Schizophrenia Research 209 (2019) 164–170

Contents lists available at ScienceDirect

Schizophrenia Research

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

An empirical study of five sets of diagnostic criteria for delusional disorder

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ARTICLE INFO

Article history:
Received 28 December 2017
Received in revised form 29 April 2019
Accepted 30 April 2019
Available online 10 May 2019

Keywords:
Delusional disorder
DSM-III
DSM-III-R
DSM-IV
DSM-5
ICD-10

ABSTRACT

Background: The diagnosis of paranoia/delusional disorder has been significantly modified and redefined from DSM-III to DSM-5, which in turn also meaningfully differ from the ICD-10 criteria. In this study we examined the degree to which these diagnostic systems differ on external variables.
Method: Two-hundred and eighty-six subjects diagnosed of paranoia/delusional disorder according to DSM-III, DSM-III-R, DSM-IV, DSM-5 or ICD-10 criteria were examined for a number of validators including risk factors, premorbid features, illness-related variables and psychosocial functioning. The prevalence rates of the diagnostic criteria and their concordance level were examined, such as the degree to which the criteria sets and their main diagnostic features were differentially related to the validators.
Results: Diagnostic criteria showed poor to fair concordance. The most inclusive system was the DSM-5 ($n = 274$) and the most restrictive the DSM-III ($n = 187$). Compared with subjects fulfilling other diagnostic criteria, those with a DSM-III diagnosis showed more and stronger associations with the validators: presence of cluster A personality disorders, insidious illness onset, poor response to treatment, chronic illness course and poor psychosocial functioning. This association pattern was mainly due to the 6-month duration criterion. Stability of delusions, type of delusions and the ICD-10 3-month duration criterion were poorly related to the validators.
Conclusions: Diagnostic criteria for delusional disorder are not interchangeable. DSM-III criteria for paranoia may identify a more severe disorder mainly because the 6-month duration criterion. Type of delusions had a small impact on the validators across diagnostic systems. These findings have implications for future classifications of delusional disorder.

1. Introduction

Few psychiatric diagnoses have sparked as much controversy as paranoia/delusional disorder both historically and in current official classification systems. This is intriguing because most authors would agree that delusional disorder/paranoia is a disorder mainly defined by the presence of delusions that usually follows a chronic course and lacks other schizophrenia symptoms. Since the early descriptions of paranoia/delusional disorder, the disorder itself, its boundaries, diagnostic criteria, core assumptions, prevalence and clinical utility have all been subjects of great debate (Schifferdecker and Peters, 1995; Dowbiggin, 2000; Kendler, 2017). Probably as a result of the difficulties inherent to the concept, the diagnostic criteria for paranoia/delusional disorder have shifted substantially from DSM-III to DSM-5 (APA 1980, 1987, 1994 and 2013). Indeed, it has been claimed that the DSM concept of delusional disorder from the third edition onwards has much more changed than other diagnostic concepts such as mania, depression and schizophrenia (Kendler, 2017).The DSM-III set the first operational diagnostic criteria for paranoia of worldwide influence and in line with other psychiatric disorders it was based on a neoKraepelinian perspective. Kendler extensively examined the changes in the diagnostic criteria for paranoia/delusional disorder from DSM-III to DSM-5 and concluded that the successive editions increasingly moved away from a rather close Kraepelinian definition so that "by DSM-5 the syndrome of delusional disorder more closely resembled a broadly defined 'paranoia state' than Kraepilinian paranoia". Regarding the International Classification of Diseases, the tenth revision (ICD-10) (WHO, 1993) set the first operational criteria of (persistent) delusional disorder within this system and defined a syndrome halfway between the DSM-III and its successive revisions.

Major differences in the definition of paranoia/delusional disorder in DSM-III and successive editions and in ICD-10 include type of delusions endorsed, exclusion of hallucinations and duration criterion (Table 1). DSM-III only permitted paranoid and jealousy delusions, DSM-III-R,

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https://doi.org/10.1016/j.schres.2019.04.027
0920-9964/

Table 1
Major differences in the definition of paranoia/delusional disorder from DSM-III to DSM-5 and ICD-10.

	DSM-III	DSM-IIIR	DSM-IV	DSM-5	ICD-10
Name	Paranoia	Delusional Disorder	Delusional Disorder	Delusional Disorder	Delusional Disorder
Delusions	Chronic and stable delusions of persecution or jealousy	Nonbizarre delusions	Nonbizarre delusions	Any delusions	Nonbizarre delusions
Subtyping according to delusional content	No	Erotomanic, grandiose, jealous, persecutory, somatic	Erotomanic, grandiose, jealous, persecutory, somatic	Erotomanic, grandiose, jealous, persecutory, somatic and bizarre	Persecutory, litigious, self-referential, grandiose, somatic, jealous, erotomanic
Hallucinations	No prominent hallucinations	Auditory or visual hallucinations, if present, are not prominent	Tactile and olfactory hallucinations may be present if they are related to the delusional theme	If present, are not prominent and are related to the delusional theme	No persistent hallucinations in any modality (but there may be transitory or occasional auditory hallucinations that are not in the third person or giving a running commentary)
Duration criteria	6 months	1 month	1 month	1 month	3 months

DSM = Diagnostic and Statistical Manual, ICD = International Classification of Diseases.

DSM-IV and ICD-10 included nonbizarre delusions, and DSM-5 included all types of delusions. Of particular relevance appears to be the DSM-III 6-month duration criterion, with was changed to 1-month duration in the successive editions, with the 3-month duration of the ICD-10 system occupying and intermediate position. Regarding hallucinations, diagnostic systems converge to exclude prominent hallucinations with minimal modifications, albeit in DSM-IV delusion-related tactile and olfactory hallucinations of any intensity are allowed. Apart from the above-mentioned differences, diagnostic criteria virtually do not differ in terms of other diagnostic features. All five diagnostic systems converge in ruling out a diagnosis of schizophrenia and the DSM editions indicate, with minimal changes in wording, that apart from the influence of delusions, behavior is not odd or bizarre, and that negative symptoms and thought disorganization are lacking.

