

Perspective-taking deficits in people with schizophrenia spectrum disorders: a prospective investigation

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ABSTRACT

Background. This study examined data from a Danish prospective longitudinal project in attempt to address the state/trait controversy regarding theory of mind deficits in schizophrenia. Deficits in perspective-taking – a component of theory of mind – were investigated prospectively among children who developed schizophrenia spectrum disorders as adults in comparison to children who did not develop schizophrenia spectrum disorders.

Method. A total of 265 high risk and control subjects were studied in 1972. At the time of initial assessment, the Role-Taking Task (RTT) was administered. Two hundred and forty-two of these children were evaluated in 1992 during follow-up examinations. Sixteen developed schizophrenia, 10 developed a schizophrenia spectrum disorder, 70 had outcomes of other psychopathology, and 146 did not develop a mental illness.

Results. Children who later developed schizophrenia or a schizophrenia spectrum disorder had lower RTT scores, controlling for verbal IQ and age, compared to those who did not develop any mental illness. Although in the expected direction, RTT scores for those with schizophrenia spectrum disorders were not significantly different from those who developed a non-psychotic disorder.

Conclusions. Deficits in perspective-taking among children who later developed schizophrenia spectrum disorders suggest that a facet of theory of mind is impaired prior to development of schizophrenia. Our findings lend support to the hypothesis that theory of mind deficits in schizophrenia are trait markers of the disorder.

INTRODUCTION

Researchers conceptualize theory of mind ('ToM') as the ability to predict and explain the behavior of others by inferring their mental states (belief, thoughts, and intentions; Premack & Woodruff, 1978). Baron-Cohen and colleagues (1985) applied this concept to children with autism; later, Frith (1992) applied the con-

cept to people with schizophrenia. Specifically, Frith proposed that representations of mental states might underlie deficits in schizophrenia.

Among other essential skills, accurate ToM depends on the ability to take the perspective of another person (Taylor & Carlson, 1997; Charlop-Christy & Daneshvar, 2003; LeBlanc *et al.* 2003). Studies indicate that patients with schizophrenia have difficulty in perspective-taking as reflected by their poorer performance on ToM tasks when compared to normal controls and subjects with other psychiatric disorders (Frith & Corcoran, 1996; Drury *et al.* 1998).

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State versus trait controversy

Frith contended that ToM deficits in schizophrenia represent a temporary 'state,' rather than a pre-existing 'trait'. In support of his theory, studies by Frith and colleagues found that patients experiencing psychotic symptoms (i.e. in a psychotic 'state') have difficulties performing ToM tasks in comparison to patients who are not currently symptomatic (i.e. in a non-psychotic 'state') (Corcoran *et al.* 1995; Frith & Corcoran, 1996).

In contrast to Frith's theory that ToM difficulties are state dependent, other studies suggest that ToM deficits in schizophrenia are stable traits. Herold *et al.* (2002) reported that people with schizophrenia evidenced ToM deficits not only during psychotic episodes, but also during remission. A study by Langdon & Coltheart (1999) reported that non-clinical subjects high on schizotypal traits performed worse on a ToM sequencing task compared to subjects low on schizotypal traits, providing evidence for an association between ToM deficits and schizotypal qualities among non-psychotic individuals. Studies by Janssen *et al.* (2003) and Wykes *et al.* (2001) indicated that non-psychotic relatives of patients with schizophrenia performed worse on ToM tasks compared to normal controls. Qualities observed in first-degree relatives of people with schizophrenia are generally considered trait markers of the disorder. Related to research investigating first-degree relatives in the search for stable markers is the study of individuals with schizophrenia spectrum disorders. As schizophrenia spectrum disorders are genetically linked to schizophrenia, qualities observed in spectrum disorders are likely candidates for trait markers of schizophrenia.

Present study

Given that perspective-taking is a key component to ToM, investigating perspective-taking prior to the onset of schizophrenia spectrum disorders may be another effective means of addressing the state/trait controversy in ToM. Deficits in perspective-taking observed in children who later develop schizophrenia spectrum disorders relative to children who do not develop these disorders as adults would suggest a pre-existing trait related to ToM deficits in the absence of symptoms (i.e. preceding diagnosis).

To our knowledge, no study has investigated perspective-taking prospectively among individuals who later developed spectrum disorders. If perspective-taking deficits are inherent trait markers of schizophrenia, we would expect deficits to precede the development of schizophrenia spectrum disorders.

