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Disorganized Symptoms and Executive Functioning Predict Impaired Social Functioning in Subjects at Risk for Psychosis

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Abstract

Predictors of social functioning deficits were assessed in 22 individuals “at risk” for psychosis. Disorganized symptoms and executive functioning predicted social functioning at follow-up. Early intervention efforts that focus on social and cognitive skills are indicated in this vulnerable population.

Keywords

Prodromal; At-Risk; Schizophrenia; Clinical; Social Functioning; Neurocognition

1. Introduction

Schizophrenia is a chronic illness that manifests in late adolescence or early adulthood and is often preceded by both a premorbid and a prodromal phase. Unlike the premorbid phase which is a period of relatively stable social and cognitive deficits,[1] the prodromal period is characterized by its lack of stability and a downhill course of psychosocial impairment culminating in the onset of frank psychosis.[2,3]

Poor social functioning at initial assessment has been implicated as an ominous sign in subjects at risk for psychosis. It has been shown that decline in social functioning prior to ascertainment is associated with later conversion to psychosis.[4]

Dysfunction in multiple cognitive domains has been reported in patients with schizophrenia as well as individuals at-risk for psychosis.[5,6,7] The neuropsychological impairments in at-risk individuals tend to be associated with poor social and role functioning, and may predict the development of later psychosis.[6,7,8]

Despite the intuitive significance of deficits in social functioning and its importance in prodromal research, there is a dearth of longitudinal studies to explore social functioning at outcome. The present study is an attempt to elucidate the relationship between clinical

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symptomatology and neurocognition at initial presentation, and social functioning one year after ascertainment in subjects at risk for psychosis.

2. Methods

2.1. Participants

The Cognitive Assessment and Risk Evaluation (CARE) program at the University of California, San Diego provides longitudinal assessment of individuals who are considered to be at risk for developing psychosis.[9] For this study, we selected a subsample (N=22) of at-risk subjects from previously published reports[6,10,11] who had received the Social Adjustment Scale-Self Report at 1year follow-up.

2.2. Procedure

All participants received a comprehensive clinical and neurocognitive battery at initial assessment.[6] The clinical assessment included the Structured Clinical Interview for DSM-IV Axis I Disorders and the Structured Interview for Prodromal Syndromes.[12]

The SAS-SR was administered to all participants at baseline assessment and at one year follow-up. Domains related to work/school role and social/leisure time were examined. We did not examine the two SAS-SR family domains (family unit and family outside of the home) because of the young age of our sample.

The neurocognitive battery[6,11] included the Wisconsin Card Sorting Test, the Stroop Color and Word Test, the Numerical Attention test, the Hopkins Verbal Learning Test – Revised, the Spatial Span subtest of the Wechsler Memory Scale – Third Edition, as well as the Letter Number Sequencing, Block Design, and Vocabulary subtests of the Wechsler Adult Intelligence Scale – Third Edition.

3. Statistical Analyses

Analyses were performed using SPSS. Change in symptom severity and social functioning over time was assessed via paired samples t-tests. Correlations were performed between follow-up social functioning measures and baseline clinical and neurocognitive batteries to determine which variables should be included in regression analyses ($p<0.05$). Backward multiple regression analyses were then performed using baseline social functioning, clinical and neurocognitive variables as predictors of follow-up social functioning. The assumptions of normality, linearity, and homoscedasticity of residuals were met. With the use of a $p<.001$ criterion for Mahalanobis distance, no outliers among the cases were found. No cases had missing data and no suppressor variables were found, N=22.

4. Results

4.1. Sample Characteristics and Symptoms Comparison

The baseline demographic characteristics of our sample is represented in table 1. The rate of transition to psychosis in our sample was 9.1 %, as two subjects converted to schizophrenia over the one-year follow-up.

4.2. Change in Clinical Symptomatology and Level of Social Functioning Over Time

As represented in table 1, paired samples t-tests showed significant improvement between baseline and follow-up on the GAF and all of the SIPS ratings. However, there were no significant changes over time on any of the SAS-SR ratings. The at-risk subjects remained impaired in their social functioning at follow-up.

4.3. Prediction of Social Functioning Outcomes

Given our relatively small sample size, we limited the number of predictor variables that were used in the regression analyses to those that had significant correlations ($p<0.05$) with the social functioning variables at follow-up ($r= .45$ to $.67$). Yet, for each dependent variable, the corresponding baseline variable was entered into the prediction model regardless of the magnitude of the correlation between them. Interestingly, the outcome social functioning measures were not significantly correlated with baseline GAF, SIPS positive symptoms, or performance on the WCST. In order to avoid multicollinearity problems, we examined the correlations among the predictor variables. Those correlations were all small to moderate ($r= .43$ to $.59$, $p<0.05$) except for the high association between SIPS Disorganized and SIPS Negative ($r=.71$, $p<.001$). We decided to include both of those variables in the regression analyses because they represent different symptom domains. We performed three backward multiple regression analyses, one for each SAS outcome variable.

When the four variables that were significantly correlated with follow-up Overall SAS, in addition to baseline Overall SAS, were included in the first backward multiple regression, we observed a significant regression coefficient that accounted for 70% of the variance in overall functioning at outcome, $F(5,15)=7.18$, $p=.001$, $R^2=.70$ (at step 1). After Stroop Color Naming and SIPS Negative were excluded from the model, baseline Overall SAS, SIPS Disorganized, and Stroop Color/Word Interference still accounted for 70% of the variance in follow-up Overall SAS, $F(3,17)=13.29$, $p<.001$, $R^2=.70$ (at step 3). The most significant predictor of overall functioning was SIPS Disorganized ($\beta=.59$) followed by Stroop Color/Word Interference ($\beta=-.44$). Baseline SAS overall was not a significant predictor ($\beta=.28$, $p=.06$).

