it

is unlikely that these are solely responsible for the memory impairment as similar memory impairments are seen across memory paradigms differing in the extent of their attentional demands. This suggests that attentional and memory deficits are present in patients in a relatively independent manner.

Attention

The second major area of cognitive impairment that has been noted in patients with schizophrenia is that of attention. Deficits in attention are manifested in a number of different ways. Firstly, patients often have difficulty selectively paying attention to relevant information, whilst simultaneously ignoring unimportant information (Hotchkiss & Harvey, 1990). Secondly, they often also have difficulty sustaining concentration in situations demanding continuous effort (Nuechterlein, 1991).

Deficits of attention occur in both visual and auditory modalities. Patients are often 'differentially' impaired in more complex conditions, such as with distraction. In other words, their performance deteriorates more than that of normal controls when the conditions of the task become more complex. This finding may reflect a deficit in performance when there are more demands on a patient's limited capacity.

Executive Functioning

Executive functions are involved in developing plans for future actions, holding these plans and action sequences in working memory until they are executed, and inhibiting irrelevant actions (Pennington & Ozonoff, 1996). These processes are necessary for good decision-making and problem-solving, and are critical at the outset of a task when it is non-automatic and novel (Hayes, Gifford & Ruckstuhl, 1996).

Impaired executive functioning results from not being able to combine and use information from different sources. It may be difficult for individuals with these deficits to process all the features of a piece of information at the same time. This can lead to deficits in planning and carrying out everyday activities. It can also lead to difficulties in planning and maintaining a conversation and understanding instructions.

Difficulties in executive functioning are well established in patients with schizophrenia (Liddle & Morris, 1991; Morice, 1990). Individuals often perform poorly on the Wisconsin Card Sorting Test (WCST), a commonly used indicator of executive functioning (Braff et al., 1991), and on decision-making tasks. Hutton et al (2002) found that both first episode and chronic patients took longer than matched controls to make decisions, with more severe impairment in chronic patients. The finding that executive functioning is impaired in this group is consistent with the clinical presentation of the illness in the way that patients regularly fail to plan and organise their time and activities.

Theory of Mind

Theory of Mind (ToM) is the ability to infer the mental states of others and interpret them. This means having an awareness and an understanding of the intentions, knowledge, beliefs and dispositions of others. Several studies have suggested that people with schizophrenia have deficits in their ToM abilities (Frith & Corcoran, 1996). In this section, some of the literature regarding the nature of ToM impairment in schizophrenia will be reviewed, and the question of whether this deficit should be included as a fourth area of differential impairment will be considered.

ToM deficits were first identified and investigated in relation to autism and a great deal of research has been done into ToM deficits in this condition (Baren-Cohen, Tager-Flusberg & Cohen, 1993; Happé & Frith, 1994). ToM deficits in schizophrenia, though often assessed using similar tasks and conceptualized in a similar way, are not thought to exactly resemble those seen in autism. ToM deficits associated with schizophrenia are thought to be more subtle than those associated with autism (Herold, Tenyi, Lenard, & Trixler, 2002). The difference in age of onset for these two disorders has been claimed to lead to differences in the way the ToM impairment is manifested. Due to its early onset, autistic patients are unlikely to have ever developed a ToM, whereas patients with schizophrenia appear to lose an ability they once had. This means that autistic patients fail to make inferences about the mental states of others, while patients with schizophrenia tend to make the wrong inferences (Frith & Corcoran, 1996).

Patients with schizophrenia often have quite substantially impaired social skills, which could be explained to some extent by a ToM impairment. Some researchers have argued that symptoms such as thought insertion, thought withdrawal, thought broadcasting, and delusions of reference and persecution are also evidence of a compromised theory of mind (Sarfati, 2000).

Other researchers however have argued that patients with schizophrenia do not have impaired ToM. They argue that intact ToM abilities are necessary to be able to develop persecutory delusions (Walston, Blennerhassett & Charlton, 2000), and that the way that patients with schizophrenia perceive and experience social events and situations suggests that they may even have a 'hyper' theory of mind (Abu-Akel & Bailey, 2000). They suggest that tasks designed to assess ToM ability are too great a

memory load for patients with schizophrenia and these individuals only perform poorly due to one or more of the differentially impaired cognitive functions already described, such as attention or memory deficits, rather than ToM deficits.

In general, the literature is somewhat inconclusive in terms of whether there is sufficient evidence to conceptualise this ToM deficit as a fourth type of differentially impaired cognitive function, in the way that memory and attention deficits are conceptualised. There appear to be some differences in terms of the ways that these deficits are manifested. For instance ToM deficits appear to fluctuate as patients go through episodes of psychosis (Drury, Robinson & Birchwood, 1998), whereas other areas of deficit such as memory are more continuously present. ToM deficits are also suggested to be linked to psychotic symptoms such as paranoia, whereas other forms of cognitive impairment are thought to be relatively independent of psychotic symptomatology (Frith & Corcoran, 1996).

Despite these differences however, it may still be useful to include the concept of ToM deficit in future studies of the nature of cognitive impairment in schizophrenia. Discussion of the role of ToM deficits is largely absent from the literature in this area, which tends to focus exclusively on memory, attention and executive function. However, as will be discussed later in this review, ToM deficits may play quite a significant role in an individual's ability to function successfully in the community, perhaps through the way that they influence social competence. For this reason, it may be useful to give further thought to whether this area of impairment should be routinely included in discussions of the nature of cognitive impairment in schizophrenia.

Issues of Medication in Schizophrenia Research

People with schizophrenia are almost invariably on some type of antipsychotic medication, and may be taking various anti-depressant and anxiolytic medications concurrently. They may also be taking medication to counteract the side effects that occur as a consequence of taking the antipsychotic medication. In this section, the impact of neuroleptic medication on cognitive functioning in people with schizophrenia will be considered, followed by a brief discussion of the conceptual and methodological implications that these findings have for research in this area.

Cognitive Side Effects of Neuroleptics

The exact nature of the effects of medication on cognition are complex and vary depending on the type of medication (Mortimer, 1997). Whilst some medications are thought to exacerbate the cognitive deficits already experienced by people with schizophrenia, there is evidence that other types of medication have less of a negative effect on cognition and may even improve it (Blanchard & Neale, 1992).

There is a small body of literature that argues that performance on cognitive and perceptual tests is relatively unaffected by neuroleptic medication (Mortimer, 1997; Medalia, Gold & Merriam, 1988). One study reduced neuroleptic dose by 80-90% in chronic stable outpatients and failed to find any favourable effects on cognition after six weeks (Seidman, Pepple & Faraone, 1993). Executive function has been argued to be relatively unaffected by neuroleptic treatment and there are a number of studies to support this (Seidman et al., 1993), though one study found evidence that neuroleptic medication led to an impairment of executive functioning relative to a placebo (Bilder, Lieberman, Kim, Alvir & Reiter, 1992).

Another argument is that neuroleptics can actually improve cognition. One study found an improvement on a measure of semantic memory with a conventional antipsychotic medication (Plisken, Raz, Raz & Weinberger, 1987). Executive functioning has also been argued to improve with neuroleptic medication relative to a placebo (Verdoux, Magnin & Bourgeois, 1995). Another study found that neuroleptics can lead to improvements in thought disorder, sustained attention and distractibility, which are in turn reflected in better performances on cognitive tests (Spohn & Strauss, 1989).

Conventional versus Atypical

These two different classes of medication work through different mechanisms and therefore it is perhaps not surprising that there is evidence that they may have differing impacts on cognition. Atypical antipsychotics have an improved side effect profile and supposed increased antipsychotic efficacy (Mortimer, 1997). It could be argued therefore that cognitive performance is improved with these drugs, which it does indeed appear to be (Sachs, 2000), through their superior ability to relieve symptoms. A 'levels of explanation' model of psychosis (Frith, 1992; Mortimer & McKenna, 1994) would predict that as symptoms are a consequence of neuropsychological changes, any improvements in symptoms that are induced by atypical antipsychotics would be mediated through improvements in cognition. This model will be considered in further detail in the next part of this review.

Other Medications

People with schizophrenia are often on a broad range of other medications which may also have an effect on cognitive functioning. These include anticholinergic medications, used to treat neuroleptic-induced extra-pyramidal symptoms,

benzodiazepines, used to treat anxiety, and lithium carbonate, used to treat mania. Some researchers (e.g., Frith, 1984) have suggested that memory and other cognitive processes may be impaired by these medications.

Conclusions

From reviewing the literature it appears that neuroleptic medication does not have as much of an effect on cognition as is sometimes assumed. One possibility for the lack of evidence of a deleterious effect of neuroleptic medication on cognition may be owing to a “floor” effect, where cognitive functioning is already so impaired as a consequence of the schizophrenia itself that neuroleptic medication has little more to take from it (Mortimer, 1997). In studies where signs of negative effects of neuroleptic medication on cognition are seen, it has been suggested that though neuroleptics have no real direct effect on cognition, their sedative elements indirectly lead to a negative effect, particularly at higher doses (Sachs, 2000).

Issues For This Area of Research

Though the effects of medication on cognition are argued to be minimal, it is still important to consider the possibility of their playing a confounding role in research in this area. Such confounds lead to methodological complications as it may not be possible to distinguish the cognitive side effects of the medication from the cognitive deficits that are part of the schizophrenia itself (Calev, Venables & Monk, 1983).

This is a particularly important issue in studies testing different theoretical models of schizophrenia and investigating the nature, course and aetiology of cognitive impairment in schizophrenia. In studies such as these, one way of controlling for the potentially confounding effects of participants taking different medications at different dosages is to translate dose levels into chlorpromazine unit equivalents

(CPUs) (Spohn, Coyne, Lacoursiere, Mazur & Hayes, 1985). Using CPUs enables research participants to be compared on levels of medication, and any relationship between medication level and task performance to be detected. However, though this method has some usefulness in enabling participants to be compared, it is inadequate for a number of reasons. For example, participants who are on higher dose levels are likely to have higher symptomatology. Therefore finding an association between higher dose levels of medication and poorer cognitive functioning could be explained by a third variable of more severe symptomatology.

It could be argued that the issue of medication as a confounding variable is of little consequence in studies that aim to explore the relationship between cognition and community functioning however. One might say that whatever the aetiology of the impairment, whether it is a side effect of the medication or whether it is an integral part of their illness, it is the cumulative effect of these deficits and their impact on community functioning that is the issue of interest.

The Costs of Cognitive Impairment

Cognitive impairment is a major contributor to the costs of schizophrenia (Sevy & Davidson, 1995). This section will review the financial costs attributable to this cognitive impairment, though acknowledges that there can also be enormous social and emotional costs to both individuals and families. The financial costs can be divided into direct and indirect costs.

Direct Costs

Direct costs of schizophrenia include acute and chronic inpatient hospitalization as well as outpatient treatments and services. Acute hospitalisation often occurs due to

an exacerbation of psychosis. Cognitive impairment can lead to an exacerbation of psychosis if memory problems lead to difficulties in remembering to take medication. Chronic inpatient hospitalisation is often due to a deterioration in the patient's ability to care for themselves, which is also significantly related to cognitive impairment.

Cognitive impairment can lead to long-term institutionalisation. In older adults with schizophrenia, the cognitive decline associated with normal aging is superimposed on an already diminished level of cognitive performance (Davidson & Haroutunian, 1994), potentially leading to early admission into nursing homes due to a reduced ability to care for oneself. Paradoxically, institutionalization can also exacerbate and increase cognitive impairment.

In patients living in the community, cognitive deficits contribute directly to the costs of schizophrenia due to the burden they put on outpatient psychiatric (Wykes & Dunn, 1992) and medical services (Burgess, 1991), and in terms of the social support that is necessary to enable clients to maintain outpatient status due to their cognitive deficits (Perlick, Stastny, Mattis & Teresi, 1992).

Indirect Costs

The indirect costs of schizophrenia are primarily due to lost productivity (Wyatt, de Saint Ghislain, Leary & Taylor, 1994). Cognitive impairment leads to difficulty in obtaining and maintaining stable employment (Sevy & Davidson, 1995). Also, because cognitive impairment appears early in life during a critical period for developing basic skills, future social and vocational achievements are limited (Cornblatt et al., 1992). A further indirect cost is the time spent by relatives in caring

for ill family members (Wyatt et al. 1994) due to the effect of cognitive impairment on the patients' abilities to carry out basic self-care and household activities (Keefe et al., 1994).

In summary, the cognitive impairment associated with schizophrenia contributes to patients' high use of services, low productivity and to the burden placed on their families. Any progress towards reducing this impairment, pharmacologically, psychologically or rehabilitatively, would result in substantial savings in addition to significantly enhancing the patient's quality of life.

Summary

Cognitive impairment is a core feature of schizophrenia, and is not simply a result of psychotic symptoms or the effect of medication. These deficits are common and frequently severe, are present right from the onset of schizophrenia if not before, and do not remit between episodes as psychotic symptoms improve. This impairment is reflected in the finding that individuals with schizophrenia perform worse than controls on a wide range of tests of cognitive functioning, but that they perform particularly poorly on tests of memory, attention and executive functioning. There is some evidence that individuals with schizophrenia also have an impaired Theory of Mind. The impact of medication on cognitive functioning in people with schizophrenia is argued to be less than is sometimes assumed. There is some evidence that at very high levels all antipsychotics have an adverse effect on cognition because of their sedentary effects, but that at lower levels atypical antipsychotics can have a beneficial effect on cognition, to a greater extent than typicals can. The costs of this cognitive impairment to individuals, their families and society at large is huge, and can be both emotional and financial.

Cognitive Impairment, Community Functioning and Psychotic Symptomatology

No clear theories have emerged as to the way in which cognitive deficits, psychotic symptoms and an individual's ability to function in the community are related to each other. This part of the review will consider each of aspect of this relationship in turn, and will end by drawing together these findings and briefly considering the triadic relationship between all three.

Cognitive Impairment and Community Functioning

From clinical experience it is clear that cognitive difficulties have a significant impact on daily routine and quality of life for people with schizophrenia. Skills necessary for basic self-care, interpersonal interaction and occupational success are frequently impaired. People with schizophrenia may complain of having speeded up thoughts, feeling confused, having poor concentration or being forgetful. If these problems are mild this can impact on their ability to follow conversations or plan activities. A greater degree of cognitive impairment may lead to an inability to carry out tasks such as cooking, shopping and managing money. This can result in poor hygiene and self-neglect, and can lead to dangerous behaviours such as walking into traffic and mixing up medication. In the long-term, cognitive difficulties may lead to unemployment, disability, poverty, debts, social isolation and excess dependency. In addition to the negative impact these difficulties have on the individuals themselves and their families, poor adaptive functioning is a major contributor to the financial costs of schizophrenia to the public health system (Wyatt et al., 1995).

The term community functioning refers to skills and competencies in a number of different areas including social and interpersonal functioning, employment and occupational functioning, and activities of independent living and self-care. The impact of cognitive difficulties on each of these main areas of community functioning, as conceptualised in the research literature, will now be considered.

Social and Interpersonal Functioning

Due to impaired cognition, it can be difficult for patients to process information and they may have difficulty planning and maintaining conversations and understanding instructions. These difficulties can lead to problems in interpersonal interactions (Sachs, 2000), and anxiety about interpersonal situations. Patients with difficulties in verbal memory and vigilance also have difficulty learning social problem-solving skills (Sachs, 2000). Conversely, good information-processing capacity has been found to be associated with high global social competence (Sachs, 2000).

Employment and Occupational Functioning

Attention and memory difficulties interfere with patients' ability to complete training programmes and disrupt their re-entry into working life after an acute phase of the illness (Sachs, 2000). Performance on verbal memory tests has been found to be strongly associated with work capacity (Pollice et al., 2002), suggesting that a proficient memory system is necessary in order to remember and carry out instructions in the work place (Green & Nuechterlein, 1999). Clearly different cognitive processes are associated with competence in different work situations but in general, whatever the cognitive challenges of a job, there are likely to be some consequences of the cognitive deficits associated with schizophrenia.

Activities of Independent Living and Self-Care

Velligan et al. (1997) found that cognitive functioning predicted over 40% of the variance in scores on the Functional Needs Assessment (FNA)(Dombrowski, Kane, Tuttle & Kincaid, 1990), an evaluation of patients' ability to perform a wide range of everyday tasks from meal planning and avoiding hazards, to dressing and laundry skills. The ability to perform basic self-care tasks is critical and is often a prerequisite to obtaining employment or initiating social contact, and inability to perform such tasks often leads to a patient being placed in a more structured and restrictive living environment.

The Relationship between Community Functioning and Cognitive Impairment

An understanding of the way cognitive deficits impact on outcome and capacity for independent living is important as it may suggest what the priorities are in terms of targets for remediation. Recent critiques of cognitive remediation in schizophrenia have highlighted the need for research to determine which cognitive deficits among many should be selected for remediation. Green (1996) argues that “without basic knowledge of which specific neurocognitive deficits are linked to real-world functioning, such cognitive remediation efforts are destined to remain unfocused” (Green, 1996, p. 322-323).

Green (1996) has carried out two reviews of the literature in this area. In his first review he set out to explore which of the cognitive deficits experienced by patients with schizophrenia most restrict the functioning of these individuals in the outside world. He divided the literature into three parts based on the way the studies conceptualise and assess community functioning. The first group of studies used general measures of community, vocational and social functioning. The second group of studies assessed outcome in terms of social problem solving ability. The

concept of social problem solving ability as an indication of community functioning is based on the premise that this is a critical component of social functioning. Social problem solving ability is usually assessed using videotaped vignettes of interpersonal situations. The subject is asked to point out common features present in this interaction, identify a social problem, generate solutions for the problem or role play potential solutions to the problem. The third group of studies conceptualised functioning from a rehabilitation perspective and looked at patients' ability to acquire the psychosocial skills needed for community functioning.

Verbal memory was found to be associated with outcome in all three groups of studies. Green also found that vigilance was related to social problem-solving ability and skill acquisition. Vigilance is the ability to sustain attention and focus on a stimulus for an extended amount of time whilst simultaneously screening out irrelevant information. It makes intuitive sense that performance on vigilance tasks is related to social problem solving ability and skill acquisition, as vigilance enables people to separate relevant from irrelevant information in complex social situations, and enables them to focus on the specific information that they need to make sense of the situation. Green's third finding was that executive functioning was related to global community functioning, occupational attainment and the degree of independence in living environment.

Green concluded from this first review, therefore, that verbal memory, vigilance and good executive functioning are necessary for a positive functional outcome in schizophrenia, and that deficits in any of these skills could limit patients in terms of their ability to function independently in the community. A more recent study (Velligan, Bow-Thomas, Mahurin, Miller & Halgunseth, 2000) has provided further

support for these conclusions. This study found that verbal memory predicted all forms of outcome, vigilance predicted social outcomes and executive functioning predicted work and productivity, and activities of daily living (ADLs).

In Green's second review (Green, Kern, Braff & Mintz, 2000) the authors sought to confirm the conclusions from the first review. They conducted a rigorous meta-analysis including all the studies to have emerged since the publication of the first review, of which there were many due to a surge in interest in this area in recent years. This review found support for the findings of the earlier review. In addition it concluded that the relationship between cognitive impairment and community functioning is strongest when composite measures of cognitive function are used as an indication of cognitive impairment rather than scores on tests of specific deficits, and that such composite measures can explain a much higher proportion of the variance in functional outcome.

Before moving on from this area, it is worth briefly considering the issue of specificity in terms of the relationship between community functioning and cognitive deficits. As is clear from Green's reviews (1996; 2000) and Velligan's study (2000), many studies in this area attempt to link specific cognitive deficits to particular areas of impairment in community functioning. It is important to acknowledge however that the search for such specific relationships is complicated in the way that one activity may be affected by numerous different cognitive domains. For example, even simple elements of functionality may be neurocognitively multi-determined (Bellack, 1992). A simple task such as dressing relies on a number of cognitive processes including initiation and self-monitoring (executive functioning), remembering where things are (memory), and freedom from distraction (attention). Similarly each different cognitive domain is likely to be involved in countless

different activities of community functioning. This may explain the finding that different areas of functioning from occupational attainment to performance of ADLs, have been found to be highly intercorrelated (Velligan et al., 2000), indicating that the ability to function in this population may be represented by a few underlying constructs that relate to all domains of community functioning.

Other Predictors of Community Functioning Following Onset of Illness

Theory of Mind (ToM) abilities have been argued to play a significant part in an individual's ability to function in the community through the role that they play in social competence. Patients who are better at making social inferences, in other words who have good ToM abilities, have been found to have a higher level of community functioning than those who have less ability in this aspect of social cognition (Pollice et al., 2002). This study found that an individual's ability to comprehend other people's mental states was one of the best predictors of global social functioning. This study had hypothesized that ToM would correlate more strongly with social functioning than more traditional cognitive measures such as have been used in other studies in this area (Green 1996). This hypothesis was only partially confirmed however, and whilst measures of social cognition or ToM abilities may be a useful additional source of information in terms of predicting community ability, there is no evidence that they should replace or supercede more general measures of cognitive impairment.

