ELSEVIER

Journal of Affective Disorders 108 (2008) 71–86

Journal of Affective Disorders

www.elsevier.com/locate/jad

Research report

Exploring the borders of the schizoaffective spectrum: A categorical and dimensional approach

Victor Peralta *, Manuel J. Cuesta

Psychiatric Unit, Virgen del Camino Hospital, Pamplona, Spain

Received 6 August 2007; received in revised form 21 September 2007; accepted 22 September 2007
Available online 29 October 2007

Abstract

Background: Schizoaffective disorder has long been considered as an intermediate condition between major mood disorders and schizophrenia, however, the nature of the relationship to these diagnoses remains unclear. We aimed at examining the nature of such a relationship in a mixed sample of psychotic disorders by using a dimensional and categorical approach to psychopathology.
Methods: Six-hundred and sixty psychotic inpatients were assessed for lifetime ratings of mania, depression, psychosis and incongruence, diagnosed according to Research Diagnostic Criteria, and classified as having nonaffective psychosis without mood syndromes ($n=429$), nonaffective psychosis with mood syndromes ($n=101$), schizoaffective disorder mainly schizophrenic ($n=41$), schizoaffective disorder mainly affective ($n=42$) or mood disorder with psychotic symptoms ($n=47$). We tested for associations of illness-related features including risk factors, premorbid, clinical and outcome variables with classes of disorders and lifetime ratings of psychopathology, and examined the relative contribution of categorical and dimensional representations of psychopathology in explaining disease characteristics.
Results: While categories at the extreme end of the psychotic spectrum meaningfully differed across a number of the illness-related variables, no substantial discontinuity was apparent between adjacent categories of psychotic disorders. Risk factors, premorbid adjustment, clinical features and impairment appeared to be present in a mostly monotonic continuous fashion from nonaffective psychoses to mood disorders with psychotic features. The overall association pattern of illness-related variables with mood and psychotic syndromes was largely independent of specific diagnostic categories, and the dimensional approach was neatly superior to the traditional diagnostic approach in explaining the characteristics of the illness.
Limitations: This was a cross-sectional study with retrospective assessment of illness-related-variables and lifetime psychopathology.
Conclusion: The results are compatible with the notion of the schizoaffective spectrum and with a continuum model of the psychotic illness.

Keywords: Schizoaffective disorder; Schizoaffective spectrum; Psychotic illness; Classification; Psychotic continuum

1. Introduction

Kraepelin (1919) initially described dementia praecox (now called schizophrenia) and manic-depressive illness (now called major mood disorder) as different nosological entities with different etiology, symptomatology and outcome, a position that is implicitly held in current

* Corresponding author. Psychiatric Unit, Virgen del Camino Hospital, Irunlarrea 4, 31008 Pamplona, Spain. Tel.: +34 848 422488; fax: +34 848 429924.
E-mail address: victor.peralta.martin@cfnavarra.es (V. Peralta).

0165-0327/$ - see front matter © 2007 Elsevier B.V. All rights reserved.
doi:10.1016/j.jad.2007.09.009

diagnostic systems. Despite the similar demographic features, clinicians have no difficulty in distinguishing the phenomenology of classic schizophrenia and classic psychotic mood disorders. However, many patients, if not the majority, do not present a classic picture, and a substantial proportion of them are difficult to assign to one diagnosis or other. In this context the diagnosis of schizoaffective disorder (SAD) has been used as a buffer zone to describe clinically this overlap (Blacker and Tsuang, 1992). The diagnosis of SAD has, however, remained both a clinical and a scientific conundrum. While it is widely acknowledged that classes of psychotic disorders have fuzzy boundaries, and that points of relative but not complete separation can be identified based on symptoms (Pope and Lipinski, 1978; Cuesta and Peralta, 1993, 1995; Peralta and Cuesta, 1999) the very true nature of these boundaries remains a matter of debate. A diagnosis of SAD critically depends on the diagnostic criteria of schizophrenia and mood disorders, thus any changes on them affects the conceptualization of SAD (Maj, 1984). Because diagnostic criteria for mood disorders, and particularly for schizophrenia, have changed over time and across nosological systems (Berner et al., 1992; Peralta and Cuesta, 2005), it is not surprising that SAD is perhaps the most debatable class of psychotic disorders. Indeed, a research diagnosis of SAD is characterized by poor diagnostic stability (Amin et al., 1999; Schwarz et al., 2000) and reliability (Maj et al., 2000). In terms of clinical manifestations, SDA occupies an intermediate position between schizophrenia and mood disorders, with some studies favouring a closer proximity to schizophrenia (Williams and McGlashan, 1987) and others to psychotic mood disorders (Lake and Hurwitz, 2006). Furthermore, as Levitt and Tsuang (1988) have argued, SAD is likely to be quite heterogeneous. Accordingly, the issue of the nature of SAD regarding its nosological status, and more specifically its relationship with schizophrenia and major mood disorders remains largely controversial (Brockington and Meltzer, 1983).

The concept of, as well as the diagnostic criteria for, SAD has changed considerably over the past several decades, and today there is no definition that is universally agreed upon for the disorder. The various definitions converge to define SAD as presenting a combination of schizophrenic and affective symptoms, but the diagnostic criteria differ as to the number, quality, duration and time sequence of the symptoms. These differences still persist in the last editions of the consensus classifications such as the International Classification of Diseases (ICD-10) and the Diagnostic and Statistical Manual (DSM-IV-TR). The Research Diagnostic Criteria (RDC) were the first operational criteria for SAD achieving widespread acceptance among researchers. The disorder was defined as the co-occurrence of a full mood syndrome and one of a set of "core schizophrenic" symptoms, such as bizarre delusions, first-rank symptoms, or nearly continuous hallucinations. A critical distinction was made between the mainly schizophrenic subtype, requiring persistence of psychosis for more than a week (or poor premorbid functioning) and the mainly affective subtype with no persistence of psychosis for more than a week (and good premorbid functioning). DSM-I and II defined "schizoaffective schizophrenia" as a mixture of schizophrenic and mood symptoms. In the DSM-III no diagnostic criteria were given for SAD and the disorder was moved out from the chapter on schizophrenia into a separate section of "psychotic disorders not elsewhere classified". The DSM-III-R reversed the DSM-III trend and moved SAD back into the schizophrenia section where it remains today in the DSM-IV-TR. In DSM-III-R and subsequent editions, patients with a major mood disorder and mood-incongruent psychotic features would correspond to a RDC diagnosis of SAD affective subtype, while patients with SAD would correspond to a RDC diagnosis of SAD schizophrenic subtype. In contrast to these systems, the ICD-10 uses a cross-sectional approach and stresses the simultaneous occurrence of psychotic and mood symptoms; thus, many of the patients identified as having SAD by ICD-10 would fall in the DSM-IV category of "mood-incongruent" mood disorders and in the RDC category of mainly affective subtype of SAD.

The uncertain nosological status of SAD may be a consequence of at least three related factors, namely, the intrinsic complexity and heterogeneity of the disorder, the lack of clear boundaries regarding both schizophrenia and major mood disorders, and the consideration of the disorder as a discrete nosological entity as implicitly assumed by a categorical diagnosis. Accordingly, we reasoned that exploring the characteristics of SAD in relation to other psychotic disorders combining categorical and dimensional approaches to diagnosis (Peralta and Cuesta, 2007a) might shed light about the nature of the disorder. The general aim of our study was to examine the relationships of SAD with nonaffective and affective psychotic disorders by using a dimensional and categorical approach. The categorical approach is aimed at answering the question of whether SAD may be meaningfully differentiated from its neighbouring conditions, thus is mood disorder with psychotic symptoms and nonaffective psychotic disorders. The dimensional approach is aimed at answering the question of whether the clinical correlates of mood and psychotic symptoms are dependent on diagnosis or not. The two approaches were examined by analyzing the association of a number of

illness-related variables including risk factors, premorbid, clinical and outcome variables with categories and dimensions of psychotic disorders. Specific aims of the study were: (i) to examine the severity and prevalence of lifetime mood syndromes across classes of psychotic disorders, (ii) to examine the distribution of illness-related variables across classes of psychotic disorders, (iii) to check for the relationships of characteristics of the illness with mood and psychotic dimensions before and after controlling for diagnosis, and (iv) to assess the relative contribution of the dimensional vs. categorical diagnostic approach in explaining disease characteristics.

