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Performance on tests sensitive to impaired executive ability in schizophrenia, mania and well controls: acute and subacute phases

John McGrath ^{a,*}, Susan Scheldt ^b, Joy Welham ^a, Anne Clair ^a

^a Queensland Centre for Schizophrenia Research, Wolston Park Hospital, Wacol 4076, Australia

^b Secure Care Services, Wolston Park Hospital, Wacol 4076, Australia

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Abstract

Aims: To compare the performance of schizophrenia, mania and well control groups on tests sensitive to impaired executive ability, and to assess the within-group stability of these measures across the acute and subacute phases of psychoses. *Method:* Recently admitted patients with schizophrenia ($n=36$), mania ($n=18$) and a well control group ($n=20$) were assessed on two occasions separated by 4 weeks. Tests included: the Controlled Oral Word Association Test, the Stroop Test, the Wisconsin Card Sort Test, and the Trail Making Test. *Results:* The two patient groups were significantly impaired on the Stroop Test at both time points compared to the control group. Significant group differences were also found for the Trail Making Test at Time 1 and for the Wisconsin Card Sort Test at Time 2. When controlled for practice effect, significant improvements over time were found on the Stroop and Trail Making tests in the schizophrenia group and on WCST Categories Achieved in the mania group. *Discussion:* Compared to controls, the patient groups were impaired on measures related to executive ability. The pattern of improvement on test scores between the acute and subacute phases differed between patients with schizophrenia versus patients with mania. © 1997 Elsevier Science B.V.

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1. Introduction

The summary term ‘executive ability’ has achieved widespread acceptance in neuropsychology, behavioural neurology and neuropsychiatry. Stuss and Benson (1986, p. 222) have listed key neurocognitive deficits associated with impaired executive ability:

(1) ‘Deficit in the ordering or handling of sequential behaviour.

- (2) Impairment in establishing or changing set.
- (3) Impairment in maintaining a set, particularly in the presence of interference.
- (4) Decreased ability to monitor personal behaviour.
- (5) Dissociation of knowledge from the direction of response.
- (6) Altered attitudes’.

Dysfunction of the prefrontal systems is typically associated with impaired executive ability; however, efficient executive ability requires the dynamic integration (‘orchestration’) of cognitive skills whose neurobiological substrates appear to be

* Corresponding author. Tel: +61 7 3271 8595; Fax: +61 7 3271 8567; e-mail: jjm@brain.wph.uq.edu.au

widely distributed across cortical and subcortical regions.

Patients with schizophrenia have been noted to have impaired performance on tests of executive ability as judged by measures such as the Wisconsin Card Sort Test (WCST), the Trail Making Test (TMT), tests of verbal fluency and the Stroop Test (Goldberg et al., 1989; Levin et al., 1989). Similar deficits have also been described in mania (Morice, 1990; Yurgelun-Todd, 1988). Whether deficits of executive ability are more pronounced than other neurocognitive deficits has been a matter of debate. While there is considerable evidence demonstrating impairments in executive ability, attention and memory in schizophrenia, these patients tend to have impaired performance on most psychometric measures when compared to well controls, and it can be difficult to isolate specific elements as being differentially impaired (Levin et al., 1989; Gold and Harvey, 1993). In part this relates to the sensitivity and specificity of the tests of executive ability (Heinrichs, 1990; Axelrod et al., 1994). Impaired performance on tests related to executive ability can be a direct consequence of an isolated deficit in executive ability, or an indirect manifestation related to more widespread cognitive dysfunction (e.g., impaired attention, global dementia). In other words, poor performance on tests of executive ability does not necessarily indicate an isolated cognitive dysfunction. In this paper the slightly unwieldy phrase 'tests sensitive to impaired executive ability' will be used to indicate this conceptual issue.

Regardless of the specificity of the deficit, clinicians frequently recognise behaviours listed by Stuss and Benson (1986) in their patients. When the general term 'executive ability' is fractionated into behaviours such as poor planning ability, inability to maintain set in the face of distraction, and impaired ability to monitor personal behaviour, the concept takes on considerable clinical utility. With respect to psychiatric rehabilitation, a recent review suggested that executive ability was a good predictor of the level of subsequent community functioning in schizophrenia (Green, 1996).

While there is a large body of literature demon-

strating differential performance on tests sensitive to impaired executive ability in schizophrenia compared to well controls, less data are available on the longitudinal course of this deficit. Determining the 'state versus trait' components of this deficit would be of interest, as perhaps stable trait deficits would be better predictors of potential for rehabilitation than fluctuating state markers. If elements related to executive ability are state-related, charting the trajectory of these cognitive abilities over time would be of interest. The following section briefly reviews literature reporting the longitudinal performance of individuals with schizophrenia on tests sensitive to impaired executive ability. Key elements of the literature are summarised in Table 1.

Seidman et al. (1991) found no significant differences on scores derived from the WCST in 12 patients with schizophrenia who were tested on two occasions separated by variable intervals of between 6 months and 7 years. In the same article, Seidman and colleagues examined the stability of performance on the WCST in a group of 10 patients with schizophrenia after dose reduction of antipsychotic medication. The interval between testing varied between 3 and 15 months (mean 6 months). Once again, there were no significant differences across time. The authors of this study noted that scores for some patients did change over time, suggesting that group averaging may mask heterogeneity in the stability of executive ability.

Addington et al. (1991) examined performance on a range of neuropsychological tests (including measures of executive ability such as the WCST and two word fluency tasks) in a group of 38 patients with schizophrenia who were tested within 1 week of admission and again 6 months later. Neither the WCST Categories Achieved scores nor the WCST Perseverative Error scores showed any significant change over time; however, performance on one of the verbal fluency tasks improved significantly.

Sweeney et al. (1991) presented evidence of improvement on the WCST Categories Achieved and Perseverative Error scores and on the TMT. Verbal fluency showed no change. Their group included 39 patients with schizophrenia tested ini-

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