In addition to the ability of certain cognitive deficits to predict functional outcome, premorbid occupational and social functioning have been found to be among the best predictors of outcome (Strauss and Carpenter, 1972;1974). This makes sense in that it is likely to be significantly easier to reestablish previously learned social and

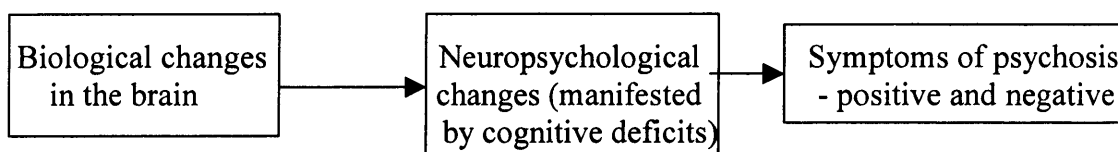
vocational skills than it is to learn them from scratch. This association between past and future functioning is also likely to be due to the fact that they are both mediated by cognitive abilities that remain stable over time. This suggests that when making decisions about educational placements and work training for people with schizophrenia, it is important to consider not only their current level of cognitive functioning, but also their level of pre-morbid occupational and social functioning.

Cognitive Impairment and Psychotic Symptomatology

Symptoms affect cognitive test performance in the way that many patients in both acute and chronic states may be completely unable to concentrate for long enough to complete any kind of neuropsychological assessment. Beyond this however the influence of symptoms on cognition, or indeed of cognition on symptoms, is far from clear. There are two competing theories which attempt to explain this relationship.

The 'Levels of Explanation Model'

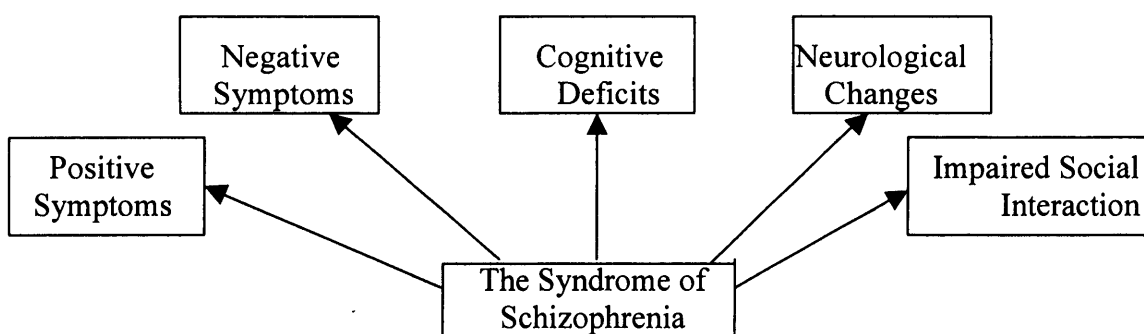
This model (Mortimer & McKenna, 1994) argues that symptoms are the result of specific neuropsychological deficits, which in turn are the result of particular pathophysiological phenomena in the brain. This model would predict that any drug-induced improvements in symptomatology would be mediated through changes at the neuropsychological level. It would also predict that better scores on tests of cognitive functioning would predict less symptomatology. This model can be represented in the following way:



This model is consistent with Frith's (1992) neuropsychological model of schizophrenia which argues that the symptoms and behavioural signs of schizophrenia are the result of cognitive deficits.

Cognitive Impairment as a Separate Domain of Pathology

An alternative model of schizophrenia sees cognitive impairment as a separate domain of schizophrenia pathology, with other domains being other groups of symptoms, and social and neurological abnormalities (Buchanan & Carpenter, 1994). Inherent in this model is the implication that symptoms and cognition are not causally related to each other in either direction, though they may coexist or be related to a third variable associated with each individually. This model would account for the finding that the effects of neuroleptic medication on symptoms and cognition appear to be relatively independent of each other. It also accounts for the finding that cognitive deficits continue to be present during periods of relative remission when symptoms are much reduced (Finkelstein, Cannon, Gur, Gur & Moberg, 1997). This model can be represented in the following way:



Cognitive Impairment and Negative Symptoms

In thinking about the relationship between cognitive impairment and symptomatology in schizophrenia, it is necessary to consider the distinction between

positive and negative symptoms. Though there is little evidence of a relationship between positive symptoms and cognitive impairment, correlations have been found between negative symptoms and particular cognitive deficits including psychomotor speed, semantic and verbal memory (O'Leary et al., 2000), semantic fluency (Chen, Lam, Chen & Nguyen, 1996), and executive functioning (Bell et al., 1997). The shared variance of this relationship is still relatively small however at around 15% (Bryson, Whelahan & Bell, 2001).

In cases of deficit syndrome schizophrenia, a supposed subtype of schizophrenia in which negative symptoms are prominent, primary and enduring features of a person's baseline functioning, cognitive functioning has been found to be particularly impaired (Bryson et al., 2001). This study compared deficit and non-deficit groups, and found that they showed different patterns and levels of cognitive impairment. The main difference between the two groups was in executive functioning and psychomotor speed. Although all subjects performed below the level of the general population, deficit syndrome participants performed significantly worse than non-deficit syndrome participants in these areas.

Bryson et al. (2001) argue that executive functioning impairments lead to difficulties processing social interactions, resulting in social withdrawal and decreased interpersonal drive. Other difficulties characteristic of executive functioning deficits, such as in planning and initiating activity, also influence behaviour, and lead to the manifestation of deficit syndrome schizophrenia. These findings are consistent with the Levels of Explanation Model (Mortimer & McKenna, 1994) to a certain extent in that the symptoms of deficit syndrome schizophrenia appear to be associated with and mediated through certain cognitive deficits such as executive functioning deficits.

Summary

The degree to which symptoms and cognitive impairment covary continues to be debated. Some researchers have argued that there is evidence that overall symptom severity is related to neuropsychological deficits (Bornstein et al., 1990), thereby supporting the levels of explanation model. Bryson et al.'s findings (2001) that negative symptoms, particularly in cases of deficit syndrome schizophrenia, are related to cognitive impairment further support this model. In his review, Green (1996) concludes however that there is limited evidence of associations between cognitive impairment and measures of symptoms. In general, the evidence seems to support this conclusion, and though there may be evidence of some correlations between symptom severity and cognitive impairment, particularly with respect to negative symptoms, psychopathology and cognitive deficits are likely to be caused, at least partially, by distinct pathophysiological processes (Bozikas, Kosmidis, Kioperlidou & Karavatos, 2004).

Psychotic Symptomatology and Community Functioning

The final aspect of this triadic relationship to be considered is that of the relationship between psychotic symptomatology and community functioning. From reviewing the literature it appears that the impact of symptoms on adaptive functioning is less than one might intuitively assume. From clinical experience one might expect that individuals who are experiencing the most acute symptoms, whether this be feelings of anxiety or paranoia, unusual perceptual experiences such as hearing voices or seeing visions, or who have the most disordered thinking or delusional beliefs, and who may be acting in a bizarre or perhaps even hostile way because of these beliefs or feelings, would be the most impaired in terms of their ability to function independently in the community.

In his review, however, Green (1996) found that the degree of symptomatology correlated neither with social problem solving ability, nor with skill acquisition, both of which are often conceptualised as indicators of community functioning. Symptomatology has also been found to predict a relatively small amount of the ability to perform basic ADLs (Velligan et al., 1997). The finding that symptomatology often improves in the absence of improvement in adaptive functioning (Velligan et al., 1996) supports the concept of a weak, if not non-existent, relationship between symptomatology and community functioning.

Having considered symptomatology in general, it is perhaps helpful to break symptomatology down into positive and negative symptoms when considering this relationship, as there is some evidence to suggest that different types of symptoms may affect community functioning in different ways.

Positive Symptoms

Few studies have found a relationship between positive symptoms and adaptive functioning (Green, 1996; Velligan et al., 1997), and psychotic symptoms have been shown to be poor predictors of future work performance in the chronically mentally ill (Anthony & Jansen, 1984).

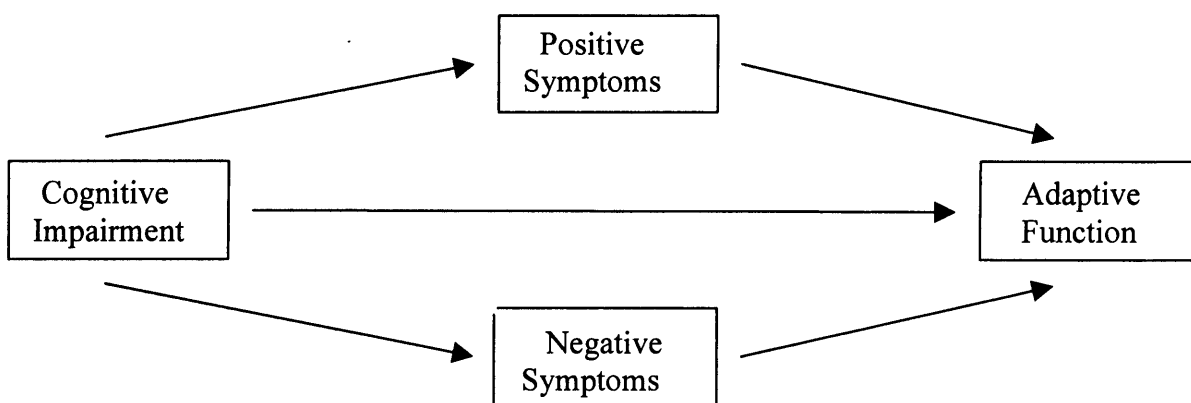
However Breier, Schreiber, Dyer & Pickar (1991) reported that psychotic symptoms rated during optimal neuroleptic treatment were significant predictors of future social and work functioning. Clinical experience would certainly suggest that some psychotic symptoms are more disruptive to functioning than others. These particular symptoms may be better predictors of community outcome than psychotic symptoms in general, and their particular relationship to community functioning should perhaps be explored.

Negative Symptoms

There is more evidence in the literature for a relationship between negative symptoms and poor adaptive functioning (Keefe, Mohs & Losonczy, 1987). Of the negative symptoms, motivation is the most strongly related to the ability to perform basic ADLs. The relationship between negative symptoms and poor adaptive functioning may be explained by the finding that negative symptoms are more closely associated with cognitive deficits than positive symptoms are. Cognitive deficits have already been established as having a significant influence on community functioning, therefore it is possible that this relationship may be mediated through these cognitive deficits. As soon as this third factor is introduced however, the complexity of this triadic relationship, between cognitive deficits, community functioning and symptoms, both positive and negative, becomes immediately clear. In the final part of this section, all three factors will be reviewed and an attempt will be made to summarise this relationship in its entirety.

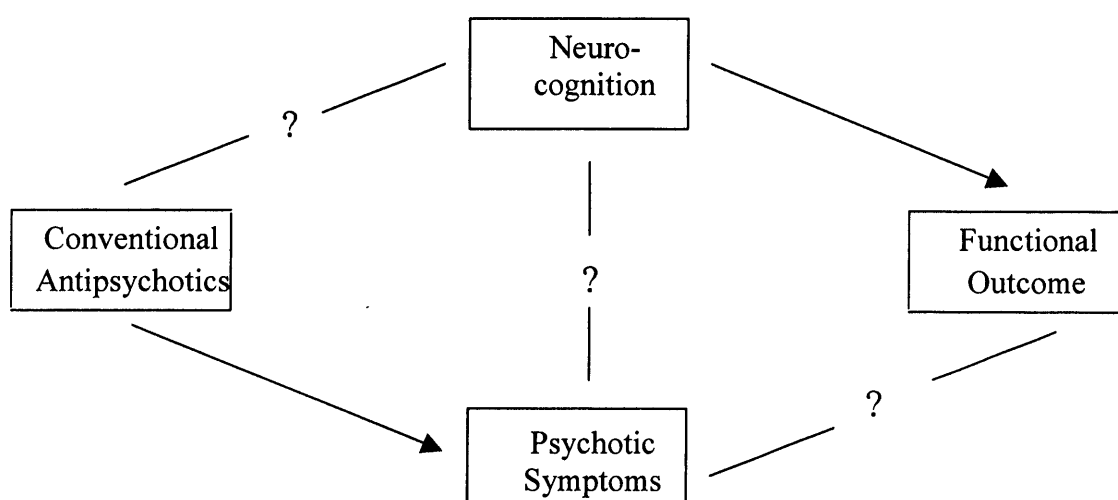
A Summary of the Relationship between Community Functioning, Cognitive Impairment and Psychotic Symptomatology.

One model that has been developed in an attempt to describe the hypothetical relationships between symptomatology, cognitive function and community functioning is that of Velligan et al. (1997):



This model views cognitive deficits as contributing to symptomatology, both positive and negative, and to impaired adaptive functioning. Symptoms are only thought to impact on functioning however because they are brought about by cognitive deficits. Velligan et al., (1997) describe 2 studies which they conducted to test out this model, and concluded that this model fitted their data. In both studies they used the Functional Needs Assessment (FNA) (Dombrowski, Kane, Tuttle & Kincaid, 1990), an assessment of ADLs, as their measure of community functioning. They found that levels of symptomatology predicted a relatively small amount of the variance in the ability to perform basic ADLs, but that cognitive functioning predicted over 40% of the variance in scores on the FNA. They concluded that cognition is related to both symptomatology and community functioning, as indicated by measures of ADLs, but that symptoms have little *direct* effect on ADLs.

An alternative model which attempts to explain this relationship, but additionally incorporates the influence of conventional antipsychotic medication, is that of Green and Nuechterlein (1999):



This model acknowledges the uncertainty around certain aspects of these relationships, and claims to be based on three conclusions that have emerged from

the literature. First, that conventional antipsychotics are generally effective in reducing psychotic symptoms, but that their effects on cognitive functioning are much less clear and are relatively weak. Second, though it is acknowledged that some very specific cognitive processes may underlie particular positive symptoms as proposed in the models of Frith (1992) and Hemsley (1994), more general relationships between cognitive functioning and psychotic symptoms are minimal. Green & Nuechterlein (1999) argue that though psychotic symptoms and cognitive processes are not completely separate, they are sufficiently separate to be conceptualised as such. Third, certain cognitive deficits are good predictors of community functioning (or functional outcome as it is described in this model), whereas the relationship between psychotic symptoms and functional outcome is more questionable.

There is clearly still a long way to go in terms of understanding the relationship between the symptoms, the cognitive impairment and the functional difficulties of people with schizophrenia. Perhaps the most significant finding from the burst of research studies conducted in recent years, due to a surge in interest in this area, is that certain areas of cognitive impairment are more strongly associated with functional outcome than are psychotic symptoms. One thing that is clear, however, is that to think that these effects of cognitive impairment on community functioning are purely unidirectional would be unrealistically simplistic. The level of activity and stimulation that a patient has will influence the extent and the effects of their cognitive difficulties. Therefore, although cognitive deficits are considered primary, they are also affected by the environment and are therefore potentially modifiable to some extent.

A Need For Neuropsychological Assessment

Until now, neuropsychological assessment for individuals with schizophrenia has often been regarded as a luxury, or as an exercise that is intelligible only to those with specialist training and knowledge. As has already been acknowledged however, the cognitive deficits associated with schizophrenia have major costs for individuals, their families and society at large. This is an area in which action needs to be taken by both researchers and clinicians if these are to be limited. This section will argue that a first step to tackling these costs would be the routine assessment of cognitive impairment for individuals with schizophrenia, and will outline several reasons why this would be a sensible, if not necessary, first step.

Reasons for Developing a Neuropsychological Assessment for Schizophrenia

1. To Develop Profiles of Individuals' Strengths and Weaknesses

There is wide variety amongst individuals with schizophrenia in terms of the nature and extent of their cognitive difficulties. This is reflected in variations in performance across different cognitive tests. A profile of an individual's performance deficits can contribute towards an individualised treatment plan that capitalises on a person's strengths and compensates for, or builds on, areas of weakness. There are four ways in which this information might be useful in planning a comprehensive intervention and package of care following this kind of assessment.

a. Highlighting Targets for Cognitive Remediation

Remediation is aimed at the restoration of cognitive function and information-processing deficits (Green, 1993). Results from a cognitive assessment would be useful in determining which deficits should be targeted by a cognitive remediation

programme. These scores would also be useful in terms of evaluating change from such an intervention, for example, comparing scores pre and post a cognitive remediation programme.

b. Highlighting Areas for Cognitive Rehabilitation

Cognitive rehabilitation would involve developing practical strategies in order to help an individual overcome and compensate for particular areas of weakness, as indicated by such an assessment.

c. Discharge Planning and Community Placements

Due to the hypothesised relationship between cognitive impairment and community functioning, the results of such an assessment would help clinicians in discharge planning and in making decisions about suitable community placements, and likely necessary levels of support in terms of day-to-day functioning.

d. Training Courses, Educational Placements and Work Capacity

Such information would be useful in predicting what sort of training courses and educational placements an individual might be expected to undertake and benefit from, enabling them to develop realistic expectations and aspirations for future work and training placements, and a better understanding of their strengths and abilities.

2. Assessment of the Impact of Pharmacological Interventions on Cognition

Interest in the effect of psychotropic medication on cognitive functioning has been increasing. This is a further reason for the need for a valid and reliable measure of cognitive functioning if the relative benefits of different medications are to be evaluated. Given the relationship between cognition and functional outcome (Green,

1996), there is a need for a better understanding of the impact of different medications on cognitive functioning.

3. The Need for a Standard Battery

Current methods of assessing cognitive impairment in people with schizophrenia involve batteries that vary widely in their content, duration and procedures. This limits the generalisability of results across research studies, thereby reducing the ability of researchers to draw conclusions from these results. Keefe et al. (2004) argue that what is needed is a standard, easily administered battery that specifically and efficiently assesses the important cognitive deficits in schizophrenia.

A Need For A Brief Neuropsychological Assessment

There are few conceptual limitations of comprehensive cognitive assessment, although there are a number of pragmatic constraints. Cognitive assessment often involves lengthy neuropsychological assessment batteries which can be difficult to administer and can require a high level of expertise to interpret. This means that cognitive assessment can be a time-consuming and expensive process. As a result, a large number of individuals will not receive a cognitive assessment, as there may not be a professional available who can perform such a test, and even if there is, they may not have sufficient time to administer lengthy batteries routinely to patients.

Another issue is that many patients with schizophrenia may be unwilling to cooperate or unable to concentrate for the length of time required to complete a lengthy cognitive assessment. The better a patient's level of cooperation and levels of

concentration and motivation, the more reliable and valid will be their scores and therefore the more accurate the reflection of their true ability.

An example of a wide-spread rapid screening measure of cognitive functioning is the Mini Mental State Examination (MMSE) (Folstein, Folstein & Fanjiang, 1975). This is commonly used to assess cognitive impairment in people with Alzheimer's Disease (AD) and other forms of dementia. AD has been recognized for years as a primarily cognitive disorder, and schizophrenia is beginning to receive similar recognition. Cognitive assessment is a fundamental part of the whole assessment process for patients suspected of having AD, largely for diagnostic reasons. For different reasons, as described in the previous section, cognitive assessment should also be routine for people with schizophrenia. It was mentioned earlier in this review that the pattern of cognitive impairment in dementia differs from that seen in schizophrenia (Welsh, Butters, Hughes, Mohs & Heyman, 1992), and clinicians working with people with schizophrenia could benefit from having a similar tool to the MMSE but one that is tailored to the areas of cognitive impairment in this population.

Limitations of a Brief Cognitive Assessment

It must be acknowledged that there are limitations to the use of brief assessments of cognitive functioning in this population. Patients with schizophrenia have significant memory impairments that are most clearly revealed over a delay period of at least 10-20 minutes. Also, cognitive deficits are only moderately correlated. This means that different domains of cognitive functioning must be investigated separately. For example, one cannot assume that a deficit in memory will indicate an equivalent deficit in attention.

This type of screening assessment can never fully replace comprehensive neuropsychological assessment batteries. The development of the MMSE has not reduced research interest into the neuropsychological aspects of AD or made redundant the clinical use of more detailed batteries. In the same way with schizophrenia, the development of a screening tool would not replace the need for such tests, but would rather be useful to indicate which specific tests might be of use in the context of the limited resources of the NHS. Therefore, though it is acknowledged that brief cognitive assessments cannot yield the wealth of information provided by more comprehensive assessments, in clinical practice the choice is rarely between doing a full neuropsychological assessment or a brief one. The reality is that the choice is more likely to be between doing a brief assessment or nothing at all (Gold, Queern, Iannone & Buchanan, 1999).

