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Language, motor and speed of processing deficits in adolescents with subclinical psychotic symptoms

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ABSTRACT

Objectives: Neuropsychological impairment is a core feature of schizophrenia. Adolescents reporting subclinical psychotic symptoms are considered to be at greater risk of developing a psychotic illness later in life than adolescents who do not report such symptoms and, thus, may represent an at-risk group for further study. We wished to investigate neuropsychological functioning in early adolescence in relation to reports of psychotic symptoms.
Methods: Participants were recruited from local primary schools after a two-stage screening and parental consent process. In brief, 277 adolescents were screened and 37 attended for testing. Seventeen adolescents who were deemed to report 'definite' psychotic symptoms after clinical interview and 20 control adolescents underwent a clinical interview and a one-hour neuropsychological battery.
Results: Adolescents who report psychotic symptoms exhibited significant impairments in receptive language (as measured by the British Picture Vocabulary Scale), motor function (as measured by the Pegboard test) and executive function/speed of processing (as measured by the Trail-Making test). There were no significant differences between the groups on measures of attention, memory or expressive language, abstract reasoning or overall scholastic ability.
Conclusions: Taken together with the results from birth cohort, genetic high risk and prodromal studies, these findings are consistent with a neural inefficiency/disconnectivity hypothesis in those at risk for psychosis. These results highlight the need to investigate developmental brain circuits subserving language and motor function and processing speed and how these change over time in at-risk adolescents.

1. Introduction

There is evidence that psychosis exists on a continuum in both adult and adolescent samples, but it is not clear whether schizophrenia represents the extreme end of a continuum within the general population or is a qualitatively distinct identity. The dimensional model of schizophrenia assumes that subclinical psychotic symptoms are relatively common in the general population (van Os et al., 2000). A systematic review and meta-analysis of this topic revealed an overall median prevalence rate of 8% for psychotic experiences in the general population (van Os et al., 2009).

The prevalence of subclinical psychotic symptoms among adolescents is about 15% in interview-based cohort studies (Poulton et al., 2000; Horwood et al., 2008) and is even higher when using self-report questionnaires (Laurens et al., 2007;

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Kelleher et al., 2009). The importance of adolescent subclinical psychotic symptoms lies in the possibility that they may index an increased risk of later psychotic illness in adulthood (Poulton et al., 2000; Scott et al., 2009). These individuals have not yet reached the peak age of onset of schizophrenia and are more likely to encompass those individuals who are truly "at risk" than adults who have already passed through the risk period. Children and adolescents with these symptoms could therefore be conceptualised as a 'symptomatic' high-risk group for later psychotic disorder, in the same way as offspring of parents with schizophrenia comprise a 'genetic' high-risk group, and may yield insights into the earliest pathological processes in vulnerability to adult psychosis.

It is well-established that individuals with schizophrenia, as a group, demonstrate significant impairments across a broad range of cognitive domains (Heinrichs and Zakzanis, 1998). These deficits are evident even at the time of the first episode of schizophrenia (Mesholam-Gately et al., 2009) and are likely to have begun even earlier in the course of the disease (Niendam et al., 2003; Cannon et al., 2006). Neuropsychological impairments have also been demonstrated among individuals in the prodrome for psychosis (Niendam et al., 2006; Keefe et al., 2006; Seidman et al., 2006) and among adults with schizotypal traits and subclinical psychotic symptoms (Johns and van Os, 2001; Bergida and Lenzenweger, 2006). Horwood et al. (2008) has shown a relationship between general intellectual functioning and presence of psychotic symptoms in adolescence. However, to our knowledge, this is the first study reporting results from a battery of neuropsychological tests among adolescents with subclinical psychotic symptoms.

2. Materials and methods

2.1. Screening

Ethics committee approval for this study was given by Beaumont Hospital Medical Committee. Five large, mixed-gender, state primary schools from North and West Dublin, agreed to participate in the present study. The screening took place in a two-stage format. The study team visited the pupils in the 2 most senior classes (aged 11–13 years) and gave a short information session about the study and distributed consent forms. Written consent was necessary from the parent for the child to complete the questionnaire. On the form parents were also asked to indicate whether they would like to be contacted about the second stage of the study involving an interview and neuropsychological testing. The study team returned to the school 1 week later to collect the completed forms and administer the questionnaire in the classrooms. For the sake of confidentiality, pupils were asked to complete the questionnaire without allowing anyone else to see their answers but could ask the researcher for clarification of any of the questions that they did not understand.

2.2. Screening instrument

A variety of positive psychotic symptoms were assessed in a brief period of time using the 7-item Adolescent Psychotic-Like Symptom Screener (APSS) (Kelleher et al., 2009). The APSS questionnaire included 4 of the 5 questions used in the Dunedin birth cohort study (Poulton et al., 2000) which were derived from the Diagnostic interview Schedule for Children (Costello et al., 1985). We also included 3 additional questions on visual hallucinations, delusions of control, and grandiosity in order to broaden the types of symptoms assessed. The questionnaire is shown in Table 1.

For each question there were 3 possible responses: "Yes, definitely" (1 point); "Maybe" (0.5 points); "No, never" (0 points). We made an *a priori* decision to rank those with scores of 2 or more as part of an 'at-risk' group for psychotic-type experiences. Individuals with a total score of less than 2 (the potential control group) and those who scored 2 or more (the potential at-risk group) on the questionnaire were invited via a letter sent to their parents to take part in the clinical interview. All parents of the children in the at-risk group were contacted along with a random selection of parents of children in the control group.

2.3. Clinical interview

Subjects were interviewed by a psychiatrist or psychologist trained in the use of the *Schedule for Affective Disorders and Schizophrenia for School-aged Children, Present and Lifetime Versions* (*K-SADS*) (Kaufman et al., 1996) which is a well-validated semi-structured research diagnostic interview for the assessment of all Axis-1 psychiatric disorders in children and adolescents. Full K-SADS interviews were carried out with each adolescent and his/her parent interviewed separately. Interviews involved a detailed assessment of 2–4 h. The psychosis section of the K-SADS assessed both current and past psychotic-type experiences with positive responses prompting detailed questioning and administration of a Psychosis supplement.

Table 1
The 7-item Adolescent Psychotic-Like Symptom Screener (APSS), a self-report questionnaire administered in the class-room to screen for the presence of psychotic symptoms.

Questionnaire items	Yes, definitely	Maybe	No, never
1. Some people believe that their thoughts can be read by another person. Have other people ever read your mind?	□	□	□
2. Have you ever had messages sent *just* to you through TV or radio?	□	□	□
3. Have you ever thought that people are following or spying on you?	□	□	□
4. Have you ever heard voices or sounds that no one else can hear?	□	□	□
5. Have you ever felt you were under the control of some special power?	□	□	□
6. Have you ever seen things that other people could not see?	□	□	□
7. Have you ever felt like you had extra-special powers?	□	□	□