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Diagnostic specificity of poor premorbid adjustment: Comparison of schizophrenia, schizoaffective disorder, and mood disorder with psychotic features

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Abstract

Individuals with schizophrenia have significant deficits in premorbid social and academic adjustment compared to individuals with non-psychotic diagnoses. However, it is unclear how severity and developmental trajectory of premorbid maladjustment compare across psychotic disorders. This study examined the association between premorbid functioning (in childhood, early adolescence, and late adolescence) and psychotic disorder diagnosis in a first-episode sample of 105 individuals: schizophrenia (n=68), schizoaffective disorder (n=22), and mood disorder with psychotic features (n=15). Social and academic maladjustment was assessed using the Cannon-Spoor Premorbid Adjustment Scale. Worse social functioning in late adolescence was associated with higher odds of schizophrenia compared to odds of either schizoaffective disorder or mood disorder with psychotic features, independently of child and early adolescent maladjustment. Greater social dysfunction in childhood was associated with higher odds of schizoaffective disorder compared to odds of schizophrenia. Premorbid decline in academic adjustment was observed for all groups, but did not predict diagnosis at any stage of development. Results suggest that social functioning is disrupted in the premorbid phase of both schizophrenia and schizoaffective disorder, but remains fairly stable in mood disorders with psychotic features. Disparities in the onset and time course of social dysfunction suggest important developmental differences between schizophrenia and schizoaffective disorder.

Keywords

Development; First-episode; Prediction; Psychosis; Schizophrenia-spectrum; Social functioning

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1. Introduction

Premorbid adjustment (e.g., developing and maintaining friendships, participation in activities) is an important correlate of individual differences in course and outcome of schizophrenia, including age of psychosis onset (Haas and Sweeney, 1992) and severity of negative symptoms, cognitive deficits, and treatment refraction (e.g., Addington et al., 2003; Haim et al., 2006; Silverstein et al., 2003). Historically, poor premorbid functioning has not been considered central to the developmental pathology or diagnosis of schizoaffective disorder, bipolar I disorder with psychotic features, or major depressive disorder with psychotic features (American Psychiatric Association, 2000), implying specificity to schizophrenia. However, only a few studies have directly compared premorbid functioning in schizophrenia with schizoaffective disorder or mood disorders with psychotic features, and we are not aware of any published comparisons between schizoaffective disorder and psychotic mood disorders. Therefore, specificity of premorbid maladjustment to schizophrenia has not been confirmed. The current study examined specificity of poor premorbid adjustment by evaluating the predictive association between premorbid social and academic maladjustment and odds of schizophrenia versus schizoaffective disorder versus mood disorder with psychosis.

2. Method

2.1 Participants

Participants were originally recruited for the longitudinal Pittsburgh First-Episode Study (see Keshavan and Schooler, 1992 for description). Participants were consecutively recruited patients who were experiencing a first episode of psychosis and were evaluated at the Western Psychiatric Institute and Clinic, Pittsburgh, Pennsylvania. Inclusion criteria for potential participants were: age between 12 and 50, symptoms of a psychotic condition reported at intake evaluation, IQ ≥ 75 , English as the primary language, no medical condition that could produce psychiatric symptoms or neurocognitive deficits (e.g., neuroendocrine disorder), no current diagnosis of substance dependence, if recent history of substance abuse, remission of symptoms for a minimum of 6 months, and no more than a 2-week (lifetime) history of antipsychotic treatment to avoid the confounding effects of medication. Participants provided written informed consent in accordance with the University of Pittsburgh Institutional Review Board guidelines.

In addition to the above criteria, selection for the current study required a Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV; American Psychiatric Association, 1994) diagnosis of schizophrenia, schizoaffective disorder (bipolar or depressed type), bipolar I disorder with psychotic features, or major depressive disorder with psychotic features. Selection also required availability of Premorbid Adjustment Scale data (PAS; Cannon-Spoor et al., 1982), which were missing for a subset of participants as funding did not allow for consistent collection of PAS data (July 1998 through June 2003).

2.2 Assessment

2.2.1 Diagnostic assessment—All participants were administered the Structured Clinical Interview for DSM-IV Axis I disorders (SCID-I; First et al., 1995) at baseline and at subsequent study visits to assess current and lifetime Axis I psychiatric diagnoses. All baseline assessments were conducted within one week of initial diagnostic evaluation. Follow-up assessments were conducted at four, eight, and 26 weeks, and at one, two, and four years post-baseline. Interviews were administered by trained interviewers under the supervision of the investigators. Lifetime, multi-axial DSM-IV diagnoses were established

at diagnostic consensus meetings by senior clinicians and interviewers using the LEAD (Longitudinal evaluation by Experts using All Data) approach (Spitzer et al., 1983).

