



Obsessive–compulsive symptom severity in schizophrenia: a Janus Bifrons effect on functioning

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Abstract The impact of obsessive–compulsive symptoms on functioning in schizophrenia is still debated. This study investigated the relationship between OC symptoms and functioning along a severity gradient of obsessive–compulsive dimension. Sixty patients affected by schizophrenia completed the SCID-IV, the Positive and Negative Syndrome Scale, the Yale-Brown Obsessive–Compulsive Scale and the Social and Occupational Functioning Assessment Scale. The relationship between functioning and obsessive–compulsive dimension was described by a reverse U-shaped curve; functioning was positively related to the presence of mild obsessive–compulsive symptoms and inversely related to moderate and severe symptoms, after controlling for the severity of positive, negative, disorganization and general psychopathological symptoms. The role of obsessive–compulsive symptoms on social functioning in schizophrenia occurs along a severity continuum with a gradual transition from a positive correlation (from absent to mild symptoms) to an inverse correlation (for symptoms ranging from moderate to severe) and independently from schizophrenia symptom dimensions.

Keywords Schizophrenia · Obsessive–compulsive symptoms · Positive and negative symptoms · Functioning · Dimension

In ancient Roman religion, Janus was the god of beginning and transitions and the guardian of doorways and gates.

He was usually represented with a two-faced head, looking both to the future and to the past, thus symbolizing the bivalent nature underlying any life movement or change.

Introduction

The rate of co-morbid obsessive–compulsive disorder (OCD) with both bipolar disorder and schizophrenia is high [1]. While co-morbid obsessive–compulsive symptoms (OCS) have been associated with poorer functioning as compared to “pure” bipolar disorder, with respect to schizophrenia, data seem more contradictory [2, 3]. In fact, over the time, the role of OCS on global functioning in schizophrenia has been changing from protective to worsening. While OC features were initially viewed as a compensatory attempt to delay the deteriorating course of the illness [4–6], following the seminal work by Fenton and McGlashan [7], OC phenomena have been associated with a worse clinical outcome and a greater disability [8]. The reason underlying the discrepancy across studies has been related to a phase-dependent effect of OC dimension on level of functioning, i.e., protective in early stages and deleterious in the later phases of the illness [9]. More recently, a 5-year follow-up study [10] has suggested that the severity of OC features might differentially impact social functioning in schizophrenia, with sub-threshold symptoms showing an improving effect and full-blown OCD a worsening one: Among patients with schizophrenia, those with OCS showed a better social functioning than both patients without OCS and with OCD. By contrast, a previous cross-sectional study [11] found no significant differences in

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social functioning between schizophrenia patients with OCS and OCD. To our knowledge, no study has so far adopted a dimensional approach in evaluating the relationship between OC phenomena and schizophrenia; all the above-mentioned studies in fact followed a categorical model (patients with OCD compared to patients without full-blown OCD).

Therefore, the present study was aimed at evaluating whether, in patients with schizophrenia, the relationship between OC dimension and functioning varies along a severity continuum, with a qualitatively different correlation moving from mild to severe OC symptoms.

Methods

Participants

The study enrolled subjects among schizophrenic patients who consecutively sought treatment at the Psychiatric Unit of the University Hospital of Parma from January 2012 to December 2012. Patients were included in the study if (1) they were aged over 17 years; (2) they received a diagnosis of schizophrenia, according to DSM-IV criteria; and (3) a written informed consent to study participation was obtained.

Moreover, in order to guarantee that the full range of severity of the obsessive–compulsive dimension was equally represented in the study sample, at least the first 25 patients with absent–mild OCS (YBOCS score lower than 16) and the first 25 patients with moderate–severe OCS (YBOCS higher than 15) were included in the study.

Patients were excluded if they were affected by (1) a current mental disorder related to a general mental condition or to a drug or alcohol abuse or dependence and (2) a cognitive disorder (Mini-Mental State Examination score lower than 25) which could impair the compliance with testing procedures.