2. Methods

2.1. Characteristics of the patients

The sample consisted of 660 psychotic inpatients who were consecutively admitted to the Psychiatric ward of the Virgen del Camino Hospital in Pamplona (Spain). Patients had to present psychotic symptoms to be included in the study. Exclusion criteria were mental retardation or other major neurologic disorder, severe drug abuse confounding diagnosis, and severe medical illness. A detailed description of the sample can be found elsewhere (Peralta and Cuesta, 2003). Briefly, the mean age at index assessment was 36.0 years (SD = 14.0), the mean age at onset was 26.9 years (SD = 10.6), and the average number of previous hospitalizations was 3.4 (SD = 4.3). Three-hundred and eighty-four patients (58%) were male. All the patients were evaluated by the authors, each of them assessing approximately the half of the patients. Patients were treated according to clinical choice and most of them (93%) were taking antipsychotic medication; the corresponding figures for benzodiazepines, antidepressants, mood stabilizers and electro-convulsive therapy being 20%, 14%, 13% and 5%, respectively. The study was carried out according to the declaration of Helsinki, it was approved by the local ethical committee and all the subjects or their legal representatives provided informed consent to participate.

2.2. Diagnostic assessment

Each patient undertook an extensive clinical, diagnostic and psychopathological assessment specifically designed to diagnose psychotic patients using a polydiagnostic methodology. A detailed description of the procedures and instruments can be found elsewhere (Peralta and Cuesta, 2003). The main diagnostic instrument was an updated version (Peralta and Cuesta, 1992) of the Manual for the Assessment of Schizophrenia (MAS) (Landmark, 1982), which was modified to accommodate the diagnosis of specific psychotic disorders according to RDC, DSM-IV and ICD-10. The MAS is a semi-structured interview for assessing characteristics of the illness and diagnosis from a polydiagnostic point of view, which provides comprehensive information on sociodemographic, premorbid and clinical features, current and past symptoms and signs, and course of the psychotic illness. Furthermore, the Leonhard system for classifying the endogenous psychoses (Leonhard, 1979) was also applied to all the patients following the criteria specified by this author (Leonhard, 1990). Information was obtained from personal interviews with the patients, current and past medical records, and informant interviews, usually with a first-degree relative. By combining all available information, a consensus best-estimate diagnosis was established for each patient under the four diagnostic systems.

For the purposes of the present study, we used the RDC and DSM-IV systems. For the sake of simplicity and group comparison (see below) we used the term nonaffective psychoses (NAP) to refer to the DSM-IV or RDC nonaffective and nonschizoaffective psychotic disorders.

2.3. Psychopathological assessment

For the present study the main outcome measure of psychopathology was the Bipolar Affective Disorder Dimension Scale (BADSS, Craddock et al., 2004). The BADSS was rated on a consensus basis by the two authors taking into account lifetime psychotic and affective psychopathology which was recorded using all the available information. The BADSS comprises four dimensions, each rated on a 0–100 scale, that measure four key domains of lifetime psychopathology: mania, depression, psychosis and incongruence. The mania and depression subscales provide specific cutoff points for rating subclinical, minor, major and severe affective syndromes. The psychosis subscale provides a measure of the proportion of psychotic illness in which psychotic symptoms have been present. The incongruence subscale provides information about the relationship between psychotic and affective syndromes on the basis of mood-congruence or incongruence of psychotic symptoms such as the temporal relationship between mood and psychotic symptoms. Inter-rater reliability for the BADSS was assessed in an independent sample of 34 consecutively admitted psychotic patients with schizophrenia ($n = 10$), schizoaffective disorder ($n = 4$), mood disorder ($n = 12$), and other psychotic disorders ($n = 8$). Intraclass correlation coefficients for the mania,

depression, psychosis and incongruence subscales were .92, .94, .93 and .84, respectively.

2.4. Illness-related variables

We selected a number of relevant risk factors, premorbid, clinical and outcome variables to examine their association with classes of psychotic disorders and dimensions of psychopathology. Risk factors included familial loading for schizophrenia and major mood disorders, and urbanicity level. Familial loading was assessed according to the procedure developed by Pak Sham (Verdoux et al., 1996) which takes into account a positive family history in first-degree relatives together with family size and age structure. The familial loading score is intended to summarize the extent of schizophrenic and mood disorder morbidity in the family by using a continuous measure of liability. For a detailed description of the procedure and familial data see Peralta and Cuesta (2007b). Level of urbanicity of place of residence during the first 15 years of live was scored as 0 (no urban environment), 1 (changing or semi-urban environment) and 2 (urban environment).

Premorbid variables included early family dysfunction as rated by the Global Family Environment Scale (Rey et al., 1997), and social and sexual premorbid adjustment as rated by the Phillips scale (Harris, 1975).

Clinical variables included age at illness onset, mode of onset (1 = acute, 2 = subacute, 3 = chronic), number of previous hospitalizations, response to the treatment at the index episode as measured by the efficacy index (Guy, 1976) rated 1 (marked improvement) to 4 (unchanged), alcohol/drug abuse as measured by the Addiction Severity Index (McLellan et al., 1980) and lifetime suicidality as measured on a 7-point scale ranging from 0 (no suicidal ideas) to 7 (repeated and severe suicidal attempts).

Outcome variables included course (rated 1 = single episode with full recuperation to 5 = chronic or continuous course), work and social activity as rated by the Strauss & Carpenter Prognosis Scale (Strauss and Carpenter, 1972) and the highest level of functioning in past year as rated by the Global Assessment of Functioning (GAF) scale (Endicott et al., 1976).

Inter-rater reliability for these variables has been reported elsewhere (Rey et al., 2000; Peralta and Cuesta, 2003) and found to be of adequate standard (ICC > .75).

2.5. Procedure and statistics

We examined the distribution of illness-related variables across classes of psychotic disorders (categorical approach) and their association with BADSS dimensions in the whole sample of psychotic disorders (dimensional approach). Group differences on continuous variables were assessed using analysis of the variance (ANOVA) and analysis of covariance (ANCOVA). The Sheffeé post hoc test was used to isolate specific group differences when a statistically significant omnibus F test was obtained. We also tested for linear trends to examine whether a continuous linear relationship existed for the illness-related variables across diagnostic groups. Group differences for categorical variables were assessed by means of the χ^2 statistic, and if significant, these analyses were followed by pairwise χ^2 analyses.

To examine the association between BADSS ratings and illness-related variables together with the influence of RDC diagnoses on these associations, each illness feature was the dependent variable in four sets of regression analyses, and the BADSS scores were the independent variables; age and gender were the only confounding factors in the first set, a diagnosis of schizophrenia was the confounding factor in the second set, a diagnosis of SAD in the third set and a diagnosis of major mood disorder in the fourth set. Lastly, in order to test the comparative validity of diagnosis and dimensions of psychopathology in predicting the illness-related variables, we used step-wise multiple regression analyses, where the goodness of fit of the model with: (a) only categories, (b) only dimensions, and (c) categories and dimensions, was expressed as the multiple correlation coefficient (R^2). All these analyses included age and gender as confounding factors.

3. Results

3.1. Diagnostic composition of the sample

The DSM-IV diagnostic breakdown of the patients was as follows: schizophrenia (n=358, 54.2%), schizophreniform disorder (n=61, 9.2%), schizoaffective disorder (n=37, 5.6%), major mood disorder (n=88, 9.6%), delusional disorder (n=27, 4.1%) and psychosis NOS (n=32, 4.8%). According to the RDC, the diagnoses were as follows: schizophrenia (n=421, 63.8%), psychosis NOS (n=109, 16.5%), SAD mainly schizophrenic (n=41, 6.2%), SAD mainly affective (n=42, 6.4%) and major mood disorder (n=47, 7.1%). Regarding RDC affective and schizoaffective disorders, the proportion of lifetime manic/bipolar or mixed subtypes was 92.7% for mainly schizophrenic SAD, 81% for mainly affective SAD, and 61.7% for psychotic mood disorder.

Table 1
Bipolar affective disorder dimension scale ratings expressed as means (95% C.I.) across the RDC classification of psychotic disorders

	Schizophrenia (n=421)	Psicosis NOS (n=109)	SAD mainly schizophrenic (n=41)	SAD mainly affective (n=42)	Psychotic mood disorder (n=47)
Mania	5.8 (4.1–7.5)	13.5 (8.3–18.9)	80.3 (73.2–87.4)	70.9 (60.4–81.3)	54.6 (42.7–66.5)
Depression	11.7 (9.5–13.9)	25.5 (19.1–31.9)	73.6 (63.9–83.4)	67.4 (56.4–78.3)	76.4 (68.5–84.5)
Psychosis	99.3 (98.8–99.6)	92.3 (88.8–95.8)	88.1 (85.0–91.1)	76.9 (71.5–82.4)	61.6 (54.4–68.9)
Incongruence	98.9 (98.3–99.5)	93.9 (91.5–96.5)	69.4 (64.5–74.4)	48.4 (42.8–54.0)	21.8 (14.8–28.7)

RDC = Research Diagnostic Criteria, NOS = not otherwise specified, SAD = schizoaffective disorder.

The concordance (kappa) of DSM-IV SAD with the RDC mainly schizophrenic and mainly affective subtypes was .84 ($p<0.0001$) and −.06 ($p=0.103$), respectively. More specifically, the agreement between a DSM-IV diagnosis of SAD and a RDC diagnosis of SAD mainly schizophrenic was 89%.