Designing a Brief Cognitive Assessment

Harvey and Keefe (1999) have suggested that cognitive assessment in this population should aim to assess a number of different types of cognitive deficit. They suggest that these should include cognitive impairments related to functional outcome, those deficits affected by pharmacological interventions and cognitive functions related to pre-morbid capacity. They have suggested that any brief cognitive assessment should also fit the following criteria:

1. Brief administration
2. High levels of patient cooperation
3. Easily interpretable results
4. Low requirements for technical competence of tester (Harvey & Keefe, 1999)

There are at least two general approaches to the development of brief cognitive assessments (Gold, 2002). One method is to create a new test or group of tests that is specifically sensitive to the relevant domains of cognition impaired in schizophrenia, and that can assess these in less time than the traditional comprehensive battery would have used. This was the approach used in developing the Brief Assessment of Cognition in Schizophrenia (BACS)(Keefe et al., 2004), and also the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) (Randolph, Tierney, Mohr & Chase, 1998). These types of original assessments require the collection of large amounts of data to establish population norms, validity and reliability.

The other approach to developing a brief cognitive assessment is to select a small number of already standardised tests that have been widely used in clinical neuropsychology, and that assess the relevant cognitive domains. Although the constituent tests making up this type of assessment would not have been developed specifically to assess the cognitive deficits associated with schizophrenia, this approach has the advantage that normative data and information regarding the sensitivity, reliability and validity of the individual tests included in the assessment are already available. Using tests that have well-understood norms is useful in terms of understanding a patient's performance in relation to their peers with respect to their age and education. It is also important to try to gauge how much a patient has declined from their level of pre-morbid functioning using either reading or vocabulary scores (Harvey and Keefe, 1999). This second method was used in developing the Brief Cognitive Assessment (BCA) (Velligan et al., 2004).

The Brief Cognitive Assessment (BCA) for Schizophrenia (Velligan et al., 2004).

This is a 10-15 minute cognitive assessment consisting of three tests commonly included in comprehensive cognitive batteries administered to patients with schizophrenia: Verbal Fluency (letters and categories), Trails A and B (Reitan, 1958), and the Hopkins Verbal Learning Test (HVLT)(Brandt, 1991). These tests will briefly be described and the cognitive domains that they are argued to assess will be discussed. They are presented in the order in which they are administered in the BCA.

1. The Trail Making Test (TMT) - A and B (Reitan, 1958).

In Trails A the subject is required to draw lines connecting 25 consecutively numbered circles on an A4 worksheet. In Trails B the subject must connect the same number of consecutively numbered and lettered circles, again on an A4 worksheet, alternating between the two sequences of letters and numbers (i.e. joining 1-A-2-B).

Performance on Trails A is influenced by cognitive processes in a number of domains. These include attention and visual scanning. Psychomotor speed and motor agility also make strong contributions. In addition, Trails B also requires executive functioning in order to switch between the two sets represented by letters and numbers. In terms of memory, working memory is necessary for Trails B in order to hold in mind what the next item is, based on what the previous two were. Verbal memory is also required in order to remember what the instructions were.

2. Verbal Fluency (letters and categories) (also known as the Controlled Oral Word Association test - COWA) (Benton & Hamsher, 1976)

In letter fluency subjects are asked to say as many words as they can think of in a minute that begin with a given letter of the alphabet, excluding numbers and the

same word with a different suffix. Different combinations of letters can be used but a commonly used combination is 'F, A and S'. In category fluency subjects are required to say as many different items as they can think of from a particular category in one minute. A commonly used category is 'animals'.

Verbal fluency is a way of assessing how well subjects organise their thinking (Estes, 1974). Poor performance is caused by subjects being unable to develop strategies to help them in generating words. Examples of strategies for word generation according to an initial letter include generating words beginning with the same consonant (eg content, contain, contend), variations on a word (shoe, shoemaker, shoelaces), or variations on a theme (sew, stitch, seam). For categories, subjects need to develop subcategories in order to organise their recall and perform well. For example, for 'animals', the category could be divided into domestic, farmyard, wild animals, or birds, fish, mammals, insects etc. When two or more successive words with similar features are generated, these are known as clusters (Lezak, 1995).

As for the Trail Making Test, verbal fluency is influenced by cognitive processes in a number of domains. Verbal memory is important as one needs intact storage of semantic information and efficient access to this information in order to perform well on this test (Van Beilen et al., 2004). Executive functioning also plays a role. Difficulties in initiating a strategy to develop a cluster, perseveration (inability to switch between clusters when a cluster is exhausted), and breaking of rules all lead to impaired fluency performance (Van Beilen et al., 2004), and are thought to be related to poor executive functioning (Troyer, Moscovitch, Winocur, Alexander, & Stuss, 1998). Reduced psychomotor speed can also reduce fluency production.

It is perhaps no surprise therefore that in schizophrenia, fluency performance is severely impaired (Joyce, Collinson & Crichton, 1996), as the processes required for verbal fluency (verbal memory, executive functioning and psychomotor speed) are all impaired in individuals with schizophrenia.

3. Hopkins Verbal Learning Test (Brandt, 1991)

In this word-learning and memory test the examiner reads aloud a list of 12 nouns. These are drawn from three different semantic categories, with four nouns coming from each different category. The subject is then required to recall as many of these words as possible in any order. This procedure is repeated two more times, making a total of three learning trials. In the BCA only the free recall part of the test is administered. Due to the time constraints of the BCA, the delayed recall trial and recognition trial are not administered. The HVLT assesses learning and verbal memory.

Other than a stopwatch, no special equipment is needed to administer the tests. The BCA claims to meet several of the criteria which are thought to be desirable in a test, and can be routinely administered to patients with schizophrenia to assess the level and nature of their cognitive impairment. These claims include assertions that:

- The BCA is very brief and takes under 15 minutes to set-up, administer and score.
- The BCA is simple to administer and score and can be carried out and the results interpreted by non-psychologists.

- The BCA has been designed specifically to assess cognitive domains known to be impaired in patients with schizophrenia. These include executive functions, memory, attention and processing speed.
- The BCA is sensitive to improvements in cognition with atypical antipsychotic medication.

The BCA has only recently been developed, and as yet only one study has looked at its reliability and validity (Velligan et al., 2004). In terms of reliability, the BCA has demonstrated good inter-item consistency (Velligan et al., 2004). For global cognition scores, test-retest reliabilities were excellent and were as good as those for a full cognitive assessment which took 8 to 12 times longer. In terms of its validity, a strong positive relationship was seen between scores on the BCA and a full cognitive assessment, suggesting that the BCA is capable of yielding information comparable to a more comprehensive neuropsychological assessment. In addition, scores on the BCA were positively correlated with measures of functional outcome. Four different measures of community functioning were used in this study and the GCS was positively and moderately correlated with all of them, suggesting that GCS may be predictive of community functioning.

From this one preliminary study the BCA appears to show a lot of promise in terms of its ability to provide researchers and clinicians with a valid and reliable tool for assessing cognitive impairment in individuals with schizophrenia in as brief and efficient a manner as possible. Further research will be needed to confirm these findings before this tool is likely to be incorporated into routine clinical assessment

for this population. From the evidence so far however, this tool clearly deserves further investigation.

Summary

Cognitive impairment is a core feature of schizophrenia and its consequences are wide reaching. There is substantial evidence to suggest that these deficits significantly effect an individual's ability to function independently in the community to a much greater extent than symptoms do, whether this is through their impact on a person's ability to form interpersonal relationships, hold down a job or complete a college course, or carry out basic activities of daily living and self-care. In order to be able to intervene to try to manage these deficits, whether through cognitive, rehabilitative or pharmacological methods, a valid and reliable way of assessing the extent and nature of this impairment is needed for this population. Several methods of briefly assessing this impairment have recently been developed, one of which is the Brief Cognitive Assessment (BCA) (Velligan et al., 2004). This measure has demonstrated good reliability and validity in one preliminary study, though further investigation is required. This will involve investigation of whether the BCA can predict a person's level of community functioning better than the extent of their symptomology can.

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Part 2

The Use of the ‘Brief Cognitive Assessment’ in Schizophrenia –

An Empirical Paper

Abstract

There is substantial evidence that cognitive deficits are widespread in this population and are a core feature of this condition. There is also evidence that the extent of an individual’s cognitive deficits may be more closely associated with their level of functioning than the severity of their symptoms. This study explored the relationship between ability to function in the community and performance on the ‘Brief Cognitive Assessment’ (BCA) (Velligan et al., 2004), a brief measure designed to assess the domains thought to be differentially impaired in individuals with schizophrenia: verbal memory, attention and executive functioning. This involved interviewing 39 individuals with a diagnosis of schizophrenia who were in contact with Community Mental Health Services. The interview consisted of a brief demographic questionnaire, The BCA (Velligan et al., 2004), the Quick Test (Ammons & Ammons, 1962), four Theory of Mind Stories (Frith & Corcoran, 1996) and the Brief Psychiatric Rating Scale (BPRS) (Overall & Gorham, 1988). Care-coordinators for each participant were asked to complete a measure of community functioning for each individual, The Multnomah Community Ability Scale (MCAS) (Barker et al., 1994). In contrast to several previous studies, symptoms were actually found to be more closely related to outcome than performance on the BCA, though this finding may be attributable to the measure used to assess community functioning.

Introduction

Individuals with schizophrenia are impaired to some degree on tests of a wide range of cognitive abilities. Some researchers have termed this ‘a generalized performance deficit’, which is reflected in the finding that the average IQ for this population is around 90 (Frith, Leary, Cahill & Johnstone, 1991). There are a number of areas however on which individuals with schizophrenia have been found to be differentially impaired, including memory, attention and executive functioning (Gold & Harvey, 1993; Green, Kern, Braff, & Mintz, 2000).

Features of Cognitive Impairment in Schizophrenia

Cognitive deficits in schizophrenia are common and are present in almost every individual with this condition (Gold & Harvey, 1993). 85% of stable outpatients with schizophrenia, in other words the least functionally impaired subgroup of patients, are estimated to be *substantially* cognitively impaired (Khanna & Varghese, 2003), suggesting that in the schizophrenia population as a whole, the proportion of cognitively impaired individuals is higher.

Cognitive deficits are a core feature of schizophrenia (Green et al., 2004). This means that this impairment is not simply secondary to symptoms or an effect of antipsychotic medication, but is an integral part of the illness. This independence of cognitive deficits from symptoms is apparent in the way that they are fairly stable, and do not tend to remit between episodes as symptoms subside (Gold & Harvey, 1993).

Cognitive impairment is argued to be evident in individuals who present with a first-episode of psychosis (Addington & Addington, 2002) and their deficits are argued to

be similar in severity and nature to those with a much longer history. This suggests that cognitive impairment does not worsen over time or as a consequence of recurrent episodes. The deterioration in cognitive functioning that is typically seen in more chronic cases is argued to occur as a consequence of age-related cognitive changes, or other mediating factors such as institutionalisation, rather than as a result of the worsening of the original deficits associated with the syndrome of schizophrenia. These are argued to be better conceptualized as ‘static abnormalities’ (Mohs, 1999).

In recent years there has been increasing interest in the impact of neuroleptic medication on cognition. This relationship is complex and varies, depending on the type of neuroleptic medication and the dosage. The consensus in the literature appears to be that the effect of medication on cognition may be less than one might ordinarily assume (Seidman, Pepple & Faraone, 1993; Mortimer, 1997). The literature suggests that typical (ie conventional) neuroleptics show no real direct effect on cognition, though at higher levels of dosage, their sedative elements can indirectly lead to a negative effect (Sachs, 2000). Atypical antipsychotics have been found to have a more beneficial effect on cognition (Green, 1996; Purdon et al., 2000) though research studies in this area are still fairly few and far between, and consequently firm conclusions are hard to draw.

Cognitive Deficits and their Relationship to Community Functioning

Over the last few years there has been an increase in the number of research studies looking at cognitive impairment in schizophrenia. One of the reasons for this is the growing body of evidence which suggests that scores on cognitive tests are more

accurate predictors of community functioning than are measures of symptomatology (Green, 1996; Velligan et al., 1997).

The term 'community functioning' refers to skills and competencies in a number of different areas including social and occupational functioning, employment, and activities of independent living and self-care. The cognitive deficits associated with schizophrenia have a significant impact on many of these skills. This leads to a major impact on the daily routine and quality of life of these individuals.

The discovery of an association between cognitive deficits and functional outcome in schizophrenia has prompted studies that have tried to establish what exactly these cognitive deficits are and how they contribute to poor functional outcome. In one review of such studies, Green (1996) set out to explore which of the cognitive deficits experienced by patients with schizophrenia most restrict the functioning of these individuals in the outside world. He concluded that verbal memory, vigilance and good executive functioning are necessary for a positive functional outcome, and that deficits in any of these skills could limit patients in terms of their ability to function independently in the community. In reviewing this literature he found only limited evidence of associations between cognitive impairment and measures of symptoms.

One further area of cognitive impairment that has been investigated in relation to its impact on community functioning is that of Theory of Mind (ToM). ToM is the ability to infer the mental states of others and to understand the connection between these mental states and behaviour. Several studies have suggested that people with schizophrenia have deficits in their ToM abilities (Brüne, 2005a). There is some

evidence that ToM ability may be a better predictor of community functioning, particularly in relation to the social and interpersonal aspects of community functioning, than other measures of cognitive functioning that have typically been seen as predictive in this area, such as memory, attention and so on (Brüne, 2005b; Pollice et al., 2002). This is argued to be because the ability to infer what other people may be thinking in an interpersonal situation has a profound effect on a person's community functioning.

Brief Cognitive Assessment in Schizophrenia

Due to the increased awareness of the role of cognitive impairment in the poor community functioning of individuals with schizophrenia, there is a growing appreciation of the need to understand these deficits better, to develop methods of assessing them and to intervene in order to try to manage them. In the past, routine neuropsychological assessment for individuals with schizophrenia has been regarded as a luxury. As has already been acknowledged however, the cognitive deficits associated with schizophrenia have major costs for individuals, their families and society at large. This is an area in which action needs to be taken by both researchers and clinicians if these are to be limited.

A first step would be the development of a routine assessment of cognitive impairment for individuals with schizophrenia. In clinical terms, an assessment of this kind would allow clinicians to develop a profile of an individual's cognitive deficits. This could contribute towards an individualised treatment plan, attempting to capitalize on a person's strengths and compensate for or build on areas of weakness. The results of such an assessment could be useful in terms of providing targets for cognitive remediation and rehabilitation, and in helping clinicians in

making decisions around discharge planning and suitability of different community placements. This information could also be useful in terms of predicting what sorts of training courses and educational placements an individual might be expected to undertake and benefit from, enabling them to develop realistic aspirations for the future.

In research terms a reliable assessment of cognitive impairment in individuals with schizophrenia would enable researchers to more effectively investigate the impact of different types of antipsychotic medication on cognition. Pharmacological interventions for schizophrenia have traditionally targeted symptoms, regardless of a large body of evidence that symptoms have a relatively small impact on community functioning. However, due to growing awareness of the impact of cognitive deficits, there is increasing recognition of the need to develop pharmacological interventions that can optimize cognitive functioning *as well as* reduce symptomatology (Velligan et al., 2004). Such an assessment would also be useful in terms of assessing the benefits of cognitive remediation programs, enabling researchers to evaluate the changes made by comparing scores pre and post such an intervention.

One of the reasons traditional cognitive assessments are of limited use for routine clinical practice in working with this population is due to the lengthy neuropsychological assessment batteries that are involved. These can be difficult to administer and can require a high level of expertise to interpret, meaning that cognitive assessment can be a time-consuming and expensive process. The consequence of this is that a large number of individuals will not receive a cognitive assessment, as there may not be a professional available who can perform such a test,

and if there is, they may not have sufficient time to administer lengthy batteries routinely to patients.

Another problem of using traditional lengthy neuropsychological measures with this population is that many patients with schizophrenia may be unwilling to cooperate or unable to concentrate for the length of time required to complete such a lengthy assessment. The more one can optimise a patient's levels of concentration and motivation and the better their cooperation, the more reliable and valid will be their scores and therefore the more accurate the reflection of their true ability.

For these reasons many researchers attempting to develop a cognitive assessment for schizophrenia have focused on developing a brief measure that would serve as a screening tool and that could be routinely administered in clinical practice. Though it is acknowledged that such brief assessments cannot yield the wealth of information provided by more comprehensive assessments, should a more in depth assessment be required, they can be a useful signpost to those specific tests which might be of use in the context of the limited resources of the NHS.

Harvey and Keefe (1999) have suggested that any brief cognitive assessment should fit the following criteria:

1. Brief administration
2. High levels of patient cooperation
3. Easily interpretable results
4. Low requirements for technical competence of tester (Harvey & Keefe, 1999)

The 'Brief Cognitive Assessment' for Schizophrenia (BCA) (Velligan et al., 2004)

One example of such a measure is the Brief Cognitive Assessment (BCA). This is a 10-15 minute cognitive assessment which consists of three tests commonly included in comprehensive cognitive batteries administered to patients with schizophrenia:

- Verbal Fluency (letters and categories)
- Trails A and B (Reitan, 1958)
- Hopkins Verbal Learning Test (Brandt, 1991)

Other than a stopwatch, no special equipment is needed to administer the tests. The BCA claims to meet several of the criteria which are thought to be desirable in such an assessment, including assertions that:

- The BCA is very brief and takes under 15 minutes to set-up, administer and score.
- The BCA is simple to administer and score and can be carried out and the results interpreted by non-psychologists.
- The BCA was designed specifically to assess cognitive domains known to be impaired in patients with schizophrenia. These include executive functions, memory, attention and processing speed.
- The BCA is sensitive to improvements in cognition with atypical antipsychotic medication.

A 'global cognition score' (GCS) can be calculated that is argued to reflect the general level of cognitive functioning. This is done by averaging the z-scores achieved for each of the three sub-tests that make up the BCA.

The BCA has only recently been developed, and as yet only one study has looked at its reliability and validity (Velligan et al., 2004). In terms of reliability, the BCA has demonstrated good inter-item consistency (Velligan et al., 2004). For global cognition scores, test-retest reliabilities were excellent and were as good as those for a full cognitive assessment which took 8 to 12 times longer. In terms of its validity, a strong positive relationship was seen between scores on the BCA and a full cognitive assessment, suggesting that the BCA is capable of yielding information comparable to a more comprehensive neuropsychological assessment. In addition, scores on the BCA were positively correlated with measures of functional outcome. Four different measures of community functioning were used in this study and the GCS was positively and moderately correlated with all of them, suggesting that GCS may be predictive of community functioning.

The current study aims to further evaluate the validity of this measure and will test out a number of hypotheses relating to it, using a sample of patients with schizophrenia. These experimental hypotheses are as follows:

1. Patients with schizophrenia will be significantly impaired in their performance on the BCA relative to normative data.
2. BCA performance, as reflected by the GCS, will correlate positively with community functioning, as measured by the Multnomah Community Ability Scale (MCAS) (Barker, Barron, McFarland, & Bigelow, 1994).
3. In a regression model, the GCS will predict more of the variance in community functioning than will ratings of symptoms.
4. Scores on a ToM task will be a significant independent predictor of community functioning, particularly when looking at the social aspect of community functioning using the social subscale of the MCAS.

In testing out these hypotheses it is expected that this study will also confirm previously established null hypotheses that the level of cognitive impairment, as reflected by the global cognition score, is not related to duration of illness, as indicated by the number of years since first contact with mental health services (Addington & Addington, 2002). It is also anticipated that no association will be found between GCS and levels of medication, as reflected by a Chlorpromazine Equivalence score (Kane, Leucht, Carpenter & Docherty, 2003; Mortimer, 1997).

Method

Participants

39 participants with a DSM-IV diagnosis of either schizophrenia or schizoaffective disorder were recruited from community mental health services in London. Participants were recruited through qualified mental health workers who were contacted and given an information sheet briefly explaining what the study was about and describing the inclusion and exclusion criteria (see Appendices 1 and 2 for staff and participant information sheets respectively). These staff members were encouraged to inform any of their clients whom they felt would be appropriate about the study and to notify the researcher of any clients who showed an interest in taking part.

For inclusion in the study participants were required to be in a period of clinical stability. There were no restrictions for inclusion in the study in terms of the minimum or maximum duration of illness, or on the level of impairment, either cognitive or functional, or the degree or nature of symptomatology. However, potential participants were excluded from the study for a number of reasons. These included anyone known to be actively using illicit drugs over the month prior to interview whether this was reported by staff or was acknowledged by the participant. Also, due to cultural restrictions of the neuropsychological tests included in the study, participants with less than a basic understanding of the English language were unable to take part. Participants were paid £10 for participating. Ethical approval for the study was gained from Camden and Islington Community Health Services Local Research Committee (see Appendix 3 for a copy of the letter of ethical approval). Demographic variables for the sample appear in Table 1.

Table 1.