The different diagnostic criteria of paranoia/delusional disorder, likely differ in their prevalence rates, diagnostic boundaries and associated clinical features. To the best of our knowledge, no previous studies have empirically examined the extent to which the concept of paranoia/delusional disorder differ in the successive DSM editions from the third edition onward and in ICD-10; thus, it is appropriate to examine this question using external validators. The present article attempts to meet this challenge through examining the prevalence rates, concordance levels, risk factors, premorbid variables, illness-related features and psychosocial outcome across 5 sets of definitions of paranoia/delusional disorder. We hypothesized that the alternative diagnostic criteria would differ to some degree regarding the validators. More specifically, we predicted that the DSM-III concept of paranoia, mainly because the 6-month duration criterion, defines a more restrictive definition of the disorder with higher severity and poorer outcome than the other definitions.

2. Methods

2.1. Subjects

The study population was recruited from consecutive admissions to the Psychiatric Unit of the Virgen del Camino Hospital (since 2010 renamed Complejo Hospitalario de Navarra) between 1988 and mid 2017 (total number of new admissions = 8755). The procedures for subjects' recruitment, assessment and diagnosis have been described in detail elsewhere (Peralta and Cuesta, 2016a). Briefly, the study sample was drawn from consecutive new admissions of subjects presenting with a functional psychotic disorder ($n = 5078$). All the subjects underwent the same assessment procedures (see below) and most of them (92%) were assessed personally by one of the authors.

To be included in the study, subjects had to fulfil at least one of the five diagnostic criteria for paranoia/delusional disorder (DSM-III, DSM-III-R, DSM-IV, DSM-5 or ICD10) and complete inpatient treatment. Only subjects with high quality data from several sources, including information provided by a close relative were included in the study. Exclusion criteria were drug abuse confounding diagnosis, demonstrable or suspected brain disease, severe medical disease or intellectual disability. At admission, a total of 291 subjects met the inclusion and exclusion criteria and accepted to participate. At 1-year follow-up, 5 subjects changed the diagnosis (3 to schizophrenia, 1 to schizoaffective disorder and 1 to psychosis not elsewhere specified) and they were excluded from the study. Accordingly, the final study sample comprised 286 subjects. The study was approved by the local ethical committee, and all the subjects or their legal representatives provided informed consent to participate.

2.2. Procedure

To examine the degree to which the alternative diagnostic systems of paranoia/delusional disorder and their main diagnostic features differ, we used a number of external validators. Sets of diagnostic criteria and their distinctive diagnostic features were examined on 19 validators, which were grouped into the following domains (in parenthesis the number of validators within each domain): putative risk factors (5), premorbid features (3), illness-related variables (6) and 1-year psychosocial functioning (5). These validators' groupings also served as family of hypotheses to control for the Type I error rate. We also examined the comparative validity of subjects concordant for all 5 criteria sets with those discordant for these diagnostic criteria.

2.3. Assessments

A summary of the variables and assessment instruments used in this study is presented in the Supplementary Table 1. For the present study, the main instrument for assessing diagnostic criteria, demographics and most clinical variables was the Comprehensive Assessment of Symptoms and History (CASH) (Andreasen, 1987). The CASH is a semi-structured interview designed to provide a comprehensive information base concerning psychotic disorders including demographic variables, premorbid features, treatment, course, outcome, 74 sign and symptoms and a variety of illness-related features. Because of the information base is broad, the CASH is not wedded to a specific diagnostic system thus permitting to make diagnoses of psychotic disorders, including delusional disorder, using a wide range of diagnostic systems as well as the ICD-10 and the DSM-III and successive editions. CASH symptoms and diagnoses have shown good to excellent inter-rater reliability in our centre (Peralta et al., 2013). Among other rating scales, the CASH includes the Scale for the Assessment of Positive Symptoms (SAPS) that served to assess delusions. The SAPS rates 12 types of delusions, five

of them of bizarre content, on a six point Liker-type severity scale. Other variables assessed with the CASH included premorbid social and sexual functioning, stability of delusional themes over the illness course, drug abuse before illness onset, age at illness onset, mode of illness onset, number of previous hospitalizations, lifetime course pattern of the illness and the Global Assessment of Functioning (GAF).

A positive family history of schizophrenia spectrum psychoses (any non-affective psychosis) and major affective disorders was examined in the 1831 first-degree relatives aged ≥15 of the study subjects by means of the Family History-Research Diagnostic Criteria (Andreasen et al., 1977), which served to calculate the familial loading score that takes into account family size and age structure (Sham et al., 1994). Psychosocial stressors before illness onset were rated according to the psychosocial stressors scale from the DSM-III-R (APA, 1987). The quality of family environment of the subjects during childhood was retrospectively assessed with the Global Family Environment Scale (GFES, Rey et al., 1997). The GFES had been validated into Spanish by the authors showing good inter-rated reliability (Rey et al., 2000). Cluster A personality disorders were rated using the DSM-III-R check-list features for these disorders (APA, 1987). Lifetime depressive symptoms were rated with the depression subscale of the Bipolar Affective Disorder Dimension scale (BADDS, Craddock et al., 2004).

