



Longitudinal trajectories of psychosocial functioning in patients with pre-existing mental disorders after one year of COVID-19 pandemic

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ABSTRACT

Aims of the present study were to prospectively assess psychosocial functioning trajectories during the COVID pandemic and the possible impact of sociodemographic variables, as well as of COVID-19 pandemic-related factors, on these trajectories, in a sample of patients with pre-existing severe mental disorders. Moreover, we aimed at identifying predictors of impairment in psychosocial functioning over a period of 9 months of COVID-19 pandemic. Patients were recruited during the 3rd wave of the COVID-19 pandemic (T0, March–April 2021) while strict containment measures were applied in Italy, and reassessed after 3 months (T1, June–July 2021), and after 6 months from T1 (T2- November–December 2021), during the 4th wave of COVID pandemic. A sample of 300 subject (out of the 527 subjects recruited at baseline) completed the T2 evaluation. Patients were assessed by: Work and Social Adjustment Scale (WSAS) for psychosocial functioning, Generalized Anxiety Disorder 7-Item (GAD-7) for anxiety symptoms, Patient Health Questionnaire-9 (PHQ-9) for depressive symptoms and the Impact of Events Scale-Revised, for post-traumatic symptoms. Cluster analyses identified 4 trajectories of functioning: the High, Stable Functioning group (N = 77), the Improvement Functioning group (N = 62), the Progressive Impairment group (N = 83) and the Persistent Severe Impairment group (N = 78) respectively. We found that predictors of higher WSAS score at T2 were higher WSAS score at T0 (B = 0.43, $p < .001$), PHQ scores at baseline >10 (B = 2.89, $p < .05$), while not living alone was found to be a protective factor (B = -2.5, $p < .05$).

Results of the present study provides insights into the vulnerability of individuals with psychiatric disorders during times of crisis. Study findings can contribute to a better understanding of the specific needs of this population and inform interventions and support strategies.

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1. Introduction

The COVID-19 pandemic, which has been declared as a public health emergency by the World Health Organization in March 2020, has had a significant impact on both physical and mental health of individuals (van den Boom et al., 2023), seriously impacting on national health systems and on the delivery of basic health services (Kuzior et al., 2023; Penninx et al., 2022; Ahmed et al., 2023; Poroos et al., 2023). More than 100 million people around the world have been infected by the virus, causing over 2,000,000 deaths (Johns Hopkins University). Beyond pulmonary complications and deaths, the pandemic has had a significant impact on the mental health of the general population, particularly for certain at-risk groups, including patients with pre-existing cardiometabolic disorders, women, adolescents, and young adults (Penninx et al., 2022; Chi et al., 2021; Salazar de Pablo et al., 2020). In particular, with respect to age differences in mental health during the COVID pandemic, it has been reported that they could be related to the social roles that younger adults play (i.e., having more responsibilities in their careers, families, and presenting an increased economic burden), while older adults have more experience using coping mechanisms to get through difficult times (Na et al., 2022).

Heterogeneous data about the psychiatric morbidity in the general population have been reported in different waves of the COVID-19 pandemic. Studies carried out in the immediate aftermath of the outbreak of COVID-19 pandemic reported an increased onset of post-traumatic stress disorder (PTSD), generalized anxiety disorder, and affective disorders (mainly unipolar affective disorder) (Sherman et al., 2020; Greenberg and Rafferty, 2021; Coleman et al., 2022; Taquet et al., 2021). However, more recent studies found no differences in the 12-month prevalence of anxiety disorders, mood disorders, substance use disorders, and attention-deficit/hyperactivity disorder before vs. during the COVID-19 pandemic, even after controlling for socio-demographic characteristics of the respondents (Ten Have et al., 2023).

Concerns have been expressed with regard to people with a pre-existing mental disorder, which represent a population with an increased risk of COVID-19 infection (Wang et al., 2022; Kestel, 2022; Stewart et al., 2023) and for worse physical and mental outcomes related to COVID-19 infection (Penninx et al., 2022), compared to the general population. In particular, it has been reported that individuals with preexisting mental disorders may be particularly vulnerable to the psychological distress associated with the pandemic and its consequences – including societal changes, loss of beloved relatives due to the COVID-19 infection, social distancing and reduced access to specialistic care (Sampogna et al., 2022; Tzur Bitan et al., 2022).