<u>Sample demographics</u>	
Mean age (years)	46.9 (11.2)
Mean education (years)	11.5 (2.4)
Mean duration of illness (years)	20.8 (12.1)
Mean age of onset (years)	25.3 (8.7)
Gender (n)	
Males	29
Females	10
Diagnosis (n)	
Schizophrenia	38
Schizoaffective disorder	1
Ethnicity (n)	
White British	22
White Other	7
Black British Caribbean	5
Black British African	3
Asian British	1
Iranian	1
Residential Status (n)	
Living alone	4
Living with family	4
Living in hostel	31
Employment (n)	
Unemployed	34
Voluntary employment	5
Medication (%)	
Atypical antipsychotics	75.0
Conventional antipsychotics	21.9
Depot medication	37.5
Anticholinergic agents	9.4
Mood stabilizers	6.3
Antidepressants	15.6
Anxiolytics	3.1

Design

Informed consent was obtained from all participants prior to their inclusion in the study (see Appendix 4 for a copy of the consent form). Upon obtaining consent, participants were required to complete an hour-long interview during which all the relevant information was collected and the measures were completed. All the interviews were carried out by the same researcher, and all participants completed the measures in one session. With participants' consent, some information was also

gathered from patients' notes. Care-coordinators for each participant were required to complete a measure of community functioning.

Measures

During the research interview, participants were required to answer a brief demographic questionnaire (see Appendix 5 for a copy of this questionnaire) before moving on to complete the following measures in the order below:

1. The BCA (see Appendix 6 for a copy of the BCA guidelines and Appendix 7 for a copy of the BCA record sheet).

The BCA comprises the following three neuropsychological tests:

i) The Trail Making Test (TMT) (Reitan, 1958)

Trails A – in this test the participant is required to draw lines connecting 25 consecutively numbered circles on an A4 worksheet.

Trails B – in this test the participant is required to connect the same number of consecutively numbered and lettered circles, again on an A4 worksheet, alternating between the two sequences of letters and numbers (that is joining 1–A–2–B–3– C).

On both tests, participants were urged to work as quickly as they could without lifting the pencil from the paper. Administration and scoring procedures for this test have evolved over the years, and a number of different methods are still practised. For the purpose of this study, the administration and scoring method introduced by Reitan (1958) was used, as it is the most common method in use today. In this method, the score is based on time alone. The examiner points out errors as and when

they occur, and the participant is required to correct the error before continuing with the test. A cut-off time of 300 seconds was imposed for this test, following personal communication from D. Velligan regarding the method used in the Velligan et al. (2004) study.

This test is in the public domain and can be reproduced without permission. Alternate forms are available for repeated testing, though this may not always be necessary as there is little published evidence of practice effects upon repeated testing in psychosis populations (Velligan et al., 2004).

Performance on the TMT is influenced by cognitive processes in a number of domains, including attention, visual scanning, psychomotor speed, executive functioning (set shifting) and verbal memory.

ii) Verbal Fluency (also known as the Controlled Oral Word Association test - COWA) (Benton & Hamsher, 1976)

Letter Fluency (FAS) – Participants are asked to say as many words as they can think of that begin with a given letter of the alphabet, excluding numbers and the same word with a different suffix. The initial letters F, A and S are used respectively, and participants have one minute for each letter.

Category Fluency (Animals) – Participants are required to say as many different types of animal as they can, again in one minute.

Norms have been developed for different sets of letters and categories and therefore these can be used as alternate forms. These include the sets of letters CFL and PRW and the categories ‘Musical Instruments’ and ‘Parts of the Body’.

As for the TMT, verbal fluency is influenced by cognitive processes in a number of domains. These include verbal memory, executive functioning (initiation) and psychomotor speed. This test is an indication of how well individuals organise their thinking.

iii) The Hopkins Verbal Learning Test (HVLT) (Brandt, 1991)

The examiner reads aloud a list of 12 nouns. These nouns are drawn from three different semantic categories, with four nouns coming from each different category. The participant is required to recall as many of these nouns as possible in any order. This procedure is repeated twice, making a total of three learning trials.

Six alternate forms of this test are available. The HVLT is a copyrighted test and forms must be purchased from a publisher.

The BCA was performed in a quiet setting with a chair and a table as the participant needed a flat surface in order to complete the TMT. A copy of one of the forms of Trails A and B, a stop watch, two pencils, a sheet of paper on which to record verbal fluency responses, and a copy of one of the forms of the HVLT were also required.

2. The Quick Test (QT) (Ammons & Ammons, 1958) (see Appendix 8 for a copy of the QT guidelines and record sheet).

This test involved the examiner reading aloud a list of words that became progressively more difficult as the test continued. The participant was shown a sheet with four different pictures on it. As the examiner said each word, the participant was required to point to the picture which 'best fits' the word. Performance on this test

has been found to be predictive of the Wechsler Adult Intelligence Scale (WAIS) (Wechsler, 1955) Full Scale Intelligence Quotient (FSIQ) (Wechsler, 1955). The QT is therefore a good way of briefly assessing general intelligence. Three forms of this test are available. For the purpose of this study, form 2 was used as it has been found to be the best predictor of the WAIS FSIQ (Abidin & Byrne, 1967).

3. Theory of Mind Stories (see Appendix 9 for a copy of the ToM stories, questions and pictures).

Four Theory of Mind (ToM) stories were read aloud to participants. These stories were taken from the study by Frith & Corcoran, 1996. Two of these stories were 'first order stories' in which the character in the story has a false belief about the state of the world. The other two stories were 'second order stories' in which one character has a false belief about the belief of another character. While the stories were read to participants, they were shown a series of cartoon drawings which corresponded to the stories.

After each story was read out, participants were asked two questions. The first tested understanding of a character's false belief and required intact ToM. The second question tested understanding of the story and participants' memory of it. ToM was not required in order to be able to answer this question correctly, though an incorrect response on this second memory question invalidated the implication of an incorrect response on the first ToM question.

4. *The Brief Psychiatric Rating Scale (BPRS) (Overall & Gorham, 1962) (see Appendix 10 for a copy of this rating scale).*

The final part of the interview was a semi-structured interview using the BPRS. The BPRS is a clinician-rated tool designed to assess the nature and extent of psychopathology in patients with psychotic illness. Items cover the broad range of symptoms commonly seen in psychotic relapse including hallucinations, delusions and disorganization, as well as the mood disturbances associated with psychosis such as anxiety and depression. This measure was used to identify and rate symptoms experienced by participants during the two weeks prior to the interview. Participants were rated on 24 different symptom constructs on a seven-point scale ranging from 'not present' to 'extremely severe'. A total score which reflected the overall level of symptomatology was calculated.

To increase the reliability of this measure, a dual-rating technique was used in order to train the researcher conducting the interviews. This involved watching video footage of clinical material which was filmed specifically for training purposes of this sort, and conducting a number of the initial interviews in this study with a second researcher (a qualified clinical psychologist) until ratings were seen to converge.

In addition to the information gathered during the research interview, care coordinators or keyworkers were required to complete a measure of community functioning for each participant.

The Multnomah Community Ability Scale (MCAS) (Barker, Barron, McFarland & Bigelow, 1994) (see Appendix 11 for a copy of this questionnaire).

The MCAS is a 17-item instrument used to assess the functioning of people with severe and persistent mental illness, and is designed to be completed by care coordinators or other professionals closely involved with the patient. The MCAS is divided into four sections, each of which contains three to five items:

- 1) Interference with functioning
- 2) Adjustment to living
- 3) Social competence
- 4) Behavioural Problems

Items are rated on a 5-point scale of severity or frequency. Scores can be calculated for each of the four sections, as well as an overall score, which ranges from 17 – 85 if all items are completed. This measure was given to either the participant's care coordinator or keyworker and they were asked to complete it and return it to the researcher as soon as possible following the interview. Care coordinators and keyworkers were able to contact the researcher if they had any questions regarding completion of this measure.

Results

Section 1 – Summary of BCA scores

The mean administration time for the BCA was 19 minutes and 39 seconds with a standard deviation of 3.273.

Scoring the BCA

The raw score generated for Trails A and B was time in seconds, with a cut-off at 300 seconds, for Verbal Fluency Letters and Categories it was the number of words generated in one minute, and for the HVLIT it was the total number of words recalled in three trials.

Following the procedure used in Velligan et al.'s (2004) study, raw scores for each of the tests in the BCA were converted into z-scores by subtracting the obtained score on each test from the mean score for the appropriate normative sample and dividing this by the standard deviation for that normative sample. The z-scores therefore reflect the degree of deviation of the patient group from the published normative data. A global cognition score (GCS) was then generated by averaging the 5 individual z-scores calculated for each sub-test. Mean z-scores and standard deviations for the patient sample on the BCA and its constituent tests are shown in Table 2.

Table 2. Mean z-scores and standard deviations for the BCA and its constituent tests

Cognition Measure	Mean z-Score	Standard Deviation (SD)	Velligan et al. (2004) Mean (SD)
Trails A	-10.64	8.75	-2.10 (0.98)
Trails B	-8.62	4.06	-1.62 (1.13)
Verbal Fluency Letters (FAS)	-1.48	0.96	-2.09 (1.11)
Verbal Fluency Categories (Animals)	-1.95	1.19	-2.75 (0.71)
Hopkins Verbal Learning Test (HVLТ)	-2.75	1.31	-3.09 (1.54)
BCA – Global Cognition Score (GCS)	-5.13	2.74	-2.38 (0.85)

Norms were derived from Selnes et al. (1991) for the TMT and verbal fluency, and from Brandt (1991) for the HVLТ. For the TMT and HVLТ norms were stratified by age. For verbal fluency, norms were stratified by years in education.

Section 2 – Summary of scores on other measures.

Descriptive statistics for the other four measures used in this study are summarized in Table 3. The ToM score that was calculated reflected the percentage of ToM questions that were answered correctly, but this was only out of the stories on which the memory questions were also answered correctly.

Table 3. Descriptive statistics for scores on other measures

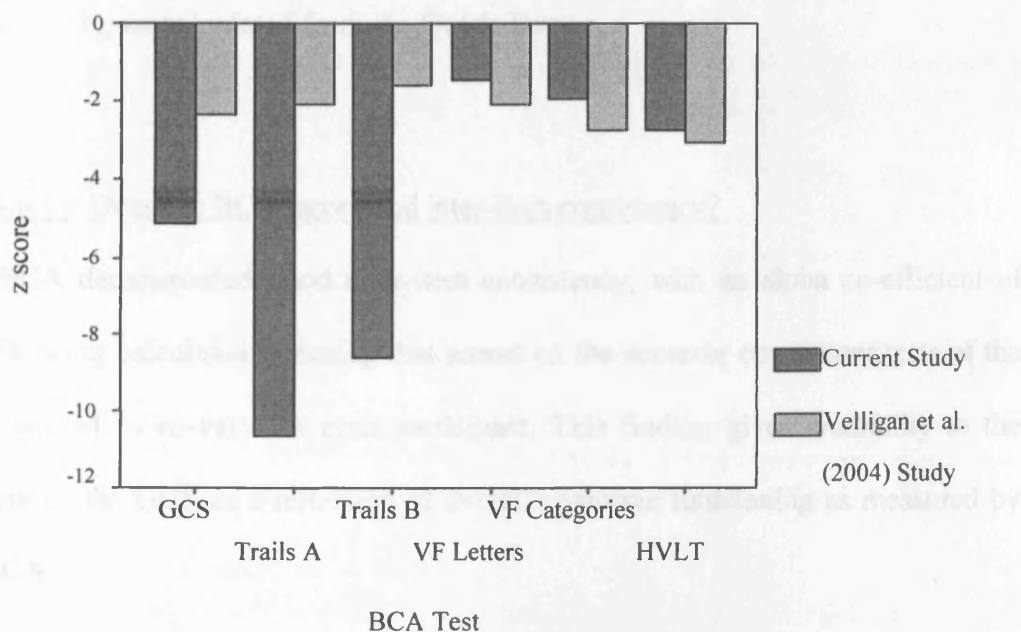
	N	Minimum	Maximum	Mean	Std. Deviation
Quick Test Score	39	13	44	32.67	7.689
ToM Score	37	0	100	57.92	38.412
Total BPRS Score	38	28	71	44.08	11.677
Total MCAS Score	33	49	79	63.30	7.848

Despite the discrepancy in TMT performance between the current study and Velligan et al. (2004) study, our patients were significantly impaired relative to normative data on all areas of the BCA. Scores were around two standard deviations below the means of normal control subjects on the verbal fluency tasks and the HVL. This degree of difference is consistent with what has been found in other similar studies (Velligan et al., 2004; Saykin et al., 1991). On Trails A and B, however, scores were substantially more impaired relative to normative data than would be expected from previous studies, with scores being around ten standard deviations below the means of control subjects.

Scores on the verbal fluency tasks and HVL were slightly better, though not considerably, than those obtained in the Velligan et al. (2004) study. On Trails A and B, scores were much more impaired than in this previous study.

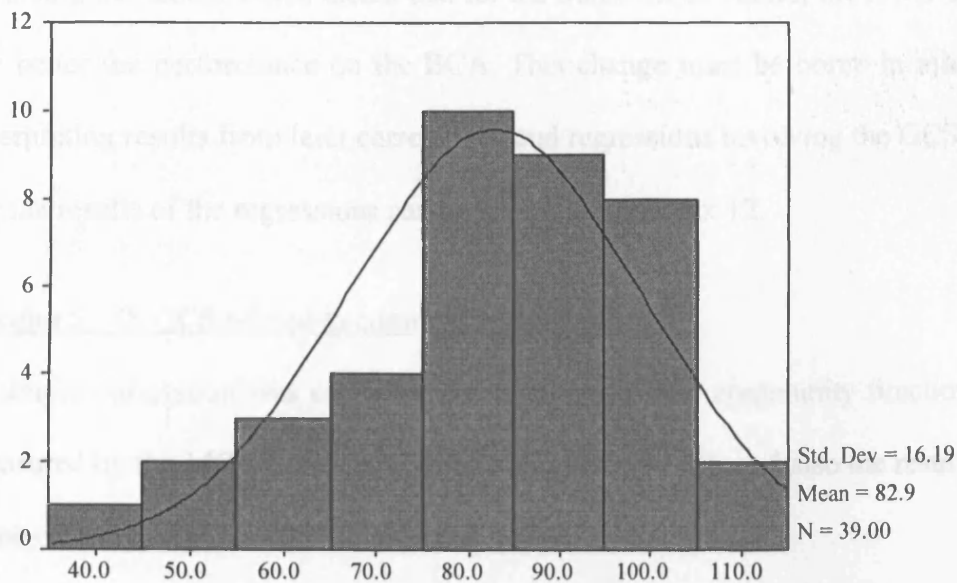
Scores on the verbal fluency tasks and HVL were slightly better, though not considerably, than those obtained in the Velligan et al. (2004) study. On Trails A and B, scores were much more impaired than in this previous study.

Fig.1. Comparison of BCA scores for current study and Velligan et al. (2004)



Despite the discrepancy in TMT performance between the current study and Velligan et al.'s (2004) study, from the graph below the IQ of this sample appears to be normally distributed, and its mean is consistent with what would be expected, being just below the average score of 90 for this population (Frith, Leary, Cahill & Johnstone, 1991).

Fig. 2. Sample population IQ



IQ as calculated from the Quick Test

Section 4 – Does the BCA have good inter-item consistency?

The BCA demonstrated good inter-item consistency, with an alpha co-efficient of 0.6153 being calculated, meaning that scores on the separate constituent tests of the BCA tended to co-vary for each participant. This finding gives credibility to the concept of the GCS as a reflection of overall cognitive functioning as measured by the BCA.

Transformations

For the remaining sections of the analysis it was necessary to perform a number of transformations on several of the variables in order to meet the assumptions necessary for parametric analyses. Square root transformations were performed on the GCS and BPRS scores. Because GCSs were all negative values, the transformation was performed on the absolute value of GCSs. This had the effect of reversing the scores which meant that for the transformed values, the lower the score the better the performance on the BCA. This change must be borne in mind when interpreting results from later correlations and regressions involving the GCS. Tables for the results of the regressions can be found in Appendix 12.

Section 5 – IS GCS related to community functioning?

A simple correlation was carried out between GCS and community functioning, as measured by the MCAS. The table below shows the results and also the results of the same calculation from the Velligan et al. (2004) study.

Table 4. Correlations between GCS and MCAS

	MCAS - Current Study		MCAS - Velligan et al. (2004)
GCS – transformed	r = -0.319 p = 0.037 (n = 36)	GCS - not transformed	r = 0.42 p = 0.02 (n = 34)

The degree of association between GCS and community functioning is similar for both studies. In the current study the correlation is negative simply because the GCS had to undergo a square root transformation. The true relationship is actually a moderate positive correlation.

Section 6 - Does GCS predict community functioning better than symptoms?

A multiple regression was performed in order to explore the varying contributions of cognitive impairment and symptomatology in predicting level of community functioning. The dependent variable in this regression was the total MCAS score, and the independent variables were the transformed GCS and BPRS scores. Overall this model was significant ($F(2,29) = 5.069, p = 0.013$), with R-square calculated to be 0.259, meaning that 25.9% of the variance in community functioning was explained by the independent variables, the GCS and BPRS scores. In terms of independent effects, symptoms were found to exert an independent effect on community functioning (Beta = -0.396, $p = 0.019$), and the independent effect of GCS was almost significant (Beta = -0.325, $p = 0.051$).

Section 7 – Are IQ or ToM ability related to ability to function in the community?

A further regression was carried out incorporating both IQ, as measured by performance on the Quick Test, and ToM score as predictors in the previous model, to explore their contributions to community functioning. With these two additional variables, R-square only increased by 1.6%, from 25.9% to 27.5%, therefore they did not significantly increase the overall significance of the model. For IQ, Beta = -0.065, $p = 0.769$, therefore it did not have a significant independent effect on community functioning. ToM score did not have a significant independent effect on community functioning either, with Beta = -0.097, $p = 0.626$. It is interesting to note that, though GCS did not quite have a significant independent effect on community functioning either, it certainly had much more of an effect on it than IQ.

Section 8 – Is the social functioning sub-scale of the MCAS more closely related to ToM ability than GCS?

Instead of using the global MCAS score, a sub-scale of the MCAS which reflects social competence and functioning was used as the dependent variable in a multiple regression in order to investigate the relative contributions of BPRS scores, ToM ability and GCS to this particular area of community functioning. Overall this model was not significant ($F(3,27)=0.771, p=.0.521$). Only 7.9% of the variance was explained by the independent variables GCS, BPRS scores and ToM score. ToM did not exert a significant independent effect on ratings of social functioning with Beta = 0.019, $p = 0.926$.

Section 9 – Are medication levels related to the amount of cognitive impairment?

Chlorpromazine equivalence (CPE) scores were calculated to enable participants to be compared in terms of the amount of medication they were taking. This involved converting each participant's medication as recorded at the time of the research interview into a value that reflected its 'chlorpromazine equivalence' using a dose equivalency table (Kane, Leucht, Carpenter & Docherty, 2003). CPE scores could only be calculated for about half of the participants in the study as many were on types of medication for which CPE scores could not be calculated. Descriptive statistics for these scores are summarized in Table 5.

Table 5. Descriptive statistics for CPE scores

	N	Minimum	Maximum	Mean	Std. Deviation
Chlorpromazine Equivalence Score	20	50	960	325.49	215.551

These scores were correlated with GCS to see whether there was any relationship between these two variables. The CPE scores did not need to be transformed before carrying out this correlation. From the existing literature (Mortimer, 1997) it was predicted that CPE scores would not be related to GCSs. A Pearson correlation coefficient of -0.093 ($p = 0.715$) was calculated, thereby supporting the null hypothesis that there is no relationship between these two variables.

Section 10 – Is cognitive functioning related to duration of illness?

Current cognitive functioning, as measured by the BCA and reflected in the GCS, was correlated with participants' duration of illness. From the existing literature (Addington & Addington, 2002) it was predicted that the duration of participants' illness would not be related to GCSs. A Pearson correlation coefficient of 0.222 ($p = 0.200$) was calculated, thereby supporting the null hypothesis that there is no significant relationship between these two variables. For these final two correlations (sections 9 and 10), it may be that an effect was not detected due to lack of power, and that the sample size was not big enough. These findings therefore are not conclusive, though they do fit with and provide further support for the findings of previous studies.

Discussion

This study investigated the use of a new measure of cognitive functioning for people with schizophrenia, the BCA. One study had previously been carried out using this measure in a similar population in the USA (Velligan et al., 2004), but the current study was the first to assess its use in a UK population within the National Health Service. In contrast to the original study, the current study incorporated a number of additional measures into its design. These included the Quick Test (to assess intelligence) and Theory of Mind (ToM) stories, in order to be able to explore the independent contributions of IQ and ToM ability to participants' levels of community functioning. In contrast to Velligan et al.'s (2004) study, the current study also incorporated a measure of symptomatology, the Brief Psychiatric Rating Scale (BPRS), into its design, which meant that the triadic relationship between cognitive impairment, community functioning and symptomatology could be explored.