At index episode, patients were treated with antipsychotic medication according to clinical choice, and response to treatment was rated at the end of admission using the Clinical Global Impression Improvement Scale (CGI-IS) (Guy, 1976). Psychosocial functioning was rated over the last year using the GAF scale and the World Health Organization Short Disability Assessment Schedule (WHO/DAS-S) (WHO, 1988) at two time points: index admission and 1 year after discharge. At 1 year follow-up, 1 subject had died and 82 subjects were unavailable or refused to participate, accordingly the follow-up sample comprised 203 subjects (71% retention rate).

The ratings for the scales that were not available since the beginning of the study, namely the BADDS and the GFES, were retrospectively made on the basis of the background information, and after their publication, ratings were prospectively made.

2.4. Diagnosis of paranoia/delusional disorder according to sets of diagnostic systems

All the diagnostic systems were rated on the basis of the information base provided by the CASH using all available sources of information including direct interviews with the subjects, information provided by a close relative, and medical and psychiatric records. To minimize criterion and information variance for final research diagnoses, the authors arrived at independent diagnoses, reached a consensus and determined the final diagnosis according to the DSM-III, DSM-III-R, DSM-IV, DSM-5 and ICD-10 diagnostic criteria of paranoia/delusional disorder. Diagnoses of paranoid/delusional disorder before DSM-III and ICD-10 editions were not considered as they lack operational definitions; neither were considered the DSM-IV-TR criteria as they are the same as DSM-IV. For subjects recruited before DSM-IV, DSM-5 and ICD-10 criteria were available, ratings were retrospectively performed, while for subjects newly recruited when these instruments were already available the ratings were prospectively made.

2.5. Statistics

We first examined descriptive statistics for the validators across diagnostic systems. Agreement among classification systems was assessed using both the percent of concordance and the κ statistic.

To examine the association between the alternative diagnostic criteria and the validating variables we used generalized linear models. These models are appropriate for analysing the effects of continuous and categorical predictor variables on a discrete or continuous dependent variable and are robust for departures of normality. For the purposes of the study, the validators were the dependent variables, the different diagnostic systems were the fixed-effect factors, and age, gender and years of education were used as covariates in each set of analyses.

In a second step, we used the same statistical methodology to examine the associations between the specific diagnostic features of the different diagnostic systems and the validators, where the dependent variables were the validators, the specific diagnostic features (DSM-III 6-month duration criterion, DSM-III stability of delusions, type of delusions according to DSM-III and DSM-5, and the ICD-10 3-month duration criterion) were the fixed effects, and age, gender and years of education the covariates. The significance level was $\alpha = 0.05$, and all tests were 2 tailed. To adjust for type I statistical error we used the family-wise Bonferroni-Holm correction, and uncorrected and corrected p values were reported. Statistical analyses were performed with the SPSS 20.

3. Results

Two-hundreds and eighty-six subjects fulfilled at least one of the five sets of diagnostic criteria of paranoia/delusional disorder, which represents the 3.27% of all admissions for any psychiatric disorder and the 5.63% of all admissions for a functional psychotic disorder. One-hundred and sixty-two subjects were concordant for all diagnostic sets. The most inclusive system was the DSM-5 ($n = 274$, 95.8%) and the most restrictive the DSM-III ($n = 187$, 65.4%). All prevalence rates differed significantly from each other ($p < 0.001$).

The different diagnostic systems showed variable levels of agreement with an overall poor level of concordance (mean $\kappa = 0.37$, Table 2). The DSM-III-R and ICD-10 showed the highest concordance ($\kappa = 0.78$) and the DSM-IV and DSM-5 the lowest concordance ($\kappa = 0.07$). Compared with the other diagnostic systems, the ICD-10 showed the highest concordance level (mean $\kappa = 0.51$), followed by DSM-III-R (mean $\kappa = 0.49$), DSM-IV (mean $\kappa = 0.35$), DSM-III (mean $\kappa = 0.33$) and DSM-5 (mean $\kappa = 0.21$).

Most subjects showed an insidious onset ($n = 175$, 61.2%), a stable pattern of delusions ($n = 217$, 75,9%) and a chronic/continuous course of the disorder ($n = 177$, 61.9%). A minority of subjects presented with hallucinations of any intensity ($n = 63$, 22%) or prominent hallucinations ($n = 49$, 17.1%).

At 1-year follow-up, completers ($n = 203$, 71%) and non-completers ($n = 83$, 29%) did not differ in age [50.1 (S.D. = 15.2) vs 50.6 (S.D. = 16.2), $t_{284} = 0.245$, $p = 0.807$], gender [40 (48,2%) *v.* 109 (53.7%), $\chi^2 = 0.71$, $p = 0.398$], years of education [9.38 (S.D. = 2.78) *v.* 9.52 (S.D. = 2.66), $t_{284} = 0.387$, $p = 0.699$], severity of delusions [4.76 (S.D. = 0.46) *v.* 4.75 (S.D. = 0.51), $t_{284} = -0.187$, $p = 0.852$], and GAF [61.7 (S.D. = 17.3) *v.* 64.7 (S.D. = 15.6), $t_{284} = 1.371$, $p = 0.171$].

Table 3 shows descriptive statistics for the demographic and clinical variables across the diagnostic systems of paranoia/delusional disorder and Table 4 shows the significant associations between the alternative diagnostic criteria and the validators. Compared with subjects fulfilling other diagnostic criteria, those with a DSM-III diagnosis showed more and stronger associations with the validators. More specifically, and after correcting for by multiple testing, a DSM-III diagnosis was related

Table 2
Percentage of agreement (upper the diagonal) and concordance κ values (lower the diagonal) between different diagnostic criteria for paranoia/delusional disorder.