However, the impact of prolonged periods of restrictions and lockdown for people with pre-existing mental disorders is still unclear. Immediately after the outbreak of the COVID-19 pandemic, studies have reported that patients with mental disorders presented mostly an acute reaction/distress to an unknown, unexpected and unfolding crisis (Ahrens et al., 2021), with an increased prevalence and severity of depressive and anxiety symptoms (McLoughlin et al., 2023). Subsequent studies reported that the initial increase in symptoms registered in the earlier phases of the COVID-19 pandemic in patients with severe mental disorders significantly declined as the pandemic progressed, reverting to pre-pandemic levels (Daly and Robinson 2022; Rainford et al., 2022). Few studies have assessed longitudinal trajectories of mental health over a longer time (up to two years). Among these, Klokgieters et al (2023), using growth mixture modelling and multinomial logistic regression, reported relatively stable trajectories of depressive and anxiety symptoms over two years and that some socio-demographic characteristics (including age, gender, educational level, income and living condition) can influence these trajectories. Moreover, Kok et al (2022), using linear mixed models, assessed changes in mental health outcomes during the initial year of the COVID-19 pandemic, reporting that depressive, anxiety and worry trajectories were remarkably stable over time, while

perceived mental health impact and fear of COVID-19 fluctuated according with decreases and increases in COVID-19 mortality and social restrictions.

However, it has to be noticed that available longitudinal studies carried out with patients with preexisting mental disorders are very few and that the majority of those available are mainly based on patients' self-reports and included small sample sizes. Moreover, the majority of studies have assessed the impact of COVID-19 pandemic only in terms of relapses and worsening of symptoms, while very few studies have assessed other mental health-related domains of well-being, including resilience, meaning in life and psychosocial functioning, and have compared their trajectories across the different waves of the COVID-19 pandemic (Steger, 2022).

In particular, it has to be noticed that patients with mental disorders present a worse psychosocial impairment compared to most chronic physical illnesses (Joo, 2017; Cuijpers et al., 2021; Wakefield, 2022), and that quality of life remains unsatisfactory even after clinical remission (Fulford and Handa, 2021) in a vast majority of patients, including asymptomatic patients and those with residual or subthreshold symptoms (Maj et al., 2021; Stein et al., 2021; McIntyre et al., 2022; Thornicroft, 2022). Although the levels of psychosocial impairment in individuals with mental disorders vary according to the different diagnostic categories and the duration and severity of the illness, deficits in global functioning are not always temporally confined to acute episodes, with persistence of psychosocial impairment over time (Leon et al., 2000; Trivedi et al., 2009; Stein et al., 2022). Impairment in social functioning may persist for years after the resolution of an acute episode, depending on the thoroughness (i.e., with vs. without residual symptoms) and stability (i.e., persistence over time) of the remission. It is worth noticing that changes in psychosocial functioning in patients with common mental disorders have been rarely assessed during the COVID-19 pandemic, despite impairment in patients' autonomy and ability to function in many areas represents one of the most important barriers in the achievement of a full functional recovery of patients with mental disorders (Bakish, 2001; Di Vincenzo et al., 2022).

This study aims to prospectively assess psychosocial functioning in a sample of patients with different mental disorders one year after the onset of the COVID-19 pandemic (T0, March–April 2021), during the so-called Italy's 3rd wave of the infection, while strict containment measures were in place all over the country. Patients were assessed after 3 months (T1, June–July 2021) – during the subsequent phase of epidemiological regression of the viral spread, with consequent easing of measures – and after 6 months from T1 (T2- November–December 2021) during the 4th wave of COVID pandemic, during new restrictions and containment measures. The secondary aim of the study was to explore the possible impact of sociodemographic variables, as well as of COVID-19 pandemic related conditions, on patients' trajectories of functioning and to identifying predictors of impairment in psychosocial functioning over a period of 9 months of COVID-19 pandemic.