Procedures

All patients completed: (1) the Structured Clinical Interview for DSM-IV Disorders (SCID-IV) [12]; (2) the Positive and Negative Syndrome Scale (PANSS) [13] for the evaluation of positive, negative and general psychopathology symptoms; (3) the Yale-Brown Obsessive–Compulsive Scale (YBOCS) [14] for the assessment of OC symptoms; and (4) the Social and Occupational Functioning Assessment Scale (SOFAS) [15] for the evaluation of the level of functioning.

According to DSM-IV diagnostic criteria [15], recurrent and persistent thoughts that were not related to individual delusional themes and hallucinations and were recognized by patients as intrusive, inappropriate and a product of his/

her own mind were considered as obsessions. Similarly, repetitive behaviors that the person felt driven to perform in response to an obsession and that were not interrelated with the content of delusions and/or hallucinations were defined as compulsions.

Five PANSS scores were used: positive symptoms, negative symptoms, disorganization, general psychopathology and total score. The disorganization score was computed by summing the items of conceptual disorganization (P2) and mannerisms and posturing (G5). A trained psychiatrist interviewed patients after the resolution of the acute phase of illness in order to guarantee an adequate cooperation to the assessment.

Drug treatment

All patients were treated with antipsychotics. Patients who had moderate–severe OC symptoms also received a serotonergic drug.

Statistical analysis

The interrelationship among the primary study variables and socio-demographic features was first examined using bivariate Spearman's correlations. A curve-fit analysis was then conducted to investigate the relationship between functioning (dependent variable: SOFAS score) and OC symptoms (independent variable: YBOCS total score). In particular, the analysis was used to evaluate whether the relationship between OC dimension and global functioning differed at varying levels of OCS severity. Next, a multivariate curvilinear regression analysis (enter method) was performed to evaluate whether OCS predicted functioning regardless of other clinical and demographic features. In each model, YBOCS score and PANSS positive, disorganization, general psychopathology and negative symptoms scores were entered as independent variables, while SOFAS score was the dependent variable. The historical and socio-demographic features, previously found to be related to SOFAS score in bivariate correlations, were controlled for in the regression analyses.

All statistical analyses were performed with SPSS for Windows (version 20.0, SPSS Inc., Chicago, IL, USA).

Results

Participants

The present study included 60 patients (38 males, 63.3 %). The historical, clinical and socio-demographic features of the sample are reported in Table 1 and their intercorrelations in Table 2. SOFAS and PANSS scores did not vary as a function of gender, while YBOCS total score was

Table 1 Socio-demographic and symptom features in patients with schizophrenia and obsessive–compulsive symptoms (OCS)

Patients (<i>n</i> = 60)		
	<i>n</i>	%
<i>Gender</i>		
Male	38	63.3
<i>Marital status</i>		
Never married	52	86.7
Married	4	6.7
Divorced/widowed	4	6.7
<i>Working status</i>		
Never occupied	36	60
Occupied/student	24	40
<i>Living status</i>		
Living alone	5	8.3
Living with someone	55	91.7
	Mean ± SD	
Age (years)	36.67 ± 10.18	
Education (years)	11.10 ± 3.59	
Age at onset (years)	23.93 ± 6.57	
Illness duration (years)	12.58 ± 9.75	
Hospital admission (n°)	4.13 ± 4.39	
<i>PANSS</i>		
Positive (score)	17.60 ± 6.23	
Negative (score)	26.62 ± 7.88	
Disorganization (score)	5.62 ± 2.67	
General psychopathology (score)	45.85 ± 11.90	
Total (score)	90.08 ± 19.07	
SOFAS (score)	39.93 ± 13.77	

higher among females (18.7 ± 14.2) than among males (11.7 ± 11.9) ($t = 2.031$, $df = 58$, $p = .05$).