3.2. Lifetime mood and psychotic dimensions across categories of psychotic disorders

Table 1 presents BADSS ratings across the RDC classification of psychotic disorders. Mania and depression scores were lower in schizophrenia, intermediate in the group of psychosis NOS, and higher in schizoaffective and mood disorders; in the last two disorders scores varied as function of subtype (manic or mixed vs. depressive). Psychosis and incongruence scores followed a continuum pattern of severity across categories of psychotic disorders ranging from schizophrenia (higher) to psychotic mood disorders (lower). As expected, mania and depression scores were highly correlated ($r=.56$, $p<0.0001$) as were incongruence and psychosis scores ($r=.73$, $p<0.0001$).

Because the RDC classification poorly characterizes the NAP group, which is limited to schizophrenia and psychosis NOS, we examined the severity and prevalence of mania and depression in the NAP group by using the more detailed DSM-IV classification. As shown in Table 2, lifetime prevalence rates of mania and depression significantly differed across NAP classes, with lower rates for schizophrenia and higher rates for psychosis NOS. The overall lifetime prevalence of mania, major depression and any major mood syndrome was 7.3, 16.4 and 20%, respectively. Major mood disorders were particularly prevalent in patients with brief psychotic disorder (31.6%) and psychosis NOS (68%).

Table 2
Prevalence[a] and severity of lifetime mania and depression ratings across the DSM-IV classification of nonaffective psychotic disorders

	Schizophrenia (S, n=358)	Schizophreniform disorder (SF, n=61)	Delusional disorder (DD, n=27)	Brief psychotic disorder (BPD, n=57)	Psychosis NOS (PNOS, n=32)	F or x^2 (df=4)	p	Post hoc comparisons
Mania								
Severity, mean (SD)	5.0 (16.7)	6.6 (18.6)	3.6 (18.1)	14.7 (26.5)	34.7 (38.5)	18.1	0.000	PNOS>BPD>SF, S, DD
Prevalence, n (%)	16 (4.5)	3 (4.9)	1 (3.7)	6 (10.5)	13 (40.6)	58.7	0.000	PNOS>BPD, SF, S, DD
Depression, n (%)								
Severity, mean (SD)	12.0 (24.1)	11.1 (22.0)	12.8 (24.8)	20.2 (28.0)	48.2 (33.7)	16.4	0.000	PNOS>BPD, DD, S, SF
Prevalence, n (%)	45 (12.6)	8 (13.1)	4 (14.8)	13 (22.8)	18 (56.3)	43.0	0.000	PNOS>BPD, DD, SF, S
Any mood syndrome								
Severity, mean (SD)	8.5 (16.9)	8.8 (16.1)	8.1 (14.6)	17.4 (21.6)	41.1 (29.5)	25.9	0.000	PNOS>BPD>SF, S, DD
Prevalence, n (%)	52 (14.5)	10 (16.4)	5 (18.5)	18 (31.6)	22 (68.8)	59.5	0.000	PNOS>BPD, DD, SF, S, BPD>S

[a] Prevalence was defined as the lifetime presence of mania or major depression as rated by the Bipolar Affective Disorder Dimension Scale.

3.3. Distribution of illness-related variables across categories of psychotic disorders

Given that the RDC diagnostic system provides a detailed classification of schizoaffective disorders, by differentiating between mainly schizophrenic and mainly affective subtypes, we used this system to examine the illness-related characteristics across the full spectrum of psychotic disorders, namely psychotic mood disorders, SAD mainly affective, SAD mainly schizophrenic and NAP, the latter group being further subdivided on the basis of the presence (NAP+) or absence (NAP−) of a lifetime history of a major mood syndrome according to the BADSS. Schizophrenia was overrepresented in the NAP− group compared with the NAP+ group (84% vs. 16%, $\chi^2=14.6$, $df=1$, $p=0.000$), thus the NAP− group was mainly made of patients with schizophrenia.

The five classes of psychotic disorders did not differ significantly in years of education ($F=0.54$, $df=4$, $p=0.706$) and years of illness duration ($F=2.09$, $df=4$, $p=0.09$). However, the groups did differ in age ($F=3.0$, $df=4$, $p=0.02$) and gender ($\chi^2=17.1$, $df=4$, $p=0.002$), thus age and gender were used as covariates in an ANCOVA analysis where the illness-related variables were the dependent variables and diagnostic grouping the fixed factor (Table 3). Three variables, familial

Table 3
Characteristics[a] of nonaffective psychoses (NAP), schizoaffective disorder (SAD) and psychotic mood disorder (PMD)

	NAP without a mood syndrome (NAP−, $n=429$)	NAP with a mood syndrome (NAP+, $n=101$)	SAD, mainly schizophrenic (SADS, $n=41$)	SAD, mainly affective (SADA, $n=42$)	Psychotic mood disorder (PMD, $n=47$)	Linear trend p	Comparison among groups		
							F	p	Post hoc comparisons
Risk factors									
Familial loading for schizophrenia	0.02 (.03)	−0.01 (.06)	0.06 (.10)	−0.11 (.09)	−0.10 (.09)	0.116	0.91	0.453	
Familial loading for mood disorders	−0.10 (.03)	0.18 (.05)	0.01 (.09)	0.07 (.09)	0.28 (.08)	0.001	9.02	0.000	PMD, NAP+>NAP−
Urbanicity	1.04 (.04)	0.99 (.08)	0.74 (.14)	0.71 (.14)	0.70 (.13)	0.003	3.22	0.012	ns
Premorbid factors									
Early family adjustment	71.7 (.94)	72.3 (1.94)	73.0 (3.05)	79.7 (3.01)	79.0 (2.85)	0.002	2.89	0.024	ns
Premorbid adjustment	5.97 (.13)	5.90 (.27)	4.76 (.43)	4.34 (.43)	3.65 (.40)	0.000	10.83	0.000	NAP−, NAP+>SADA, PMD
Clinical variables									
Age at onset	27.2 (.37)	25.5 (.76)	26.0 (1.21)	27.7 (1.19)	27.7 (1.13)	0.245	1.29	0.271	
Mode of onset	2.12 (.04)	2.02 (.07)	1.82 (.11)	1.86 (.11)	1.75 (.11)	0.001	4.61	0.001	NAP−>PMD
Number of hospitalizations	2.96 (.20)	3.75 (.42)	5.82 (.66)	5.58 (.65)	3.04 (.62)	0.191	7.45	0.000	SADS, SADA>NAP−; SADS>PMD
Addiction Severity Index	1.26 (.09)	0.86 (.19)	1.51 (.30)	0.96 (.30)	0.89 (.28)	0.352	1.54	0.189	
Suicidal thoughts/ behaviors	0.82 (.08)	1.32 (.18)	1.67 (.28)	1.51 (.28)	1.65 (.26)	0.004	5.43	0.000	SADS, PMD>NAP−
Response to treatment	2.10 (.04)	1.96 (.09)	1.74 (.14)	1.41 (.14)	1.26 (.13)	0.000	13.70	0.000	NAP−, NAP+>SADA, PMD
Outcome variables									
Course	2.46 (.06)	2.21 (.13)	1.94 (.20)	1.51 (.20)	1.42 (.19)	0.000	11.13	0.000	NAP−, NAP+>SADA, PMD
Work activity	1.99 (.07)	2.05 (.15)	1.98 (.24)	2.78 (.24)	2.91 (.23)	0.000	5.60	0.000	NAP−, NAP+>PMD; NAP−>SADA
Social contacts	1.96 (.08)	2.25 (.16)	2.49 (.26)	2.97 (.25)	3.41 (.24)	0.000	10.74	0.000	NAP−, NAP+>SADA, PMD
GAF, last year	58.5 (.79)	63.2 (1.63)	65.3 (2.57)	70.4 (2.53)	77.0 (2.39)	0.000	17.45	0.000	PMD>SADS, NAP+, NAP−; SADA>NAP−

ns = nonsignificant after Bonferroni correction.
[a] For each group, values are means (s.e.) after correcting for age and gender.