2.2.2 Premorbid functioning assessment—Premorbid functioning was assessed at baseline using the Premorbid Adjustment Scale (PAS; Cannon-Spoor et al., 1982). The PAS is a semi-structured rating schedule designed to retrospectively assess developmental stage appropriate functioning prior to psychosis onset, particularly social and academic adjustment¹. The PAS has established predictive and concurrent validity (Brill et al., 2008). Items are interviewer-rated on a 0–6 scale with '0' representing freedom from maladjustment and higher ratings reflecting evidence of maladjustment. Scoring was based on patient report and all available medical and social history data.

To enhance reliability of PAS scoring, patient information was collected using a semi-structured interview developed by Haas and colleagues (available on request). Interviewers were trained via didactic presentation by the senior investigator (Haas) and by observing and independently scoring 5 interviews by a trained rater. Practice interviews were audio-recorded and scored by an expert interviewer; divergent scoring was reviewed with the trainee. Inter-rater reliabilities for scoring of the PAS using the interview format are good, with intra-class correlation coefficients (ICCs) of 0.86 (childhood), 0.78 (early childhood), and 0.88 (late adolescence) based on 6 interviewers who independently coded 20 interviews.

The PAS assesses up to four periods of development: childhood (age 5–11), early adolescence (age 12–15), late adolescence (age 16–18), and adulthood (age 19 and above). Indicators of social maladjustment (e.g., withdrawal from peers, unstable peer relationships) can be rated for all developmental periods (excluding social-sexual maladjustment in childhood). Ratings of academic maladjustment (e.g., poor scholastic performance, difficulty adapting to school regimen) are recorded for childhood through late adolescence, as applicable. Total (social and academic combined) maladjustment scores are derived for each developmental period.

To minimize the influence of prodromal symptoms and active illness, PAS ratings are generated for periods up to and excluding six months prior to the estimated onset of first psychotic symptoms. In the current study, duration of psychosis prodrome was defined as the difference between the estimated age of onset of first attenuated psychotic symptom, as defined in the SCID, and age of onset of first psychotic episode. Onset date of first attenuated psychotic symptom and onset date of first psychotic episode were determined by consensus conference using a best estimate approach based on all available information, including patient report on the SCID-Patient Interview, outpatient therapist report, family report, and medical records.

The current study utilized mean social, academic, and total maladjustment ratings for childhood, early adolescence, and late adolescence. Adult social maladjustment ratings were not included in analyses because ratings for that period were not generated for the substantial minority of participants (25.7%) for whom psychosis onset occurred prior to adulthood and because the validity of these items as measures of social function is in question (Van Mastrigt and Addington, 2002).

2.3 Analyses

To identify demographic characteristics that could potentially confound the association between functioning and first-episode diagnosis, pairwise diagnostic group comparisons

¹Academic maladjustment as assessed on the PAS is not a measure of cognitive ability per se, but rather a gauge of adaptation to the school environment and scholastic performance.

were conducted using either t-test or chi-square analyses. Demographic characteristics that differed among diagnostic groups were then tested for correlation with PAS ratings in the total sample.

Associations between social, academic, and total premorbid maladjustment and first-episode psychotic disorder diagnosis were examined using logistic regression analysis. For all regression analyses, covariates were entered into the model first (when applicable), followed by premorbid maladjustment ratings. For each domain (social, academic, and total), binary logistic regression was performed first to examine the individual contribution of maladjustment at each developmental period to first-episode diagnosis (pairwise contrasts), without controlling for maladjustment at other ages. To evaluate change in functioning over time within diagnostic groups, paired t-tests were used to perform within-group comparisons of functioning between childhood and early adolescence, and between early adolescence and late adolescence. Unadjusted mean PAS ratings were used in these analyses to aid comparison with prior studies.

Second, the three diagnostic outcomes of schizophrenia, schizoaffective disorder, and psychotic mood disorder were modeled together utilizing multinomial logistic regression analyses. For each domain, standardized maladjustment ratings for childhood, early adolescence, and late adolescence were entered sequentially into a multinomial logistic regression model, following entry of any covariates, to examine developmental effects at each age while controlling for maladjustment at prior developmental periods. Multinomial logistic regression is an extension of logistic regression that allows simultaneous comparison of categorical outcomes with greater than two values, resulting in odds ratios for each of two diagnostic groups compared to a third “baseline” diagnosis. The baseline group can be changed to identify significant odds ratios in comparison to a new baseline, but the overall significance of the model is independent of the baseline chosen. To insure that all models utilized the same individuals, only participants with PAS data for all three developmental periods were included in multinomial analyses.