Treatment

Fifty-five patients (91.7 %) were treated with oral antipsychotics, and the remaining five patients (8.3 %) received a long-acting antipsychotic. Twenty-one patients (35 %) were receiving a first-generation antipsychotic (FGA) and thirty-nine (65 %) a second-generation antipsychotic (SGA). Five patients (8.3 %) were treated with clozapine. The mean chlorpromazine equivalent dose was 432 ± 121 mg/day.

Curve-fit analysis

In the curve-fit analysis of YBOCS scores (independent variable) and SOFAS scores (dependent variable), both a linear model and a quadratic model were significant. However, while the linear model explained only 8 % of the variance of SOFAS score, showing an inverse relationship

($b = -.3$) between OCS and SOFAS score, the quadratic equation explained about 27 % of the variance in functioning, thus representing the best model fit for the OCS/SOFAS relationship (Table 3).

The positive $b1$ value (1.498) and the negative $b2$ value ($-.054$) of the quadratic model indicate that increasing OCS were associated with better functioning up to a YBOCS value of $(b1/2 \times b2) = 13.87$ (corresponding to the maximum value of the curve where the first derivative becomes the zero, i.e., $0 = 1.498 - [2 \times YBOCS \times .054]$), and with decreased functioning above this value, which corresponds to YBOCS cutoff value from mild to moderate OC severity [12]. Thus, a reverse U-shaped curve described a gradual transition from a positive YBOCS/SOFAS score association (for YBOCS scores representing absent-to-mild OCS) to an inverse relationship (for OCS ranging from moderate to severe), along a severity gradient of OC dimension (Fig. 1a). Scatterplots of residuals versus predicted values (Fig. 1b, c) showed that residuals were not independent of fit values for the linear model, with a clear reverse U-shaped curve to the points, suggesting that this data pattern is not captured by such model and supporting a nonlinear relationship between OCS and level of functioning. To evaluate the specificity of the above findings, cubic and exponential models were also tested, but none was found to explain a significantly higher amount of the variance in SOFAS scores than the quadratic model.

OCS and social functioning

Having found a quadratic relationship between YBOCS and SOFAS scores, we next conducted a multivariate curvilinear regression analysis (enter method). SOFAS score was entered as dependent variable, and the YBOCS score as well as its squared term (YBOCS**2) as predictors, after controlling for schizophrenic symptoms (PANSS scores) and historical/demographic covariates (i.e., number of hospital admissions and years of education, previously found to be correlated with functioning). The results confirmed the pattern described by the reverse U-shaped curve: After controlling for the effect of schizophrenic symptoms and other potentially confounding variables, YBOCS total score was positively associated with functioning, but the squared YBOCS term was negatively related to functioning, and its addition provided a significant increase in the model fit (Table 4). Positive and negative symptoms were also associated with lower functioning.

Discussion

The present study was aimed at evaluating the effect of OC dimension on psychosocial functioning in schizophrenia;

Table 2 Spearman's correlations between SOFAS scores, positive and negative dimensions of schizophrenia and demographic variables in the study sample ($n = 60$)

Variables	1.	2.	2a.	2b.	3.	4.	5.	6.	7.	8.	9.	10.	11.	11a.	11b.
1. SOFAS scores	–														
2. PANSS Positive Scale	–.553**	–													
Delusions	–.395**	.716**	–												
Hallucinations	–.279*	.658**	.445**	–											
3. PANSS Negative Scale	–.331**	.090	–.030	.098	–										
4. Disorganization score	–.498**	.725**	.414**	.407**	.118	–									
5. General psychopathology score	–.567**	.305*	.257*	.182	.353**	.360**	–								
6. Age years	.012	–.046	–.114	–.171	–.253	.056	–.103	–							
7. Age at onset years	.108	–.157	–.087	–.025	–.198	–.102	–.063	.423**	–						
8. Illness duration years	–.039	.055	–.073	–.141	–.138	.132	–.086	.719**	–.260*	–					
9. Hospital admission n°	–.277*	.170	.056	.246	.122	.275*	.143	.275*	–.067	.377**	–				
10. Education years	.390**	–.124	–.173	.000	–.117	–.142	–.284*	.001	.174	–.099	–.311*	–			
11. YBOCS scores	–.225	.057	.104	–.064	.041	–.010	.354**	.251	.279*	.061	–.123	–.195	–		
Obsessions	–.141	–.010	.069	–.022	.136	–.045	.362**	.154	.311*	–.067	–.158	–.091	.921**	–	
Compulsions	–.325*	.120	.082	–.083	.004	.072	.336**	.320*	.213	.168	–.062	–.296*	.899**	.714**	–