Table 4
Standardized beta coefficients of dimensions from the Bipolar Affective Disorder Dimension Scale relating to illness variables

	Mania	Depression	Incongruence	Psychosis
Familial loading for schizophrenia	−0.04	−0.07	0.07	0.07
	−0.03	−0.06	0.06	0.06
	−0.02	−0.06	0.07	0.07
	−0.02	−0.05	0.04	0.05
Familial loading for mood disorders	0.17***	0.23***	−0.16***	−0.11**
	0.11***	0.18***	−0.10**	−0.07
	0.15***	0.22***	−0.15***	−0.10**
	0.13***	0.18***	−0.07*	−0.03
Urbanicity	−0.08*	−0.14***	0.13**	0.17***
	−0.02	−0.08*	0.06	0.11**
	−0.02	−0.10**	0.09**	0.14**
	−0.06	−0.11**	0.07*	0.12***
Early family adjustment	0.13***	0.04	−0.11**	−0.09*
	0.10**	0.00	−0.07*	−0.05
	0.09**	0.01	−0.09*	−0.07
	0.11**	0.01	−0.05	−0.04
Premorbid adjustment	−0.21***	−0.17***	0.24***	0.19***
	−0.10**	−0.06	0.12***	0.09**
	−0.12***	−0.11**	0.18***	0.16***
	−0.16***	−0.10**	0.11***	0.09**
Age at onset	−0.14**	−0.03	−0.03	−0.03
	−0.16***	−0.05	−0.02	−0.02
	−0.14**	−0.03	−0.04	−0.03
	−0.16***	−0.05	−0.01	−0.01
Mode of onset	−0.19***	−0.11**	0.16***	0.11**
	−0.12***	−0.04	0.08*	0.04
	−0.13***	−0.06	0.11**	0.09*
	−0.16***	−0.06	0.08**	0.05
Number of hospitalizations	0.26***	0.15**	−0.08*	0.05
	0.24***	0.13**	−0.05	0.07*
	0.14***	0.07*	−0.01	0.10**
	0.27***	0.16**	−0.10**	0.03
Addiction severity index	−0.02	−0.07	0.05	0.03
	−0.01	−0.05	0.02	0.01
	−0.02	−0.08*	−0.05	0.03
	0.00	−0.05	0.02	0.01
Suicidal thoughts/behaviours	0.04	0.22***	−0.14**	−0.10*
	−0.02	0.17***	−0.08*	−0.04
	−0.03	0.18***	−0.11**	−0.07
	0.01	0.19***	−0.08**	−0.05
Response to treatment	−0.18***	−0.16***	0.27***	0.21***
	−0.10**	−0.08*	0.17***	0.18***
	−0.10**	−0.10**	0.21***	0.18***
	−0.13***	−0.09*	0.13***	0.10**
Course	−0.18***	−0.12**	0.25***	0.21***
	−0.10**	−0.03	0.16***	0.12***
	−0.10**	−0.05	0.20***	0.17***
	−0.14***	−0.06	0.14***	0.12***
Work activity	0.11**	0.04	−0.17***	−0.15***
	0.02	−0.05	−0.07*	−0.07
	0.08*	−0.07*	−0.15***	−0.14***
	0.07*	−0.01	−0.08**	−0.08*
Social contacts	0.23***	0.14***	−0.25***	−0.18***
	0.14***	0.04	−0.14***	−0.10**
	0.16***	0.09*	−0.21***	−0.16***
	0.18***	0.06	−0.12***	−0.08*

(continued on next page)

Table 4 (*continued*)

	Mania	Depression	Incongruence	Psychosis
Global assessment of functioning	0.22***	0.18***	−0.32***	−0.26***
	0.11**	0.07*	−0.20***	−0.16***
	0.14***	0.12***	−0.27***	−0.23***
	0.16**	0.10**	−0.16***	−0.13***

*$p<0.05$, **$p<0.01$, $p<0.001$.

Within each cell, values of the first line are adjusted by age and gender, values of the second, third and fourth line are adjusted by age and gender and controlled for a RDC diagnosis of schizophrenia, schizoaffective and mood disorder, respectively.

loading for schizophrenia, age at onset and severity of drug abuse, did not differ significantly across disorders and were the sole variables, together with number of hospitalizations, that did not show a significant linear trend across groups. Two variables, urbanicity level and early family adjustment, although differed significantly across groups ($p=0.012$ and 0.024, respectively), the statistical significance disappeared after univariate post hoc testing.

Those illness-related variables that significantly differed across groups generally discriminated between the extreme ends of the psychotic spectrum, and most importantly, no significant differences were observed between adjacent categories of psychotic disorders. The only exception to this rule was represented by the familial loading score for mood disorders, which was significantly higher in patients with NAP+ relative to patients with NAP− (mean difference=0.282, s.e.= 0.62, $p=0.000$).

Compared with NAP and psychotic mood disorder, the two classes of SAD occupied an intermediate position regarding most of the examined variables, although schizoaffective patients, and particularly those with the schizophrenic subtype, had the highest levels of previous hospitalizations and suicidality.

3.4. Relationship of lifetime mood and psychotic syndromes with illness-related variables

Associations between BADSS scores and illness characteristics before and after controlling for diagnosis are presented in Table 4. The two mood scores were significantly associated with familial loading for mood disorders, lower urbanicity level, better premorbid adjustment, a more acute onset, more hospitalizations, better response to treatment and better outcome (excepting that depression was unrelated to work activity). Additionally, mania was related to better early family adjustment, and depression to suicidality. The incongruence and psychosis scores were similar to each other in their pattern of associations with illness variables, although the strength of the associations was higher for the former. Overall, the two psychosis scores and the two mood scores were related to the same illness variables, but with an inverse association pattern. For example, higher mood scores were associated with lower premorbid adjustment ratings (better adjustment) and higher psychosis and incongruence scores were associated with higher premorbid adjustment ratings (worse adjustment).

After controlling for diagnosis, the majority of associations remained statistically significant, although the strength of the associations was weaker. Those associations the significance of which is lost after controlling for diagnosis are mainly concerned with the associations between mania and urbanicity, and between depression and course/outcome, thus indicating that the relationship of mood scores with these two variables is largely dependent on diagnosis. The type of RDC diagnosis which was controlled for (i.e. schizophrenia, SAD or mood disorder) did not alter meaningfully the association pattern. We repeated the analysis using the DSM-IV and ICD-10 classification of psychotic disorders and found that, with minor variations, all the findings were replicated (data not shown and available on request).

3.5. Relative contribution of diagnosis and dimensions of psychopathology in explaining the variability of illness-related variables

The results of comparing regressions models to assess the relative contribution of the BADSS dimensions and that of the RDC diagnosis in the variability of illness characteristics are presented in Table 5. Familial loading for schizophrenia, early family adjustment and severity of drug abuse were not explained by either dimensions or diagnosis. The dimensional approach was superior to the categorical one in explaining familial loading for mood disorders ($p<0.001$), age at onset ($p<0.01$), mode of onset ($p<0.001$), number of hospitalizations ($p<0.001$), response to treatment ($p<0.05$), course of the illness ($p<0.05$), work activity ($p<0.001$), social contacts ($p<0.01$) and global functioning ($p<0.01$). However,

Table 5
Regressions[a] of illness-related variables on RDC diagnosis, Bipolar Affective Disorder Dimension Scale ratings and a combination of diagnosis and dimensions

	Effect of diagnosis (Model 1)	Effect of dimensions (Model 2)	Combined effect of diagnosis and dimensions (Model 3)	Model comparison[b]
Risk factors				
Familial loading for schizophrenia	0.042	0.044	0.049	ns
Familial loading for mood disorders	0.042	0.098	0.099	3, 2>1***
Urbanicity	0.076	0.087	0.089	3>1*
Premorbid factors				
Early family adjustment	0.043	0.056	0.056	ns
Premorbid adjustment	0.116	0.113	0.120	3>2*
Clinical variables				
Age at onset	0.478	0.489	0.491	3,2>1**
Type of onset	0.034	0.048	0.049	3,2>1***
Number of hospitalizations	0.039	0.126	0.130	3,2>1***
Addiction severity index	0.098	0.102	0.102	ns
Suicidal thoughts/ behaviours	0.024	0.072	0.073	3,2>1***
Response to treatment	0.067	0.081	0.082	3,2>1*
Outcome variables				
Course	0.076	0.096	0.096	3,2>1**
Work activity	0.045	0.053	0.060	3>2*>1*
Social contacts	0.085	0.104	0.105	3,2>1**
Global assessment of functioning	0.112	0.134	0.135	3,2>1**

[a] Values are R^2 of the regression model indicating the goodness-of-fit of the model. All associations were adjusted by age and gender.
[b] Based on R^2 differences, * $p \leq 0.05$, ** $p \leq 0.01$, * $p \leq 0.001$.

the categorical approach did not show to be superior to the dimensional approach in any of the examined variables. A combination of diagnosis and dimensions seemed to add minimally to the explanation of dimensions in that the combined model was only superior in explaining premorbid adjustment ($p<0.05$) and work activity ($p<0.05$). This pattern of results remained virtually unchanged if, instead of RDC diagnoses, ICD-10 or DSM-IV diagnoses were used.

4. Discussion

4.1. Main findings

Mood symptoms and syndromes were found to be relatively prevalent in patients with a DSM-IV or RDC diagnosis of NAP in that a lifetime history of major mood syndromes could be ascertained in 20% of these patients. Patients with a DSM-IV diagnosis of brief psychotic disorder or psychosis NOS had a particularly high rate of mood syndromes (31.6 and 68%, respectively). Indeed, the residual DSM-IV category of psychosis NOS seems to comprise many patients with mood and psychotic features that do not meet the criteria for inclusion in the SAD category.

