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Executive functions in adolescents with schizotypal personality disorder

Donald Diforio, Ph.D., Elaine F. Walker, Ph.D. *, Lisa P. Kestler, B.A.

Department of Psychology, Emory University, Atlanta, GA 30322, USA

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Abstract

Adolescents meeting diagnostic criteria for schizotypal personality disorder (SPD) are presumed to be at risk for developing schizophrenia in adulthood, making them an important group for exploring the developmental trajectory of the disease. Deficits in executive functioning have been documented in schizophrenia patients and adults with SPD. The present study examined executive functions in adolescents with SPD. It was predicted that the SPD group would score below comparison groups (normals and adolescents with other disorders) on measures of executive function, and that those with greater 'negative' signs of SPD would show more pronounced performance deficits. Analyses revealed that the performance of the SPD subjects was impaired relative to the other groups on the modified Wisconsin Card Sorting Test (MCST), but not on the Tower of London or the Controlled Oral Word Association Test. Consistent with prediction, regression analyses indicated that MCST deficits were associated with greater negative signs of SPD, but not positive signs. © 2000 Elsevier Science B.V. All rights reserved.

Keywords: Adolescents; Executive functions; Schizotypal personality disorder

1. Introduction

The introduction of schizotypal personality disorder (SPD) as a diagnostic category in DSM-III rapidly led to the study of SPD as a strategy for shedding light on the etiology of schizophrenia. Further, it has been suggested that children and adolescents with SPD can serve as a high-risk group for research on the developmental precursors of schizophrenia. Retrospective studies demonstrate an increased incidence of schizotypal symptoms in the premorbid histories of adult schizophrenia patients (Kendler et al., 1981; Fish, 1987; Schulsinger et al., 1987; Ambleas, 1992). Prospective studies of SPD indicate a poor prognosis, although the rate of eventual schizophrenia has not been established (Nagy and Szatmari, 1986; Wolff, 1991; Stone, 1993).

There is extensive evidence that SPD is part of the schizophrenia spectrum, with both genetic links and similarities in biological and psychological correlates (Siever et al., 1993). For example, youths with SPD show cognitive and biological abnormalities similar to those observed in adult schizophrenia patients. These include formal thought disorder (Caplan et al., 1990a,b), communication deficits (Caplan and Guthrie, 1992), impairments in abstract thinking (Caplan et al., 1990a,b), memory deficits (Bergman et al., 1998; Park and McTigue, 1997), and reduced P300 responses (Erwin et al., 1986).

The hypothesis that frontal lobe dysfunction

* Corresponding author. Tel.: +1-404-727-0761; fax: +1-404-727-0372.

E-mail address: walker@ss.emory.edu (E.F. Walker)

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characterizes schizophrenia spectrum disorders has received considerable support. Several studies have demonstrated increases in ventricular volume among schizophrenia (e.g. Andreasen et al., 1982; Klausner et al., 1992) and SPD patients (Siever et al., 1995) suggestive of a loss of frontal tissue. Neuroimaging studies have also provided direct evidence of structural and functional abnormalities of the frontal lobes in adult schizophrenia patients (e.g. Andreasen et al., 1992, 1994; Cleghorn et al., 1989; Ebmeier et al., 1993; Ingvar and Franzen, 1974; Jernigan et al., 1991; Weinberger et al., 1992; Wolkin et al., 1992; Schroder et al., 1995; Raine et al., 1992a,b) and schizotypal subjects (Raine et al., 1992a,b; Silverman et al., 1992; Buschbaum et al., 1997; Brooks et al., 1998).

Paralleling the findings from neuroimaging studies, numerous investigations have shown that schizophrenia is associated with deficits on neuropsychological measures of frontal or 'executive' functions, especially the Wisconsin Card Sorting Task (WCST), a widely utilized measure of frontal integrity [for review, see Randolph et al. (1993)]. Schizophrenia patients also show deficits on tests of verbal fluency, a function presumed to be subserved by the frontal cortex (Gruezelier et al., 1988; Hoff et al., 1992; Morrison-Stewart et al., 1992). The same holds true for the Tower of London (TOL), a test that taps strategic planning (Goldberg et al., 1990; Andreasen et al., 1992).

Like schizophrenia patients, individuals with SPD also score below normal comparison groups on the WCST (Spaulding et al., 1989; Lyons et al., 1991; Condray and Steinhauer, 1992; Raine et al., 1992a,b; Lenzenweger and Korfine, 1994; Obiols et al., 1997; Suhr, 1997). However, adult SPD subjects do not show performance deficits on some other purported measures of frontal function, such as verbal fluency tests or the TOL (Trestman et al., 1995; Suhr, 1997). Similarly, some studies of adults with SPD have found no evidence of deficits on measures of general cognitive function, despite significant impairment on the WCST (Trestman et al., 1995; Voglmaier et al., 1997). Thus, adults with SPD show less pervasive cognitive deficits than schizophrenia patients. Of course, given that the modal age at onset of schizophrenia is early adulthood, the older the adult with SPD, the lower the risk rate for eventual schizophrenia. For most schizophrenia patients, the developmental course involves a progression from schizotypal signs in adolescence to clinical schizophrenia in early adulthood. Thus, adolescents with SPD may be at greater risk for schizophrenia than adults with SPD.

Among schizophrenia patients, impairment on measures of executive functioning is differentially associated with symptomatology. Ratings of the severity of 'negative' symptoms (e.g. blunted affect and social withdrawal), but not 'positive' symptoms (e.g. hallucinations and delusions) (Andreason and Olsen, 1982), are correlated with structural brain abnormalities (Buchanan et al., 1993; Kemali et al., 1987; Siever et al., 1993; Seidman et al., 1994), 'hypofrontality' (Andreasen et al., 1992; Weinberger et al., 1992, Wolkin et al., 1992; Schroder et al., 1995), and deficits on tests of executive functioning (Bilder et al., 1985; Wagman et al., 1987; Wolkin et al., 1992). To date, we are aware of only one published report addressing the relation between clinical symptoms in SPD subjects and measures of frontal function (Siever et al., 1993). The investigators found that WCST deficits were associated with ratings of physical anhedonia, social deficits and odd speech, but not perceptual aberration or 'psychotic-like' symptoms (e g. magical ideation, ideas of reference, illusions, suspiciousness) in adults with SPD. These above findings suggest that the 'negative' features of schizophrenia-spectrum disorders are the clinical expression of 'frontal' dysfunction (Levin, 1984; Liddle, 1987; Siever et al., 1993).

It has been proposed that a genetic diathesis to a neurodevelopmental 'lesion' of the frontal cortex is involved in both schizophrenia (Weinberger, 1987) and SPD (Siever et al., 1993). More specifically, it has been suggested that the behavioral consequences of this lesion are first apparent during adolescence, when the frontal lobes attain functional maturity, and adult performance levels on measures of executive functioning are achieved (Levin et al., 1991). If this is the case, then the selective relation between frontal function and negative signs should be apparent in adolescence. In the present study, we test this hypothesis by examining the association between clinical symp-

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