Discussion of the Results

Administration time

The mean time taken to administer and score the BCA was 19 minutes and 39 seconds. Though Velligan et al. (2004) do not report the actual mean time that was recorded in their study, they do claim that it took approximately 15 minutes to administer and score. The mean time recorded in this study is therefore somewhat longer. In the current study, most of the variance in the time taken to complete the BCA was accounted for by the TMT as this was the only timed part of the test. The other two parts of the test, verbal fluency and the HVLT, took similar amounts of time for nearly all participants, irrespective of their level of impairment. The most

likely possible explanation for this difference in administration time between the current study and Velligan et al.'s (2004) study is therefore because participants in this study took longer to complete both Trails A and B. This would account for at least a couple of extra minutes in administration time. The BCA is still a comparatively brief assessment however in relation to other neuropsychological batteries.

Comparison of performance on the BCA to published normative data and data from Velligan et al. (2004) study.

Participants were substantially impaired on the BCA relative to normative data and therefore the first hypothesis was supported. For the individual BCA tests, scores for the verbal fluency tasks and HVLT were as would be expected, at around two standard deviations below the means of normal control subjects. Scores on these tests were also around the same level as those obtained in the Velligan et al. (2004) study.

Participants in this study performed significantly lower on the TMT, however, than would be expected. Their scores were substantially lower than those obtained by Velligan et al. (2004), and were around ten standard deviations below normative data which is a much greater difference than would be expected. Due to the motor demands of the test, this might be expected in a sample of participants with a high prevalence of movement disorders, though this was not case for this sample. There are a number of other possible explanations for this discrepancy. There are a number of different ways of administering the TMT and the method used in this study may have been different from that used in the Velligan et al. (2004) study, though this is not clear as the method that they used was not specified in their publication. The

method used in the current study was the same however as the method used in the study that produced the norms (Selnes et al. 1991). This lends support to the conclusion that performance on the TMT was particularly impaired in the present sample, and that the low score is not simply a consequence of a different method of administration.

It is interesting to note that whilst participants' performance on the TMT was much more impaired than would be expected, their performance on verbal fluency, the HVLT and IQ, as predicted by the Quick Test, was not. It is possible that, though their IQs were generally similar, this sample were more impaired in specific areas of cognition than the sample in Velligan et al.'s (2004) study, and that the TMT is simply more sensitive to this cognitive impairment than the other BCA tests. Certainly the majority of the sample were living in hostel accommodation which suggests that, in terms of functioning, they represented the more impaired end of the range of patients with schizophrenia living in the community. Given the relationship between community functioning and cognitive impairment, it might be expected that this sample would therefore be more cognitively impaired, and perhaps the TMT is simply the test that is most sensitive to picking up on this.

Inter-item consistency of the BCA

The BCA had good inter-item consistency which means that relative to each other, participants scored at a similar level on all five parts of the BCA. In other words, participants who performed the most poorly on the TMT also scored the worst on verbal fluency and the HVLT. This suggests that the Global Cognition Score (GCS) is a meaningful value in terms of patients' neuropsychological presentation. If inter-item consistency were low, this would suggest that the GCS was simply an average

of differences in performance over the different parts of the BCA and the result would be less meaningful clinically. However because inter-item consistency is high, the GCS can be seen as a useful reflection of the degree of cognitive impairment experienced by different individuals. This finding that inter-item consistency is high shows that the cognitive domains as assessed by the different tests of the BCA do co-vary. Whether this is because these tests measure similar constructs or whether they measure different constructs that happen to co-vary is less clear.

Relationship between performance on the BCA and community functioning

On doing a simple correlation it was found that GCS was significantly related to community functioning, and to a similar degree to that found in the Velligan et al. (2004) study, thereby supporting the second hypothesis of this study. The results did not confirm the third hypothesis of this study, however, that cognitive impairment is more predictive of community functioning than level of symptomatology. In the regression analysis, symptomatology was found to be a significant predictor of community functioning. GCS was not found to be a significant predictor, though it was only just outside the 5% level of significance. This finding suggests that the severity of a persons' symptoms may influence their ability to function in the community more than the degree of their cognitive impairment.

This finding is contrary to what has previously been found in the literature which would predict that cognitive functioning would explain more of the variance in such a regression than symptomatology (Green, 1996; Velligan et al., 1997). One possible explanation for this finding is the measure used in the current study to assess community functioning. The Multnomah Community Ability Scale (MCAS) is a very global measure of community functioning and, as well as rating participants in

areas such as their ability to manage money and perform independently on basic self-care tasks, it also includes items that rate individuals on their mood, their thought processes and their response to stress and anxiety. This could therefore account for some of the shared variance between MCAS and BPRS scores. Perhaps if a more functionally based measure of community functioning, such as the Functional Needs Assessment (FNA) (Dombrowski, Kane, Tuttle & Kincaid, 1990) had been used then the relationship between symptoms and community functioning would not have been as significant. Velligan et al. (2004) did not use a measure of symptomatology in their study, therefore it is not possible to know whether they would have found the same degree of shared variance between the MCAS and a measure of symptomatology. They did however use the FNA as one of their measures of community functioning and of the four different measures that they used, this was the one found to be most highly correlated with the GCS, with a Pearson correlation coefficient of 0.66 ($p < 0.0001$) (Velligan et al., 2004).

The role of IQ in community functioning

When IQ was incorporated into the regression model it was found not to be related to community functioning. Interestingly IQ accounted for much less of the variance than GCS did, and so it seems that GCS is related to community functioning to a much greater extent than IQ is. GCS does not therefore appear to simply reflect IQ but instead reflects more specific cognitive deficits associated with schizophrenia. This means that someone can have a relatively high IQ but may have moderately severe cognitive deficits which impact on their ability to function independently in the community. Alternatively someone may have a relatively low IQ but if their cognitive deficits are relatively mild, their community functioning may not be as impaired.

The role of Theory of Mind in community functioning

Performance on the ToM task was not found to be related to either community functioning generally, or the social aspect of community functioning. It predicted much less of the variance than GCS in terms of both community functioning and social functioning in the regression analyses. This suggests that GCS is a better indicator of community functioning than performance on a ToM task is. This is contrary to previous studies which have suggested that ToM ability may be a better predictor of community functioning, particularly in relation to its social and interpersonal aspects, than other measures of cognitive functioning, (Brüne, 2005b; Pollice et al., 2002).

The effect of medication and duration of illness on community functioning

Finally, no relationship was found between Chlorpromazine Equivalence and GCS. This finding was consistent with our hypothesis that medication would not have a significant impact on the degree of cognitive impairment. This was an important finding as it suggests that medication was not acting as a confounding factor in the present study, as it was not significantly associated with cognitive impairment. A null hypothesis was also confirmed for the relationship between GCS and the duration of participants' illness. These findings should be interpreted with caution, because confirmation of the null hypothesis may simply reflect an inadequate sample size to reveal any effect. However, it is interesting to note that the pattern of results in this study fits with what would be expected from reviewing the literature.

Evaluation of the Study

The strengths and limitations of this study must be borne in mind when considering the results.

Strengths

The design of this study was based on hypotheses which were, in turn, based on the findings of previous studies in the literature. This is an important characteristic of a well-designed research study as studies that are not driven by a priori hypotheses, and where data-analysis is conducted in an arbitrary and post-hoc fashion, run the risk of finding statistically 'significant' results that are more down to chance than actual true associations. This has been a criticism of research in this area in the past. This is partly due to the fact that research into the relationship between cognitive impairment and community functioning, and into cognitive assessment in schizophrenia generally, is a relatively new and as yet unexplored area. This means that previous studies have been more exploratory and divergent than hypotheses-driven and convergent. This study however was designed, and the hypotheses based, on previous studies and reviews of the literature in this area (Velligan et al. 2004; Green, 1996; Green, Kern, Braff, & Mintz, 2000). Analysis of the data was also guided by these hypotheses.

As well as looking at the relationship between cognitive impairment and community functioning, this study assessed concurrent levels of symptomatology. This additional measure provided valuable information which made it possible to investigate the triadic relationship between community functioning, cognitive impairment and level of symptomatology. It is important that research in this area does not shy away from the complexities of this relationship, whilst at the same time

also does not become entangled in its intricacies. By including all three of these variables, but by keeping the analysis simple and hypotheses-driven, it is argued that this study was successful in achieving these goals.

By incorporating the Quick Test and ToM stories and questions into the research interview, it also made it possible to test out hypotheses relating to the potential of ToM ability and IQ as predictors of community functioning. Incorporating these measures into the research interview did not substantially extend the interview, and participants on the whole reported enjoying the experience of doing the interview. These additional measures therefore appear to have been a worthwhile addition to the study.

Community functioning was assessed by keyworkers who completed a copy of the Multnomah Community Ability Scale (MCAS) for each participant. Asking keyworkers to rate community functioning meant that, in some ways, a more objective measure of community functioning was obtained. Many of the participants in the study were residents of hostels. This meant that their keyworkers, as staff members within the hostel, were often familiar with difficulties that participants had in their day-to-day functioning. It also meant that responses on this measure would not be distorted by disordered thoughts or by delusional or grandiose thinking, as they may have been had this measure been completed by participants themselves.

It was useful to gather information about concurrent types and levels of medication as well as demographic information regarding the age at which participants first had contact with mental health services and the duration of their illness. Though this

additional information could not confirm particular null hypotheses, due to the sample size, it was interesting that the pattern of results did fit with the literature. In studies of this kind it is also useful to record the residential status of participants and whether or not they are in any form of employment. Unfortunately it was not possible to use this information in any kind of statistical analysis as there was not a sufficient number of participants in different groups on each of these variables, but this is still useful demographic information to have when considering the results.

Limitations

Compared to the original study (Velligan et al., 2004), which had a total sample size of 402, the sample size for this study was relatively small. The sample was also fairly heterogeneous with participants ranging in terms of the chronicity of their illness, their level of symptomatology and their degree of independence in community functioning. The more heterogeneous a sample, the harder it is to ascertain which variables are leading to which outcomes or effects. This heterogeneity is unfortunately a reality however in research with this population as patients with schizophrenia living in the community do vary in many ways, and arguably it is virtually impossible to attain homogeneity in a sample drawn from this population.

Many of the participants in this sample lived in hostels which suggests that they represent the more functionally impaired end of the range of patients with schizophrenia living independently in the community. Though this is not a limitation in itself, as the BCA should be tested out on patients with as wide a level of functioning as possible, it possibly makes it harder to compare the findings of this study with those of Velligan et al.'s (2004) study. Participants in Velligan et al.'s (2004) study were simply described as being outpatients and their residential status

was not included in the paper, so it is unclear how similar these two samples were in terms of their level of functioning.

Participants were compared in terms of the medication they were each taking by converting medication dosages into Chlorpromazine equivalence scores. As Chlorpromazine equivalence scores can not be calculated for all of the atypical antipsychotics however, this could only be done for about half the sample. An alternative method of comparison involves calculating what percentage of the maximum dose of any particular antipsychotic each participant is on. This method is recommended for use in future studies where it is desirable to be able to compare participants on their levels of medication, as a score can be calculated for each participant whatever type of medication they are on.

Community functioning was assessed using the MCAS. There were two areas of concern regarding the way in which this measure was completed which may have affected its reliability. Firstly, the MCAS is designed to be completed by a keyworker or case-manager. Good inter-rater reliability is therefore a critical aspect of this measure, as it is crucial that different keyworkers are completing it based on the same criteria if participants are to be meaningfully compared. Participants in this study varied substantially in terms of their level of independence however, and because of the variety of different settings in which keyworkers were working, they would have had different expectations and different ideas about how well patients were doing relative to others. This could therefore have impacted on their ratings of participants and had a negative effect on inter-rater reliability. Ideally raters should all be trained in order to ensure the highest possible inter-rater reliability. Due to time

constraints, particularly for the keyworkers themselves, this was not possible however for this study.

Secondly, information used to complete the MCAS came from only one source, the keyworker. Though involving the keyworker and getting an objective perspective on participants' levels of functioning has already been identified as a strength of this study, it may have been beneficial to get additional information from other sources, either from the individuals themselves or from their notes. By not asking the individual about how competent they felt in terms of independent living and community functioning, a valuable subjective perspective was lost. There may have been areas of difficulty that only they were aware of. To increase its validity therefore, several sources of information would ideally have been used to rate each participant on the items of the MCAS.

In addition to the issues surrounding the methodology involved in rating the MCAS, there is also the question of whether this measure was the best way of assessing community functioning. For various pragmatic reasons, mainly related to wanting to minimise disruption to both keyworkers and participants, only one measure of community functioning was used in this study. For this reason it was critical that this measure was as valid and reliable as possible in representing as many of the relevant aspects of community functioning as possible. There are certain aspects of the MCAS however which suggest that it may not be the ideal measure in this respect. For example, as has already been suggested, the inclusion of items in the MCAS that rate individuals on their mood, response to stress and their thought processes may have accounted for some of the shared variance between performance on this measure and on the BPRS, and is arguably a limitation of this measure.

Future studies might consider using more functionally-based measures of community functioning. Ideally it would have been useful to incorporate a measure such as the Functional Needs Assessment (FNA) (Dombrowski et al., 1990) into the study. The FNA assesses basic activities of daily living (ADLs) including self-care and care of living quarters, based on performance in front of an examiner. This measure is more time consuming to complete for both staff and participants, but is valuable in terms of providing an indication of participants' abilities on a more functional level. ADLs such as the ability to complete self-care tasks including bathing, dressing, laundry, shopping, meal preparation and using public transport are often not assessed in people with schizophrenia. Arguably these kinds of assessments should be carried out more routinely on such patients who are living in the community for clinical purposes. If this were the case, and with participants' consent, such information would be readily available for use in research studies such as this one.

Alternatively it would perhaps have been useful to incorporate a global indicator of functioning such as the Global Assessment of Functioning (DSM-IV, 1994) into the study. This would have been simple to incorporate into the current design as it is a one-item measure and would have taken only a brief amount of additional time. Because this measure involves rating participants on a single dimension using clearly defined anchor points, it would also potentially have been a more reliable way of comparing the level of functioning of participants across different settings.

As for the MCAS and community functioning, a similar issue applies to the rating of symptoms using the BPRS. Ratings for each participant on the 24 items of this scale were based on a semi-structured interview which took place at the end of the

research interview. Although attempts were made to improve the reliability of ratings through training the researcher using a dual-rating technique until ratings were seen to converge, Ventura et al. (1993) have advised that to increase the reliability and validity of this measure, all available sources of information should be used in rating participants on the BPRS. As well as the semi-structured interview that took part at the end of the research interview, it would have been useful therefore to corroborate this information by checking its accuracy with staff or family members, or by looking at patients' notes.

Clinical and Scientific Implications of the Findings

Cognitive impairment is a clear feature of schizophrenia and patients are impaired on tests that involve a range of different cognitive domains including memory, attention and executive function (Gold & Harvey, 1993). This impairment is something that needs to be addressed and its implications can no longer be overlooked. This study has provided further evidence of the significant cognitive difficulties experienced by people with schizophrenia and therefore supports the need to develop a standardised way of assessing these deficits that is brief, reliable and has high validity.

This study has provided some support for the possibility that the BCA may be a useful measure and that it fits these criteria. In terms of its ability to predict levels of community functioning, a similar degree of association between GCS and MCAS score was found in this study as in Velligan et al.'s (2004).

The BCA was certainly very straightforward to administer and score, and would be relatively simple to train a wide range of mental health professionals to use. It was also fairly brief, though took slightly longer to administer than in the original study

(Velligan et al., 2004). Participants appeared to be motivated to perform to the best of their ability on the tasks and cooperated well. These are important aspects of any cognitive assessment that is to be widely and routinely used in this population, both in terms of persuading staff to administer it and encouraging patients to complete it.

In this study participants were particularly impaired on the TMT (Reitan, 1958). This is something which could be explored further in order to determine why this was. The extent of this impairment meant that participants' scores on the TMT significantly influenced their GCS, more so than their performance on the other two tests. Whether this influence increases or decreases the association of GCS with ratings of community functioning could be investigated. If it increases it then the TMT alone may be a useful predictor of community functioning. However if it decreases it then perhaps the inclusion of the TMT in the BCA should be reconsidered and it should be substituted for another test more reflective of community functioning.

Conclusions

This study has provided evidence to support Velligan et al.'s (2004) study that the BCA is be a useful indicator of cognitive impairment in people with schizophrenia and can be used to predict a person's level of community functioning. Contrary to previous research studies and the conclusions drawn from reviewing the literature, this study found that symptoms were more strongly associated with community functioning than the level of cognitive impairment. This may be an effect of the particular measure of community functioning that was used in this study, the MCAS. The hypothesis that ToM ability is a better predictor of community functioning than level of cognitive impairment, as reflected by the GCS, was not supported.

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Part 3

The Use of the 'Brief Cognitive Assessment' in Schizophrenia – A Critical Review

This review provides an opportunity to consider some of the issues that have arisen in the process of this study in more detail. I will begin by reflecting on the experience of conducting this study, initially from the perspective of the actual research process, before going on to discuss the more clinical issues that arose whilst using the BCA itself. Because this is such a new test, this second part of the personal reflection will involve a fairly detailed discussion of the subjective experience of administering the BCA, as well as further consideration of some of its strengths and weaknesses from a more theoretical perspective. The clinical implications of the BCA, or a similar cognitive assessment of this kind, will also be discussed, before concluding with ideas of possible directions for future research.

Personal Reflections

The Research Process

One thing that became clear from my experience in conducting this study was the need for planning and thinking ahead. Time invested at the beginning of a project in setting up an efficient method of gathering and recording the data saves significant amounts of time further down the line. At the same time being flexible and prepared to try new ways of doing things was also important when problems arose with the original plan. Having a timetable projected several months into the future is important to ensure one is on track and progressing at an appropriate rate, and having a clear deadline for completion of the study in many ways helped with this.

Two main difficulties arose during the course of the study which needed to be overcome. The first, which is extremely common in clinical research, was that of recruitment. Service users of Community Mental Health Teams (CMHTs) were initially approached through their care-coordinators and several of the first participants were recruited in this way. Care-coordinators frequently visit their clients at home however as clients are often reluctant to come into the CMHT base. This can be for many reasons including stigma, anxiety, lack of motivation and so on. Due to potential risk, it was not possible to interview participants at home however, and as only a few were willing to come into the CMHT, this method of recruitment yielded relatively few participants.

The second method of recruitment was much more fruitful and involved contacting managers of several medium-to-low-level support hostels for people with mental health problems living in the community. Staff identified residents who were interested in participating in the study and, with their consent, they were visited and interviewed in an appropriate room at the hostel. Staff were generally supportive and helpful and many residents were keen to take part as they could be seen in their place of residence at a time which suited them.

The second area of difficulty in this study was ensuring that keyworkers completed the MCAS for each participant that was interviewed. This needed to be done as close as possible in time to the research interview taking place as ratings on some of the items could feasibly change over time and they needed to reflect the persons functioning as much as possible on the day of the research interview. A MCAS was

completed for almost all of the participants. In order to ensure the help and support of staff in both recruiting participants and completing the MCAS it was crucial to build rapport with the team and in particular the team manager. It was also important to have a clear rationale for why the study was being done and a straightforward information sheet describing this. It was necessary to ensure that all staff that were going to be referring participants and completing the MCAS had actually seen and read this information sheet themselves, and that it hadn't simply been 'okayed' by the team manager. Some staff had concerns about how to respond on some of the items on the MCAS and it was necessary, in some cases, to provide staff with support in completing this.

Clinical Issues

Cognitive Impairment in Schizophrenia

One of the most striking aspects of my experience in conducting this study was just how cognitively impaired almost all of the participants in this study were. Participants varied quite substantially in terms of their presentations, their levels of functioning, their symptomatology, their social skills, their articulateness and the chronicity of their illness. Regardless of these other variables however, participants were substantially cognitively impaired across the board. It was often surprising the extent to which participants struggled on the BCA based on their initial presentation, and was often contrary to my preconceptions. It seems that many patients with cognitive deficits may be very good at covering these up and that often quite severe cognitive deficits can go unnoticed. Alternatively they may be masked as a side effect of their medication or confused with simply being part of the symptomatology. From my experience of carrying out the BCA with 39 individuals with a diagnosis of

schizophrenia however, what was clear was that, though the level of impairment does vary, it *is* present and it is moderate to severe.

Reflections on using the BCA

The BCA was straightforward to administer, score and interpret. Participants were generally very cooperative and appeared motivated to do well. They showed interest in finding out the results of the assessment and appeared to enjoy completing the various tests. On the whole participants listened well when they were being given instructions about how to complete each of the tests, and they did not have any major difficulties in following these. The exception to this is Trails B which will be discussed in the next section.