	DSM-III	DSM-IIIR	DSM-IV	DSM-5	ICD-10
DSM-III ($n = 187$, 65.4%)	*	74.8	69.2	69.6	79.0
DSM-III-R ($n = 235$, 82.2%)	0.37	*	85.3	86.4	93.0
DSM-IV ($n = 241$, 84.3%)	0.22	0.47	*	80.1	84.6
DSM-5 ($n = 274$, 95.8%)	0.15	0.34	0.07	*	82.9
ICD-10 ($n = 225$, 78.7%)	0.49	0.78	0.49	0.28	*

DSM = Diagnostic and Statistical Manual, ICD = International Classification of Diseases.
The asterisk corresponds to the corresponding author (Victor Peralta).

Table 3
Demographic and clinical variables across alternative diagnostic criteria for paranoia/delusional disorder ($n = 296$).

	Diagnostic criteria									
	DSM-III		DSM-III-R		DSM-IV		DSM-5		ICD-10	
	Present 187 (65.4%)	Absent 99 (34.6%)	Present 235 (82.2%)	Absent 51 (17.8%)	Present 241 (84.3%)	Absent 45 (15.7%)	Present 274 (95.8%)	Absent 12 (4.2%)	Present 225 (78.7%)	Absent 61 (21.3%)
Age	51.9 (15.4)	47.2 (15.2)	50.2 (15.5)	50.8 (15.8)	50.6 (15.5)	48.6 (15.6)	50.0 (15.6)	56.5 (12.4)	50.7 (15.4)	48.6 (15.9)
Gender, male, *n* (%)	98 (52.4)	51 (51.5)	124 (52.8)	25 (49.0)	127 (52.7)	22 (48.9)	144 (52.6)	5 (41.7)	119 (52.9)	30 (49.2)
Education, years	9.19 (2.65)	9.86 (2.88)	9.19 (2.65)	9.86 (2.87)	9.32 (2.72)	9.93 (2.83)	9.41 (2.73)	9.75 (3.22)	9.32 (2.74)	9.79 (2.73)
Familial loading for Schizophrenia Spectrum D.	8.17 (36.7)	7.07 (27.9)	8.24 (36.8)	7.06 (27.9)	7.89 (36.4)	7.26 (14.8)	7.94 (34.6)	4.37 (7.23)	8.39 (37.6)	5.59 (13.2)
Familial loading for Major Affective Disorders	2.07 (6.01)	1.90 (4.38)	1.87 (5.53)	1.90 (4.39)	1.97 (5.57)	2.31 (5.16)	2.04 (5.57)	1.49 (3.62)	2.00 (5.73)	2.10 (4.58)
Global family environment	68.6 (18.7)	73.0 (16.1)	68.6 (18.7)	73.0 (16.1)	70.0 (18.2)	70.8 (16.8)	70.4 (17.9)	63.5 (18.1)	69.7 (18.4)	71.7 (16.0)
Psychosocial stressors	1.10 (1.86)	0.94 (1.58)	1.10 (1.87)	0.94 (1.58)	1.03 (1.78)	1.09 (1.73)	1,08 (1.80)	0.25 (0.62)	1,10 (1.84)	0.84 (1.50)
Drug abuse before illness onset	0.80 (1.34)	0.72 (1.26)	0.79 (1.32)	0.68 (1.24)	0.81 (1.36)	0.53 (0.97)	0.75 (1.28)	1.16 (1.80)	0.77 (1.32)	0.77 (1.28)
Premorbid social functioning	4.79 (2.03)	4.47 (2.19)	4.79 (2.02)	4.47 (2.19)	4.76 (2.04)	4.29 (2.30)	4.66 (2.06)	5.28 (2.54)	4.70 (2.03)	4.61 (2.29)
Premorbid sexual functioning	1.22 (0.66)	1.22 (0.77)	1.22 (0.69)	1.22 (0.77)	1.23 (0.71)	1.19 (0.65)	1.21 (0.69)	1.54 (0.94)	1.21 (0.68)	1.29 (0.78)
Cluster A personality disorders, *n* (%)	64 (34.2)	18 (18.2)	68 (28.9)	14 (27.5)	70 (29.0)	12 (26.7)	79 (28.8)	3 (25.0)	67 (29.8)	15 (24.6)
Age at illness onset	40.3 (13.9)	37.2 (14.6)	38.8 (13.9)	41.1 (15.2)	39.6 (14.3)	37.2 (13.7)	38.8 (14.2)	48.3 (11.8)	39.3 (14.0)	39.1 (15.1)
Mode of onset	3.41 (0.96)	2.87 (1.23)	3.25 (1.07)	3.10 (1.20)	3.30 (1.04)	2.80 (1.27)	3.20 (1.10)	3.67 (0.79)	3.35 (1.00)	2.75 (1.27)
N. of previous hospitalizations	1.40 (1.64)	1.32 (1.21)	1.39 (1.55)	1.29 (1.25)	1.37 (1.54)	1.40 (1.32)	1.40 (1.51)	0.67 (0.89)	1.40 (1.58)	1.25 (1.16)
Lifetime depressive symptoms	17.7 (24.6)	16.4 (22.9)	18.4 (24.6)	18.3 (24.6)	17.8 (24.3)	14.4 (22.9)	17.0 (23.8)	22.2 (29.5)	18.1 (24.5)	14.1 (22.0)
Treatment response	2.93 (0.99)	2.28 (1.11)	2.77 (1.07)	2.41 (1.08)	2.78 (1.06)	2.31 (1.09)	2.73 (1.08)	2.25 (1.06)	2.84 (1.05)	2.20 (1.12)
Course pattern	1.61 (0.63)	1.13 (0.90)	1.49 (0.74)	1.24 (0.86)	1.50 (0.72)	1.18 (0.86)	1.46 (0.76)	1.17 (0.94)	1.56 (0.70)	1.05 (0.90)
1-year functional outcome										
	Present 140 (63%)	Absent 63 (31%)	Present 173 (85.2%)	Absent 30 (14.8%)	Present 169 (83.3%)	Absent 34 (16.7%)	Present 199 (98%)	Absent 4 (2%)	Present 169 (83.3%)	Absent 34 (16.7%)
Personal care functioning	0.40 (0.81)	0.25 (0.74)	0.38 (0.83)	0.17 (0.46)	0.37 (0.83)	0.26 (0.57)	0.36 (0.80)	0.25 (0.50)	0.40 (0.84)	0.12 (0.40)
Occupational functioning	1.88 (1.46)	1.42 (1.41)	1.80 (1.50)	1.40 (1.19)	1.84 (1.48)	1.23 (1.26)	1.75 (1.47)	1.50 (1.29)	1.88 (1.47)	1.06 (1.23)
Family functioning	2.88 (1.47)	2.00 (1.63)	2.71 (1.56)	2.00 (1.53)	2.72 (1.51)	2.05 (1.77)	2.63 (1.58)	1.25 (0.50)	2.83 (1.48)	1.50 (1.58)
Social functioning	2.21 (1.76)	1.65 (1.50)	2.04 (1.73)	2.03 (1.54)	2.04 (1.69)	2.00 (1.77)	2.06 (1.70)	1.00 (1.15)	2.12 (1.72)	1.61 (1.53)
Global Assessment of Functioning	58.6 (16.2)	68.6 (17.8)	61.3 (17.4)	63.9 (17.0)	60.5 (17.4)	68.0 (15.6)	61.8 (17.1)	59.7 (27.6)	59.8 (16.6)	71.1 (17.8)