The current study analyzed data from a 31-year prospective longitudinal study investigating pre-morbid correlates of schizophrenia among Danish children. Measures from this investigation were assessed prior to age of risk. This prospective method allowed for the observation of perspective-taking well before symptom onset. In 1972, subjects (ages 10–13 years) were administered Feffer's Role-Taking Task (RTT; Feffer, 1959; Feffer & Gourevitch, 1960) to assess perspective-taking ability. Researchers typically measure ToM by testing the understanding of false beliefs, a construct not directly measured by the RTT. We assume, however, that the RTT's measurement of perspective-taking captures the ability to infer the mental states of others, and therefore approximates typical conceptions of ToM.

Given recent evidence suggesting ToM deficits as trait markers of schizophrenia (Herold *et al.* 2002; Janssen *et al.* 2003), it was hypothesized that (1) children who later developed schizophrenia spectrum disorders would have perspective-taking deficits compared to children who had an outcome of no mental illness, and (2) compared to children who developed other psychopathology (Specificity Hypothesis). We used the more inclusive diagnostic grouping schizophrenia spectrum disorders to increase sample size for analyses.

METHOD

The present study is a component of a larger longitudinal high-risk project investigating the precursors of schizophrenia. The design of the study, the subject characteristics, and follow-up diagnoses are described in greater detail elsewhere (Schiffman *et al.* 2002).

Subjects

Subjects were part of a Danish birth cohort consisting of all children born between 1 September 1959 and 31 December 1961 at Rigshospitalet in

Copenhagen. In 1972, 265 high-risk and control children from this cohort were studied. All children whose mothers or fathers had a psychiatric hospital diagnosis of schizophrenia comprised the first group ($n=90$). A group of matched controls consisted of children who had at least one parent with psychiatric records other than schizophrenia ($n=93$). The remaining subjects were matched controls with no parental records of psychiatric hospitalization ($n=82$). In 1992, 242 of these children were available for follow-up examinations. Psychiatric outcomes of subjects included schizophrenia spectrum disorders (schizophrenia, schizotypal personality disorder, delusional disorder, paranoid personality disorder, and psychosis NOS), other psychopathology, and no mental illness.

The task

In 1972, when subjects were 10–13 years old, perspective-taking ability was assessed through the administration of the RTT (Feffer, 1959; Feffer & Gourevitch, 1960). The RTT consists of background scenes picturing places (e.g. living room, park) and people (adults and children). Using these materials, subjects told two stories for two background scenes using three characters in each story. After completing the initial story, subjects were provided the following instructions, 'Now make believe that you are (the mother, boy, etc.) in the story you made up. Tell the story again like you are (the mother, boy, etc.)'. Subjects took the perspective of the three characters from the background scene, retelling the story (e.g. events, feelings) as each character experienced it. The procedure was repeated for the second story.

The scoring of perspective-taking ability was based on a comparison between what was said about Person I when the subject took this person's perspective and what was said about Person I when the subject retold the story from the perspectives of Persons II and III. Subjects could earn between one and three points for each character based on level of perspective-taking demonstrated. The scoring was repeated for each character; therefore a subject could earn a minimum of three points and a maximum of nine points per story. Scores from the two stories were combined to create a final average score, with the highest possible average score being nine.

According to Feffer (1959), a score of one reflected the lowest level of perspective-taking; the ability to acknowledge that another's perspective existed. A score of one was assigned if, while taking the perspective of a character, the subject acknowledged the other characters. For example, a subject received one point if he/she simply described Person I as 'had a bad day at school' from Person I's perspective and as 'hungry' from Person II's perspective.

A score of two indicated a more sophisticated perspective-taking ability; the ability to accurately, but simply, reflect the perspective of another. Subjects earned a score of two if, when taking the perspective of a character, the subject described the other characters using related but different terms than those used by the characters to describe themselves. For example, a subject received two points if Person I was initially described as 'had a bad day at school' from Person I's perspective, and as 'was thinking about school' from Person II's perspective.

According to Feffer (1959), a score of three reflected the most sophisticated level of perspective-taking, incorporating the ability to infer feelings through the observation of external events. A subject earned a score of three if, when taking the perspective of a character, the subject described the character with internal attributions and offered reasons for the character's feelings. Additionally, the subject must have described the other characters accurately, and described their motivations using external attributions. For example, a subject received three points if he/she described Person I as 'had a bad day at school' from Person I's perspective, and as 'looked blue because he got a bad grade' from Person II's perspective.