When the four variables that were significantly correlated with follow-up SAS Social/Leisure, in addition to baseline SAS Social/Leisure, were included in the second backward multiple regression, we observed a significant regression coefficient that accounted for 64% of the variance in social role functioning at outcome, $F(5,15)=5.42$, $p=.005$, $R^2=.64$ (at step 1). After SAS Social/Leisure and SIPS Negative were excluded from the model, the three-predictor model including SIPS Disorganized, HVLT Total Recall, and Stroop Color/Word Interference accounted for 61% of the variance in follow-up SAS Social/Leisure, $F(3,17)=8.78$, $p=.001$, $R^2=.61$ (at step 3). The most significant predictor of social role functioning was SIPS Disorganized ($\beta=.49$) followed by Stroop Color/Word Interference ($\beta=-.37$). HVLT's regression coefficient was not significant ($\beta=-.31$, $p=.08$).

When the three variables that were significantly correlated with follow-up SAS Work Role, in addition to baseline SAS Work Role, were included in the third backward multiple regression, we observed a significant regression coefficient that accounted for 81% of the

variance in work role functioning at outcome, $F(4,11)=11.62$, $p=.001$, $R^2=.81$ (at step 1). After baseline SAS Work Role was excluded from the model, Stroop Color Naming, Stroop Color/Word Interference, and Numerical Attention significantly contributed to the prediction of follow-up SAS Work Role, accounting for 79% of the variance, $F(3,12)=14.92$, $p<.001$, $R^2=.79$ (at step 2). The most significant predictor of Follow-up work role functioning was Stroop Color Naming ($\beta=-.50$), followed by Stroop Color/Word Interference ($\beta=-.38$), and Numerical Attention ($\beta=.31$).

4. Discussion

Our results showed that disorganized symptoms and executive functioning deficits at baseline assessment were significant predictors of overall social functioning and the subscale of social role functioning. Work role impairment was also accounted for by deficits in executive functioning as well as processing speed.

Impairment in social functioning is arguably the most debilitating aspect of schizophrenia in the broader context of an individual's lifelong struggle with the disorder. Interestingly, our results indicate that longitudinal outcomes of social functioning impairment are independent of positive symptoms. This finding is noteworthy as it suggests that regardless of successful treatment of positive symptoms, individuals at risk for schizophrenia continue to have social functioning deficits.[13,14] Therefore, assessment, and early intervention for impairments in social functioning are unquestionably important in this population.

This finding, if corroborated by larger studies, suggests that interventions that address social functioning in this vulnerable group are indicated. Social skills training, individualized educational programs, family psychoeducation and/or psychotherapy could all help reduce stress and improve functional outcome. Also, psychosocial treatment efforts that focus on cognitive training or remediation might help to ameliorate the observed functional deficits in this vulnerable.[14,15]

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Table 1

Demographic, Clinical and Neurocognitive Characteristics of At-Risk Sample at Baseline and Follow-up

At-Risk (N=22)			
Demographics			
Age (mean/SD)	21.9 (3.1)		
Gender (% male)	54.5		
Ethnicity (% Caucasian)	59.1		
Handedness (% right)	95.5		
Education (mean/SD)	13.3 (1.7)		
Parental Education (mean/SD)	15.4 (1.6)		
Family History of Mental Illness %	90.9		
1st Degree Relative w/Psychosis %	18.2		
Antipsychotics %	22.7		
Neurocognitive Measures (Mean/SD)			
WCST Perseverative Responses	10.04 (9.75)		
SCWT Color/Word Interference	43.42 (11.57)		
SCWT Color Naming	71.50 (10.25)		
Numerical Attention	194.04 (74.75)		
HVLT-R Total Recall	27.12 (4.07)		
WMS-III Spatial Span backwards	8.84 (2.36)		
WAIS-III Letter Number Sequencing	11.52 (2.36)		
WAIS-III Vocabulary	42.17 (13.00)		
WAIS-III Block Design	49.36 (11.61)		
Clinical Assessment (Mean/SD)	Baseline	Follow-Up	p
SIPS Positive	12.00 (5.84)	3.95 (4.51)*	<.001
SIPS Negative	11.30 (7.77)	5.95 (5.89)*	.003
SIPS Disorganized	7.85 (4.23)	3.90 (4.48)*	.002
SIPS General	6.70 (4.28)	3.20 (3.76)*	.003
SIPS Total	37.85 (17.94)	17.00 (14.93)*	<.001
GAF	55.50 (8.88)	61.65 (10.77)*	.03
SAS Work Role	2.17 (.88)	2.01 (.83)	NS
SAS Social/Leisure	2.59 (.54)	2.42 (.67)	NS
SAS Overall	2.39 (.45)	2.28 (.60)	NS

WCST = Wisconsin Card Sorting Test; SCWT = Stroop Color and Word Test; HVLT-R = Hopkins Verbal Learning Test – Revised; WAIS-III = WechslerAdult Intelligence Scale – Third Edition; WMS-III = Wechsler Memory Scale – Third Edition; SIPS = Structured Interview for Prodromal Syndromes; GAF=Global Assessment of Functioning; SAS = Social Adjustment Scale.