3. Results

3.1 Sample Characteristics

3.1.1 Psychotic disorder diagnosis—Of the 142 first-episode patients recruited between 1990 and 2009 that met inclusion and diagnostic criteria described above, 105 individuals had PAS ratings available for childhood, early adolescence, and/or late adolescence and thus were eligible for the current study. Participants for whom any PAS data were available completed more years of education at baseline [mean years (SD): 13.5 (3.3) versus 12.3 (3.1); $t = 1.96$, $p = .052$] and were ranked higher on socio-economic status (SES) [Hollingshead Four Factor Index (Cirino et al., 2002; Hollingshead, 1975)] [mean SES (SD): 32.1 (13.6) versus 26.8 (14.5); $t = 1.99$, $p = .049$] compared to those without PAS data. These groups did not differ on age at first episode, sex, race, or parental SES.

Among the 105 individuals included in the current study, the following mutually exclusive DSM-IV psychotic disorder diagnoses were present (n): schizophrenia (68), schizoaffective disorder, bipolar type (7), schizoaffective disorder, depressed type (15), bipolar I disorder with psychotic features (7), and major depressive disorder (MDD) with psychotic features (8). Consensus diagnosis was established at baseline and at each subsequent study visit utilizing all available information. Diagnosis did not change between baseline and subsequent follow-up visits (four, eight, and 26 weeks, and one, two, and four years post-baseline) in the majority of the sample (63.8%, $n = 67$). Diagnoses stabilized by 26 weeks for 13.3% ($n = 14$) of the sample and by one year for 21.9% ($n = 23$) of the sample. The

remaining single participant was diagnostically stable at 2 years. For the current study, final (stabilized) diagnoses were used.

PAS data for childhood and early adolescence were available for all 105 participants; of these individuals, 94 also had PAS ratings for late adolescence. Late adolescent ratings were not applicable for the 11 youngest participants (n): schizoaffective disorder (4), schizophrenia (5), and psychotic mood disorder (2). Thus, all 105 participants were included in bivariate logistic regression analyses and the 94 participants with PAS ratings for all three age groups were utilized in multinomial logistic regression analyses.

3.1.2 Diagnostic sub-group comparisons

3.1.2.1 Schizoaffective disorder subtypes: Pairwise comparisons indicated that patients with schizoaffective disorder, bipolar type, and those with schizoaffective disorder, depressed type, did not differ on age at first episode, sex, education, ethnicity, SES, or parental SES. Patients with schizoaffective disorder, bipolar type, received higher maladjustment ratings than patients with schizoaffective disorder, depressed type, on the PAS item “peer relationships” for early adolescence ($p = .008$). Groups did not differ on the other 13 PAS items. The schizoaffective disorder subtypes were combined in subsequent analyses to maximize sample size.

3.1.2.2 Psychotic mood disorders: Likewise, individuals diagnosed with bipolar I disorder with psychotic features or MDD with psychotic features did not differ on age at first episode, sex, education, ethnicity, or SES. Significant differences were found for parental SES [higher for Bipolar I vs. MDD ($p < .004$)]. Patients with MDD with psychotic features received higher maladjustment ratings than patients with bipolar I disorder with psychotic features on the PAS item “scholastic performance” for late adolescence ($p = .010$). Groups did not differ on the other 13 PAS items. These two groups were combined to form the “psychotic mood disorder” diagnostic group for subsequent analyses.

3.1.3 Demographic and clinical features of final diagnostic groups

3.1.3.1 Demographic variables: The three psychotic disorder diagnostic groups utilized in the current study were schizophrenia ($n = 68$), schizoaffective disorder ($n = 22$), and psychotic mood disorder ($n = 15$). Demographic characteristics for these diagnostic groups are presented in Table 1. Using a relaxed alpha of 0.10, pairwise comparisons indicated that these groups did not differ on age at first episode, sex, education, or ethnicity. Patient SES and parental SES were higher among individuals with psychotic mood disorders compared to those with schizophrenia (patient SES: $p = .087$; parental SES: $p = .013$) and parental SES was higher among patients with psychotic mood disorder versus those with schizoaffective disorder ($p = .010$). Schizophrenia and schizoaffective disorder did not differ from each other on either patient or parental SES.