Unless than otherwise specified, values are mean (S.D.)
Except for premorbid social and sexual functioning, global family environment and global assessment of functioning, higher ratings indicate more pathology.

Table 4
Significant associations between diagnostic criteria for paranoia/delusional disorder ($n = 286$) and risk factors, premorbid, illness-related and 1-year functioning variables.

	Diagnostic criteria				
	DSM-III	DSM-III-R	DSM-IV	DSM-5	ICD-10
	Wald (p)	Wald (p)	Wald (p)	Wald (p)	Wald (p)
Family global environment	5.869 (0.015)			10.51 (0.001)[b]	
Drug abuse before illness onset				4.621 (0.032)	
Cluster A personality disorders	7.385 (0.007)[a]				
Mode of onset	6.761 (0.009)[a]	5.034 (0.025)		4.192 (0.041)	14.3 (<0.001)[c]
Treatment response	7.655 (0.006)[b]				4.866 (0.027)
Course pattern	7.983 (0.005)[b]	4.728 (0.030)			8.954 (0.003)[b]
Occupational functioning	5.859 (0.016)[a]				5.454 (0.020)
Family functioning	5.479 (0.020)[a]				10.8 (<0.001)[b]
Social functioning	6.791 (0.010)[a]				
Global assessment of functioning	6.758 (0.009)[b]		5.123 (0.024)		9.794 (0.002)[b]

[a] [b] and [c], respectively indicate significant associations at $p < 0.05$, $p < 0.01$ and $p < 0.01$ levels after the Bonferroni-Holm correction for type I statistical error.

to cluster A personality disorders ($p < 0.05$), insidious illness onset ($p < 0.05$), poor response to treatment ($p < 0.01$), chronic illness course ($p < 0.01$) and all domains of poor functioning excepting personal care functioning. DSM-III-R and DSM-IV did not show any associations with the validators. The only association of DSM-5 was with a poorer family global environment ($p < 0.01$). Lastly, the ICD-10 system was related to an insidious illness onset ($p < 0.001$), a chronic illness course ($p < 0.01$), and poor family ($p < 0.01$) and global ($p < 0.01$) functioning. Subjects concordant for all 5 diagnostic criteria exhibited the same association pattern excepting that cluster A personality disorders and social functioning were unrelated to a concordant diagnosis of paranoia/delusional disorder (supplementary Table 2). Lastly, because of subjects were recruited across a large period, which may have influenced the results, the analyses were repeated controlling for the year entering the study; this re-analysis revealed that this variable did not influenced the results (data not shown).

Descriptive statistics for the validators and the distinctive diagnostic features of paranoia/delusional disorder are shown in Supplementary Table 3 and the significant associations in Table 5. The 6-month duration criterion (DSM-III) exhibited the most robust associations with the validators, and after controlling for multiple testing, this criterion was related to an insidious illness onset ($p < 0.001$), poor treatment response ($p < 0.001$), chronicity of course ($p < 0.001$), poor family functioning ($p < 0.01$), poor social functioning ($p < 0.01$) and poor global functioning ($p < 0.001$). The only associations of delusions of persecution or jealousy (DSM-III) and bizarre delusions (DSM-5) were with poor family functioning ($p < 0.01$) and acuity of illness onset ($p < 0.01$), respectively. Stability of delusions (DSM-III) and the 3-month duration (ICD-10) were both unrelated to the validators.

Given the high variability among diagnostic systems regarding the criteria for excluding hallucinations, we also examined the distribution of hallucinations across diagnostic systems (see Supplementary Table 4) such as the association of the different criteria for excluding hallucinations with the validators. After correcting for multiple testing, no significant associations were observed between the criteria for excluding hallucinations and the validators (data not shown).

