Schizophrenia Research 147 (2013) 153–156

Contents lists available at SciVerse ScienceDirect

Schizophrenia Research

journal homepage: www.elsevier.com/locate/schres

Broadly defined risk mental states during adolescence: Disorganization mediates positive schizotypal expression

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ARTICLE INFO

Article history:
Received 1 June 2012
Received in revised form 28 February 2013
Accepted 13 March 2013
Available online 6 April 2013

Keywords:
Hallucinations
Disorganization
Schizotypy
Schizophrenia
Somatic Complaints

ABSTRACT

While schizotypal features are common during adolescence, they can also signal increased risk for the onset of schizophreniform disorders. Most studies with adolescents find that hallucination and delusion-like symptoms (positive schizotypal features) best predict future psychopathology. Still, the developmental process of positive schizotypy remains elusive, specifically with regards to 1) its relationships to negative and disorganization schizotypal dimensions; 2) its associations to maladaptive functioning during adolescence. This longitudinal study aimed to further characterize these relationships, thereby delineating "early and broadly defined psychosis risk mental states" (Keshavan et al., 2011).

The current study presents the 3-year course of schizotypal trait expression in 34 clinical adolescents aged 12 to 18 years consulting for non-psychotic difficulties. Schizotypal expression was assessed twice using the Schizotypal Personality Questionnaire, accompanied by an examination of internalizing/externalizing problems using the Achenbach scales. Cross-sectional and longitudinal analyses were conducted to assess the expression and course of schizotypal dimensions; mediation analyses were further employed to highlight the developmental interactions promoting the maintenance of positive schizotypal expression.

The results reveal that positive schizotypy, and more specifically unusual perceptual experiences, significantly declined during the study interval. Disorganization features were found to mediate the relationships between the negative and positive dimensions of schizotypy within and across evaluations. Somatic complaints and attentional difficulties further strengthened the expression of positive schizotypy during the study interval. These results suggest that the relationship between disorganization features and positive schizotypy may play a central role in establishing risk for psychosis during adolescence.

1. Introduction

Schizotypal features are most commonly understood as signalling a liability to develop schizophrenia (Lenzenweger, 2010; Meehl, 1990), and their expression during childhood and adolescence can be understood as early and broadly defined risk mental states for the development of psychosis (Keshavan et al., 2011). Their expression can be monitored during childhood and adolescence (Barrantes-Vidal et al., 2003; Debbané et al., 2009; Fonseca-Pedrero et al., 2008), and most psychometric analyses testing the factorial structure of schizotypal expression consistently identify three main dimensions: the cognitive-perceptual (positive symptoms: hallucination and delusion-like experiences), the interpersonal (negative symptoms; blunted affect, social anxiety and poor emotional expression) and the disorganization features (disorganized speech and behavior) (Raine, 2006). To date, most developmental studies have focused on transient positive symptom manifestations and found them to be predictive of increased risk for psychotic disorders in later adult development (Cougnard et al., 2007; Poulton et al., 2000). More recent epidemiological evidence suggests that critical interactions between schizotypal features take place during adolescence and predict the unfolding of clinically significant psychotic symptoms (Dominguez et al., 2010). From a developmental standpoint, a better understanding of the early schizotypal features is critical for two reasons. Firstly, given their predictive value for psychotic disorders, the unfolding schizotypal features and their potential interactions might reveal developmental pathways to psychosis orienting research questions, as well as early detection and intervention strategies. Second, children and adolescents who later develop schizophrenic disorders often report a history of non-psychotic disorders (Cannon et al., 2001). Therefore, examination of schizotypal features in clinically referred youths may prove both useful for primary prevention strategies and scientifically informative for understanding psychosis from the perspective of developmental psychopathology (Keshavan et al., 2011).

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http://dx.doi.org/10.1016/j.schres.2013.03.012

The present study sought to examine the 3-year developmental course and potential interactions within the triad of schizotypal features in a group of non-psychotic adolescents seeking psychological counselling. The first aim of our investigation was to evaluate the stability or change for each schizotypal dimension. Based on recent research (Ericson et al., 2011; Peskin et al., 2011), we expected that the negative and disorganization schizotypal dimensions would yield longitudinal stability during adolescence, while the positive dimension would show significant reduction during the 3-year interval. Our second aim was to specifically analyse the trajectory of positive schizotypy as a function of negative and disorganization schizotypal traits. We expected that the negative and/or disorganization factor would significantly influence the expression of positive schizotypy during adolescence (Dominguez et al., 2010). Additionally, we explored mediation relationships to identify potential developmental interactions within the schizotypal dimensional triad. Finally, we examined how maladaptive functioning related to positive schizotypy across evaluations.

2. Materials and methods

2.1. Participants

Fifty-four clinically referred adolescents (25 female) were recruited through the child and adolescent community outpatient psychiatric service of Geneva, Switzerland. ICD-10 diagnostic categories encompassed only internalizing and externalizing disorders, with no personality, psychotic or autistic spectrum disorders reported (Debbané et al., 2012). Thirty-four completed the longitudinal study protocol, ages 12 to 18 ($M = 15.19$; $SD = 1.49$) at T1, and ages 16 to 22 at T2 ($M = 18.25$; $SD = 1.56$), within a 3-year interval (Minterval = 3.05; $SD = .30$). Drop-out rate could be accounted for different reasons (refuse to participate $n = 13$, moved to different city/country $n = 3$, could not be reached $n = 6$). Schizotypy scores did not significantly differ between study and dropout group (Mean total Schizotypal Personality Questionnaire (SPQ) score for dropouts = 21.05, $p > 0.05$). None of the participants reported schizophrenic disorders in family or first-degree relatives. Written informed consent was received from participants under protocols approved by the Institutional Review Board of the Department of Psychiatry of the University of Geneva Medical School.