Despite generally good levels of motivation and cooperation, some participants did have difficulties with concentration even during this brief period of testing. For example, some participants found it difficult to concentrate for the entire minute during the verbal fluency tasks and whilst doing Trails B, and would drift off task.

Though participants did on the whole appear to enjoy doing the BCA, it is important for clinicians and researchers to be aware of the impact that doing the BCA may have on an individual. Individuals in this population often have low self-esteem and very little confidence in their ability on such tasks. Professionals administering the BCA need to be aware of this and the potential frustration that can be aroused when tackling such tasks. It is perhaps appropriate to provide some degree of reassurance and support, and always important to give constructive feedback.

This issue is illustrated by one particular individual who, despite doing very well on Trails A, angrily refused to complete Trails B after he made a mistake early on. This individual scored particularly high on the 'grandiosity' subscale of the BPRS, and it might be argued that he found being confronted by his difficulties in this way, very difficult to deal with. This same individual also appeared to find the HVLT very frustrating, and became agitated and irritable when he found he could not remember every single item on the list.

The three constituent tests of the BCA will now be considered in turn, and relevant issues that came up pertaining to each test will be considered.

The Trail Making Test (TMT)

Of the three tests, participants appeared to find Trails significantly more difficult. Several patients were completely unable to complete Trails B, and many more were unable to complete it within the 300 second cut-off that was imposed. The method of administration that was used in this study required the examiner to correct participants each time they made a mistake, allowing them to carry on from there. Most of the participants needed at least some guidance and correcting on Trails B with some needing so much that the reliability of the score was questionable, as the examiner effectively appeared to be doing the test for them. Trails B was the part of the BCA that caused participants the most distress and frustration.

Based on these issues this raises the question of whether Trails, particularly part B, is the best test to be included in the BCA, due to the issue of possible floor effects and the possible distress caused to participants. Further investigation is required in order

to establish whether the extremely poor performance on Trails B reflected in this study is representative of this population as a whole. Clearly Velligan et al.'s (2004) findings would dispute that, but further studies are needed to establish exactly how individuals in this population do perform on this test.

Verbal Fluency (COWA)

This was perhaps the most straightforward part of the BCA to administer and generally participants did not have any difficulty in comprehending the instructions. The only misinterpretation that did occur was when one participant, when moving onto the category fluency task, continued to apply the restriction of the previous letter fluency task. In other words he only generated animals that began with the letter 'S'. This mistake appeared to be a misunderstanding of the requirements of the task rather than a true 'perseveration', as once he was corrected this error was not repeated. BCA administrators need to be aware of such misunderstandings and correct them if necessary.

Of all the tests in the BCA this is the one most sensitive to education and for this reason it is important to take into account the influence of different levels of education and a participant's premorbid verbal skill level when interpreting performance on this task (Crawford, Moore & Cameron, 1992). An illustration of this sensitivity is the finding that control subjects of low ability perform less well on verbal fluency tasks than brighter brain damaged patients (Borkowski et al., 1967). For this reason, norms stratified by education were used in calculating the z scores on these tasks.

An additional point is that variability is particularly wide at lower educational levels. For this reason, Lezak (1995) has pointed out that performances of participants with less than a secondary school education must be interpreted with caution. As with the Trails, this raises the question of the suitability of including Verbal Fluency in the BCA, considering the fact that a large proportion of the population whom the BCA is designed to assess have lower levels of education than perhaps the general population at large.

The Hopkins Verbal Learning Test (HVLT)

This part of the BCA was also simple to administer and score, and participants had no difficulties in comprehending the instructions. This test provided a useful indication of participants' verbal memory. This test is simpler than other serial word-learning tests and was specifically designed for brain-disordered populations. For example, the California Verbal Learning Test (CVLT) (Delis, Kramer, Kaplan & Ober, 1987) consists of 16 words that are repeated over 5 trials. This is compared to the HVLT which consists of 12 words that are repeated over 3 trials. Despite the simplicity of the HVLT however, there were no ceiling effects. This is perhaps a reflection of the severity of the memory impairment associated with schizophrenia.

Summary

The BCA has several strengths. It is straightforward to administer and interpret and would be simple for a wide range of mental health workers from different professional backgrounds to use. This is an important factor in terms of its utility in a clinical setting. Though it took somewhat longer than the time reported in the Velligan et al. (2004) study, it is still a very brief measure to administer, requiring

virtually no additional time to set up or score. Based on the finding that participants' scores were significantly lower than published normative data, the BCA does seem to be sensitive to the cognitive impairments associated with schizophrenia. The BCA can also be used repeatedly as there are several equivalent forms for Trails, Verbal Fluency and the HVLIT. This is another crucial factor in terms of its utility if the BCA is to be administered routinely. Finally, the good inter-item consistency of the BCA means that a meaningful Global Cognition Score (GCS) can be calculated. This score may be a useful possible indicator of potential ability to function independently in the community, making the BCA a useful screening tool of cognitive impairment.

This study has also highlighted a number of possible limitations of the BCA however. Due to the possible floor effects seen on Trails B it may be that the BCA would not be as useful or reliable in more cognitively impaired populations. The motor requirements of Trails may also mean that it would not be possible to assess individuals with movement disorders using the BCA. The issue of the reliability of verbal fluency tasks in more poorly educated populations has also already been raised. Another issue that frequently comes up in this field of neuropsychological assessment is the culturally binding nature of this test. Spoken English is an essential requirement for the completion of this test. Clearly there are many individuals in clinical settings who would benefit from a cognitive assessment but who would not fit this criterion. Also, even for those who do speak English, but only as a second language, their performance may be unduly influenced by the bias of this test towards fluent English speakers.

Clinical and Scientific Implications of the BCA

This study has confirmed the need for a reliable and valid assessment of cognitive impairment in schizophrenia. This is not simply to see whether or not an individual is cognitively impaired or not, as it appears that all individuals with schizophrenia have some degree of impairment. More specifically, such an assessment could provide an indication of the *severity* of this impairment. There is a great deal of variability amongst patients in terms of the extent of their cognitive deficits, and it is important to get an idea of this because of the functional implications that it has.

Cognitive impairment is not related to the duration of an individual's illness or the nature of their symptomatology, and there is only limited evidence that it is related to medication. This means that cognitive assessment is necessary because an individual's level of cognitive impairment cannot be inferred from these other variables, but must be investigated separately. Patients may be quite adept at compensating for these deficits and covering them up, perhaps because they feel embarrassed or ashamed by them. The extent of an individual's impairment that is revealed on completing a cognitive assessment may be much more severe than one might expect based on their initial presentation. This suggests that routine cognitive assessment is important for *all* individuals with schizophrenia as it is hard to predict which individuals will be the most impaired based on superficial appearances.

It has been acknowledged that a very brief measure such as the BCA can only really act as a screening tool and its greatest use lies in its ability to give a rough indication of a person's level of cognitive impairment as reflected by the GCS. For those who perform particularly badly on the BCA, it may be useful to explore the breakdown of

the individual's scores on the separate BCA tests for more information. However it is likely that for those who are particularly impaired it would be beneficial for them to have a more in-depth cognitive assessment. Due to limited resources it is not viable for these lengthier assessments to be administered to all patients, but by using the BCA as a screening tool, this can highlight those who are in greatest need of further investigation of their cognitive deficits and help clinicians in prioritising them.

Several possible clinical uses of the results of such an assessment have been discussed in an earlier part of this thesis when a case was made for the need for neuropsychological assessment in schizophrenia. These included highlighting targets for cognitive remediation and rehabilitation and making decisions about necessary levels of support and suitable placements in discharge planning.

It appears that cognitive impairment is present from the earliest stages of schizophrenia (Addington & Addington, 2002). Routine cognitive assessment should therefore be incorporated as standard into the rigorous assessment protocols that are currently being designed for use in Early Interventions Services for psychosis. If some form of cognitive assessment such as the BCA could be built into these kinds of protocols right from their inception, this would help introduce routine cognitive assessment into the philosophy of these teams. A core aim of the work of these services is helping young people who have had a first episode of psychosis to get on with their lives and supporting them in achieving their goals. A critical part of this work will therefore involve assessing and supporting individuals in coping with any cognitive deficits that they may have that may be making it difficult for them to progress whether this is because they are having difficulties concentrating at college or due to problems remembering instructions at work.

In the past, the cognitive deficits associated with schizophrenia have often been ignored, or difficulties that result from cognitive impairment have been put down to individuals being stupid or lazy. By recognizing these difficulties as an inherent part of this illness however and not the 'fault' of the individual, this is likely to significantly improve individuals' self-esteem and may help them to feel more empowered to do something to overcome these problems. Also, if care-givers and family members are educated about these deficits and have a better understanding of the reasons behind some of their relative's difficulties in functioning, this may lead them to be more considerate and tolerant of their problems. It is possibly easier for others to relate to the experience of having a poor memory or difficulty concentrating than it is to the experience of being thought disordered or hearing voices. This may make family members more sympathetic and empathic and make them less blaming of the individual for their problems. By having a better understanding, family members are also likely to be more supportive and enthusiastic about putting in place strategies for coping with this cognitive impairment.

Future Directions for Research into Cognitive Assessment in Schizophrenia

This review has discussed both the strengths and the weaknesses of the BCA as a possible assessment of cognitive impairment in schizophrenia. The importance of cognitive assessment for people with schizophrenia and its clinical relevance can no longer be overlooked, but whether the BCA is the best possible test of this impairment needs to be further explored. The BCA is one combination of three commonly used neuropsychological tests. The relative merits of each of these tests has been discussed and the TMT in particular has been noted to be potentially difficult. There are a large number of other tests available which assess similar

domains. Perhaps different combinations of some of these tests should be explored as an alternative to the BCA before the BCA is simply accepted as the most suitable method for assessing cognitive impairment in people with schizophrenia. For example, a test such as digit span, which is very quick to administer, requires no specialized materials for administration and arguably assesses domains that are relevant to schizophrenia, could be incorporated into a brief measure of this kind along with other brief measures with similar attributes.

In addition to exploring the potential of using other existing tests commonly used in clinical neuropsychology, as mentioned earlier in this thesis, several other brief measures specifically designed to assess the cognitive deficits associated with schizophrenia have emerged in recent years. These include the Brief Assessment of Cognition in Schizophrenia (BACS)(Keefe et al., 2004), and also the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) (Randolph, Tierney, Mohr & Chase, 1998). In many ways the emergence of more and more of these brief measures is a positive development in that it reflects the way in which the cognitive impairment associated with schizophrenia is finally getting the recognition that it deserves, and it is highlighting the need for cognitive assessment in this population. A sudden proliferation of only loosely related measures will not help however in the search for a standardized method of assessing cognitive impairment in schizophrenia.

The relative strengths and limitations of each of these measures need to be reviewed, and those with the best reliability and validity should be noted. Some of these measures may be more suitable for certain sub-groups within this population or may be more useful in certain situations. For example one measure may be particularly

useful in terms of identifying targets for cognitive remediation whereas another may demonstrate good reliability in terms of assessing whether a new medication has improved or worsened a patient's cognitive functioning. If a system could be developed for informing clinicians of which assessment to use in which circumstances depending on the decision that needs to be made, so that the particular cognitive assessment that is used is based on a rationale rather than being an arbitrary choice, then this would greatly increase the validity of the results of such assessments and increase their value as a clinical tool.

If cognitive impairment is to be routinely incorporated into the assessment and treatment of individuals with schizophrenia across mental health services in a significant way, it is absolutely critical that mental health professionals support this. An important area of future research will therefore be some kind of qualitative research that explores staff attitudes to cognitive assessment in schizophrenia. It will be critical to explore whether staff feel they would be motivated to use a measure such as the BCA and whether they think it would help them in their work. It would also be useful to see whether staff appreciate the rationale behind the use of cognitive assessment, whether they see a need for it, and whether they think the information that it would produce would be clinically relevant. As the BCA is designed to be able to be used by a wide range of mental health professionals it would be important to research the feelings of doctors, psychiatric nurses, social workers and support workers, as well as psychologists, who are traditionally more familiar with cognitive assessments. It would also be useful to research the attitudes of staff working in different settings including outpatient, inpatient, rehabilitation and residential services.

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Appendices

Appendix 1 – Staff Information Sheet



Sub-Department of Clinical Health Psychology
UNIVERSITY COLLEGE LONDON
GOWER STREET LONDON WC1E 6BT

Assessing Memory, Attention and Thinking Skills in People

With Mental Health Problems – An Information Sheet for Staff

This study is currently being undertaken within Community Mental Health services in Camden and Islington. Please take time to read the following information.

What is the purpose of the study?

This study will look at the relationship between cognitive functioning (for example memory, attention, and general thinking and reasoning) and ability to function independently in the community in people with a diagnosis of schizophrenia or schizoaffective disorder.

People with these diagnoses often have difficulty remembering things, concentrating, following conversations and thinking clearly. These difficulties can affect a person's quality of life and can make it difficult to carry out tasks such as cooking, shopping and managing money.

This study has been reviewed by the Camden and Islington Community Health Services NHS Trust Local Research Ethics Committee.

Who will take part in this study?

The aim is to interview 40 service users of Community Mental Health services.

Participants suitable for the study will fill the following criteria:

- Participants will have a diagnosis of schizophrenia or schizoaffective disorder but will be in a period of clinical stability.
- They may be inpatients if their mental state at the time of interview is sufficiently stable, otherwise they will be living in the community.
- Participants will have at least a basic level of spoken English.

Anyone known by staff to be actively using illicit drugs on a regular basis over the month prior to interview would not be suitable.

What will participants have to do?

There will be one interview which will last about 50 minutes. This will involve participants completing a brief cognitive assessment of memory and attention, and also answering some questions about their current symptoms, similar to a psychiatric interview. Participants (ie patients) will each receive £10 for their time.

What are the benefits of taking part for participants?

The study will give clinicians a way of quickly and simply assessing difficulties people have with their memory, attention, and thinking. If participants wish, they and their care co-ordinators will be informed of their results on the cognitive assessment. This is potentially useful clinical information and can be helpful in picking up on whether there are particular areas of difficulty and how participants can be helped with them.

If you wish, you will be sent a summary of the general findings when the study has been completed.

What will staff have to do?

Staff will be asked to identify any service users who they believe fit the criteria described above for participation in the study. If they are the keyworker for any service user who agrees to participate in the study, they will also be requested to complete a brief questionnaire of that individuals functioning in the community. This questionnaire is called the Multnomah Community Ability Scale (MCAS) and involves the keyworker rating the individual on a number of aspects of social and community functioning.

What will happen to the results of the research study?

It is anticipated that the results of the study will be published in a scientific journal.

Contact for Further Information

If you would like any further information please contact Jo Crockett, Trainee Clinical Psychologist, on 07*** ***. She will discuss with you any questions you may have.

Thank you for reading this. Your support is very much appreciated!

Appendix 2 – Patient Information Sheet



Sub-Department of Clinical Health Psychology
UNIVERSITY COLLEGE LONDON
GOWER STREET LONDON WC1E 6BT

Assessing Memory, Attention and Thinking Skills in People With Mental Health Problems.

You are being invited to take part in a research study. Before you decide whether to take part or not it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and ask if there is anything that is not clear or if you would like more information. Thank you for reading this.

What is the purpose of the study?

People who have mental health problems often have difficulty remembering things, concentrating, following conversations and thinking clearly. These difficulties can affect a person's quality of life and can make it difficult to carry out tasks such as cooking, shopping and managing money.

This study will look at how these difficulties with memory and thinking can be assessed in a quick and simple way. It will also look at how these difficulties are related to people's ability to cope with living in the community.

Why have I been asked to take part?

You have been asked to take part because you are a service user of Community Mental Health Services. You have also had some mental health difficulties which doctors think might have affected your memory or concentration. This study will involve talking to about 40 service users who all have similar difficulties to you.

Do I have to take part?

It is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form. If you decide to take part you are still free to withdraw at any time and without giving a reason. A decision to withdraw at any time, or a decision not to take part, will not affect the standard of care you receive.

What do I have to do?

There will be one interview which will last about 50 to 60 minutes. You will be asked about what sort of symptoms you have been experiencing over the previous month and how you have been feeling. You will also be asked to do a simple memory test and a couple of word puzzles. I will ask your care co-

ordinator to answer some questions about your ability to function in the community and what sorts of things you find easy and difficult in day to day life. If you decide to take part, you will be paid £10 for your time.

What are the possible disadvantages and risks of taking part?

There are no risks of taking part. The interview will take no more than 50 to 60 minutes of your time.

What are the possible benefits of taking part?

The information we get from this study will give us more understanding about why some people with mental health problems find some parts of day to day life in the community difficult to manage.

The study will give us a way of quickly and simply assessing difficulties people have with their memory, attention, and thinking. If you wish, you can find out your results. This might be helpful in picking up on whether you are having any difficulties in any of these areas and how you can be helped with them. If you wish, you will also be sent a summary of the findings when the study has been completed.

Will my taking part in this study be kept confidential?

All information which is collected about you during the course of the research will be kept strictly confidential. Staff will not have access to the information which is gathered, not even your care co-ordinator, unless you would like them to. All information will have your name and address removed so that you cannot be recognised from it.

What will happen to the results of the research study?

The results of the study may be published in a scientific journal. You will not be identified in any report or publication however.

Who has reviewed the study?

This study has been reviewed and passed by the Camden and Islington Community Health Services NHS Trust Local Research Ethics Committee.

What if I want to make a complaint?

If you wish to complain, or have any concerns about any aspect of the way you have been approached or treated during the course of this study, the normal National Health Service complaints mechanisms are available to you.

Contact for Further Information

If you would like any further information please contact Jo Crockett on 07***
*** ***. Jo is a Trainee Clinical Psychologist based at University College London. She will be pleased to answer any questions you may have.



29 July 2004

Miss Joanna Crockett
Trainee Clinical Psychologist
Sub-Department Clinical Health Psychology
University College London

Dear Miss Crockett,

Full title of study: *An Evaluation of the Ecological Validity and Utility of a Brief Cognitive Assessment in Schizophrenia.*
REC reference number: 04/Q0511/3
Protocol number: 1

Thank you for your letter of 28 July 2004, responding to the Committee's request for further information on the above research.

The further information has been considered on behalf of the Committee by the Chair and Dr

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation.

The favourable opinion applies to the following research site:

Site: Camden and Islington Mental Health and Social Care Trust.

Principal Investigator: Miss Joanna Crockett

Conditions of approval

The favourable opinion is given provided that you comply with the conditions set out in the attached document. You are advised to study the conditions carefully.

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

Document Type: Application
Version: 1
Dated: 13/04/2004
Date Received: 13/04/2004

Document Type: Investigator CV
Version: 1
Dated: 13/04/2004
Date Received: 13/04/2004

Document Type: Protocol
Version: 1
Dated: 31/03/2004
Date Received: 13/04/2004

Document Type: Covering Letter
Version:
Dated: 13/04/2004
Date Received: 13/04/2004

Document Type: Participant Information Sheet
Version: 1
Dated: 13/04/2004
Date Received: 13/04/2004

Document Type: Participant Information Sheet
Version: 3
Dated: 28/07/2004
Date Received: 28/07/2004

Document Type: Participant Consent Form
Version: 1
Dated: 13/04/2004
Date Received: 13/04/2004

Document Type: Response to Request for Further Information
Version:
Dated: 28/07/2004
Date Received: 28/07/2004

Document Type: Response to Request for Further Information
Version:
Dated: 23/06/2004
Date Received: 23/06/2004

Document Type: Other
Version:
Dated: 13/04/2004
Date Received: 13/04/2004

Management approval

The study may not commence until final management approval has been confirmed by the organisation hosting the research.

All researchers and research collaborators who will be participating in the research must obtain management approval from the relevant host organisation before commencing any research procedures. Where a substantive contract is not held with the host organisation, it may be necessary for an honorary contract to be issued before approval for the research can be given.

Notification of other bodies

We shall notify the North Central London Research Consortium (R&D) that the study has a favourable ethical opinion.

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

REC reference number: 04/Q0511/3 Please quote this number on all correspondence

Yours sincerely,

Chair

Enclosures

Standard approval conditions

Appendix 4 – Participant Consent Form



Sub-Department of Clinical Health Psychology
UNIVERSITY COLLEGE LONDON
GOWER STREET LONDON WC1E 6BT

Patient Identification Number:.....

CONSENT FORM

**Assessing Memory, Attention and Thinking Skills
in People With Mental Health Problems.**

Name of Researcher: Jo Crockett

Please initial box

- 1. I confirm that I have read and understand the information sheet for the above study and have had the opportunity to ask questions.
- 2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my medical care or legal rights being affected.
- 3. I understand that sections of my medical notes may be looked at by responsible individuals. I give permission for these individuals to have access to my records.
- 4. I agree to take part in the above study.