** $p \leq .01$; * $p \leq .05$

Table 3 Curve estimation analysis comparing linear and quadratic models for the YBOCS/SOFAS relationship in the overall sample ($n = 60$)

	Model fit			Parameter estimates		
	R^2	F	p	Constant	$b1$	$b2$
Linear model	.08	5.11 (df 1,57)	.03	44.43	-.301	
Quadratic model	.2274	10.56 (df 2,56)	<.0005	39.05	1.498	-.054

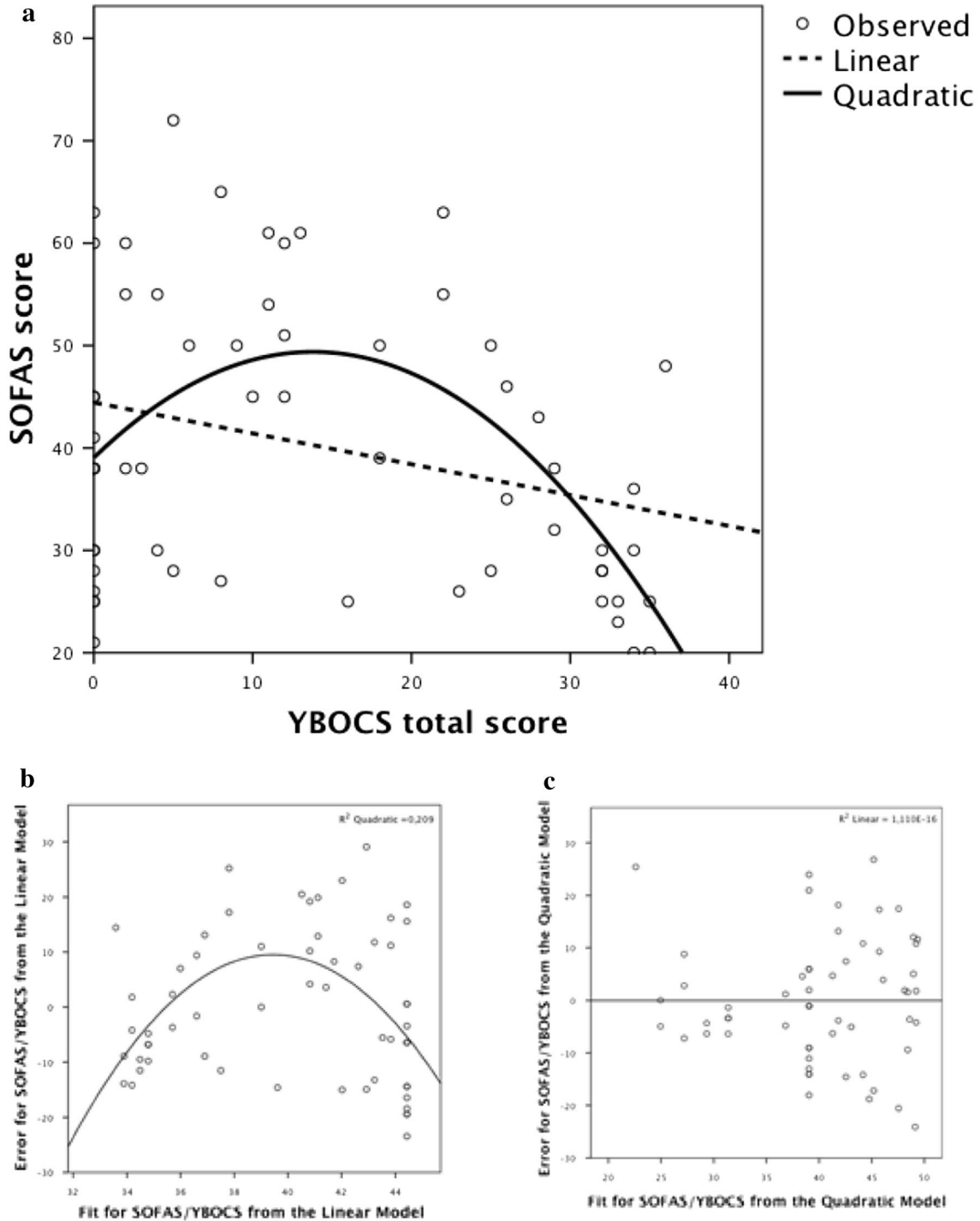


Fig. 1 Curve-fit estimation of the relationship between YBOCS and SOFAS scores in the overall sample ($n = 60$) (a), plots of the residuals versus predicted values for both the linear and quadratic models (b–c)

Table 4 Association between obsessive–compulsive symptoms (YBOCS score) and social functioning (SOFAS score) controlling for symptom severity and demographic covariates

	β	t	p	R ² change	F change (p)
Number of prior hospitalizations	-.105	-1.195	.238	.089	.022
Years of education	.105	1.197	.237	.095	.013
PANSS positive score	-.322	-2.878	.006	.201	<.0005
PANSS negative score	-.188	-2.095	.041	.075	.009
PANSS disorganization	-.135	-1.177	.245	.068	.008
PANSS general psychopathology score	-.151	-1.480	.145	.016	.185
YBOCS TOT	1.126	3.323	.002	.020	.133
YBOCS TOT**2	-1.350	-3.909	<.0005	.102	<.0005

Model R² = .592, adjusted R² = .536, p < .0005

in particular, we tested the hypothesis that OCS are differentially correlated with functioning along an OC severity continuum.

To our knowledge, no study to date has investigated this hypothesis by adopting a dimensional model. In fact, the few studies about this topic maintained a categorical approach (sub-threshold OCS vs full-blown OCD) [10, 11].

The present results confirm the study hypothesis: The relationship between social functioning and OC phenomena in schizophrenia is described by a reverse U-shaped curve, with a gradual transition from a positive association (for absent–mild OCS) to an inverse relationship (for moderate–severe OCS), along a severity gradient of the OC dimension (Fig. 1). These