2.2. Instruments

The *SPQ*, translated (Dumas et al., 2000) and validated in French-speaking adolescents (Badoud et al., 2011), yielded three main factors: cognitive-perceptual, interpersonal, and disorganization. These were employed as measures of positive, negative, and disorganization schizotypal expression, respectively. Psychopathological symptoms were assessed with the *Youth and Adult Self – Reports* (Achenbach, 1991; Achenbach and Rescorla, 2003). Anxious/depressed, withdrawn, somatic complaints, attention problems, rule-breaking and aggressive behaviours subscales were utilized.

2.3. Statistical analyses

Using SPSS19, matched-sample T-tests were employed to evaluate longitudinal change between measures of schizotypy. Then, direct and indirect contributions of negative and disorganized SPQ on positive SPQ were investigated. Finally, direct and indirect contributions of adolescent psychopathology on positive SPQ were tested. Pearson correlations and linear regression models were run to assess direct effects whereas mediation analyses were used for indirect effects, following Baron and Kenny's procedure and calculating Sobel tests.

Table 1
Descriptive data for all variables included in the study.

	Baseline			Time 2			Δ T1-T2
	Mean	Std.Dev.	Range	Mean	Std.Dev	Range	p val.
Positive SPQ	11.94	7.07	1–27	8.71	5.70	0–26	.005
Unusual perceptual experiences	3.44	2.40	0–9	1.97	1.85	0–8	.000
Ideas of reference	3.50	2.72	0–9	2.79	2.04	0–8	.102
Suspiciousness	3.24	2.49	0–8	2.53	2.27	0–8	.102
Odd beliefs	1.76	1.56	0–5	1.41	1.39	0–5	.314
Negative SPQ	8.09	4.65	0–19	7.29	5.44	0–19	.301
Disorganized SPQ	7.35	4.84	0–16	7.26	4.63	0–19	.910
Anx/Dep Y/ASR	77.42	19.19	50–97	73.69	18.08	50–97	.255
Withdrawn Y/ASR	73.42	17.43	50–97	69.31	19.96	29–97	.000
Somatic complaints Y/ASR	68.27	17.49	50–97	67.32	16.04	50–97	.512
Attention Y/ASR	80.21	15.61	50–97	79.19	15.04	50–97	.977
Rule-breaking Y/ASR	81.36	16.64	50–97	73.55	21.55	50–97	.274
Aggressive Y/ASR	83.42	14.50	54–97	75.45	16.74	50–97	.000

3. Results

3.1. Descriptive statistics and SPQ dimensions over time

Table 1 presented descriptive results for the variables included in our analysis at T1 and T2 and revealed that negative ($p = .301$) and disorganization ($p = .910$) subscales remained stable over time while positive schizotypy decreased between baseline and T2 ($t = 3.03$; $p < .01$). This trajectory was mainly driven by a reduction in the unusual perceptual experiences scores (Baseline: $M = 3.44$; $SD = 2.40$; T2: $M = 1.97$; $SD = 1.85$ $t = 3.96$, $p < .001$).

3.2. Cross-sectional and longitudinal SPQ dimensions mediation analyses

Regression models in Tables 2 and 4 revealed that the disorganization score contributed to positive schizotypy ($B = .632$; $p < .001$) at T1 and from a longitudinal standpoint ($B = .386$, $p < .05$), after removing one potentially influential case (standardized residual > 3). At T2, both disorganization and negative scores accounted for level of positive schizotypy (Table 3).

Table 2
Simple and multiple regression analyses performed on T1 variables. This table included raw coefficients and standard errors required to calculate mediation model.

	Model		Coefficients				
	R^2	F	*b*	SE *b*	β	*t*	*p*
Positive SPQ Score T1	.566	F (2,31)					
Negative SPQ score T1			.286	.213	.190	1.345	.188
Disorganized SPQ score T1			.915	.205	.632	4.470	.000
Positive SPQ Score T1	.286	F (1,32)					
Negative SPQ score T1			.806	.225	.535	3.584	.001
Disorganized SPQ Score T1	.299	F (1,32)					
Negative SPQ score T1			.568	.154	.547	3.692	.001
Positive SPQ Score T1	.628	F (3,29)					
Anxious–Depressed YSR score T1			.033	.054	.088	.604	.551
Somatic complaints YSR score T1			.228	.057	.563	4.018	.000
Aggressive YSR score T1			.132	.069	.271	1.919	.065
Positive SPQ Score T1	.629	F (2,30)					
Disorganized SPQ score T1			.587	.237	.404	2.473	.019
Somatic complaints YSR score T1			.182	.066	.448	2.748	.010
Positive SPQ Score T1	.541	F (1,32)					
Disorganized SPQ score T1			1.066	.174	.735	6.138	.000
Somatic complaints YSR score T1	.536	F (1,31)					
Disorganized SPQ score T1			2.631	.440	.732	5.985	.000

Italicized terms indicate dependent variables and bold terms indicate independent variables.