3.1.3.2 Covariates: As patient and parental SES differed across diagnostic groups, their associations with PAS ratings were examined within the total sample (schizophrenia, schizoaffective, and psychotic mood disorders combined). Higher patient SES and parental SES were associated with better premorbid academic (but not social) adjustment during early adolescence (patient SES: $p = .005$; parental SES: $p = .008$) and late adolescence (patient SES: $p < .001$; parental SES: $p = .034$). Higher patient SES was also associated with better premorbid total adjustment in late adolescence ($p = .001$). Patient SES and parental SES were thus included as covariates in analyses concerning academic maladjustment; patient SES was included as a covariate in analyses of total maladjustment. No covariates were used in analyses of social maladjustment.

3.2 Premorbid Maladjustment and First-Episode Diagnosis

3.2.1 Developmental period univariate effects on diagnosis—Figures 1 and 2 present the unadjusted social and academic maladjustment mean PAS ratings for the schizoaffective disorder, schizophrenia, and psychotic mood disorder groups, along with effects of maladjustment at each developmental period without controlling for maladjustment at other ages. All participants with data relevant to a particular developmental period are represented.

3.2.1.1 Social maladjustment: As shown in Figure 1, bivariate logistic regression analyses indicated that higher ratings (greater pathology) on childhood social maladjustment predicted significantly higher odds of schizoaffective disorder compared to psychotic mood disorder (OR = 2.02) and showed a trend compared to schizophrenia (OR = 1.47). In contrast, higher ratings on social maladjustment in late adolescence predicted significantly higher odds of schizophrenia compared to psychotic mood disorders (OR = 1.97). Groups did not differ on early adolescent social maladjustment.

Results of within-diagnostic group pairwise comparisons between childhood and early adolescence and between early adolescence and late adolescence indicated that schizophrenia was associated with a significant increase in social maladjustment between early and late adolescence ($p < .001$), whereas schizoaffective disorder patients showed a trend of improved social functioning from childhood to early adolescence ($p = .095$). No change in functioning was observed for individuals with psychotic mood disorders.

3.2.1.2 Academic maladjustment: In contrast to results for social maladjustment, academic maladjustment did not differentiate schizoaffective disorder, schizophrenia, and psychotic mood disorder (Figure 2) at any developmental period. Results did not change when analyses were performed without controlling for patient SES and parental SES (not shown).

Within-diagnostic group pairwise comparisons between childhood and early adolescence and between early adolescence and late adolescence indicated that schizophrenia was associated with a significant increase in academic maladjustment between childhood and early adolescence ($p < .001$) and between early and late adolescence ($p = .032$). Schizoaffective disorder patients showed a significant increase in academic maladjustment between childhood and early adolescence ($p = .010$) and a trend of increased academic maladjustment from early to late adolescence ($p = .078$). A trend of worsening academic adjustment between childhood and early adolescence was observed in patients with psychotic mood disorder ($p = .079$). Results did not change when patient SES and parental SES were excluded from the model.

3.2.1.3 Total maladjustment: Finally, total maladjustment (social and academic combined) predicted greater odds of schizoaffective disorder versus psychotic mood disorder when assessed for childhood (schizoaffective, mean = 2.30 vs. psychotic mood, mean = 1.38; OR = 2.99, $p = .013$), early adolescence (schizoaffective, mean = 2.38 vs. psychotic mood, mean = 1.68; OR = 2.75, $p = .028$), and late adolescence (schizoaffective, mean = 2.54 vs. psychotic mood, mean = 1.78; OR = 2.89, $p = .029$). Total maladjustment in late adolescence also predicted greater odds of schizophrenia versus psychotic mood disorder (schizophrenia, mean = 2.48 vs. psychotic mood, mean = 1.78; OR = 1.93, $p = .051$), but not in childhood (schizophrenia, mean = 1.83 vs. psychotic mood, mean = 1.38) or early adolescence (schizophrenia, mean = 2.17 vs. psychotic mood, mean = 1.68). Total maladjustment did not differentiate odds of schizoaffective disorder and schizophrenia at any age. Results did not change when analyses were performed without controlling for patient SES.

Within-diagnostic group pairwise analysis showed a significant increase in total maladjustment among schizophrenia patients between childhood and early adolescence ($p < .001$) and between early and late adolescence ($p < .001$). No developmental change in total maladjustment was found among schizoaffective patients or among patients with psychotic mood disorders. Results did not change when patient SES was excluded from the model.