Name of Patient

Date

Signature

Researcher

Date

Signature

9. Do you drink alcohol? (Do you use recreational drugs?)

What are your drinking habits like? How much and how often do you drink?

In the past two weeks: - has your drinking caused problems for you?

- has anyone objected to your drinking?

Abuse -have you missed work or an important engagement because you were drunk or hungover?

- have you drunk in a situation in which it might be dangerous?

- has your drinking got you in trouble with the law?

- has your drinking caused problems with family members, friends or people at work?

Dependence – have you found that you end up drinking more than you were planning to?

- have you tried to cut down or stop drinking alcohol?

- have you spent a lot of time being drunk or hung over?

- have you had any withdrawal symptoms when you have cut down or stopped drinking, like: sweating, a racing heart, hand shakes, trouble sleeping, nausea or vomiting, feeling agitated etc

No.	Category	Substance	Abstinence	Use without impairment	Abuse	Dependence
9.	Substance Abuse	Alcohol Cannabis Amphetamines Cocaine Crack Opiates LSD, Mushrooms Ecstasy Barbiturates Benzodiazepines Solvents & Gases				

No.	Category	Question	Response
10.	Community Status	Where are you living at the moment? Who lives with you?	Community – alone <input type="checkbox"/> Community – not alone <input type="checkbox"/> (with:.....) Hostel <input type="checkbox"/> Rehabilitation ward <input type="checkbox"/> Other..... <input type="checkbox"/>

From Notes (Not from Interview)

		Type	Name	Dose
11.	Medication	Atypical antipsychotics	.....	..... Mg
			.....	..... Mg
		Conventional Neuroleptics	.....	..... Mg
			.....	..... Mg
		Anticholinergic Agents	.....	..... Mg
			.....	..... Mg
		Mood Stabilisers	.....	..... Mg
			.....	..... Mg
		Anti-depressants	.....	..... Mg
			.....	..... Mg
		Anxiolytics	.....	..... Mg
			.....	..... Mg
		Sedatives	.....	..... Mg
			.....	..... Mg

Appendix 6 – Guidelines for Administering the BCA

a) Trail Making Test Administration

Sample A “On this page (point) are some numbers. Begin at number 1 (point to 1) and draw a line from 1 to 2 (point to 2), 2 to 3 (point to 3), 3 to 4 (point to 4), and so on, in order, until you reach the end (point to the circle marked ‘end’). Draw the lines as fast as you can. Ready! Begin!”

If sample is completed correctly, say: “Good! Let’s try the next one”

Trail A “On this page are numbers from 1 to 25. Do this the same way. Begin at number 1 (Point to 1) and draw a line from 1 to 2 (point to 2), 2 to 3 (point to 3), 3 to 4 (point to 4), and so on, in order, until you reach the end (point to the circle marked ‘end’). If you make a mistake, don’t worry. Just go back and correct it and then carry on. Remember, work as fast as you can. Ready? Begin!”

When completed, say: “That’s fine. Now we’ll try another one”

Sample B “On this page are some numbers and some letters. Begin at number 1 (point) and draw a line from 1 to A (point), A to 2 (point to 2), 2 to B (point to B), B to 3 (point to 3), 3 to C (point to C) and so on, in order, until you reach the end (point to circle marked ‘end’). Remember, first you have a number (point to 1), then a letter (point to A), then a number (point to 2), then a letter (point to B), and so on. Draw the lines as fast as you can. Ready? Begin!”

If sample is completed correctly, say: “Good! Let’s try the next one”

Trail B “On this page are both letters and numbers. Do this the same way. Begin at number 1 (point) and draw a line from 1 to A (point to A), A to 2 (point to 2), 2 to B (point to B), B to 3 (point to 3), 3 to C (point to C), and so on, in order, until you reach the end (point to circle marker ‘end’). Remember, first you have a number (point to 1), then a letter (point to A), then a number (point to 2), then a letter (point to B), and so on. Do not skip any, but go from one circle to the next in the proper order. If you make a mistake, don’t worry. Just go back and correct it and then carry on. Draw the lines as fast as you can. Ready? Begin!”

NB **On both trails, if the participant makes an error, call it to his attention immediately and have him proceed from the point the mistake occurred. Do not stop timing.**

b) Verbal Fluency Administration

“Next I am going to tell you a letter and I would like you to tell me as many words as you can think of that begin with this letter. The words must be different from each other though and cannot have the same beginning. For example if I give you the letter D you cannot say dance, dancer, dancing, danced. Do you understand?”

“Please tell me as many words as you can think of beginning with the letter F....A....S.”

“Now I would like you to tell me as many different types of animal that you can think of.”

c) Hopkins Verbal Learning Test Administration

Trial 1 “I am going to read a list of words to you. Listen carefully, because when I’m through, I’d like you to tell me as many of the words as you can remember. You can tell them to me in any order. Are you ready?”

- Repeat or paraphrase the instructions if necessary.
- Read the words at the rate of approximately one word every 2 seconds.
- If the individual does not spontaneously begin reporting words after the last word is read, say the following:

“Okay. Now tell me as many of those words as you can remember.”

Record the responses verbatim (including repetitions and intrusions) in the Trial 1 column. When the individual indicates no more words can be recalled, proceed to Trial 2.

Trial 2 “ Now we are going to try it again. I am going to read the same list of words to you. Listen carefully, and tell me as many of the words as you can remember, in any order, including all the words you told me the first time.”

Use the same procedure as in Trial 1 to record the responses in the column for Trial 2. Then proceed to Trial 3.

Trial 3 “ I am going to read the list one more time. As before I’d like you to tell me as many of the words as you can remember, in any order, including all the words you’ve already told me.”

Record the responses in the column for Trial 3 using the same procedure as in the previous trials.

Appendix 7 – BCA Record Sheet

Patient ID:.....

Date of Interview:.....

Time started:.....

a) Trails A – Time.....mins.....secs

Trails B – Time.....mins.....secs

b) Verbal Fluency

F.....
.....
.....
.....
.....**Total:**.....

A.....
.....
.....
.....
.....**Total:**.....

S.....
.....
.....
.....
.....**Total:**.....

Animals.....
.....
.....
.....
.....**Total:**.....

c) Hopkins Verbal Learning Test

WORD LIST	Trial 1	Trial 2	Trial 3
LION			
EMERALD			
HORSE			
TENT			
SAPPHIRE			
HOTEL			
CAVE			
OPAL			
TIGER			
PEARL			
COW			
HUT			
Total correct responses:			

Time finished:.....

Appendix 8 – Guidelines for Quick Test Administration (Ammons & Ammons, 1958)

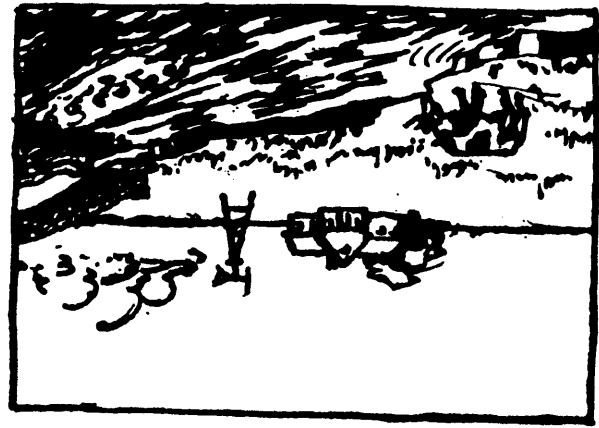
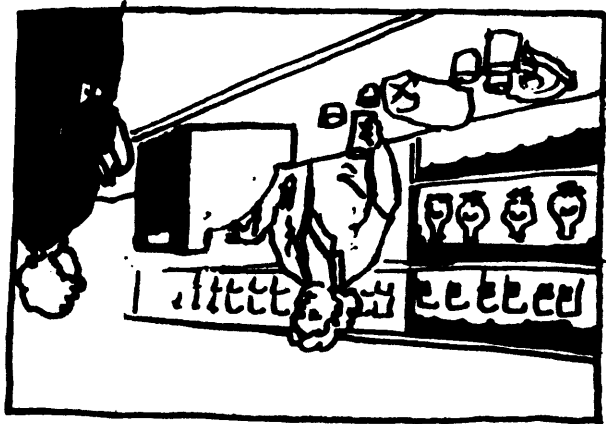
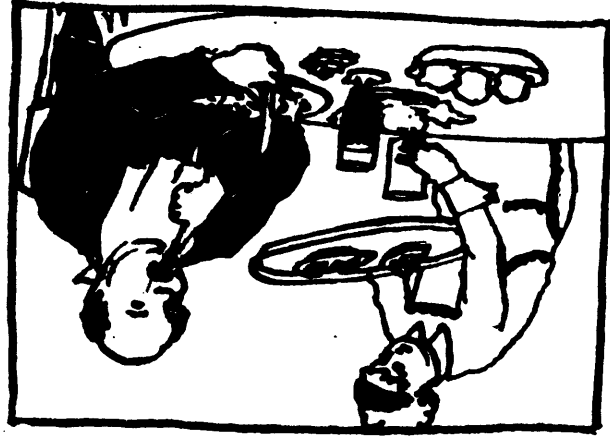
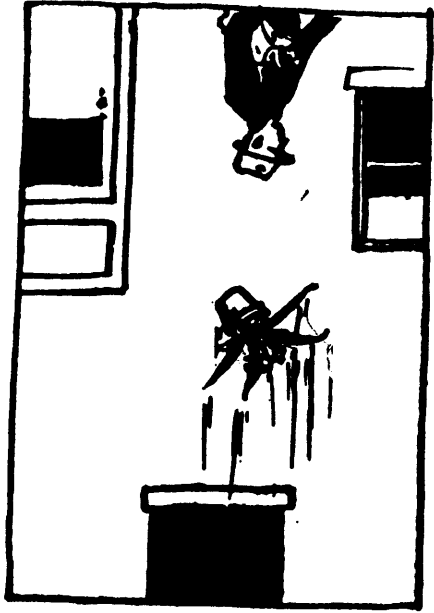
Materials required: 1 x Picture Sheet (Form 2)
1 x Word List Sheet
1 x Record Sheet

“I’m going to show you some pictures, and say some words. When I say a word, show me which of the pictures best fits it. Show me _____”

Give several easy words, making sure the participant understands to point. Then give a hard word. When the participant can’t point with confidence, say

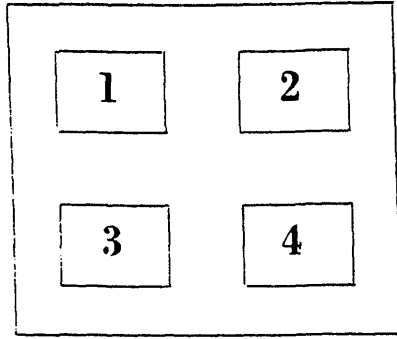
“Some of these words are going to be rather hard. Just say ‘Don’t know’ when you get one you don’t know. Then we can go ahead.”

Give another hard word to make sure that the participant understands to say ‘Don’t know’. Start at appropriate point on the list and work downwards until there have been 6 consecutive fails.



1	2	3
belt dancing traffic whistle fence	cans chewing falling dinner cow	sheet exercise machine burners audience
drink wreck music medicine gun	groceries hat sitting country danger	dish drying food fork crowd
pepper racing salt woman sugar	plate river tasting shelves sky	slice washing tears fighting kitchen
track school partner couples rail	table carelessness manners adding injury	tasty windy pitiful contest sorrow
respectful betting daring stadium pedestrian	merchandise waitress horizon retail irrigation	loser heartbreak struggle rotary opponents
graceful fluid solution discipline bleachers	unaware current fertile descending spacious	grief utensils lever portion edible
crystallized turntable saccharin immature cordiality	proprietor inattentive indulging precipitation freshet	exhibition soothed caress combatant forlorn
velocity decisive laceration foliage imperative	transom consumption aquatic perilous terrain	nutrient solace pacify contorted jets
intimacy concoction conviviality chevrons condiment	imminent foresight condensation satiation visceral	doleful tines disconsolate sustenance maudlin
cacophony miscible imbibe amicable pungent	bovine replete prehension ingress celerity	gustatory poignant bellicose comestible despondency

Top of Card



Answer Alternatives
(key to left of items)

QT

Name: _____ Age: _____ Sex: M F Date: _____ Tester: _____

Form: 1 2 3 4

PERFORMANCE: Raw Score: _____ : Raw Score
 MA: _____ : MA
 IQ: _____ : IQ
 Percentile: _____ : Percentile

NOTES: _____

FORM 1	FORM 2	FORM 3
1 belt (easy)	2 cans (easy)	2 sheet (easy)
1 dancing (easy)	3 chewing (easy)	1 exercise (easy)
1 traffic (easy)	4 falling (easy)	2 machine (easy)
1 whistle (easy)	3 dinner (easy)	4 burners (easy)
1 fence (easy) 5	1 cow (easy)	5 1 audience (easy)
2 drink (easy)	2 groceries (easy)	3 dish (easy)
3 wreck (easy)	4 hat (easy)	2 drying (easy)
1 music (easy)	3 sitting (easy)	3 food (easy)
2 medicine (easy)	1 country (easy)	3 fork (easy)
1 gun (easy) 10	4 danger (easy)	10 1 crowd (easy)
2 pepper (easy)	3 plate (easy)	3 slice (easy)
3 racing (easy)	1 river (easy)	2 washing (easy)
2 salt (easy)	3 tasting (easy)	4 tears (easy)
1 woman (easy)	2 shelves (easy)	1 fighting (easy)
2 sugar (easy) 15	1 sky (easy)	15 4 kitchen (easy)
3 track (easy)	3 table (easy)	3 tasty (easy)
4 school (6)	4 carelessness (6)	2 windy (6)
1 partner (6)	3 manners (6)	4 pitiful (6)
1 couples (7)	2 adding (7)	1 contest (7)
3 rail (7) 20	4 injury (7)	20 4 sorrow (8)
4 respectful (8)	2 merchandise (8)	1 loser (7)
3 betting (8)	3 waitress (8)	4 heartbreak (8)
3 daring (9)	1 horizon (9)	1 struggle (9)
3 stadium (9)	2 retail (9)	2 rotary (10)
4 pedestrian (10) 25	1 irrigation (10)	25 1 opponents (9)
1 graceful (10)	4 unaware (10)	4 grief (10)
2 fluid (11)	1 current (11)	3 utensils (11)
2 solution (11)	1 fertile (11)	2 lever (11)
4 discipline (12)	4 descending (12)	3 portion (12)
3 bleachers (12) 30	1 spacious (12)	30 3 edible (12)
2 crystallized (13)	2 proprietor (13)	1 exhibition (13)
1 turntable (13)	4 inattentive (13)	4 soothed (13)
2 saccharin (14)	3 indulging (14)	4 caress (14)
4 immature (14)	1 precipitation (14)	1 combatant (14)
1 cordiality (15) 35	1 fresher (15)	35 4 forlorn (15)
1 velocity (15)	4 transom (15)	3 nutrient (15)
1 decisive (16)	3 consumption (16)	4 solace (16)
1 laceration (16)	1 aquatic (16)	1 pacify (16)
1 foliage (17)	4 perilous (17)	1 contorted (17)
1 imperative (17) 40	1 terrain (17)	40 4 jets (17)
1 intimacy (18)	4 imminent (18)	4 doleful (18)
2 concoction (18)	2 foresight (18)	3 tines (18+)
1 conviviality (18+)	1 condensation (18+)	4 disconsolate (18)
1 chevrons (18+)	3 satiation (hard)	3 sustenance (18+)
1 condiment (hard) 45	3 visceral (hard)	45 4 maudlin (hard)
1 cacophony (hard)	1 bovine (18+)	3 gustatory (hard)
1 miscible (hard)	3 replete (hard)	4 poignant (hard)
1 imbibe (hard)	3 prehension (hard)	1 bellicose (hard)
1 amicable (hard)	4 ingress (hard)	3 comestible (hard)
1 pungent (hard) 50	3 celerity (hard)	50 4 dependency (hard)

core _____

Appendix 9 - Theory of Mind Stories and Pictures (from Story 2)(Frith & Corcoran, 1996)

First order false belief

John has five cigarettes left in his packet. He puts his packet on the table and goes out of the room. Meanwhile, Janet comes in and takes one of John's cigarettes and leaves the room without John knowing.

ToM Question – When John comes back for his cigarettes, how many does he think he has left?.....

Memory Question–How many cigarettes are really left in John's packet?.....

First order deception - prediction

Mary has a box of chocolates which she puts in her top drawer for safe keeping. A few minutes later Burglar Bill comes in and asks Mary, 'Where are your chocolates, in the top or the bottom drawer?' Mary doesn't want Bill to find her chocolates.

ToM Question – In which drawer does Mary say her chocolates are, the bottom or the top?.....

Why?.....

Memory Question – Where are her chocolates really?.....

Second order false belief

Sally and Ian are at the station because Sally has to catch a train home. Sally lives in Homesville but the train does not stop at Homesville station. Sally will have to get off at Neartown and walk. Sally goes to buy a magazine to read on her journey before she buys her ticket. While she is gone there is an alteration to the timetable and the train is now going to stop at Homesville. The guard tells Ian about this change and Ian sets off to find Sally to tell her but before Ian finds her, the guard meets Sally and tells her, 'the train will now stop at Homesville'. Ian eventually finds Sally who has bought her ticket.

ToM Question – Which station does Ian think that Sally has bought her ticket for?.....

Memory Question – Where has Sally really bought her ticket for?.....

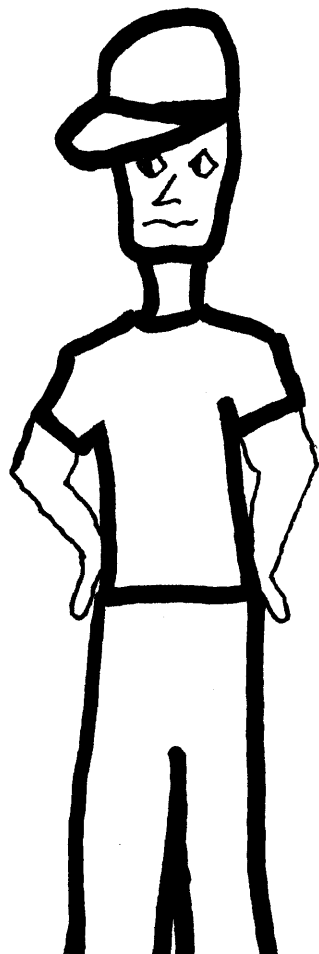
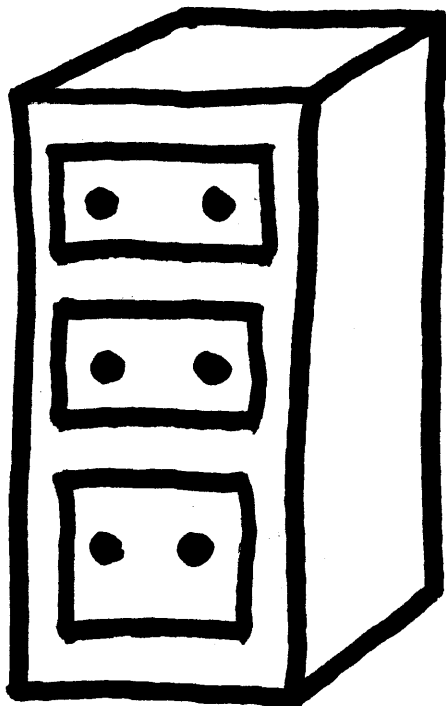
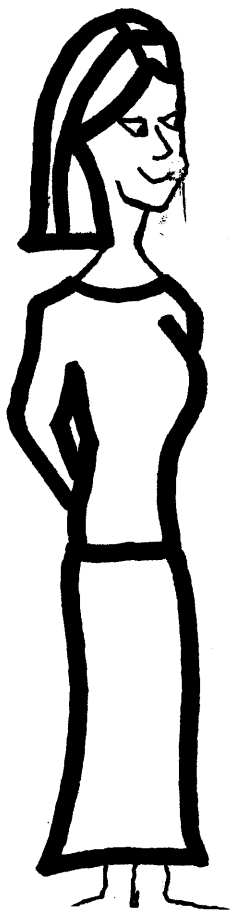
Second order deception – prediction

Burglar Bill has just robbed a bank and is running away from the police when he meets his brother Bob. Bill says to Bob, 'Don't let the police find me, don't let them find me!' then he runs off and hides in the churchyard. The police have looked everywhere for Bill except the churchyard and the park. When they come across Bob they were going to ask him, 'Where is Bill, is he in the park or the churchyard?' But the police recognise Bob and they realise that he will try to save his brother. They expect him to lie and so wherever he tells them, they will go and look in the other place. But Bob who is very clever and does want to save his brother knows that the police don't trust him.

ToM Question - Where will Bob tell the police to look for Bill, in the churchyard or in the park?.....