data are consistent with previous findings [10] of higher levels of functioning in patients with OCS in comparison with both patients without OCS and with full-blown OCD; on the other hand, they are in contrast with Üçok and colleagues' study [11], which failed to find any differences in social functioning between OCS and OCD schizophrenic patients. This discrepancy could possibly be related to the use of a categorical approach (patients with OCD vs patients without full-blown OCD) [11], which may not fully grasp the complex interaction between functioning and obsessive symptom severity, since DSM-IV diagnosis of OCD may include patients with different levels of symptom severity.

Importantly, in the present study, curvilinear regression analysis confirmed the above pattern of associations after controlling for schizophrenia symptom dimensions, which were associated with lower social functioning too. These results are in line with the findings of previous studies which observed a relationship between functional impairment and symptoms severity, particularly negative symptoms. [16].

In line with previous studies [17, 18], OCS and schizophrenia symptoms were not correlated in this sample, since we failed to find a correlation between OCS severity and PANSS sub-items. This finding suggests that the effect of OCS on functioning appears to be independent of that of schizophrenic symptoms severity. Our data failed to

replicate the results by Guillem and colleagues [19] who found a strong positive relationship between obsessions and delusions and between hallucinations and compulsions. We speculate that the lack of association between obsessive dimension and PANSS sub-items is explained by the narrow definition of OCS adopted in the present study, which implied strictly ego-dystonic features (i.e., typical OCS with insight and not related to positive symptoms). In fact, more broadly defined OCS might result less distinguishable from delusions.

