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# Dimensions of Delusions in Major Depression: Socio-demographic and Clinical Correlates in an Unipolar-Bipolar Sample

Leonardo Zaninotto[1,2], Daniel Souery[3], Raffaella Calati[4], Giovanni Camardese[1], Luigi Janiri[1], Stuart Montgomery[5], Siegfried Kasper[6], Joseph Zohar[7], Diana De Ronchi[2], Julien Mendlewicz[8], Alessandro Serretti[2]

[1]Institute of Psychiatry and Psychology, Catholic University of the Sacred Heart, Rome, [2]Department of Biomedical and NeuroMotor Sciences, University of Bologna, Bologna, Italy, [3]Laboratoire de Psychologie Medicale, Université Libre de Bruxelles and Psy Pluriel, Centre Européen de Psychologie Medicale, Brussels, Belgium, [4]IRCCS Centro S. Giovanni di Dio, Fatebenefratelli, Brescia, Italy, [5]Department of Psychiatry, Imperial College, London, United Kingdom, [6]Department of Psychiatry and Psychotherapy, Medical University of Vienna, Vienna, Austria, [7]Anxiety and Obsessive Compulsive Clinic, Chaim Sheba Medical Center, Tel Hashomer, Israel, [8]Laboratoire de Recherches Psychiatriques, Université Libre de Bruxelles, Brussels, Belgium

**Objective:** The present study aims at exploring associations between a continuous measure of distorted thought contents and a set of demographic and clinical features in a sample of unipolar/bipolar depressed patients.
**Methods:** Our sample included 1,833 depressed subjects. Severity of mood symptoms was assessed by the 21 items Hamilton Depression Rating Scale (HAM-D). The continuous outcome measure was represented by a delusion (DEL) factor, extracted from HAM-D items and including items: 2 ("*Feelings of guilt*"), 15 ("*Hypochondriasis*"), and 20 ("*Paranoid symptoms*"). Each socio-demographic and clinical variable was tested by a generalized linear model test, having depressive severity (HAM-D score-DEL score) as the covariate.
**Results:** A family history of major depressive disorder (MDD; $p$=0.0006), a diagnosis of bipolar disorder, type I ( $p$=0.0003), a comorbid general anxiety disorder ($p$<0.0001), and a higher number of manic episodes during lifetime ($p$<0.0001), were all associated to higher DEL scores. Conversely, an older age at onset ($p$<0.0001) and a longer duration of hospitalization for depression over lifetime ($p$=0.0003) had a negative impact over DEL scores. On secondary analyses, only the presence of psychotic features ($p$<0.0001) and depressive severity ($p$<0.0001) were found to be independently associated to higher DEL scores.
**Conclusion:** The retrospective design and a non validated continuous measure for distorted thought contents were the main limitations of our study. Excluding the presence of psychotic features and depressive severity, no socio-demographic or clinical variable was found to be associated to our continuous measure of distorted thinking in depression.

KEY WORDS: Delusions; Psychotic disorders; Depression; Dimensional model.

## INTRODUCTION

An increasing body of evidence suggests the superiority of dimensional over categorical models of psychopathology.[1-3] Psychopathological dimensions are thought to express more suitable clinical phenotypes,[4,5] and to have a much more identifiable biological basis.[6,7]

A dimensional approach may be particularly relevant for psychotic symptoms,[8] such as delusional thinking and hallucinations. Indeed, psychotic experiences have been shown to exist across a symptomatic continuum in the general population.[9] Furthermore, in psychiatric disorders there is a high degree of overlap between psychotic experiences and affective symptoms below the threshold for a clinical disorder.[10-12] Thus, the notion of a continuum of psychosis may be particularly relevant to mood disorder patients, whose symptoms can span from common dysfunctional thoughts and negative attributions to delusional beliefs.[13]

The present study aims to explore, through multivariate analysis, any association between a continuous measure of delusional thinking and a set of demographic, anamnestic and psychopathological features in a sample of unipolar/bipolar depressed patients.