As would be expected from the diagnostic criteria, patients with SAD had characteristics between those with a diagnosis of NAP and those with psychotic mood disorders regarding risk factors, premorbid adjustment, clinical features and outcome. By dividing the group of patients with a diagnosis of NAP into those without (NAP−) and with (NAP+) a lifetime history of major mood syndromes we could demonstrate that the latter group represents an intermediate and large class between the “pure” NAP group (thus is without a lifetime history of mood syndromes) and the mainly schizophrenic SAD. In fact, patients with NAP+ and patients with the mainly schizophrenic subtype of SAD did not differ in any of the illness characteristics examined, which support the consideration of the NAP+ group as part of a broad

schizoaffective spectrum concept. Interestingly, with the sole exception of the two NAP subgroups, which significantly differed in familial loading for mood disorders, no other classes of psychotic disorders differed from their neighbouring conditions in any of the examined variables. Indeed, linear trend analysis showed that most of the variables displayed a gradient pattern of severity across classes of psychotic disorders. These findings support a spectrum concept of the psychotic illness in general, and of the schizoaffective disorders in particular, ranging from mood disorders with psychotic features to psychotic disorders without mood features.

Mania and depression were significantly associated with a number of variables such as familial loading for mood disorders, less urbanicity, better premorbid adjustment, a more acute onset, better response to treatment, higher number of hospitalizations, and an overall better outcome. Incongruence and psychosis dimensions were very similar to each other in their pattern of associations with illness variables, and this pattern was of inverse sign that that showed by mood syndromes. This "bipolar" association pattern between the two mood dimensions and the two psychotic dimensions may help to explain both the complex nature of the relationships between mood and psychosis and the heterogeneity of schizoaffective disorders regarding risk factors, clinical features and outcome. For all four BADSS ratings the strength of the associations generally decreased after controlling for diagnosis, but most of them continued to be significant. In line with this, we also found that symptom dimensions are clearly superior to diagnostic categories in explaining most of the illness characteristics examined in our study. In fact, a combined model of dimensions and categories adds very few to the explanation of illness characteristics supplied by symptom dimensions. The superiority of dimensional models over the more traditional categorical ones has recently been supported by independent groups, in different settings and samples of psychotic disorders (Van Os et al., 1999; Peralta et al., 2002; Rosenman et al., 2003; Dikeos et al., 2006). This converging evidence indicates that dimensional approaches to studying psychopathology may be more reflective of clinical reality and underlying aetio-pathology that are the categorical diagnosed-based approaches.

4.2. Comparison with the literature

Our findings are difficult to compare with those from previous studies mainly because only a few studies have used a RDC-based classification of the full spectrum of psychotic disorders including a differentiation between the mainly schizophrenic and mainly affective subtypes of SAD. Other factors hampering comparison include the use of different criteria for diagnosing SAD and variability in both sample composition and variables examined. Despite these differences, our results are in overall agreement with those reported in the literature that place SAD in an intermediate position between schizophrenia and mood disorders on virtually all investigated areas including familial liability (Angst et al., 1979; Maj et al., 1991; Taylor, 1992; Kendler et al., 1993; Bertelsen and Gottesman, 1995), neurobiology (Ketter et al., 2004), premorbid adjustment (Marneros et al., 1989a), symptoms (Kendell and Brockington, 1980; Peralta et al., 1997), response to treatment (Johnstone et al., 1988; Levinson et al., 1999) and outcome (Marneros et al., 1990;, Tsuang and Coryell, 1993; Harrow et al., 2000). Also our study provides further support for the notion that the schizophrenic subtype is closer to schizophrenia and related psychoses and the affective subtype is closer to mood disorder with psychotic features (Pope et al., 1980).

Our findings also need to be interpreted in the context of other studies that examined the validity of SAD regarding the prototypical diagnoses of schizophrenia and major mood disorders and found that SAD could be meaningfully differentiated from these diagnoses in some way. For example, Kendler et al. (1995) reported that DSM-III-R SAD statistically differed from schizophrenia and major mood disorder with respect to symptoms, course, outcome and patterns of familial psychopathology. Evans et al. (1999) compared DSM-III-R SAD with schizophrenia without mood symptoms and nonpsychotic mood disorder on a number of clinical and neuropsychological variables and, on the basis of a discriminant function analysis, they concluded that SAD is more closely related to schizophrenia than nonpsychotic mood disorder. However, in these studies and similar others, comparisons were made with the extreme conditions of schizophrenia and mood disorders rather than the boundary conditions of schizophrenia-related psychoses with mood symptoms on the one hand and psychotic mood disorders on the other. On the basis of our findings, it would be expected that these meaningfully differences would attenuate or even disappear if the most boundary conditions had been used as comparison groups.

We did not find an association between any of the categories of psychotic disorders and familial loading for schizophrenia, which is consistent with findings from family studies showing a family history of schizophrenia through the schizophrenia spectrum including psychotic mood disorders (Kendler et al.,

1993). Urbanicity is a meaningful risk factor for psychosis and particularly for schizophrenia (Van Os, 2004) that has also been related to the level of psychotic symptoms in bipolar disorders (Kaymaz et al., 2006). Our data extend these findings and support a dose-response pattern between urbanicity and psychosis type ranging from psychotic mood disorders (lowest) to psychoses without mood symptoms (highest). The only variable that differentiated the two types of SAD from mood disorder and NAP was the number of hospitalizations, which was significantly higher in SAD, a finding already reported in the literature (Pini et al., 2001; Benabarre et al., 2001). Early family adjustment has not been previously examined across psychotic disorders, and we found that patients with mainly affective SAD or psychotic mood disorder had better family adjustment that those with other diagnoses, although statistical differences disappeared after post hoc testing. Our data on suicidal behavior are in concordance with those of Radomsky et al. (1999) reporting higher rates of lifetime suicidal attempts in DSM-IV SAD compared with other classes of psychotic disorders.

To the best our knowledge, only two previous studies have examined the clinical correlates of lifetime scores of mania and depression in mixed samples of psychotic disorders together with controlling for diagnosis. In the study by Dikeos et al. (2006) mania was related to better premorbid adjustment, more acute onset, stressors before onset and better outcome, the latter being also reported in the study by Van Os et al. (1996). However, in the two studies the strength of the associations was markedly attenuated when diagnosis was taken into account. These studies did not report any meaningful association between depression and clinical variables. Differences in findings may be due to the fact that in these studies mood scores were obtained by means of factor analysis, which is a poor measure of severity, thus lacking enough power to detect correlates.

4.3. Implications for the schizoaffective spectrum concept and the nosology of SAD

The different empirical observations have led to at least four nosological hypotheses of SAD: (a) SAD is as a form of schizophrenia, (b) SAD is a form of affective illness, (c) SAD is an independent disorder, and (d) SAD is a heterogeneous condition. All these hypotheses, however, share the consideration of SAD as a discrete diagnosis that can be meaningfully differentiated from the diagnoses of schizophrenia and mood disorders. In a recent review of 257 studies on SAD, Lake and Hurwitz (2006) noted that 133 supported the heterogeneity hypothesis, 86 the affective hypothesis, 23 the schizophrenia hypothesis, 9 an independence hypothesis and 6 studies were inconclusive. Support for the heterogeneity hypothesis is overwhelming and indicates that patients diagnosed of SAD are heterogeneous in terms of heritability, clinical manifestations and outcome. This heterogeneity is well illustrated by the identification of up to 20 subtypes of SAD (Maj and Perris, 1985) and 10 different patterns of outcome (Maj and Perris, 1990). However, as our study demonstrates, heterogeneity does not occur in a random pattern but along a continuum of severity ranging from mainly affective SAD, through mainly schizophrenic SAD, to NAP with mood syndromes. In fact, although it is generally accepted that the schizophrenic subtype of SAD is closely related to schizophrenia and the affective subtype to mood disorders (Pope et al., 1980), with some authors suggesting that this is the true dividing line between these two prototypical disorders (Winokur et al., 1996), we could not demonstrate any significant difference between the two subtypes of SAD. Indeed, subtypes of SAD are best viewed as diagnostic conventions imposed on a continuum of mood and psychotic syndromes of varying severity, duration and impairment. Accordingly, the heterogeneity hypothesis may be reformulated as a continuum or spectrum hypothesis, which possesses an important heuristic value and seems to accommodate most of the available data on the disorder. The concept of diagnostic spectra was discussed by Kety et al. (1968) in relation to schizophrenia and by Akiskal et al. (1977) in relation to mood disorders. In this context, the schizoaffective spectrum may be best viewed as a broad and diffuse field of confluence between the schizophrenia and major mood disorder spectra (Marneros and Akiskal, 2007; Akiskal, 2007; Angst, 2007).

