



Deficits in memory strategy use are related to verbal memory impairments in adolescents with schizophrenia-spectrum disorders

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Abstract

Objective: To assess the nature of learning and verbal memory deficits in adolescents with schizophrenia-spectrum disorders (SzS) (i.e., schizophrenia, schizoaffective disorder, and schizophreniform disorder).

Method: Sixty patients with SzS (mean age=16.1 years, S.D.=2.2) and 60 age- and gender-matched diagnosis-free healthy volunteers were assessed using the California Verbal Learning Test (CVLT). Planned analyses were conducted to assess the following aspects of memory: span of apprehension, verbal learning, short-term and long-term memory, rate of forgetting, interference, and organizational strategies. Adolescents with schizophrenia (Sz) were compared to those with schizoaffective disorder (SzA). Second, patients' test profiles were compared to those of controls. Relationships between initial learning and overall verbal learning with organizational strategy were explored.

Results: Neurocognitive profiles did not significantly differ between Sz and SzA participants. Patients performed significantly worse than healthy comparison subjects on measures of span of apprehension, verbal learning, short- and long-term memory, and organizational strategies after adjusting for differences in premorbid intelligence. No group differences were found in rate of forgetting or susceptibility to proactive or retroactive interference.

Conclusions: Adolescents with SzS are characterized by significant verbal memory dysfunction similar to what has been observed in adults with first-episode schizophrenia. Deficits in consistency of learning over several trials, as well as a strong

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relationship between semantic organizational strategies and reduced learning capacity, implicate dysfunction of the dorsolateral prefrontal cortex as a contributor to verbal memory deficits in adolescents with SzS.

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1. Introduction

An earlier age at onset of schizophrenia (Sz) has been associated with specific deficits in verbal learning and memory, rather than with global cognitive deficits in adults with Sz (Jetter et al., 1986; Tuulio-Henriksson et al., 2004). In adolescents with childhood-onset (COS) (onset of psychotic symptoms by 13 years) (Kumra et al., 2000) and early-onset schizophrenia (EOS) (onset of psychotic symptoms by age 18 years) (Kenny et al., 1997; McClellan et al., 2004; Oie and Rund, 1999; Rhinewine et al., 2005), verbal memory deficits have been shown to persist after adjusting for group differences in IQ (Kravariti et al., 2003). Longitudinal studies show that deficits in verbal memory are associated with poor functional outcome in both adults with Sz (Green et al., 2004) and in adolescents with schizophrenia-spectrum disorders (SzS; i.e., schizophrenia, schizoaffective disorder, schizophreniform disorder) (Cervellione et al., submitted).

Among adolescents who report psychotic symptoms, a high percentage are observed to have prominent affective symptoms and would be diagnosed as having schizoaffective disorder (SzA) using the DSM-IV TR (McClellan and McCurry, 1999). In a previous report, we included adolescents with SzA in our description of the overall profile of neuropsychological deficits in adolescents with schizophrenia-spectrum disorders and noted deficits in immediate recall and cued recall after a long delay (Rhinewine et al., 2005). In that paper the approach used was to treat SzA as analogous to Sz. This assumption may have been problematic since recently published data have demonstrated verbal memory deficits in adolescents with bipolar disorder (McClure et al., 2005). A considerable literature indicates that the diagnostic boundary between SzA and bipolar disorder is unclear in both adolescents (Werry et al., 1991) and adults (Averill et al., 2004; Blacker and Tsuang, 1992; Martinez-Arán et al., 2000) and that the two illnesses

may share some genetic and pathophysiological underpinnings (Kempf et al., 2005). Thus, it may have been unwarranted to assume that the distinction between SzA and Sz was irrelevant in our previous analyses (Rhinewine et al., 2005) and that the data from these two diagnostic groups could be pooled and interpreted as if the sample were comprised entirely of adolescents with Sz. To address this, in this report, we performed additional analyses to compare verbal learning and memory impairments in adolescents with Sz and adolescents with SzA. This report represents an updated sample of data from patients included in our previously published paper (Rhinewine et al., 2005). We hypothesized that both groups of adolescents with SzS would demonstrate a similar pattern of verbal learning and memory deficits based on the adult literature (Evans et al., 1999).

Second, we further extended our previous analyses (Rhinewine et al., 2005) to more closely examine components of memory that have been linked to frontal (e.g., semantic organization) and temporal lobe function (e.g., recall; proactive and retroactive interference) to provide in-depth characterization of verbal memory deficits in adolescents with SzS relative to previously published data in adults with first-episode Sz (Hill et al., 2004). There is increasing evidence that an early-onset of Sz is associated with a more striking abnormal pattern of selective, severe frontal gray matter loss after the onset of psychosis compared to later-onset Sz (Thompson et al., 2001), including regions thought to subservise verbal memory and learning such as the dorsolateral prefrontal and superior temporal gyri (Ragland et al., 2004). Based on the adult literature, we hypothesized that adolescents with SzS would be less likely than healthy volunteers to use a semantic clustering strategy to support initial and overall verbal learning and that the reliance on a less effective strategy to learn information would be associated with worse learning performance (Brebion et al., 2004; Hill et al., 2004; Paulsen et al., 1995).

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