3.2.2 Prediction of first episode diagnosis across development—The effects of childhood, early adolescent, and late adolescent functioning on odds of first-episode diagnosis of schizoaffective disorder, schizophrenia, and mood disorder with psychotic features were examined further using multinomial logistic regression analysis. In these analyses, developmental periods were entered sequentially into the model and pairwise contrasts among the three possible diagnostic outcomes were estimated simultaneously. Only participants with data for all three developmental periods were included in multivariate analyses.

3.2.2.1 Social premorbid maladjustment: Consistent with univariate analyses, the association held between social maladjustment in childhood and greater odds of schizoaffective disorder compared to odds of schizophrenia when early and late adolescence were included in the model ($OR = 3.42, p = .007$). The contrast between schizoaffective and psychotic mood disorder, reflecting worse functioning for those with schizoaffective disorder, was at the trend level ($p = .061$). Controlling for childhood and early adolescent maladjustment, greater social maladjustment in late adolescence was associated with lower (one-third) odds of schizoaffective disorder ($OR = 0.30, p = .043$) and with lower (one-fifth) odds of psychotic mood disorder ($OR = 0.20, p = .025$) compared to odds of schizophrenia. Parameters for the final model that includes all three developmental periods are presented in Table 2.

3.2.2.2 Academic premorbid maladjustment: Academic maladjustment ratings for childhood, early adolescence, and late adolescence were not associated with differential odds of being diagnosed with schizoaffective disorder versus schizophrenia versus psychotic mood disorder. Results did not change when patient SES and parental SES were not included as covariates in the model (not shown). Parameters for the final model that includes covariates and all three developmental periods are presented in Table 3.

3.2.2.3 Total premorbid maladjustment: Analyses indicated a significant association between worse total maladjustment in childhood and greater odds of schizoaffective disorder compared to odds of schizophrenia ($OR = 3.85, p = .015$) when early and late adolescence were included in the model. The contrast between schizoaffective and psychotic mood disorder, reflecting worse functioning for those with schizoaffective disorder, was at the trend level ($p = .056$). When patient SES was excluded from the model (not shown), the contrast between schizoaffective and psychotic mood disorder no longer approached significance ($OR = 2.50, p = .150$). No other comparisons were significant. Model parameters for the final model are presented in Table 4.

4. Discussion

This first-episode study examined specificity of social and academic premorbid dysfunction to schizophrenia, schizoaffective disorder, and mood disorder with psychotic features. Primary findings were as follows:

- In childhood, greater social or total maladjustment predicted significantly higher odds of schizoaffective disorder compared to odds of schizophrenia.

- In late adolescence, greater social maladjustment predicted significantly lower odds of either schizoaffective or psychotic mood disorder compared to odds of schizophrenia.
- Psychotic mood disorder was not preceded by deterioration in premorbid social functioning.
- Decline in premorbid academic functioning was characteristic of all three diagnostic groups, but did not differentiate odds of receiving one diagnosis versus another.

4.1 Social and academic premorbid functioning in psychotic disorders

Across development, social and academic maladjustment differed in sensitivity to psychotic disorder diagnosis among study participants. This distinction between social and academic functioning is consistent with a number of previous observations (e.g., Allen et al., 2001; MacBeth and Gumley, 2008; Norman et al., 2005; Strauss et al., 1977) and implies that “total” premorbid adjustment is a heterogeneous construct. As such, diagnostic sensitivity and interpretability of total maladjustment ratings may be limited.

When social and academic functional domains were examined separately, premorbid social functioning was disrupted in both schizoaffective disorder and schizophrenia, but remained relatively intact and developmentally stable in participants with psychotic mood disorder. By contrast, deterioration in premorbid academic functioning was observed in all three diagnostic groups with comparable severity of academic dysfunction across developmental periods. Thus, social dysfunction prior to psychosis onset appears to be associated specifically with the development of schizophrenia-spectrum psychotic disorders relative to psychotic mood disorders, at least in the current sample, whereas premorbid decline of academic functioning may be a non-specific correlate of psychosis-related illness. Although these findings are preliminary given the small sample size, the results further suggest the possibility that premorbid maladjustment may not be diagnostically unique to schizophrenia. Instead, and in contrast to current diagnostic convention, schizoaffective disorder may be similarly preceded by a period of poor social functioning early in development, although without a significant decline over adolescence as observed in advance of psychosis onset in schizophrenia. Additionally, schizophrenia, schizoaffective disorder, and psychotic mood disorder may all be preceded by some degree of academic functional decline.