Additional support for a broad schizoaffective spectrum concept comes from the clinical practice realm. First, a diagnosis of SAD is substantially more common in clinical that in research settings in that 10–30% of psychotic patients admitted to a psychiatric ward are diagnosed as SAD (Azorin et al., 2005), whereas the corresponding figure for a research diagnosis is 5–12% depending on the diagnostic criteria used (McGorry et al., 1992, 1998; Ratakonda et al., 1998). Second, a clinical diagnosis of SAD seems to be much more stable over time than a research diagnosis (Woo et al., 2006). And third, about half of schizophrenia patients are treated with antidepressants or mood stabilizers (Chakos et al., 2006), and antipsychotic exposure in bipolar patients ranges from 55 to 100% depending on the phase of the illness considered (Tohen and Zarate, 1998). These data converge to indicate that current definitions of SAD

such as those included in the RDC, ICD-10 and DSM-IV classifications are far from capturing the complex clinical reality of the schizoaffective phenomenon (Maj and Perris, 1985; Marneros, 2003; Marneros and Akiskal, 2007). In fact, SADs are very unstable and polymorphous in the long run, as patients may present alternatively with schizoaffective episodes, pure mood episodes and pure psychotic episodes (Marneros et al., 1989b). These clinical features support the conceptualization of SAD as a fluctuating midpoint along the continuum of the psychotic illness and help to explain the poor stability and reliability of that diagnosis. Lastly, recent studies from the fields of genetic epidemiology, linkage, association, cytogenetics and gene expression provides accumulating suggestive evidence for some overlap in the genes that predispose to schizophrenia and bipolar disorder (Potash, 2006). More specifically, a number of genes such as G72 (Schumacher et al., 2004), DISC1, NRG1 and BDNF (Barretini, 2003; Craddock et al., 2006) seem to be particularly overlapping susceptibility genes and thus closely related to the schizoaffective spectrum.

4.4. Implications for a dimensional view of psychopathology and the continuum hypothesis of the psychotic illness

We suggest that the longstanding dispute about the nosological status of SAD is related to the issues of the continuum hypothesis and the categorical vs. dimensional approach for diagnosing psychotic disorders in general and SAD in particular. These issues are concerned with the three main implications of our data, namely that classes of psychotic disorders are clearly differentiated only at the extreme ends of the continuum, that the illness-related correlates of mood and psychotic syndromes are not diagnosis-specific, and that a dimensional approach to diagnosis is clearly superior to traditional diagnostic categories in explaining the characteristics of the psychotic illness. In fact, the continuum within the schizoaffective spectrum may be extended without clear points of rarity to NAP on the one side and to psychotic mood disorders on the other. On the whole, our results and most from the literature suggest that the current conceptualization of SAD may be arbitrary and not reflective of a natural discontinuity in mood and psychotic syndromes as experienced in a population of psychotic patients (Cuesta and Peralta, 2001). Accordingly, these findings support both a dimensional approach to psychopathology that cut across diagnostic categories and a continuum hypothesis of the psychotic illness. To quote Karl Jaspers (1913), it seems that, by using diagnostic categories, we are "drawing a line where none exits".

The dimensional approach to schizophrenic and mood syndromes (Yasami, 1987; Allardyce et al., 2007) is conceptually linked to the hypothesis of the continuum of the psychotic illness, which has been marshaled by Tim Crow on the basis of persuasive clinical and genetic evidence (Crow, 1986, 2007). A basic assumption of the psychotic continuum theory is that major mood disorders and schizophrenia are not distinct disorders but the extreme or prototypical conditions that lie along a continuum of etiology, pathophysiology, and clinical manifestations, thus is, there would be differences by degree, and not by kind, between the conventional categories of psychosis (Van Os et al., 1998). Under this view each patient can be thought of as having a unique mixture of symptoms from various domains and outcome, which are the result of the effect of various risk factors operating across a continuum. Accordingly, SAD rather than being a residual category actually represents the link between schizophrenia and mood disorders by means of which the two conditions are intimately connected. Whether this continuum is one of variation at a single disease (Crow, 1986; Lake and Hurwitz, 2007) or at a continuum of diseases (i.e. schizophrenia and major mood disorder) with both specific and common features (Murray et al., 2004; Ketter et al., 2004; McDonald et al., 2004) can not be directly inferred from our data and remains a matter of nuance.

4.5. Limitations

A major limitation of current diagnostic systems, including the RDC classification of psychotic disorders, is that definition of psychopathology items is not fully independent of diagnostic concepts. For example, poor premorbid adjustment is required for diagnosing the mainly schizophrenic SAD subtype, by which such trait is tautologically predicted by diagnosis. It must be noted, however, that the remaining illness-related variables were independent of the diagnostic criteria. The study sample was made of inpatients who were admitted due to illness exacerbation, and patients with mood disorders were included in the study only if they had psychotic symptoms during the index episode, accordingly findings may not apply to the whole population of psychotic disorders and nonpsychotic mood disorders. The relative low prevalence of mood disorders was a consequence of our ascertainment procedure, and it impeded us to examine further the bipolar/unipolar distinction in schizoaffective and mood disorders. Another limitation of our study is represented

by its cross-sectional nature with retrospective assessment of illness-related-variables and psychopathology; however, we relied on multiple sources of information to maximize accuracy, used standardized rating scales and inter-rater reliability was of adequate standard. Regression analysis assumes that variables are interval, however little is know about the psychometric properties of BADSS dimensions and there is a ceiling effect recognized. Therefore, although regression analysis is quite robust as concerns the distributional properties of the variables, caution should be taken in interpreting our results. Finally, it is possible that classes of psychotic disorders differ on measures that were not included in the present study.

5. Conclusions

In this study we addressed the nature of the relationship between SAD and its boundary conditions by examining the distribution of risk factors, clinical features and outcome across classes of psychotic and schizoaffective disorders (categorical approach) and their association with mood and psychotic syndromes (dimensional approach). From a categorical perspective, classes of disorders show relations of continuity rather than discontinuity, and more specifically, SAD appears to extend beyond classical definitions of the disorder to conform a broad category of schizoaffective spectrum disorders that includes NAP with a lifetime history of mood syndromes. The schizoaffective spectrum, as defined in this study, is composed by a group of disorders with no "points of rarity" within the spectrum itself, which in turn has no "points of rarity" with the nonaffective and purely affective classes of psychotic disorders. From a dimensional perspective, mood and psychotic symptoms show an association pattern with illness-related variables that, with minor exceptions, is largely independent of diagnostic categories. The categorical and dimensional approaches converge to indicate a continuum of severity or a graded balance between mood and psychotic dimensions across diagnostic categories. If SAD itself can not be clearly differentiated from both schizophrenia and psychotic mood disorders, but rather has relations of continuity with these diagnoses, then its conceptualization as a discrete category may be erroneous. All together, these findings support both a dimensional approach to diagnosis and a continuum or spectrum hypothesis of psychotic disorders where SADs represent the true center between the schizophrenic and mood spectra. The continuity vs. discontinuity issue is more than a theoretical question since it has profound implications for clinical practice. Clinicians must move away from traditional and empty debates about whether patients with a mixture of psychotic and mood symptoms "really" have schizophrenia or mood disorder, debates that often amount to trying to fit complex clinical problems into simplistic and exclusionary nosological models, at great costs in both clinical richness and treatment optimization. In this respect, a dimensional and continuum model, in either of the two meanings mentioned above, seems to accommodate better to clinical practice and research findings than any other nosological hypothesis. Given the overwhelming superiority of dimensional representations of psychopathology over and above the traditional diagnostic systems in explaining disease characteristics, there is an urgent need to incorporate dimensional measures of domains of psychopathology into the future DSM-V and ICD-11 classifications of psychotic disorders.

Role of funding source
Nothing declared.

Conflict of Interest
No conflict declared.

Acknowledgement

The authors thank Dr. Virginia Basterra for collaborating in the inter-rater reliability study of the Bipolar Affective Disorder Dimension Scale (BADSS).

References

Akiskal, H.S., 2007. The interface of affective and schizophrenic disorders: a cross between two spectra. In: Marneros, A., Akiskal, H.A. (Eds.), The Overlap of Affective and Schizophrenic Spectra. Cambridge University Press, Cambridge, UK, pp. 277–291.

Akiskal, H.S., Djenderedjian, A.M., Rosenthal, R.H., Khani, M.K., 1977. Cyclothymic disorder: validating criteria for inclusion in the bipolar affective group. Am. J. Psychiatry 134, 1227–1233.

Allardyce, J., Suppes, T., van Os, J., 2007. Dimensions and the psychosis phenotype. Int. J. Methods Psychiatr. Res. 16, 34–40.

Amin, S., Singh, S.P., Brewin, J., Jones, P., Medeley, I., Harrison, G., 1999. Diagnostic stability of first-episode psychosis. Comparison of ICD-10 and DSM-III-R systems. Br. J. Psychiatry 175, 537–543.

Angst, J., 2007. The bipolar spectrum. Br. J. Psychiatry 190, 189–191.