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**Address for correspondence:** Alessandro Serretti, MD, PhD
Department of Biomedical and NeuroMotor Sciences, University of Bologna, Viale Carlo Pepoli 5, Bologna 40123, Italy
Tel: +39-051-6584233, Fax: +39-051-521030
E-mail: alessandro.serretti@unibo.it

## METHODS

Participants were recruited from two large study projects: 1) the "Patterns of treatment resistance and switching strategies in unipolar affective disorder" project, in the context of the Group for the Study of Resistant Depression (GSRD),[14,15]; and 2) Clinical Outcome and Psycho Education (COPE) program for Bipolar Disorder.[16]

Patients were included if they met the Diagnostic and Statistical Manual of Mental Disorders 4th edition (DSM-IV) diagnostic criteria for a mood disorder, including major depressive disorder (MDD); bipolar disorder, type I (BP-I); and bipolar disorder, type II (BP-II).[17] Individuals with mental retardation, dementia, or severe organic diseases were excluded. The study protocol was approved by the ethics committees of all participating centers, and written informed consent was obtained from all participants.

Current and lifetime diagnosis, course of illness and psychiatric comorbidities were assessed by specifically trained psychiatrists on the basis of a modified version of the Mini International Neuropsychiatric Interview (MINI) - version 5.0.0.[18] Psychiatric familial antecedents and somatic comorbidities were also screened by clinical investigation using all available sources of information, including previous charts, family members and previous treating clinicians.

Following the MINI-5.0.0 interview,[18] all subjects meeting diagnostic criteria for a major depressive episode (MDE) at the intake were included in the final sample (n=1,833). Severity of mood symptoms was assessed at baseline by the 21 item Hamilton Depression Rating Scale (HAM-D).[19] For the present study, a delusion (DEL) factor was extracted following a previous pooling of HAM-D items.[20,21] DEL factor included items 2 ("*Feelings of guilt*": scoring from 0="No symptom" to 4="Hears accusatory or denunciatory voices and/or experiences threatening visual hallucinations"), 15 ("*Hypochondriasis*": scoring from 0="No symptom" to 4="Hypochondriac delusions"), and 20 ("*Paranoid symptoms*": scoring from 0="No symptom" to 3="Delusions of reference and persecution"). DEL factor was explored as the continuous outcome variable, spanning from common dysfunctional thoughts and negative attributions to delusional beliefs.

The accuracy and completeness of the clinical information collected were independently tested by two researchers. All raters were trained in the use of instruments with good inter-rater reliability ($k > 0.8$).

All statistical analyses were performed using Statistica package (Dell Software, Tulsa, OK, USA). A series of generalized linear model tests were performed to detect any individual effect on the outcome variable of 6 socio-demographic and 30 clinical variables. A measure of depressive severity (HAM-D score − DEL score) was used as the covariate. All significant variables in the previous models were considered as eligible predictors in a final generalized linear model having DEL as the dependent variable. In order to limit the number of predictors, levels of Pearson's r ($> 0.40$) were used to detect any strong correlation between continuous independent variables. All $p$ values were 2-tailed, and statistical significance was conservatively set at the 0.001 level (0.05 divided by 6 socio-demographic and 30 clinical variables), also considering that the present sample has been previously investigated.[14-16] A Bonferroni corrected $\alpha$ was adopted to adjust for multiple comparisons.

## RESULTS

Sample features are described in Table 1. Regarding the impact of socio-demographic variables, gender, ethnic origin or civil status had no effect on DEL, while being older (Estimation [EST]= − 0.004; standard error [SE]= 0.001; Wald= 11.491; $p$=0.001), employed (vs. student; Est= − 0.112; SE=0.031; Wald=13.294; $p$=0.0003) and with no education (vs. high education; Est= − 0.242; SE=0.070; Wald=12.051; $p$=0.0005) were all significantly and negatively correlated with DEL score. A family history of MDD in first degree relatives was associated to higher DEL scores (Est=0.056; SE=0.016; Wald=12.058; $p$=0.0006), while we did not find any effect of family history of BP or suicide.