Why?.....

Memory Question – Where is Bill really hiding?.....



Appendix 10 – Brief Psychiatric Rating Scale (Ventura, Green, Shaner & Liberman, 1993).

Instructions: This form consists of 24 symptom constructs, each to be rated in a 7-point scale of severity ranging from 'not present' to 'extremely severe'. If a specific symptom is not rated, mark 'NA' (not assessed). Circle the number headed by the term that best describes the patient's present condition.

1	2	3	4	5	6	7
not present	very mild	mild	moderate	moderately severe	severe	extremely severe

1 Somatic concern	NA	1	2	3	4	5	6	7
2 Anxiety	NA	1	2	3	4	5	6	7
3 Depression	NA	1	2	3	4	5	6	7
4 Suicidality	NA	1	2	3	4	5	6	7
5 Guilt	NA	1	2	3	4	5	6	7
6 Hostility	NA	1	2	3	4	5	6	7
7 Elated Mood	NA	1	2	3	4	5	6	7
8 Grandiosity	NA	1	2	3	4	5	6	7
9 Suspiciousness	NA	1	2	3	4	5	6	7
10 Hallucinations	NA	1	2	3	4	5	6	7
11 Unusual thought content	NA	1	2	3	4	5	6	7
12 Bizarre behaviour	NA	1	2	3	4	5	6	7
13 Self-neglect	NA	1	2	3	4	5	6	7
14 Disorientation	NA	1	2	3	4	5	6	7
15 Conceptual disorganisation	NA	1	2	3	4	5	6	7
16 Blunted affect	NA	1	2	3	4	5	6	7
17 Emotional withdrawal	NA	1	2	3	4	5	6	7
18 Motor retardation	NA	1	2	3	4	5	6	7
19 Tension	NA	1	2	3	4	5	6	7
20 Uncooperativeness	NA	1	2	3	4	5	6	7
21 Excitement	NA	1	2	3	4	5	6	7
22 Distractibility	NA	1	2	3	4	5	6	7
23 Motor hyperactivity	NA	1	2	3	4	5	6	7
24 Mannerisms and posturing	NA	1	2	3	4	5	6	7

Appendix 11 – Multnomah Community Ability Scale (MCAS) (Barker, Barron, McFarland & Bigelow, 1994)

Client Name:.....

Rater:.....

Date:.....

Instructions: Circle the appropriate number for each question which best corresponds with the clients functioning over the past 2 weeks.

1. Physical Health

How impaired is the client by his/her physical health status?

NOTE: Impairment may be from chronic health problems and/or frequency and severity of acute illnesses. Many chronically mentally ill clients are scored 5 because their disability is psychiatric and not physical. Remember that a health condition is not the same as a health impairment. Some examples are that a controlled seizure condition would be scored 4 and a poorly controlled or uncontrolled seizure condition would be scored at less than 4, depending on the severity and lack of control. Think about how the condition affects functioning on a day-to-day basis.

1=Extreme health impairment(Major medical problem that precludes participation in most daily activities)

2 = Marked health impairment (Major medical problem that interferes with most of client's activities, e.g., multiple sclerosis that requires use of walker)

3 = Moderate health impairment (Medical problem that interferes some with client's activities, e.g., an uncontrolled seizure condition)

4 = Slight health impairment (e.g., Controlled seizure condition or recent tooth abscess)

5 = No health impairment

CUE TO RATERS: A rating of 2 is limited to a person who has a pervasive health problem, e.g., walks with a walker, constant breathing problems, etc.

2. Intellectual Functioning

What is the client's level of general intellectual functioning?

NOTE: Low intellectual functioning may be due to a variety of reasons. It should be distinguished from impaired cognitive processes due to psychotic symptoms, which are covered in later questions. In the absence of tested intelligence, estimate the level of intellectual functioning from your observation of their reading and other cognitive abilities.

1 = IQ < 60 Extremely low intellectual functioning (Not literate)

2 = IQ in the 60's Moderately low intellectual functioning (Mild mental retardation or has literacy problems or major deficits in orientation)

3 = IQ in the 70's Low intellectual functioning (Borderline intellectual functioning; very limited conceptual thinking; 2 or more deficits in orientation)

4 = IQ in the 80's Slightly low intellectual functioning (Low average I.Q.; mild deficits in orientation)

5 = IQ in the 90's & above Normal or above level of intellectual functioning (Well oriented)

Basis for rating: Consider client's vocabulary and conceptual thinking. Consider client's general intellectual skills, apart from psychotic symptoms or thought disorder.

3. Thought Processes / Psychosis

How impaired are the client's thought processes as evidenced by such symptoms as hallucinations, delusions, tangentiality, loose associations, response latencies, ambivalence, incoherence, etc.?

NOTE: Consider the client's ability at the current or most recent time. If the client has changed within the time period rated, use the most recent condition.

1 = Extremely impaired thought processes (*Speech word salad or inability to focus on anything but psychotic ideas*)

2 = Markedly impaired thought processes (*Speech which is difficult to follow or preoccupation with psychotic ideas*)

3 = Moderately impaired thought processes (*Hallucinations, delusions, or disorganization which interfere with functioning some of the time*)

4 = Slightly impaired thought processes (*Mild hallucinations, disorganized thinking or occasional delusional thinking*)

5 = No impairment, normal thought processes

CUE TO RATERS: Reserve a rating of 2 for a person who is absorbed by psychotic ideas.

4. Mood Abnormality

How abnormal is the client's mood as evidenced by such symptoms as constricted mood, extreme mood swings, depression, rage, mania, etc.?

NOTE: Abnormality in this area may include any of the following: range of moods, level of mood, and/or appropriateness of mood.

1 = Extremely abnormal mood (*Despondence or uncontrolled mania or rage*)

2 = Markedly abnormal mood (*Mania or marked irritability or severe depression*)

3 = Moderately abnormal mood (*Moderate depression or marked blunted affect or significant irritability or passive suicidal ideation*)

4 = Slightly abnormal mood (*Mild depression or mild blunted affect or mild irritability*)

5 = No impairment, normal mood

CUE TO RATERS: If the person has any passive suicidal ideation (e.g., the person wishes they were dead sometimes), consider a rating of 3.

5. Response to Stress and Anxiety

How impaired is the client by inappropriate and/or dysfunctional responses to stress and anxiety?

NOTE: Impairment could be due to inappropriate responses to stressful events (e.g., extreme responses, or no response to events that should be of concern) and/or difficulty in handling anxiety as evidenced by agitation, perseveration, inability to problem-solve, etc. A client may become hostile or aggressive, self-destructive, antisocial, or have other outward manifestations or poor coping. A client may also withdraw or actively isolate him/herself.

If client is in an intensive residential program (>16 hrs/day), rating should be 3 or less.

1 = Extremely impaired response (*Extreme reactivity to stressors, from acting out to paralysis, resulting in the inability to adapt*)

2 = Markedly impaired response (*Marked reactivity; very limited problem solving in response to stress; need for large amount of support and intervention from others; daily panic attacks or severe anxiety*)

3 = Moderately impaired response (*Moderately reactive to stress; needs assistance in order to cope*)

4 = Slightly impaired response (*Somewhat reactive to stress, has some coping skills, responsive to limited intervention*)

5 = Normal response

CUE TO RATERS: *If the person has severe anxiety such as daily panic attacks, consider a rating of 2.*

6. Ability to Manage Money

How successfully does the client manage his/her money and control expenditures?

NOTE: If there is no indication that the client has any trouble managing money, assume that she/he manages it successfully. If the client only manages a slight amount of money because most of it is managed by someone else, rate below 3. Rate what clients ARE doing, not what they MIGHT do if they had a chance. If a client is not managing money, she/he cannot be scored higher than a 1 or 2. If they have a bank account and if they pay their own bills this would indicate a rating of 4 or 5 depending on their need for assistance.

1 = Almost never manages money successfully (*Only manages pocket money*)

2 = Seldom manages money successfully (*Only manages money which is handed out daily*)

3 = Sometimes manages money successfully (*Money doled out weekly by supervised housing or family; can buy food, cigarettes and manage that money ok; or manages money on own, but with difficulty*)

4 = Manages money successfully a fair amount of the time (*Does more than a rating of 3 - i.e., pays for rent, treatment or other bills by self - or manages all monthly bills with assistance*)

5 = Almost always manages money successfully (*Generally independent in managing money*)

7. Independence in Daily Living

How well does the client perform independently in day-to-day living?

NOTE: Performance includes personal hygiene, dressing appropriately, obtaining regular nutrition, and housekeeping. If a client resides in a residential care facility or is hospitalized, the rating would be 3 or less.

1 = Almost never performs independently (*Minimal to no ADLs even with repeated staff interventions*)

2 = Often does not perform independently (*Completes only some ADLs, even with prompts and direction*)

3 = Sometimes performs independently (*Needs consistent prompts for ADLs, but usually does complete most of them*)

4 = Often performs independently (*May need occasional prompts or has difficulty in one area of ADLs*)

5 = Almost always performs independently

CUE TO RATERS: *If the person needs only occasional help and in only one area of 'ADLs' ('Activities of Daily Living'), then consider a rating of 4.*

8. Acceptance of Illness

How well does the client accept (as opposed to deny) his/her psychiatric disability?

NOTE: Some insight into or verbal admission of the client's mental illness is necessary for a high rating. Remember that issues of medication compliance and compliance with treatment are rated in items 14 and 15 and should not be considered in this question.

1 = Almost never accepts disability (*Adamantly denies illness and need for treatment*)

2 = Infrequently accepts disability (*Consistently misunderstands illness or symptoms*)

3 = Sometimes accepts disability (*Some denial evident in attributing problems to external factors or minimizing seriousness or denying specific symptoms*)

4 = Accepts disability a fair amount of the time (*Much of the time acknowledges having an illness and/or some specific symptoms*)

5 = Almost always accepts disability (*Identifies illness and symptoms consistently*)

CUE TO RATERS: *If the person knows his/her diagnosis, can give relevant symptoms, and knows the importance of medications, then consider a rating of 5.*

9. Social Acceptability

In general, what are other people's reactions to the client?

NOTE: Consider this item within the range of the client group instead of the general population. Consider physical appearance, behavior in public situations, and reports from others. If appearance and behavior motivate others to cross to the opposite side of the street, a low rating is required.

1 = Very negative (*Consistently elicits avoidant reaction from others*)

2 = Fairly negative (*Presentation elicits some negative reaction from others*)

3 = Mixed, mildly negative to mildly positive

4 = Fairly positive (*Presentation slightly impaired, but can navigate in public without attracting negative attention*)

5 = Very positive (*No outward appearance of mental illness or impairment*)

Basis for rating: *Client's general countenance and demeanor. This includes grooming and clothing, cleanliness, general attitude. The presence of intrusive behavior; talking or laughing inappropriately; body odor; odd movements or posture would lower the rating on this item.*

Consider these questions of yourself when rating this item:

Would you feel comfortable sitting next to this person on a bus, if you did not know him/her?

How would you respond to him/her, seeing him/her in public, if you did not know him/her?

CUE TO RATERS: *If the person looks grossly "normal," consider a rating of 5.*

10. Social Interest

How frequently does the client initiate social contact or respond to others' initiation of social contact?

NOTE: This item is a measure of frequency of social interest without a judgment of the appropriateness or the quality of social interactions.

1 = Very infrequently (*Almost never participates in social activities; usually avoids available social situations*)

2 = Fairly infrequently (*Limited response to invitation or opportunity for social interaction; does not go on recreation outings; e.g., passive interaction with others when smoking*)

3 = Occasionally (*Sometimes initiates and responds to social activities; e.g., goes on outings with program which are arranged by staff, may have some withdrawal from others*)

4 = Fairly frequently (*Responds consistently and initiates occasionally; e.g., has some social contacts outside of activities which are organized by staff*)

5 = Very frequently (*Ongoing initiation and responses to social interactions; e.g., actively maintains social activities outside of household*)

***** Basis for rating:** Rate the interest the client shows in initiating and/or engaging in social activities with others.

CUES TO RATERS: If the person has some withdrawal from others, consider a rating of 3.

11. Social Effectiveness

How effectively does the client interact with others?

NOTE: "Effectively" refers to how successfully and appropriately the client behaves in social settings, i.e., how well he or she minimizes interpersonal friction, meets personal needs, achieves personal goals in a socially appropriate manner, etc. Behavior, which is aggressive, intrusive, inappropriate, goal-inappropriate, illegal, immoral, or ridiculous, causes this item to be rated low.

1 = Very ineffectively (*Lacking in almost any social skills; inappropriate response to social cues*)

2 = Ineffectively (*Uses only minimal social skills, can not engage in give-and-take of instrumental or social conversations; limited response to social cues*)

3 = Mixed or dubious effectiveness (*Marginal social skills, not always appropriate*)

4 = Effectively (*Is generally able to carry out social interactions with minor deficits, can generally engage in give-and-take conversation with only minor disruption*)

5 = Very effectively (*Social skills are within the normal range*)

Basis for rating: Consider the following when rating this item:

Based on your observation, do you think that the client is able to communicate needs in order to get them met? For example, could they walk into a bank and be able to open a bank account?

Is the client able to engage in simple social conversation? For example, do you think that they could carry on a conversation over a meal or at a social activity?

CUES TO RATERS: Base this rating on your experience of the person's behaviour in your interactions with them. Also consider any clear evidence that the person has provided about interactions with others.

12. Social Network

How extensive is the client's social support network?

NOTE: A support network may consist of interested family, friends, acquaintances, professionals, coworkers, socialization programs, etc. Rate the size of the network, not the social acceptability.

1 = Very limited network (*Nobody*)

2 = Limited network (*Family member or Casemanager*)

3 = Moderately extensive network (*Family member and: a Case Manager or a Friend or a Socialization group*)

4 = Extensive network (*Family member and a Case Manager and: a Friend or a Socialization group*)

5 = Very extensive network (*Most of the above and close friends or a partner with some experience of intimacy*)

CUES TO RATERS: *If the person has a romantic relationship, consider a rating of 5.*

If the person has no contact at all with family, consider a rating of 3.

13. Meaningful Activity

How frequently is the client involved in meaningful activities that are satisfying to him or her?

NOTE: Meaningful activities might include arts and crafts, reading, going to a movie, etc.

1 = Almost never involved (*Does nothing outside of meeting basic needs*)

2 = Seldom involved (*May be involved in some passive activities with little enthusiasm*)

3 = Sometimes involved (*Does passive activities such as listening to music, watching T.V. with some enthusiasm; at day program has only passive involvement or skips groups*)

4 = Often involved (*Has some constructive activities with others which are identified as meaningful; active involvement at day program, may include part-time sheltered work activity at day program*)

5 = Almost always involved (*Consistently involved in an interactive activity like work, school, volunteering outside of a sheltered psychiatric setting*)

CUE TO RATERS: *If the person declines to attend groups at his/her day program, consider a rating of 3.*

14. Medication Compliance

How frequently does the client comply with his/her prescribed medication regimen?

NOTE: This question does not relate to how much those medications help the client.

1 = Almost never complies (*Forced compliance of any medication*)

2 = Infrequently complies (*Does not take medication independently; staff directly monitor self-administration of all medications*)

3 = Sometimes complies (*Takes medication on own, but misses frequently and/or needs periodic checks, monitoring, or help with packing medications*)

4 = Usually complies (*Takes medication perfectly with prompting, or takes medication on their own, but misses occasionally*)

5 = Almost always complies (*Takes medication completely independently and compliantly*)

Basis for rating: *Rate current medication administration arrangements, not what client may be capable of.*

CUE TO RATERS: *If medications are administered directly by staff, or if the person's taking of medications is directly observed by staff, then consider a rating of 2.*

15. Cooperation with Treatment Providers

How frequently does the client cooperate as demonstrated by, for example, keeping appointments, complying with treatment plans, and following through on reasonable requests?

1 = Almost never cooperates (*Does not cooperate at all with treatment plans or keep appts.*)

2 = Infrequently cooperates (*Non-compliant with treatment efforts; does not follow daily schedule, though may keep some appts.*)

3 = Sometimes cooperates (*Follows through some of the time with daily schedule or other treatment activities; is minimally involved in treatment planning*)

4 = Usually cooperates (*Usually keeps doctor's appts. and attends day programs on scheduled days; involved in treatment planning*)

5 = Almost always cooperates (*Rarely misses appointments or scheduled activities, actively engaged in treatment planning/goal setting*)

CUES TO RATERS: *Cooperating refers mostly to keeping doctor's appointments and attending day program on scheduled days. A person should be able to state and have some understanding of their rehabilitation goals in order to receive a rating of 5.*

16. Alcohol / Drug Abuse

How frequently does the client abuse drugs and/or alcohol?

NOTE: "Abuse" means use to the extent that it interferes with functioning. Abuse of drugs includes **illegal street drugs** as well as abuse of **over-the-counter and prescribed medications**.

1 = Frequently abuses (*Drug/alcohol dependence; daily abuse of alcohol or drugs which causes severe impairment of functioning; inability to function in community secondary to alcohol/drug abuse*)

2 = Often abuses (*Recurrent use of alcohol or abuse of drugs which causes significant effect on functioning*)

3 = Sometimes abuses (*Some use of alcohol or abuse of drugs with some effect on functioning*)

4 = Infrequently abuses (*Occasional use of alcohol or abuse of drugs without impairment*)

5 = Almost never abuses (*Abstinence; no use of alcohol or drugs during rating period*)

17. Impulse Control

How frequently does the client exhibit episodes of extreme acting out?

NOTE: "Acting out" refers to such behavior as temper outbursts, spending sprees, aggressive actions, suicidal gestures, inappropriate sexual acts, etc.

1 = Frequently acts out (*Frequent and/or severe acting out behavior, e.g., behaviors which could lead to criminal charges*)

2 = Acts out fairly often (*Impulsive acts which are fairly often and/or of moderate severity*)

3 = Sometimes acts out (*Some acting out behavior; moderate severity; at least one episode of behavior that is dangerous or threatening*)

4 = Infrequently acts out (*Maybe one or two lapses of impulse control; minor acting out, such as attention-seeking behavior which is not threatening or dangerous*)

5 = Almost never acts out (*No noteworthy incidents*)

CUE TO RATERS: *If the person has verbal arguments with others, consider a rating of 4.*

Appendix 12 – Tables for Results of Regressions

Table 1. Multiple regression looking at effects of GCS and BPRS on community functioning

a) Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.509(a)	.259	.208	7.083

a Predictors: (Constant), transformed BPRS score, transformed GCS

b) ANOVA (b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	508.618	2	254.309	5.069	.013(a)
	Residual	1454.850	29	50.167		
	Total	1963.469	31			

a Predictors: (Constant), transformed BPRS score, transformed GCS

b Dependent Variable: total mcas score

c) Coefficients (a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	96.035	10.635		9.030	.000
	Transformed GCS	-4.254	2.092	-.325	-2.034	.051
	Transformed BPRS score	-3.556	1.434	-.396	-2.480	.019

a Dependent Variable: total mcas score

Table 2. Multiple regression looking at effects of IQ and ToM as well as GCS and BPRS on community functioning

a) Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.524(a)	.275	.163	7.348

a Predictors: (Constant), ToM score, transformed BPRS score, transformed GCS, IQ as calculated from the QT

b) ANOVA (b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	531.677	4	132.919	2.462	.070(a)
	Residual	1403.678	26	53.988		
	Total	1935.355	30			

a Predictors: (Constant), ToM score, transformed BPRS score, transformed GCS, IQ as calculated from the QT

b Dependent Variable: total mcas score

c) Coefficients (a)

Model		Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.
		B	Std. Error			
1	(Constant)	104.387	18.380		5.679	.000
	Transformed BPRS score	-3.962	1.566	-.443	-2.529	.018
	IQ as calculated from the QT	-.033	.110	-.065	-.296	.769
	Transformed GCS	-5.056	2.732	-.387	-1.851	.076
	ToM score	-.019	.038	-.097	-.493	.626

a Dependent Variable: total mcas score

Table 3. Multiple regression looking at the effects of ToM, GCS and BPRS on social functioning.

a) Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.281(a)	.079	-.023	3.006

a Predictors: (Constant), ToM score, transformed BPRS score, transformed GCS

b) ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	20.881	3	6.960	.771	.521(a)
	Residual	243.894	27	9.033		
	Total	264.774	30			

a Predictors: (Constant), ToM score, transformed BPRS score, transformed GCS

b Dependent Variable: social acceptability, social interest, social effectiveness, social network + meaningful activity

c) Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.
		B	Std. Error			
1	(Constant)	24.197	5.306		4.560	.000
	Transformed GCS	-.465	.973	-.096	-.477	.637
	Transformed BPRS score	-.847	.632	-.256	-1.339	.192
	ToM score	.001	.015	.019	.094	.926

a Dependent Variable: social acceptability, social interest, social effectiveness, social network + meaningful activity