Angst, J., Ferder, W., Lohmeyer, B., 1979. Schizoaffective disorders. Results of a genetic investigation I. J. Affect. Disord. 1, 139–153.

Azorin, J.M., Kaladjian, A., Fakra, E., 2005. Current issues on schizoaffective disorder. Encephale 31, 359–365.

Barretini, W., 2003. Evidence for shared susceptibility in bipolar disorder and schizophrenia. Am. J. Med. Genet. C. Semin. Med. Gen. 123, 59–64.

Benabarre, A., Vieta, E., Colom, F., Martinez-Aran, A., Reinares, M., Gastó, C., 2001. Bipolar disorder, schizoaffective disorder and

schizophrenia: epidemiologic, clinical and prognostic differences. Eur. Psychiatr. 16, 1–6.
Berner, P., Gabriel, E., Katsching, H., Kieffer, W., Koehler, K., Lenz, G., Nutzinger, D., Shanda, H., Simhandl, C., 1992. Diagnostic Criteria for Functional Psychoses, 2nd edition. Cambridge University Press, Cambridge, UK.
Bertelsen, A., Gottesman, I.I., 1995. Schizoaffective psychoses: genetical clues to classification. Am. J. Med. Genet. 60, 7–11.
Blacker, D., Tsuang, M.T., 1992. Contested boundaries of bipolar disorder and the limits of categorical diagnosis in psychiatry. Am. J. Psychiatry 149, 1473–1483.
Brockington, I.F., Meltzer, H.Y., 1983. The nosology of schizoaffective disorders. Psychiatr. Dev. 4, 317–338.
Chakos, M.H., Glick, I.D., Miller, A.L., Hamner, M.B., Miller del, D., Patel, J.K., Tapp, A., Keefe, R.S., Rosenheck, R.A., 2006. Baseline use of concomitant psychotropic medications to treat schizophrenia in the CATIE trial. Psychiatr. Serv. 57, 1094–1101.
Craddock, N., Jones, I., Kirov, G., Jones, L., 2004. The Bipolar Affective Disorder Dimension Scale (BADSS) — a dimensional scale for rating lifetime psychopathology in bipolar spectrum disorders. BMC Psychiatry 4, 1–10.
Craddock, N., O'Donovan, M.C., Owen, M.J., 2006. Genes for schizophrenia and bipolar disorder? Implications for psychiatric nosology. Schizophr. Bull. 32, 9–16.
Crow, T.J., 1986. The continuum of psychosis and its implications for the structure of the gene. Br. J. Psychiatry 149, 419–429.
Crow, T.J., 2007. How and why genetic linkage has not solved the problem of psychosis: review and hypothesis. Am. J. Psychiatry 164, 13–21.
Cuesta, M.J., Peralta, V., 1993. Does formal thought disorder differ among patients with schizophrenic, schizophreniform, and manic schizoaffective disorders? Schizophr. Res. 10, 151–158.
Cuesta, M.J., Peralta, V., 1995. Are positive and negative symptoms relevant to cross-sectional diagnosis of schizophrenic and schizoaffective patients? Compr. Psychiatry 36, 353–361.
Cuesta, M.J., Peralta, V., 2001. Integrating psychopathological dimensions in functional psychoses: a hierarchical approach. Schizophr. Res. 215–229.
Dikeos, D.G., Wickham, H., McDonald, C., Walshe, M., Sigmundsson, T., Bramon, E., Grech, A., Toulopoulo, T., Murray, R., Sham, P., 2006. Distribution of dimensions across Kraepelinian divisions. Br. J. Psychiatry 189, 346–353.
Endicott, J., Spitzer, R.L., Fleiss, J.L., Cohen, J., 1976. The Global Assessment Scale: a procedure for measuring overall severity of psychiatric disturbance. Arch. Gen. Psychiatry 33, 766–771.
Evans, J.D., Heaton, R.K., Paulsen, J.S., McAdams, L.A., Heaton, S.C., Jeste, D.V., 1999. Schizoaffective disorder: a form of schizophrenia or affective disorder? J. Clin. Psychiatry 60, 874–882.
Guy, W., 1976. ECDEU Assessment Manual for Psychopharmacology. Department of Health, Education, and Welfare, Washington, D.C., U.S.
Harris, J.G., 1975. Abbreviated form of the Phillips' rating scale of premorbid adjustment in schizophrenia. J. Abnorm. Psychology 84, 129–137.
Harrow, M., Grossman, L.S., Herbener, E.S., Davies, E.W., 2000. Ten-year outcome: patients with schizoaffective disorders, schizophrenia, affective disorders and mood-incongruent psychotic symptoms. Br. J. Psychiatry 177, 421–426.
Jaspers, J., 1913. General Psychopathology. Manchester University Press and University of Chicago Press, Manchester. (Translated by Hoenig, J. and Hamilton, M., 1963).
Johnstone, E.C., Frith, C.D., Crow, T.J., Owens, D.G.C., 1988. The Northwick park "functional" psychosis study: diagnosis and treatment response. Lancet 16, 119–125 July.
Kaymaz, N., Krabbdendam, L., de Graaf, R., Nolen, W., ten Have, M., van Os, J., 2006. Evidence that urban environment specifically impacts on the psychotic but not the affective dimension of bipolar disorder. Soc. Psychiatry Psychiatr. Epidemiol. 41, 679–685.
Kendell, R.E., Brockington, I.F., 1980. The identification of disease entities and the relationship between schizophrenic and affective psychoses. Br. J. Psychiatry 137, 324–331.
Kendler, K.S., McGuire, M., Gruenberg, A.M., O'Hare, A., Spellmann, M., Walsh, D., 1993. The Roscommon family study I. Methods, diagnosis of probands, and risk of schizophrenia in relatives. Arch. Gen. Psychiatry 50, 527–540.
Kendler, K.S., McGuire, M., Gruenberg, A.M., Walsh, D., 1995. Examining the validity of DSM-III-R schizoaffective disorder and its putative subtypes in the Roscommon family study. Am. J. Psychiatry 152, 755–764.
Ketter, T.A., Wang, P.W., Becker, O.V., Nowakowska, C., Yang, Y.-S., 2004. Psychotic bipolar disorders: dimensionally similar to or categorically different from schizophrenia. Psychiatr. Res. 38, 47–61.
Kety, S.S., Rosenthal, D., Wender, P.H., Schulsinger, F., 1968. The types and prevalence of mental illness in the biological and adoptive families of adopted schizophrenics. J. Psychiatr. Res. 6 (Suppl 1), 345–362.
Kraepelin, E., 1919. Dementia Praecox and Paraphrenia. Krieger, Huntington, NY. Transtaled by Barclay, R.M., 1971.
Lake, C.R., Hurwitz, N., 2006. Schizoaffective disorders are psychotic mood disorders; there are no schizoaffective disorders. Psychiatry Res. 143, 255–287.
Lake, C.R., Hurwitz, N., 2007. Schizoaffective disorder merges schizophrenia and bipolar disorders as one disease — there are no schizoaffective disorders. Curr. Opin. Psychiatry 20, 365–379.
Landmark, J., 1982. A manual for the assessment of schizophrenia. Acta Psychiatr. Scand. 65 (Suppl. 298), 1–88.
Leonhard, K., 1979. The Classification of Endogenous Psychoses, 5th ed. Irvington, New York.
Leonhard, K., 1990. Defferenzierte Diagnostik der Endogenen Psychosen unter Anlehnung an einem Symptomenkatalog. Psychiatr. Neurol. med. Psychol. 42, 136–145.
Levinson, D.F., Umapathy, C., Musthaq, M., 1999. Treatment of schizoaffective disorder and schizophrenia with mood symptoms. Am. J. Psychiatry 156, 1138–1148.
Levitt, J.J., Tsuang, M.T., 1988. The heterogeneity of schizoaffective disorder: implications for treatment. Am. J. Psychiatry 145, 926–936.
Maj, M., 1984. The evolution of some European concepts relative to the category of schizoaffective psychoses. Psychopathology 17, 158–167.
Maj, M., Perris, C., 1985. An approach to the diagnosis and classification of schizoaffective disorders for research purposes. Acta Psychiatr. Scand. 72, 405–413.
Maj, M., Perris, C., 1990. Patterns of course in patients with a cross-sectional diagnosis of schizoaffective disorder. J. Affect. Disord. 20, 71–77.
Maj, M., Starace, F., Pirozzi, R., 1991. A family study of DSM-III-R schizoaffective disorder, depressive type, compared with schizophrenia and psychotic and nonpsychotic major depression. Am. J. Psychiatry 148, 612–616.
Maj, M., Pirozzi, R., Formicola, A.M., Bartoli, L., Bucci, P., 2000. Reliability and validity of the DSM-IV diagnostic category of

