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Psychosis risk screening in clinical high-risk adolescents: A longitudinal investigation using the Child Behavior Checklist

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ABSTRACT

This is the first study to investigate whether parent-reported social and behavioral problems on the Child Behavior Checklist (CBCL) can be used for psychosis risk screening and the identification of at-risk youth in the general population. This longitudinal investigation assessed 122 adolescent participants from three groups (at-risk, other personality disorders, non-psychiatric controls) at baseline and one year follow-up. The findings indicate that two individual CBCL rating scales, Withdrawn/Depressed and Thought Problems, have clinical and diagnostic utility as an adjunctive risk screening measure to aid in early detection of at-risk youth likely to develop psychosis. Furthermore, the findings shows that a cost-effective, general screening tool with a widespread use in community and pediatric healthcare settings has a promise to serve as a first step in a multi-stage risk screening process. This can potentially facilitate increased screening precision and reduction of high rate of false-positives in clinical high-risk individuals who present with elevated scores on psychosis-risk measures, but ultimately do not go on to develop psychosis. The findings of the present study also have significant clinical and research implications for the development of a broad-based psychosis risk screening strategy, and novel prevention and early intervention approaches in at-risk populations for the emergence of severe mental illness.

1. Introduction

In recent years, increased research attention has been focused on the identification and improvement of psychosis risk screening methods in at-risk populations. An extensive body of research provides evidence for social and behavioral precursors of vulnerability to psychosis long before the illness onset (Nuechterlein and Dawson, 1984; Olin and Mednick, 1996; Erlenmeyer-Kimling, 2000; Johnstone et al., 2000; Cornblatt et al., 2002). It is estimated that at least 70% of patients with schizophrenia manifest behavioral problems during adolescence (Cannon et al., 1999; Neumann et al., 1995). Early adulthood is the modal period for the onset of psychosis (Neumann and Walker, 2003). The premorbid indicators of vulnerability include schizotypal symptoms, such as social withdrawal and thought abnormalities (Walker et al., 1999), deficits in memory and executive function (Silverstein et al., 2003), neurological soft signs (Neumann and Walker, 2003), movement abnormalities (Mittal et al., 2007), and other. Also, the majority of individuals who succumb to psychotic disorders manifest prodromal signs of behavioral disturbance (Neumann et al., 1995; Larsen et al., 1996).

The general pattern of findings suggests that pre-psychotic youth are more socially isolated, withdrawn, emotionally labile, anxious, and aggressive than their healthy siblings and/or age-matched comparison subjects. They also have higher levels of impaired attention, which remain stable and elevated from childhood to adolescence, and are assumed to negatively affect social interactions leading to increased stress related to social situations (Cornblatt et al., 1997; Amminger et al., 1999; Hans et al., 2000; Miller et al., 2002a; Ballon et al., 2007). The divergence in developmental trajectories becomes more pronounced with age and is especially apparent in the adolescent period. Research findings also suggest that the behavioral expression of vulnerability to psychosis is characterized by sex differences, with males exhibiting more externalizing behavior problems, while females exhibiting more internalizing behavior problems (Neumann et al., 1995; Walker et al., 1995; Gutt et al., 2008).

Given evidence that early identification and treatment can prevent or delay the transition to psychotic illness (Stafford et al., 2013), efforts to enhance early intervention and prevention methods have become a central focus of attention. Clinician-administered assessments such as the Structured Interview for Prodromal Syndromes (SIPS; Miller et al., 2002b, 2003) and the Comprehensive Assessment of At-Risk Mental States (CAARMS; Yung et al., 2005) have been the standard measures used in specialty research clinics for early detection of patients at risk for psychotic illness. These measures, however, require substantial time for clinician training and patient participation, and are unlikely to

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be widely adopted in general clinical settings. One feasible strategy to enhance broad-based community screening of individuals at risk for psychosis is to assess the clinical and diagnostic utility of existing and widely used mental health screening tools. For instance, results from a recent study indicate that the Atypicality scale of the Behavior Assessment System for Children, Second Edition (BASC-2; Reynolds and Kamphaus, 2004) may be a useful measure for identifying youth in the early stages of psychosis (Thompson et al., 2013). Another study used the Child Behavior Checklist (CBCL; Achenbach, 1991) to assess its utility to distinguish within a clinical high-risk group of adolescents, individuals who subsequently converted to psychosis compared to those who did not convert (Simeonova et al., 2011). The findings indicate that within a clinical high-risk sample, the CBCL did not show promise as an alternative or adjunctive predictor of conversion to psychosis. No investigations, however, exist on whether the CBCL holds promise for the identification of at-risk youth in the general population. This is a feasible line of investigation, because the CBCL is a parent-report measure with extensive published normative data and its reliability and validity are well established. Although this instrument was not intended to differentiate between individuals at-risk for psychosis and control groups, it has the potential to serve as an inexpensive adjunctive screening measure in clinical practice. Also, the findings of the present study could have important implications for psychosis risk assessments in a variety of youth-oriented settings such as high-school, community centers, pediatric healthcare practice, and other.