4. Discussion

4.1. Main findings

This is the first study empirically examining the degree to which alternative diagnostic criteria for paranoia/delusional disorder differ on prevalence rates, risk factors, premorbid variables, illness-related features and psychosocial functioning. Four appear to be the main findings of our study. First, the prevalence rates of paranoia/delusional disorder highly varied across definitions such as their corresponding concordance levels. Indeed, the concordance level among diagnostic systems was low to fair, which was likely due to variability in diagnostic features such as duration criterion, type of delusions included and the remarkable inconsistency in the definition of hallucinations as exclusionary criterion. The DSM-5 system was the most inclusive system and showed the lowest concordance levels with other systems, which was probably due to the inclusion of bizarre delusions. The most restrictive system was the DSM-III, this mainly due to the six-month duration criterion and the constraint of delusional content to paranoid and jealousy themes. Second, the diagnostic system having more associations with the validators was the DSM-III, since it was related to the presence of

Table 5
Associations between distinctive diagnostic features of diagnostic systems of paranoia/delusional disorder ($n = 286$) and risk factors, premorbid, illness-related and 1-year psychosocial functioning variables.

	Specific diagnostic features				
	6-month duration (DSM-III)	Stability of delusions (DSM-III)	Delusions of persecution or jealousy (DSM-III)	Bizarre delusions (DSM-5)	3-month duration (ICD-10)
	Wald (p)	Wald (p)	Wald (p)	Wald (p)	Wald (p)
Familial loading of MMD	5.235 (0.022)	6.180 (0.013)			5.704 (0.017)
Drug abuse before illness onset			5.041 (0.025)		
Cluster A personality disorders			4.484 (0.034)		
Mode of onset	49.7 (<0.001)[c]			9.000 (0.003)[b]	
Treatment response	40.7 (<0.001)[c]				
Course pattern	54.2 (<0.001)[c]				
Occupational functioning	4.176 (0.041)				
Family functioning	11.50 (0.001)[b]		9.489 (0.002)[b]		
Social functioning	9.920 (0.002)[b]				
Global assessment of functioning	14.3 (<0.001)[c]				

[a] [b] and [c], respectively indicate significant associations at $p < 0.05$, $p < 0.01$ and $p < 0.01$ levels after the Bonferroni-Holm correction for type I statistical error.

cluster A personality disorders, an insidious illness onset, poor treatment response, chronicity of course and most indicators of 1-year poor psychosocial functioning. Third, this association pattern was mostly due to the 6-month duration criterion, since all the abovementioned variables, excepting cluster A personality disorders, were strongly related to this duration criterion. Fourth, all other distinctive diagnostic features were of minor relevance in differentiating among diagnostic systems as were risk factors and premorbid variables.

4.2. Comparison with the literature

Apart from excellent theoretical reviews comparing alternative definitions of paranoia/delusional disorder (Fear et al., 1998; Kendler, 2017), there are no previous studies with which to compare our data directly. However, some considerations of our results regarding the existing literature are in order. Our prevalence rates of delusional disorder concerning total psychiatric admissions for psychotic disorders are in the middle range of those reported in the literature (Kendler, 1982). A single previous study (Jäger et al., 2004) examining the concordance between ICD-10 and DSM-IV criteria for delusional disorder reported a kappa value of 0.92. This high concordance level was likely influenced by some false positive diagnoses, since this was a first-episode sample in which a diagnosis of delusional disorder conveys poor stability (Heslin et al., 2015).

Overall, our results are in accord with previous claims that variability of the clinical and outcome correlates of delusional syndromes are highly dependent on the diagnostic criteria employed (Schanda et al., 1984). Our data indicated that the 6-month duration criterion is critical in defining the chronicity of the disorder, since this criterion seems to underlie an insidious illness onset, poor response to treatment, higher course chronicity and poor psychosocial functioning of the DSM-III criteria relative to other diagnostic systems. This finding is consistent with a study of 72 first-admitted patients with delusional disorders who were followed after a mean of 10 years (Opjordsmoen and Retterstöl, 1991). These authors reported that those patients with a duration of delusions longer than 6 moths at admission displayed a poorer outcome at follow-up as measured by the GAF scale. Also in line with our findings, other studies have linked poor outcome delusional disorder with both a six-month duration criterion and an insidious onset (Retterstøl, 1966; Stephens et al., 2000). A major drawback of DSM-III criteria, however, is the restraint of delusional content to persecution or jealousy themes, which is at odds with Kraepelin's own view of paranoia as he also described other delusional contents such as delusions of grandiosity, hypocondriacal, and erotomania (Kraepelin, 1921).

Type of delusions included in diagnostic systems showed a paucity of associations with the validators, since only bizarre delusions were related to a more acute illness onset and delusions of persecution or jealousy were related to a poor family functioning. These findings are in accord with a strong line of evidence indicating that delusional content is a poor predictor of the clinical correlates of both delusions and psychotic disorders (Kendler, 1980; Appelbaum et al., 1999; Lincoln, 2007; So et al., 2015; Peralta and Cuesta, 2016b) and that bizarre delusions lack of specificity for schizophrenia (Peralta and Cuesta, 1999). Furthermore, stability of delusional themes over the illness course does not appear to be a meaningful distinctive feature between the different diagnostic criteria, which may be likely due to the fact that most subjects with delusional disorder (75.9%) showed stability of delusions.