schizoaffective disorder: preliminary data. J. Affect. Disord. 57, 95–98.
Marneros, A., 2003. The schizoaffective phenomenon: the state of the art. Acta Psychiatr. Scand. 108 (Suppl. 418), 29–33.
Marneros, A., Akiskal, H.A., 2007. The Overlap of Affective and Schizophrenic Spectra. Cambridge University Press, Cambridge, UK, pp. 277–291.
Marneros, A., Rhode, A., Deister, A., Steinmeyer, E.M., 1989a. Premorbid and social markers of patients with schizoaffective psychoses. Fortschr. Neurol. Psychiatr. 57, 205–212.
Marneros, A., Rhode, A., Deister, A., 1989b. Unipolar and bipolar schizoaffective disorders. A comparative study. II. Long term course. Eur. Arch. Psychiatr. Neurol. Sci. 239, 158–163.
Marneros, A., Deister, A., Rhode, A., 1990. Psychopathological and social status of patients with affective, schizophrenic and schizoaffective disorders after long term course. Acta Psychiatr. Scand. 82, 352–358.
McDonald, C., Bullmore, E.T., Sham, P.C., Chitnis, X., Wickham, H., Bramon, E., Murray, R.M., 2004. Association of genetic risk factors for schizophrenia and bipolar disorder with specific and generic brain structural endophenotypes. Arch. Gen. Psychiatry 61, 974–984.
McGorry, P.D., Singh, B., Connel, S., McKenzie, D., Van Riel, R., Copolov, D., 1992. Diagnostic concordance in functional psychosis revisited: a study of inter-relationships between alternative concepts of psychotic disorder. Psychol. Med. 22, 367–378.
McGorry, P.D., Bell, R.C., Dudgeon, P.L., Jackson, H.J., 1998. The dimensional structure of first-episode psychosis: an exploratory factor analysis. Psychol Med. 28, 935–947.
McLellan, A.T., Luborsky, L., Woody, G.E., O'Brien, C.P., 1980. An improved diagnostic evaluation instrument for substance abuse patients. J. Nerv. Ment. Dis. 168, 26–33.
Murray, R.M., Sham, P., van Os, J., Zanelli, J., Cannon, M., McDonald, C., 2004. A developmental model for similarities and dissimilarities between schizophrenia and bipolar disorder. Schizophr. Res. 71, 405–416.
Peralta, V., Cuesta, M.J., 1992. A polydiagnostic approach to self-perceived cognitive disorders in schizophrenia. Psychopathology 25, 232–238.
Peralta, V., Cuesta, M.J., 1999. Diagnostic significance of Schneider's first-rank symptoms in schizophrenia. Br. J. Psychiatry 174, 243–248.
Peralta, V., Cuesta, M.J., 2003. The nosology of psychotic disorders: a comparison among competing classification systems. Schizophr. Bull. 29, 413–425.
Peralta, V., Cuesta, M.J., 2005. The underlying structure of diagnostic systems of schizophrenia: a comprehensive polydiagnostic approach. Schizophr. Res. 79, 217–229.
Peralta, V., Cuesta, M.J., 2007a. A dimensional and categorical architecture for the classification of psychotic disorders. World Psychiatry 6, 36–37.
Peralta, V., Cuesta, M.J., 2007b. The relationship between syndromes of the psychotic illness and familial liability to schizophrenia and major mood disorders. Schizophr. Res. 91, 200–209.
Peralta, V., Cuesta, M.J., Farre, C., 1997. Factor structure of symptoms in functional psychoses. Biol. Psychiatry 42, 806–815.
Peralta, V., Cuesta, M.J., Giraldo, C., Cardenas, A., Gonzalez, F., 2002. Classifying psychotic disorders: issues regarding categorical vs. dimensional approaches and time frame to assess symptoms. Eur. Arch. Psychiatry Clin. Neurosci. 252, 12–18.
Pini, S., Cassano, G.B., Dell'Osso, L., Amador, X.F., 2001. Insight into illness in schizophrenia, schizoaffective disorder, and mood disorder with psychotic features. Am. J. Psychiatry 158, 122–125.
Pope Jr., H.G., Lipinski, J.F., 1978. Diagnosis in schizophrenia and manic-depressive illness. Arch. Gen. Psychiatry 35, 811–828.
Pope Jr., H.G., Lipinski, J.F., Cohen, B.M., Axelrod, D.T., 1980. "Schizoaffective disorder": an invalid diagnosis? A comparison of schizoaffective disorder, schizophrenia and affective disorder. Am. J. Psychiatry 137, 921–927.
Potash, J.B., 2006. Carving chaos: genetics and the classification of mood and psychotic syndromes. Harv. Rev. Psychiatry 14, 47–63.
Radomsky, E.D., Haas, G.L., Mann, J.J., Sweeney, J.A., 1999. Suicidal behaviour in patients with schizophrenia and other psychotic disorders. Am. J. Psychiatry 156, 1590–1595.
Ratakonda, S., Gorman, Yale, S.A., Amador, X.F., 1998. Characterization of psychotic conditions. Use of the domains of psychopathology model. Arch. Gen. Psychiatry 55, 75–81.
Rey, J.M., Shing, M., Hung, S.F., Dossetor, D.R., Newman, L., Plapp, J.M., Bird, K.D., 1997. A global scale to measure the quality of the family environment. Arch. Gen. Psychiatry 54, 817–822.
Rey, J.M., Peng, R., Morales-Blanquez, C., Widyawati, I., Peralta, V., Walter, G., 2000. Rating the quality of the family environment in different cultures. J. Am. Acad. Child Adolesc. Psych 39, 1168–1174.
Rosenman, S., Korten, A., Medway, J., Evans, M., 2003. Dimensional vs. categorical diagnosis in psychosis. Acta Psychiatr. Scand. 107, 378–384.
Schumacher, J., Jamra, R.A., Freudenberg, J., Becker, T., Ohlraum, S., Otte, A.C.J., Tullius, M., Kovalenko, S., Van den Bogaert, A., Maier, W., Rietschel, M., Propping, P., Nöthen, M.M., Cichon, S., 2004. Examination of G72 and D-amino-acid oxidase as genetic risk factors for schizophrenia and bipolar disorder. Mol. Psychiatry 9, 203–207.
Strauss, J.S., Carpenter, W.T., 1972. The prediction of outcome in schizophrenia, I: characteristics of outcome. Arch. Gen. Psychiatry 27, 739–746.
Schwarz, J.E., Fenning, S., Tanenberg-Karant, M., Carlson, C., Craig, T., Galambos, N., Lavelle, J., Bromet, E.J., 2000. Congruence of diagnoses 2 years after a first-admission diagnosis of psychosis. Arch. Gen. Psychiatry 57, 593–600.
Taylor, M.A., 1992. Are schizophrenia and affective disorders related? A selective literature review. Am J. Psychiatry 149, 22–32.
Tohen, M., Zarate Jr., C.A., 1998. Antipsychotic agents and bipolar disorder. J. Clin. Psychiatry 59 (Suppl. 1), 38–48.
Tsuang, D., Coryell, W., 1993. An 8-year follow-up of patients with DSM-III-R psychotic depression, schizoaffective disorder, and schizophrenia. Am. J. Psychiatry 150, 1182–1188.
Van Os, J., 2004. Does the urban environment cause psychosis? Br. J. Psychiatry 184, 287–288.
Van Os, J., Fahy, T., Jones, P., Harvey, I., Lewis, S., Sham, P., Toone, B., Murray, R.M., 1996. Psychopathological syndromes in the functional psychoses: associations with course and outcome. Psychol. Med. 26, 203–208.
Van Os, J., Jones, P., Sham, P., Bebbington, P., Murray, R.M., 1998. Risk factors for onset and persistence of psychosis. Soc. Psychiatry Psychiatr. Epidemiol. 33, 596–605.
Van Os, Gilvarry, C., Bale, R., Van Horn, E., Tattan, T., White, I., Murria, R., 1999. A comparison of the utility of dimensional and categorical representations of psychosis. Psychol. Med. 29, 595–606.
Verdoux, H., van Os, J., Sham, P., Jones, P., Gilvarry, K., Murray, R., 1996. Does familiality predispose to both emergence and persistence of psychosis? A follow-up study. Br. J. Psychiatry 168, 620–626.

Williams, P.V., McGlashan, T.H., 1987. Schizoaffective psychosis. I. Comparative long-term outcome. Arch. Gen. Psychiatry 44, 130–137.

Winokur, G., Monahan, P., Coryell, W., Zimmerman, M., 1996. Schizophrenia and affective disorder—distinct entities or continuum? An analysis based on a prospective 6-year follow-up. Compr. Psychiatry 37, 77–87.

Woo, B.K.P., Sevilla, C.C., Obrocea, G.V., 2006. Factors influencing the stability of psychiatric diagnoses in the emergency setting: review of 934 consecutively inpatient admissions. Gen. Hosp. Psych. 28, 434–436.

Yasami, M.T., 1987. Schizoaffective disorder: a dimensional approach. Acta Psychiatr. Scand. 76, 609–618.