The purpose of the present study is to shed light on two research questions: 1) Do CBCL rating scales significantly differentiate between at-risk youth and control groups? 2) At what level of accuracy do selected CBCL rating scales correctly classify individuals based on risk status? It was hypothesized that at-risk youth will be rated by parents as exhibiting more pronounced social and behavioral problems on the CBCL when compared to control groups. It was also predicted that the differences between the groups will become more pronounced over time. The adolescent period is the focus of this study because it is characterized by a rapid increase in risk for psychosis onset, and it is likely to be a critical period for early intervention and prevention (Walker, 2002).

2. Methods

The study sample of 122 participants, ranging in age from 12 to 18 years, was enrolled in a prospective study at Emory University focused on neurobiological and behavioral aspects of clinical risk for psychosis in adolescents. The three diagnostic groups included 53 adolescents designated as at-risk (AR), 37 adolescents with other personality disorders (OPD), and 32 non-psychiatric controls (NC) (mean age = 14.2; SD = 1.8), who underwent assessments at baseline and at one year follow-up and for whom a CBCL had been completed. Participants were designated to the AR group if they met DSM-IV diagnostic criteria for schizotypal personality disorder (SPD) ($n = 1$), the Scale of Prodromal Symptoms (SOPS) criteria for attenuated positive symptoms (APS) ($n = 13$), or both risk criteria ($n = 39$). Demographic characteristics by diagnostic group are presented in Table 1.

The following instruments were administered to all study participants: Structured Interview for DSM-IV Personality Disorders (SIDP-IV) (Pfohl et al., 2001), Structured Clinical Interview for Axis I DSM-IV Disorders (SCID-I) (First et al., 1995), Structured Interview for Prodromal Symptoms (SIPS) (Miller et al., 2002b, 2003), and CBCL parent-report scale (Achenbach, 1991). For a detailed description of the methodology approach, please see the online Supplementary Materials section.

Multivariate-analyses of covariance (MANCOVA) and repeated-measures analyses of covariance (ANCOVA) were conducted with baseline and follow-up data to test the a priori hypotheses of the present study. Given that psychotropic medications can have an effect on behavioral characteristics, medication status was dummy-coded variable (0 = no medication, 1 = medication) and included in the analyses to control, separately for the three major classes of medications: stimulants, antidepressants, and antipsychotics. Also, given evidence of sex differences in behavioral problem symptoms in clinical samples, sex was examined as an independent variable in the statistical analyses. Assumptions for parametric tests were met, with normal sample distribution and appropriate homogeneity of variances and covariances. In addition, discriminant analysis was conducted with baseline CBCL data to determine at what level of accuracy the CBCL can classify participants correctly based on risk status.

The cross-temporal stability of the CBCL scales was examined with correlational analyses for the entire sample and for each diagnostic group. The analyses revealed significant positive inter-correlations across assessment periods (baseline and one year follow-up) within each CBCL scale. All p values were less than .05. These results suggest longitudinal stability of the ratings.

Table 1
Demographic characteristics of samples.

	AR	OPD	NC	Total
Total	53	37	32	122
Males	35	17	16	68
Females	18	20	16	54
Age				
M (SD)	14.17 (1.70)	14.59 (1.83)	14.00 (1.93)	14.25 (1.80)
Medications				
Stimulants	10	4	3	17
Antidepressants	3	1	0	4
Antipsychotics	2	1	0	3
More than one medication category	9	2	0	11
No medications	29	29	29	87

AR = at-risk, OPD = other personality disorders, NC = normal controls.

3. Results

3.1. Cross-sectional comparisons at baseline

Analyses were first conducted to test for demographic differences among the three diagnostics groups. There were no significant age ($F(2,119) = 1.03$, $p = .358$) or sex differences ($\chi^2 = 4.14$, $p = .349$) between the groups.

The CBCL scores and significant group differences for the individual and composite scales are presented in Table 2. Consistent with the prediction, there were significant differences between the groups on the CBCL at baseline assessment. MANCOVA with the CBCL individual scales revealed a significant main effect for diagnostic status, Wilks's $\Lambda = .61$, $F(22, 198) = 2.51$, $p = .000$, $\eta^2 = .22$. MANCOVA with the CBCL composite scales yielded similar findings with a significant main effect for diagnostic status, Wilks's $\Lambda = .66$, $F(6, 216) = 8.09$, $p = .000$, $\eta^2 = .18$. Univariate tests results were partially consisted with predictions. The findings showed that diagnostic groups differed on all CBCL rating scales. The only scale that did not show group differences was Activities. Also, overall there were no significant differences between the AR and OPD groups across all CBCL (see Table 2).

The analyses revealed a main effect for stimulant medications, Wilks's $\Lambda = .76$, $F(11, 99) = 2.85$, $p = .003$, $\eta^2 = .24$ (for individual CBCL scales) and Wilks's $\Lambda = .91$, $F(3, 108) = 3.57$, $p = .016$, $\eta^2 = .09$ (for composite CBCL scales). The medication covariate was significant for the scales Withdrawn, $F(1, 109) = 4.43$, $p = .038$, $\eta^2 = .04$, Social Problems, $F(1, 109) = 8.53$, $p = .004$, $\eta^2 = .07$, Aggressive Behavior, $F(1, 109) = 9.18$, $p = .003$, $\eta^2 = .08$, and Externalizing Problems $F(1, 110) = 9.17$, $p = .003$, $\eta^2 = .08$. This effect was due to higher symptoms ratings for participants on stimulant medication.

There was no significant main effect or interaction effect of sex with diagnostic group on the CBCL scales.