4.3. Limitations

This study should be interpreted in the context of 5 potential methodological limitations. Firstly, this was a hospital-based sample and our study population was biased to the more severe forms of delusional disorder. The recruitment of subjects with delusional disorder possess important difficulties since only half of them have been in hospital and a minority of 21.4% are in current contact with community mental health services (Suvisaari et al., 2009). Otherwise, delusional experiences are continuously distributed in the general population, with actual delusions being placed at the extreme end of the continuum (Bebbington et al., 2013). Accordingly, it is likely that a substantial proportion, if not the majority, of subjects with a diagnosis of delusional disorder are not willing to be treated and remain out of mental health services (Manschreck, 1996); therefore, hospital samples will remain an important source for examining these subjects. Despite these caveats, and given the nature of our study, diagnostic criteria for delusional disorder are likely biased in the same direction of severity, and therefore the impact of this bias on our findings appears to be rather unlikely. Secondly, delusions were assessed using the SAPS, which only include as bizarre delusions the so-called first-rank symptoms (Schneider, 1959), also known as disorders of the ego-boundaries. There are, however, delusions with fantastic or bizarre content which are not in the realm of abnormal ego-boundaries (Spitzer et al., 1993; Fear et al., 1998); therefore, bizarre delusions might have been underrepresented in our study and thus the prevalence and correlates of a more broad definition of bizarre delusions remains unclear. Thirdly, diagnostic criteria and the validators were not assessed under blind conditions. Fourth, while we took a categorical approach to delusional disorders, the dimensional approach to delusions and delusional disorder may be a more valid approach than a strictly categorical one (Muñoz-Negro et al., 2015; Bebbington and Freeman, 2017). Fifth, some important validators were not examined in the present study; for example, neurocognitive functioning has been demonstrated to be an important factor underpinning functionality in delusional disorder (Diaz-Caneja et al., 2019). Lastly, criteria for diagnostic systems other than DSM-III and DSM-III-R were retrospectively made in a substantial proportion of subjects, and thus some inconsistence is possible regarding the application of diagnostic systems. Notwithstanding, the diagnosis of paranoia/delusional disorder is relatively easy to apply across the alternative diagnostic systems provided a high quality and standardized data collection, which was our case.

4.4. Implications for DSM-6 and ICD-11

As in other mental disorders, the definition of delusional disorder against a gold standard is a difficult enterprise mainly because such a standard does not exist and we need to rely on clinical criteria such as the course of the disorder. Even when considering the Kraepelinian concept of the disorder as based on chronic and stable delusions as the reference standard, it actually does not capture the own Kraepelin's view of paranoia as he acknowledged mild forms of the disorder characterized by a remitting course (Kraepelin, 1921; Kendler, 1988). Anyway, and in line with implementing a continuous improvement model in future DSM editions (First, 2016), our data raise some questions that could be useful in this regard. First, if the diagnostic criteria are intended to capture a disorder with essentially a chronic course, a minimum of 6-month duration of the delusions should be considered (Opjordsmoen, 1993). An additional advantage of the six-month criterion would be the alignment with the duration required for diagnosing schizophrenia according to the DSM, a disorder with which delusional disorder often needs to be differentiated in clinical practice. For the same reason, the duration criteria for schizophrenia and delusional disorder should be aligned in the ICD-11. Second, the inclusion of bizarre delusions does not appear to influence in a meaningful way the definition of the disorder; therefore, these delusions should be included in future revisions of DSM and ICD classifications. Third, given the poor clinical validity of the delusional content, future classifications should consider the content of delusions as specifiers rather than subtypes. Fourth, whereas there is some consensus about the exclusion of prominent hallucinations for diagnosing the disorder, the differentiation among types of hallucinations permitted appears to be irrelevant and highly arbitrary; one exception to this rule could be somatic and olfactory hallucinations related to the delusional (usually somatic) theme.

Conflict of interest

The authors report no financial or other relationship relevant to the subject of this article.

Contributors

Victor Peralta and Manuel J. Cuesta designed the study and conducted the evaluations. Victor Peralta performed the statistical analyses and wrote the first draft of the manuscript. The two authors contributed to and approved the final manuscript.

Funding

This study was partly funded by the Departamento de Salud del Gobierno de Navarra (grants 946/2005, 55/2007, 04/2010 and 031/2017), the Ministerio de Educación y Ciencia (grant SAF2008-05674-C03-02), and the Ministerio de Economía y Competitividad (grant PI16/02148).

Acknowledgements

None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.schres.2019.04.027.