Being diagnosed as BP-I (vs. MDD; Est=0.094; SE=0.026; Wald=13.226; $p$=0.0003) and currently having a MDE with psychotic features (Est=0.303; SE=0.015; Wald=416.972; $p < 0.0001$) were both associated to higher DEL scores. Otherwise, past psychotic symptoms, seasonal recurrence, melancholic features and double depression (dystimic disorder + MDE) resulted to have no effect.

An older age at onset (Est= − 0.005; SE=0.001; Wald=18.822; $p < 0.0001$), an older age at the first MDE (Est= − 0.004; SE=0.001; Wald=14.410; $p$=0.0001), and a longer duration of hospitalization for depression during lifetime (expressed in weeks; Est= − 0.003; SE=0.0008; Wald=13.140; $p$=0.0003) had a negative impact over DEL score. Also, being an inpatient at the intake was associated with lower DEL scores (Est= − 0.068; SE=0.015;

**Table 1.** Socio-demographic and clinical variables of the sample (n=1,833)

| Clinical variable | Data |
|---|---|
| Males | 562 (30.7) |
| Caucasians (vs. other) | 1,778 (97) |
| Age (yr) | 48.4±14.1 |
| Civil status (n=1,684) | |
| Single | 459 (27.3) |
| Married/cohabiting | 832 (49.4) |
| Divorced/separated | 250 (14.8) |
| Widowed | 143 (8.5) |
| Employment status (n=1,723) | |
| Employed | 1,439 (83.5) |
| Unemployed | 150 (8.7) |
| Retired | 88 (5.1) |
| Student | 46 (2.7) |
| Level of education (n=1,760) | |
| None | 94 (5.3) |
| Elementary | 338 (19.2) |
| Intermediate | 796 (45.2) |
| High | 532 (30.2) |
| Diagnosis | |
| MDD | 1,330 (72.6) |
| BP-II | 147 (8.0) |
| BP-I | 356 (19.4) |
| Family history | |
| MDD | 998 (54.4) |
| BP | 247 (13.5) |
| Suicide | 291 (15.9) |
| Illness course | |
| MDD, single episode | 426 (23.8) |
| Last episode depressive | 1,540 (93.3) |
| Last episode manic/hypomanic | 110 (6.7) |
| Seasonal affective disorder | 275 (15.0) |
| Psychotic features Lt* (n=1,732) | 301 (17.4) |
| Features (feat.) of current MDE | |
| MDE with psychotic feat. (n=1,723) | 237 (13.8) |
| MDE with melancholic feat. (n=1,767) | 1,135 (64.2) |
| Double depression† (n=1,713) | 74 (4.3) |
| Presence of suicide risk (n=1,797) | 1,183 (65.8) |
| Comorbidities | |
| Somatic comorbidites | 1,019 (55.6) |
| Psychiatric comorbidites | 897 (48.9) |
| Anxiety disorders | 710 (38.7) |
| Panic disorders | 401 (21.9) |
| Social phobia (n=1,829) | 195 (10.7) |
| OCD (n=1,814) | 122 (6.7) |
| PTSD (n=1,831) | 95 (5.2) |
| Generalized anxiety disorder | 308 (16.8) |
| Substance use disorders | 224 (12.2) |
| Drug use | 83 (4.5) |
| Alcohol use (n=1,830) | 164 (9.0) |
| Axis II (n=423) | 154 (36.4) |
| HAM-D score | 20.7±7.0 |

Values are presented as number (%) or mean±standard deviation. MDD, major depressive disorder; BP, bipolar disorder; BP-I, BP, type I; BP-II, BP, type II; Lt, lifetime; MDE, major depressive episode; OCD, obsessive-compulsive disorder; PTSD, post-traumatic stress disorder. *At least one mood episode (both depressive and manic) with psychotic features during lifetime.
†Double depression is defined by a MDE accompanied by dysthymic disorder.