4.2 Social premorbid functioning in schizophrenia-spectrum disorders

In addition to the apparent specificity of premorbid social dysfunction to schizophrenia-spectrum disorders, the current results suggest significant developmental variation in the severity and timing of premorbid social dysfunction among individuals who develop schizophrenia versus schizoaffective disorder. In the current sample, individuals who received a diagnosis of schizophrenia reported progressive deterioration in social functioning between childhood and late adolescence and showed greater severity of social maladjustment in late adolescence than those with schizoaffective disorder. Less expected, childhood social dysfunction was more severe in schizoaffective disorder participants compared to schizophrenia participants and showed a trend for improvement in early adolescence. As such, worse childhood social functioning predicted higher odds of first-episode diagnosis of schizoaffective disorder, whereas worse social functioning in late adolescence (controlling for earlier maladjustment) predicted higher odds of schizophrenia.

These findings differ from earlier reports that schizophrenia and schizoaffective disorder patients show similar levels of social dysfunction, at least in childhood and early adolescence, and that deterioration of social functioning across development occurs in both

diagnoses (Norman et al., 2005; Saracco-Alvarez et al., 2009). However, these earlier findings were based on discrete comparisons of individual age groups. In the present study, univariate tests of social maladjustment at each developmental stage likewise did not strongly differentiate schizophrenia and schizoaffective disorder. Current results thus extend earlier findings by drawing attention to the potential for very early (pre-adolescent) developmental differences in premorbid social functioning between schizophrenia and schizoaffective disorder. These results further suggest that care should be taken in interpretation of cross-sectional analyses, as these tests may have lower sensitivity to diagnostic differences early in development.

If replicated in larger samples, evidence of child pathology in conjunction with a lack of social functional decline in schizoaffective disorder would imply important developmental differences from schizophrenia (and psychotic mood disorder). It is unclear why individuals who go on to develop schizoaffective disorder would show greater severity of social maladjustment in childhood compared to those who go on to develop schizophrenia or psychotic mood disorder. One possibility is that elevated childhood social dysfunction in schizoaffective disorder patients may reflect pre-adolescent onset of psychopathology in the form of pre-pubertal mood instability, in contrast to adolescent onset of mood symptoms typical of psychotic mood disorders and to the relative absence of mood symptoms in schizophrenia. Putative neurodevelopmental abnormalities associated with the nature and timing of symptom onset may also show diagnostically relevant variation early in development. If confirmed, observable differences in social functioning years prior to psychosis onset would have important implications for prediction of and perhaps early intervention for specific psychotic disorders.

The current results thus argue that differentiation of schizophrenia-spectrum psychotic disorders requires consideration of changes in functioning across premorbid development. Furthermore, these results provide preliminary support for a conceptualization of schizoaffective disorder as developmentally distinct from both schizophrenia and psychotic mood disorders such as bipolar I disorder with psychotic features. These findings are timely given the current debate on whether schizoaffective disorder constitutes a valid, separate diagnostic entity (Jager et al., 2011) and consideration given to potential revisions for DSM 5 that aim to enhance the reliability of schizophrenia-spectrum psychotic disorder diagnoses.

4.3 Limitations

To the best of our knowledge, this is the first report to directly compare individuals with schizoaffective disorder to those with psychotic mood disorders on premorbid adjustment. Given the relatively small number of schizoaffective disorder and psychotic mood disorder participants, current results must be considered preliminary, and statements about generalizability would be premature. Considering the potential impact of these findings, efforts to validate these results in larger samples will be an important contribution.

Limited sample sizes also precluded separate examination of bipolar I disorder with psychotic features and MDD with psychotic features, or the bipolar and depressed subtypes of schizoaffective disorder. It would be interesting to study premorbid functioning in each of these groups, particularly given the current debate regarding categorical versus dimensional characterization of psychotic disorders and efforts to characterize the prodromal phase in bipolar disorder (e.g., Correll et al., 2007).

Finally, the retrospective design of the PAS does raise the possibility of recall bias; however, predictive and concurrent validity of the PAS are well supported (Brill et al., 2008). Contemporaneous assessment of multiple developmental periods during the same interview could also bias recall, possibly inflating similarities across age periods. If so, the

magnitude of change in maladjustment across developmental periods could be underestimated in this study, although it seems unlikely that this would account for current results.