The pathophysiology of OCD has been associated with orbitofronto-striatal circuits [20], which are supposed to be involved in the regulation of daily master routines and subroutines [21, 22]. One can speculate that mild OCS may induce repetitious and routinizing behaviors that fix an order and stability to daily activities, partly reducing the functional impairment associated with schizophrenia. When OCS increase from moderate to severe, their interference could counteract and prevail on the protecting effect, thus worsening social functioning. The present results should be considered in light of some limitations. First, the cross-sectional design cannot rule out the possibility that OCS may fluctuate during the course of the disease and that the relationship between OCS and functioning may also change over time; in particular, a phase-dependent effect of OCS on functioning was not investigated. Second, premorbid functioning was not assessed in the present study, so it was not possible to evaluate whether moderate or severe OC symptoms develop in subjects with an already compromised social functioning. Third, caution should be used in drawing firm conclusions from this study due to its small sample size. Therefore, the present findings need replication in prospective investigations with larger samples before concluding that severe OCS exert a worsening effect on social adjustment in schizophrenia. Fourth, cognitive functions were not assessed in the present study, and therefore, we cannot exclude that the difference in the social functioning found between groups could be partially due to different levels of cognitive dysfunctions. Fifth, we cannot exclude that OCS may have been induced by SGA,

particularly in more severely ill patients, who could have been treated with clozapine. By contrast, in our sample, we excluded patients with substance abuse or dependence, which can induce or worsen OCS too [23].

Nevertheless, if replicated, our results may have important consequences on clinical practice and may explain existing discrepancies across previous studies by suggesting that among patients with schizophrenia, OCS have a qualitatively different effect on functioning as a function of their severity (i.e., along a severity gradient). These data also encourage further investigation on the possible mechanisms, mediating the differential relationship between OCS and social adjustment (i.e., neurocognitive functioning).

In conclusion, the present study suggests that the impact of the OC dimension on social functioning in patients with schizophrenia varies as a function of OC symptom severity, ranging from a positive association at mild levels of OC symptom severity to an inverse correlation at moderate/severe degrees of OC symptoms. Thus, alike Janus Bifrons, obsessive-compulsive symptoms in schizophrenia might reveal a “double nature”. In addition, this “dual face” of OCS (“Janus Bifrons effect”) appears to be independent of schizophrenia symptom dimensions.