Unfortunately for the purposes of reliability, only one psychiatrist administered and rated the RTT. The psychiatrist was, however, well trained in the assessment. In addition, Feffer (1959) reported that the RTT is a valid and reliable tool measuring an individual's awareness of the perspectives of others. All but three subjects were administered the RTT (two with no mental illness outcome and one with another psychopathology outcome).

Adult diagnostic assessment

In 1992, subjects were 31–33 years of age and their psychiatric status was determined by

Table 1. *Adult outcome diagnoses for subjects with Role-Taking Task scores*

Schizophrenia spectrum disorders	
Schizophrenia	16
Schizotypal personality disorder	3
Any psychosis/delusional disorder	5
Paranoid personality disorder	2
Other psychopathology	
Non-psychotic mood/anxiety disorder	19
Non-psychotic alcohol/drug abuse	32
Non-hospitalized minor Axis I disorder	1
Borderline personality disorder	5
Schizoid personality disorder	1
Antisocial personality disorder	1
Personality disorder NOS	4
Other personality disorder	6
No mental illness	
No diagnosis	144
Total	239

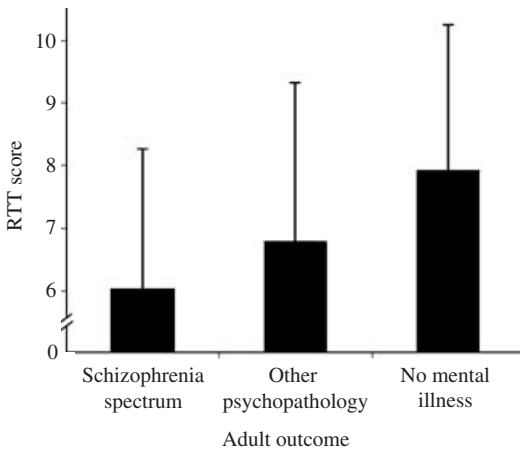


FIG. 1. Childhood Role-Taking Task (RTT) score by adult diagnostic group.

structured interviews and examination of Danish psychiatric hospital records. Based on interview and/or hospital records, we obtained adult diagnostic outcomes for 242 of the 265 subjects (Table 1). Unfortunately, we only had complete RTT data from 239 subjects. After complete description of the study to the subjects, written informed consent was obtained.

RESULTS

We tested whether the three adult outcome diagnostic groups (schizophrenia spectrum, other psychopathology, and no mental illness outcome) significantly differed from one another

Table 2. *Mean (s.d.) age and verbal IQ at time of Role-Taking Task administration by diagnostic outcome group*

Diagnostic outcome group	Mean (s.d.) age at testing	Mean (s.d.) verbal IQ at testing
Schizophrenia spectrum ($n=26$)	11.65 (0.64)	101.92 (13.69)
Other psychopathology ($n=69$)	11.75 (0.69)	100.59 (16.12)
No mental illness ($n=144$)	11.74 (0.67)	105.21 (14.55)

based on childhood RTT scores (Fig. 1). We were concerned, however, with the potential confound of verbal IQ and age on the RTT performance (see Table 2 for age and verbal IQ means and standard deviations). We therefore conducted a one-way analysis of covariance (ANCOVA) to control for the effects of verbal IQ (as assessed by the Wechsler Intelligence Scale for Children) and age at testing. Results of the ANCOVA indicated significant differences between adult diagnostic outcome groups on childhood adjusted RTT scores [$F(2, 234) = 7.91, p < 0.001$]. The adjusted means were in the hypothesized direction, with the schizophrenia spectrum group having the lowest scores and the no mental illness group the highest. Follow-up pairwise comparisons revealed that children who later developed a schizophrenia spectrum disorder had significantly lower adjusted RTT scores relative to children with an outcome of no mental illness [$F(1, 234) = 11.99, p < 0.005$]. Adjusted childhood RTT scores did not significantly differentiate an outcome of schizophrenia spectrum disorder from other psychopathology [$F(1, 234) = 2.19, p = 0.14$]. For completeness, we compared adjusted RTT scores for the other psychopathology group with no mental illness [$F(1, 234) = 7.29, p = 0.007$] (see Table 3 for adjusted means and standard errors, as well as raw means and standard deviations).