References

A.P.A, 1980. Diagnostic and Statistical Manual for Mental Disorders. 3rd edn. American Psychiatric Association, Washington DC.
A.P.A, 1987. Diagnostic and Statistical Manual for Mental Disorders. 3rd edn. American Psychiatric Association, Washington DC revised.
A.P.A, 1994. Diagnostic and Statistical Manual for Mental Disorders. 4rd edn. American Psychiatric Association, Washington DC.
A.P.A, 2013. Diagnostic and Statistical Manual for Mental Disorders. 4rd edn. American Psychiatric Association, Washington DC.
Andreasen, N., 1987. Comprehensive Assessment of Symptoms and History (CASH). University of Iowa College of Medicine, Iowa.
Andreasen, N.C., Endicott, J., Spitzer, R.L., Winokur, G., 1977. The family history method using Research Diagnostic Criteria. Arch. Gen. Psychiatry 34, 229–1235.
Appelbaum, P.S., Robbins, P.C., Roth, L.H., 1999. Dimensional approach to delusions: comparison across types and diagnoses. Am. J. Psychiatry 156, 1938–1943.
Bebbington, P., Freeman, D., 2017. Transdiagnostic extension of delusions: schizophrenia and beyond. Schizophr. Bull. 43, 273–282.
Bebbington, P.E., McBridge, O., Steel, C., Kuipers, E., Radonovic, H., Brugha, T., Jenkins, R., Meltzer, H.I., Freeman, D., 2013. The structure of paranoia in the general population. Br. J. Psychiatry 202, 419–427.
Craddock, N., Jones, I., Kirov, G., Jones, L., 2004. The Bipolar Affective Disorder Dimension Scale (BADDS)–a dimensional scale for rating lifetime psychopathology in bipolar spectrum disorders. BMC Psychiatry 5, 4–19.
Diaz-Caneja, C.M., Cervilla, J.A., Haro, J.M., Arango, C., de Portugal, E., 2019. Cognition and functionality in delusional disorder. Eur Psychiatry 55, 52–60.
Dowbiggin, I., 2000. Delusional diagnosis? The history of paranoia as a disease concept in the modern era. His. Psychiatry. xi 37–69.
Fear, C.F., McMonagle, T., Healy, D., 1998. Delusional disorders: boundaries of the concept. Eur. Psychiatry. 13, 210–218.
First, M.B., 2016. Adopting a continuous improvement model for future DSM revisions. World Psychiatry 15, 223–224.
Guy, W., 1976. ECDEU. Assessment Manual for Psychopharmacology. NIMH Psychopharmacology Research Branch, Department of Health Education and Welfare, Rockville, MD.
Heslin, M., Lomas, B., Lappin, J.M., Donoghue, K., Reininghaus, U., Onyejiaka, A., Crouzade, T., Jones, P.B., Murray, R.M., Fearon, P., Dazzan, P., Morgan, C., Doody, G.A., 2015. Diagnostic change 10 years after a first episode of psychosis. Psychol. Med. 45, 2757–2769.
Jäger, M., Bottlender, R., Strauss, A., Möller, H.-J., 2004. Classification of functional psychoses and its implications for prognosis: comparison between ICD-10 and DSM-IV. Psychopathology 37, 110–117.
Kendler, K.S., 1980. Are there delusions specific for paranoid disorders vs. schizophrenia? Schizophr. Bul. 6, 1–3.
Kendler, K.S., 1982. Demography of paranoid psychosis (delusional disorder). Arch. Gen. Psychiatry 39, 890–902.
Kendler, K.S., 1988. Kraepelin and the diagnostic concept of paranoia. Compr. Psychiatry 29, 4–11.
Kendler, K.S., 2017. The clinical features of paranoia in the 20th Century and their representation in diagnostic criteria rrom DSM-III through DSM-5. Schizophr. Bull. 43, 332–343.
Kraepelin, E., 1921. Manic-depressive Insanity and Paranoia. Livingstone Press, Edinburgh, England.
Lincoln, T.M., 2007. Relevant dimensions of delusions: continuing the continuum versus category debate. Schizophrl Res 93, 211–220.
Manschreck, T., 1996. Delusional disorder: the recognition and management of paranoia. J. Clin. Psychiatry. 57, 32–38.
Muñoz-Negro, J.E., Ibanez-Casas, I., de Portugal, E., Ochoa, S., Dolz, M., Haro, J.M., Ruiz-Veguilla, M., deDios Luna Del Castillo, J., Cervilla, J.A., 2015. A dimensional comparison between delusional disorder, schizophrenia and schizoaffective disorder. Schizophr. Res. 163 (2), 248–254.
Opjordsmoen, S., 1993. The duration criteria of delusional disorder in modern classification. Psychopathology 26, 85–89.
Opjordsmoen, S., Retterstöl, N., 1991. Delusional disorder: the predictive validity of the concept. Acta Psychiatr. Scand. 84, 250–254.
Peralta, V., Cuesta, M.J., 1999. Diagnostic significance of Schneider's first-rank symptoms for schizophrenia. Comparative study between schizophrenic and non-schizophrenic psychotic disorders. Br. J. Psychiatry 174, 243–248.
Peralta, V., Cuesta, M.J., 2016a. Delusional disorder and schizophrenia: a comparative study across multiple domains. Psychol. Med. 46, 2829–2839.
Peralta, V., Cuesta, M.J., 2016b. Characteristics and clinical correlates of dimensions of delusional experience in schizophrenia and delusional disorder. Schizophr. Res. 176, 404–410.
Peralta, V., Moreno-Izco, L., Calvo-Barrena, L., Cuesta, M.J., 2013. The low- and higher-order factor structure of symptoms in patients with a first-episode of psychosis. Schizophr. Res. 147, 116–124.
Retterstøl, 1966. Paranoid and Paranoiac Psychoses. Charles C. Thomas, Springfield, IL.
Rey, J.M., Singh, 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. Amer. Acad. Child Adol. Psychiatry. 39, 1168–1174.
Schanda, H., Thau, K., Küfferle, B., Kieffer, W., Berner, P., 1984. Heterogeneity of delusional syndromes: diagnostic criteria and course prognosis. Psychopathology 17, 280–289.
Schifferdecker, M., Peters, U.H., 1995. The origin of the concept of paranoia. Psychiat. Clin. North America. 18, 231–249.
Schneider, K., 1959. Clinical Psychopathology. Grune & Stratton, New York.
Sham, P.C., MacLean, C.J., Kendler, K.S., 1994. A typological model of schizophrenia based on age at onset, sex and familial morbidity. Acta Psychiatr. Scad. 89, 135–141.
So, S.H., Tang, V., Leung, P.W.-L., 2015. Dimensions of delusions and attribution biases along the continuum of psychosis. PLoS One 10. https://doi.org/10.1371/journal.pone.0144558.
Spitzer, R.L., First, M.B., Kendler, K.S., Stein, D.J., 1993. The reliability of three definitions of bizarre delusions. Am. J. Psychiatry 150, 880–884.
Stephens, J.L., Richard, P., McHugh, P.R., 2000. Long-term follow-up of patients with a diagnosis of paranoid state and hospitalized, 1913 to 1940. J. Nerv. Ment. Dis. 188, 202–208.
Suvisaari, J., Perälä, J., Saarni, S.I., Juvonen, H., Tuulio-Henriksson, A., Lönnqvist, J., 2009. The epidemiology and descriptive validity of DSM-IV delusional disorder and subtypes of schizophrenia. Clin. Schizophr. Rel. Dis. 1, 289–297.
W.H.O, 1988. WHO Psychiatric Disability Assessment Schedule (WHO/DAS). World Health Organization, Geneva.
W.H.O, 1993. The ICD-10 Classification of Mental and Behavioral Disorders. Diagnostic Criteria for Research. World Health Organization, Geneva.