Wald=19.166; $p<0.0001$). Conversely, a higher number of manic episodes was associated to higher DEL scores (Est=0.0184; SE=0.005; Wald=13.014; $p<0.0001$).

Regarding comorbidites, we could detect a positive effect of anxiety disorders in general (Est=0.048; SE=0.015; Wald=9.645; $p$=0.0019), and generalized anxiety disorder (GAD) in particular (Est=0.101; SE=0.018; Wald=32.414; $p<0.0001$). No effect was found for panic disorder, social phobia, post-traumatic stress disorder, obsessive-compulsive disorder, alcohol use or substance use disorders. The presence of an Axis II disorder was associated to higher DEL scores (Est=0.156; SE=0.047; Wald=10.828; $p$=0.0010).

A final generalized linear model was performed to test the effect of significant categorical and continuous variables on DEL score. Since lifetime duration of hospitalization for depression (weeks), age, age at the first MDE, and age at onset resulted to be reciprocally correlated ($r\geq 0.4$; $p<0.0001$), we only considered the latest variable for the final model. Thus, independent variables were: a) "*Age at onset*"; b) "*Number of manic episodes during lifetime*"; c) "*Presence of Psychotic features* (current)"; d) "*Being employed*" (vs. being student); e) "*A diagnosis of BP-I*" (vs. MDD)"; f) "*A family history of MDD*"; g) "*A diagnosis of comorbid GAD*"; h) "*Being an inpatient* (vs. outpatient); i) "*Depressive severity*" (HAM-D score − DEL score). After Bonferroni *post-hoc* correction (corrected $\alpha$=0.0001), only the presence of psychotic features (Est=0.305; SE=0.019; Wald=256.936; $p<0.0001$) and depressive severity (Est=0.027; SE=0.003; Wald=86.952; $p<0.0001$) were found to be positively and independently associated to higher DEL scores.

## DISCUSSION

The present study aims to provide an overall view of the effects of different socio-demographic and clinical variables on a continuous measure of depressive distorted thinking. Overall, our preliminary findings seem to sketch out the features which may be associated to more distorted thought contents during a depressive episode. A diagnosis of BP-I, a comorbid anxiety disorder (especially GAD), a younger age at onset, a shorter duration of hospitalization for depressive episodes, and a higher number of manic episodes during lifetime, were all associated to higher DEL scores. The importance of bipolarity on the emergence of psychotic features,[22,23] and the higher frequency of mood episodes of psychotic affective disorders[24-26] are both clearly defined. Nonetheless, our results indicate the significant role of mania[27] in fostering the development of

psychotic symptoms in depression. A recent study by Popovic *et al.*[28] has shown that bipolar patients with a predominantly manic polarity presented a younger age at onset and a higher prevalence of BP-I diagnosis and psychotic symptoms.

The fact that patients with a greater severity of dysfunctional beliefs are treated in an outpatient setting may be due to two factors : a) other variables (e.g., suicide risk) may be more important in guiding decisions on admission; and b) psychotic symptoms may be missed because of their tendency to be intermittent, less prominent, or concealed by the patient.[29]

After *post-hoc* correction, no significant anamnestic or clinical determinant other than depressive severity resulted to impact over the emergence of dysfunctional beliefs.[13,25,30,31] Severity of depression has been proved to be associated with more severely distorted negative cognitions, which in turn may predict the emergence of psychotic symptoms,[13] however this multivariate analysis may hide the clinical univariate correlations, therefore we reported both.

A major strength of our study is that participants came from a non-specific clinical population, including both inpatients and outpatients. Most of our findings are easily detectable at a screening interview and with the most common rating scales for depression. The major limitation of this study is its retrospective design. Secondly, we did not account for the influence of previous pharmacotherapy on the clinical presentation of the patients' current mood episodes. The psychopathological dimensions of DEL was constructed of scales which were not specifically designed for that purpose.

The use of dimensional models of psychopathology in addition to categorical ones might be profitable in the future.[32-35] Our study suggests that depressive severity may be the only significant determinant on the development dysfunctional thinking and delusions during a depressive episode.

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