5. Conclusion

Study results provide preliminary evidence that social functioning is impaired in the premorbid phase of both schizophrenia and schizoaffective disorder, remaining relatively more intact among individuals who go on to develop psychotic mood disorders. Academic dysfunction may be broadly characteristic of premorbid development in individuals who go on to develop psychotic disorders, but is not specific to any particular diagnosis. Furthermore, disparities in the timing and severity of premorbid social dysfunction in schizophrenia and schizoaffective disorder suggest the possibility of important developmental differences between these disorders. Consideration of premorbid developmental changes in social functioning may enhance sensitivity to diagnostic differences among schizophrenia spectrum psychotic disorders.

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Figure 1.
Social Maladjustment across Development in Schizoaffective Disorder, Schizophrenia, and Psychotic Mood Disorder

Childhood: Schizoaffective > Psychotic Mood d/o, OR = 2.02; $p = .024$

Schizoaffective > Schizophrenia, OR = 1.47; $p = .058$

Early Adolescence: n.s.

Late Adolescence: Schizophrenia > Psychotic Mood d/o, OR = 1.97; $p = .031$

Note: Values in figure are unadjusted PAS ratings; n's for childhood and early adolescence are: schizoaffective d/o = 22, schizophrenia = 68, psychotic mood d/o = 15; n's for late adolescence are: schizoaffective d/o = 18, schizophrenia = 63, psychotic mood d/o = 13; logistic regression analysis was utilized for bivariate diagnostic comparisons; results not presented were not significant.

Figure 2. Academic Maladjustment across Development in Schizoaffective Disorder, Schizophrenia, and Psychotic Mood Disorder

Childhood: n.s., Early Adolescence: n.s., Late Adolescence: n.s.

Note: Values in figure are unadjusted PAS ratings; n's for childhood and early adolescence are: schizoaffective d/o = 22, schizophrenia = 68, psychotic mood disorder = 15; n's for late adolescence are: schizoaffective d/o = 18, schizophrenia = 63, psychotic mood disorder = 13; covariates for academic maladjustment are patient SES and parent SES; logistic regression analysis was utilized for bivariate diagnostic comparisons; all comparisons were not significant.

Table 1**Demographic Characteristics**

Demographic Characteristics	Diagnosis (n)			
	Total sample (105)	Schizophrenia (68)	Schizoaffective disorder (22)	Psychotic mood disorder (15)
Age at 1st episode: mean years (sd)	25.4 (7.5)	26.3 (7.3)	23.9 (8.5)	24.3 (6.4)
Sex: % male	60.9	63.2	68.2	46.7
Education: mean years (sd)	13.4 (3.2)	13.4 (2.9)	13.2 (4.4)	14.3 (3.0)
Ethnicity: % EuroAm/ %AfAm ^a	63.6 / 27.3	58.8 / 29.4	59.1 / 36.4	86.7 / 6.7
Patient SES: mean (sd)	31.8 (13.5)	31.3 (12.7)	30.8 (16.5)	37.6 (13.4) ^b
Parent SES: mean (sd)	39.8 (14.7)	39.6 (13.8)	38.1(12.6)	49.2 (11.3) ^{c, d}

^a Six response categories were utilized for ethnicity assessment: European American (EuroAm), African American (AfAm), East Asian, West Asian, Hispanic, other. The two categories with highest frequency are presented in the table, and therefore presented data does not sum to 100%.

^b versus schizophrenia, $p = .087$.

^c versus schizophrenia, $p = .013$.

^d versus schizoaffective disorder, $p = .010$.

Table 2
Social Premorbid Maladjustment and Prediction of Diagnosis

	Parameter estimates ^c		
	<i>B (SE)</i>	<i>p</i>	<i>OR (95% CI)</i>
Schizoaffective disorder ^a			
Intercept	−1.47 (0.32)	<.001	
Childhood social adjustment	1.23 (0.46)	.007	3.42 (1.39–8.41)
Early adolescent social adj.	0.18 (0.70)	.795	1.20 (0.30–4.73)
Late adolescent social adi.	−1.19 (0.59)	.043	0.30 (0.10–0.97)
Psychotic mood disorder ^a			
Intercept	−1.78 (0.38)	<.001	
Childhood social adjustment	0.10 (0.54)	.850	1.11 (0.39–3.17)
Early adolescent social adj.	0.70 (0.80)	.383	2.01 (0.42–9.62)
Late adolescent social adi.	−1.59 (0.71)	.025	0.20 (0.05–0.82)
Schizo affective disorder ^b			
Intercept	0.31 (0.46)	.494	
Childhood social adjustment	1.13 (0.60)	.061	3.09 (0.95–10.04)
Early adolescent social adj.	−0.52 (0.96)	.592	0.60 (0.09–3.95)
Late adolescent social adj.	0.40 (0.83)	.628	1.49 (0.29–7.59)

Note: Schizoaffective d/o, n = 18; schizophrenia, n = 63; psychotic mood disorder, n = 13.