Exploratory analyses assessing perspective-taking skills while controlling for age and verbal IQ in *spectrum-only* subjects (excluding schizophrenia) and in *schizophrenia-only* subjects (excluding spectrum) remained consistent with the above analyses [spectrum-only, other psychopathology, no mental illness, $F(2, 218) = 8.77, p < 0.001$; spectrum-only *versus* no mental illness, $F(1, 218) = 8.11, p < 0.01$; spectrum-only

Table 3. Raw mean (S.D.) and adjusted for verbal IQ and age mean (S.E.) Role-Taking Task (RTT) scores by diagnostic outcome group

Diagnostic outcome group	Mean (S.E.) RTT score adjusted for age and verbal IQ score	Raw mean (S.D.) RTT score
Schizophrenia spectrum (n=26)	6.16 (0.44)	6.02 (2.24)
Other psychopathology (n=69)	6.92 (0.27)	6.78 (2.54)
No mental illness (n=144)	7.81 (0.19)	7.90 (2.35)

versus other psychopathology $F(1, 218)=2.51$, $p=0.11$; schizophrenia-only, other psychopathology, no mental illness, $F(2, 224)=5.44$, $p<0.01$; schizophrenia-only versus no mental illness, $F(1, 224)=5.45$, $p<0.05$; schizophrenia-only versus other psychopathology $F(1, 24)=0.60$, $p=0.44$].

DISCUSSION

Our results indicated an association between pre-morbid schizophrenia spectrum disorders and perspective-taking deficits. Poorer RTT scores, controlling for verbal IQ and age, in childhood were related to later development of schizophrenia spectrum disorders relative to an outcome of no mental illness. The pre-existing deficits observed prior to symptom onset on the RTT suggest that difficulties in perspective-taking precede schizophrenia spectrum conditions. Signs preceding the disorder, observed in the absence of overt psychotic symptoms, are probably subtle trait markers associated with the developmental course of schizophrenia. Given that perspective-taking is a necessary component of ToM, our results support previous findings suggesting that ToM deficits in schizophrenia are a function of a pre-existing trait.

Qualities observed among individuals with spectrum-only disorders typically represent putative trait markers to full schizophrenia. We found perspective-taking deficits *prospectively* among children who later developed a *spectrum disorder* other than schizophrenia, relative to children who did not develop a mental illness. Deficits among spectrum-only subjects further suggest that the deficiency in inferring mental states seen in schizophrenia may, in part, be a stable trait for the disorder.

Contrary to prediction, we did not observe a significant difference between childhood RTT scores of individuals who developed schizophrenia spectrum disorders compared to individuals who developed non-psychotic disorders. Scores for the other psychopathology group fell, however, in between the scores of the schizophrenia spectrum and no mental illness outcome groups. Given our small sample size, a lack of power may have contributed to our null findings between the schizophrenia spectrum and other psychopathology groups. It is important to mention, however, that lack of significant differences between outcomes of other psychopathology and schizophrenia spectrum raises questions regarding specificity of perspective-taking deficits to schizophrenia spectrum disorders. Given that the other psychopathology group significantly differed from the no mental illness outcome group, it might be argued that RTT deficits suggest an underlying vulnerability to psychopathology, rather than a specific deficit related to schizophrenia spectrum disorders. Further research is needed to address this question.

This study suffered from notable limitations. The RTT used in this study may not be an ideal measure of ToM. Unlike more common measures of ToM, first- and second-order false beliefs were not directly measured. Unfortunately at initial interview in 1972, we did not select a measure more consistent with current assessment of ToM. The RTT, however, does appear to be a viable measure of perspective-taking, a key component in ToM. Also, subjects generated the stories, leading to a high degree of individual variation. Despite these limitations, Feffer (1959) reported that the RTT possesses sound psychometric properties in its ability to measure perspective-taking. Additionally, several other studies used a version of the RTT around 1972 when our project began (Keller, 1976; Olson & Partington, 1977; Cutrona & Feshbach, 1979).

It should be mentioned that weak validity and reliability of a measure typically increases error and decreases the likelihood of detecting expected group differences. These factors may have contributed to our lack of significant differences between the spectrum and other psychopathology group. Despite questions regarding the RTT as an ideal tool for measuring ToM, we found a pattern of results consistent with

initial hypotheses. Given concerns regarding the psychometric properties of the RTT, our findings of group differences lead us to speculate that a more established measure of ToM in childhood would have been even more effective in differentiating adult diagnostic outcomes.

Overall, our finding of pre-morbid deficits in perspective-taking among individuals who later develop schizophrenia spectrum disorders contributes to evidence of ToM deficits as a pre-existing trait marker of schizophrenia.

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DECLARATION OF INTEREST

None.

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