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

References

- Schirmbeck F, Swetz M, de Haan L (2015) Epidemiology: prevalence and clinical characteristics of obsessive-compulsive disorder and obsessive-compulsive symptoms in patients with psychotic disorders. In: De Haan L, Schirmbeck F, Zink M (eds) *Obsessive-compulsive symptoms in schizophrenia*. ISBN 978-3-319-12951-8, ISBN 978-3-319-12952-5 (eBook) doi: [10.1007/978-3-319-12952-5](https://doi.org/10.1007/978-3-319-12952-5)
- Hunter HK, Lysaker PH (2015) Associations of comorbid obsessive-compulsive symptoms with psychotic and affective symptoms and general functioning. In: De Haan L, Schirmbeck F, Zink M (eds) *Obsessive-compulsive symptoms in schizophrenia*. ISBN 978-3-319-12951-8, ISBN 978-3-319-12952-5 (eBook) doi: [10.1007/978-3-319-12952-5](https://doi.org/10.1007/978-3-319-12952-5)
- Tonna M, Amerio A, Ottoni R, Paglia F, Odone A, Ossola P, De Panfilis C, Ghaemi SN, Marchesi C (2015) The clinical meaning of obsessive-compulsive symptoms in bipolar disorder and schizophrenia. *Aust N Z J Psychiatry*. doi:[10.1177/0004867415572010](https://doi.org/10.1177/0004867415572010)
- Jahreiß W (1926) Über Zwangsvorstellungen im Verlauf der Schizophrenie. *Arch Psychiatr Nervenkr* 77:740–893
- Stengel EA (1945) A study of some clinical aspects of the relationship between obsessional neurosis and psychotic reaction types. *J Mental Sci* 91:166–874
- Rosen I (1957) The clinical significance of obsessions in schizophrenia. *J Mental Sci* 103:778–785
- Fenton WS, McGlashan T (1986) The prognostic significance of obsessive-compulsive symptoms in schizophrenia. *Am J Psychiatry* 143:416–437
- Poyurovsky M, Zohar J, Glick I, Koran LM, Weizman R, Tandon R, Weizman A (2012) Obsessive-compulsive symptoms in schizophrenia: implications for future psychiatric classifications. *Compr Psychiatry* 53:480–4837
- Bottas A, Cooke RG, Richter MA (2005) Comorbidity and pathophysiology of obsessive-compulsive disorder in schizophrenia: is there evidence for a schizo-obsessive subtype of schizophrenia? *J Psychiatry Neurosci* 30:187–1938
- De Haan L, Sterk B, Wouters L, Linszen DH (2013) The 5-year course of obsessive-compulsive symptoms and obsessive-compulsive disorder in first-episode schizophrenia and related disorders. *Schizophr Bull* 39:151–609
- Üçok A, Ceylan ME, Tihan AK, Lapcin S, Ger C, Tükel R (2011) Obsessive-compulsive disorder and symptoms may have different effects on schizophrenia. *Prog Neuropsychopharmacol Biol Psychiatry* 35:429–43310
- Mazzi F, Morosini P, De Girolamo G, Lussetti M, Guaraldi GP (2000) Structured clinical interview for DSM-IV axis I disorders (SCID). Edizione italiana. Organizzazioni Speciali
- Kay SR, Fiszbein A, Opler LA (1987) The Positive and Negative Syndrome Scale (PANSS) for schizophrenia. *Schizophr Bull* 13:261–276
- Goodman WK, Price LH, Rasmussen SA, Mazure C, Fleischmann RL, Hill CL, Heninger GR, Charney DS (1989) The Yale-Brown Obsessive Compulsive Scale. I. development, use, and reliability. *Arch Gen Psychiatry* 46:1006–1011
- American Psychiatric Association (2000) *Diagnostic and statistical manual of mental disorders, fourth edition text revision (DSM-IV-TR)*. APA, Washington DC
- Marchesi C, Affaticati A, Monici A, De Panfilis C, Ossola P, Ottoni R, Tonna M (2015) Decrease of functioning in remitted and non-remitted patients 16 years after a first-episode schizophrenia. *J Nerv Mental Dis*. in press
- Hwang MY, Morgan JE, Loschnozcy MF (2000) Clinical and neuropsychological profiles of obsessive-compulsive schizophrenia: a pilot study. *J Neuropsychiatry Clin Neurosci* 12:91–94
- Byerly M, Goodman W, Acholonu W, Bugno R, Rush AJ (2005) Obsessive-compulsive symptoms in schizophrenia: frequency and clinical features. *Schizophr Res* 76:309–316
- Guillem F, Satterhwaite J, Pampoulova T, Stip E (2009) Relationship between psychotic and obsessive-compulsive symptoms in schizophrenia. *Schizophr Res* 115:358–362
- Rasmussen SA, Eisen JL, Greenberg BD (2013) Toward a neuroanatomy of obsessive-compulsive disorder revisited. *Biol Psychiatry* 73:298–299
- MacLean PD (2000) *The triune brain in evolution: role in paleocerebral functions*. Plenum Pub Corp, New York
- Ploog DW (2003) The place of the triune brain in psychiatry. *Physiol Behav* 79:487–493
- Marchesi C, Tonna M, Maggini C (2009) Obsessive-compulsive disorder followed by psychotic episode in long-term ecstasy misuse: a case report. *World J Biol Psychiatry* 10:599–602