^aReference group is schizophrenia.

^bReference group is psychotic mood disorder.

^cParameter estimates from standardized PAS ratings.

Table 3**Academic Premorbid Maladjustment and Prediction of Diagnosis**

	Parameter estimates^c		
	<i>B (SE)</i>	<i>p</i>	<i>OR (95% CI)</i>
Schizoaffective disorder^a			
Intercept	−2.08 (1.26)	.099	
Patient SES	0.02 (0.03)	.359	1.03 (0.97–1.08)
Parents' SES	−0.01 (0.02)	.847	1.00 (0.95–1.04)
Childhood academic adjustment	0.66 (0.49)	.180	1.93 (0.74–5.05)
Early adolescent academic adj.	−0.47 (0.62)	.448	0.63 (0.19–2.10)
Late adolescent academic adj.	0.50 (0.50)	.316	1.65 (0.62–4.38)
Psychotic mood disorder^a			
Intercept	−4.97 (1.56)	.001	
Patient SES	0.05 (0.03)	.088	1.05 (0.99–1.10)
Parents' SES	0.04 (0.03)	.120	1.04 (0.99–1.10)
Childhood academic adjustment	0.20 (0.67)	.761	1.23 (0.33–4.53)
Early adolescent academic adj.	−0.59 (0.78)	.447	0.55 (0.12–2.55)
Late adolescent academic adj.	0.38 (0.57)	.504	1.46 (0.48–4.44)
Schizoaffective disorder^b			
Intercept	2.89 (1.83)	.114	
Patient SES	−0.02 (0.03)	.543	0.98 (0.92–1.05)
Parents' SES	−0.05 (0.03)	.161	0.96 (0.90–1.02)
Childhood academic adjustment	0.46 (0.77)	.555	1.58 (0.35–7.13)
Early adolescent academic adj.	0.12 (0.92)	.893	1.13 (0.19–6.89)
Late adolescent academic adj.	0.12 (0.68)	.858	1.13 (0.30–4.28)

Note: Schizoaffective d/o, n = 18; schizophrenia, n = 63; psychotic mood disorder, n = 13; Covariates for academic maladjustment are patient SES and parent SES.

^aReference group is schizophrenia.

^bReference group is psychotic mood disorder.

^cParameter estimates from standardized PAS ratings.

Table 4

Total Premorbid Maladjustment and Prediction of Diagnosis

	Parameter estimates ^c		
	<i>B (SE)</i>	<i>p</i>	<i>OR (95% CI)</i>
Schizoaffective disorder ^a			
Intercept	−1.75 (0.91)	.055	
Patient SES	<0.01 (0.03)	.895	1.00 (0.96–1.05)
Childhood total adjustment	1.35 (0.56)	.015	3.85 (1.29–11.44)
Early adolescence total adj.	−0.50 (0.62)	.419	0.60 (0.18–2.05)
Late adolescence total adj.	−0.39 (0.50)	.436	0.68 (0.26–1.80)
Psychotic mood disorder ^a			
Intercept	−3.01 (0.96)	.002	
Patient SES	0.04 (0.02)	.144	1.04 (0.99–1.09)
Childhood total adjustment	<−0.01 (0.54)	.998	1.00 (0.35–2.85)
Early adolescence total adj.	−0.03 (0.66)	.959	0.97 (0.27–3.51)
Late adolescence total adj.	−0.60 (0.60)	.311	0.55 (0.17–1.76)
Schizoaffective disorder ^b			
Intercept	1.25 (1.21)	.299	
Patient SES	−0.03 (0.03)	.305	0.97 (0.91–1.03)
Childhood total adjustment	1.35 (0.71)	.056	3.85 (0.97–15.36)
Early adolescence total adj.	−0.47 (0.83)	.572	0.63 (0.12–3.20)
Late adolescence total adj.	0.22 (0.71)	.763	1.24 (0.31–5.00)

Note: Schizoaffective d/o, n = 16; schizophrenia, n = 62; psychotic mood disorder, n = 13; Covariate for total maladjustment is patient SES.

^aReference group is schizophrenia.

^bReference group is psychotic mood disorder.

^cParameter estimates from standardized PAS ratings.