2. Methods

2.1. Sample recruitment and assessment

This is a multicentric, longitudinal, no-profit study, coordinated by the University of Pisa and carried out at the psychiatric outpatient services of nine Italian University clinics (Universities of Bologna “Alma Mater Studiorum”, Campania “Luigi Vanvitelli”, Catania, Florence, Pisa, Rome “La Sapienza”, Trieste, Turin and Verona).

Patients were consecutively recruited in the study if they were 18 years of age or older, able to provide a written informed consent, had a main diagnosis of psychiatric disorder or, alternatively, with a first contact with participating mental health centers. In case of lack of knowledge of the Italian language or other limitations in verbal communication significantly impairing the subject's skills to be assessed, or presence of a diagnosis of neurocognitive disorder according

to the DSM-5 criteria were excluded from the study. Interview for the Disorders of the DSM-5 (SCID-5) (First et al., 2016) was used to determine mental disorder diagnosis.

Patients were recruited from 15th March to 15th April 2021 (T0), during the third wave of the COVID-19 pandemic, in the framework of a routine clinical visit or of a first contact with participating mental health centers. Patients were reassessed from 15th June to 15th July 2021 (T1 – after 3 months from T0) and between October and November 2021 (T2), when containment measured were re-established in Italy, as a consequence of a new-wave of COVID-19 pandemic. All assessments were made in person by skilled mental health professionals, in the framework of a psychiatric visit. All patients were then asked to be reassessed at T1 and T2, independently from being still in charge to the local mental health centre.

A written informed consent was subjected to all eligible participants after receiving an accurate description of the study, with the opportunity to ask questions. The study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee of Area Vasta Nord-Ovest Toscana, Italy (Protocol number 17152/2020).

2.2. Assessment instruments

A Case Report Form (CRF) was formulated specifically in order to gather participants' sociodemographic (age, gender, marital status, housing status, education level, employment status) and clinical (previous psychiatric diagnoses and psychopharmacological therapy) characteristics along with a set of information focusing on the pandemic scenario (high-risk medical conditions, family members at risk for COVID-19 complications, COVID-19 infection of the subject or close ones, bereavements due to COVID-19 or economic losses caused by the pandemic, changes in work routine, quarantine or self-isolation), which were systematically collected with an ad hoc schedule.

Work and Social Adjustment Scale (WSAS) was used to assess measure patients perceived functional impairments. WSAS includes 5 different items, scored on a scale ranging from 0 (not at all impaired) to 8 (very severely impaired). The five items investigated functional impairment in different life domains including: a) home management (cleaning, tidying, shopping, cooking, looking after home or children, paying bills); b) social leisure activities (activities together with other people, such as parties, bars, clubs, outings, visits, dating, home entertainment), c) private leisure activities (activities such as reading, gardening, sewing, walking alone); d) ability to effectively work or study e) close relationships. It has shown a good internal consistency (Cronbach α from 0.7 to 0.94) and test-retest reliability ($r = 0.73$) (Mundt et al. 2002). Moreover, the WSAS demonstrated to show a good sensitivity to detect changes in global functioning over time (Cella et al., 2011), especially those related to treatments (Zahra et al., 2014). Despite the WSAS was initially developed to assess psychosocial functioning in patients with anxiety and depressive disorders, its reliability and validity has been assessed also in other patients with mental and physical disorders (Mataix-Cols et al., 2005; Fagiolini et al., 2005; Frank et al., 2011; Kennedy et al., 2006; Goldstein et al., 2020; Pedersen et al., 2017; Porcelli et al., 2020) and in patients with post-COVID syndrome (Walker et al., 2023). It is currently considered one of the most reliable self-reported questionnaires to assess psychosocial functioning, compared to the Social Functioning Questionnaire, WHO-Disability Assessment Schedule (WHODAS) and Short-Form 12-Item Health Survey (Zahra et al., 2014). The total score ranges from 0 to 40, where higher scores correspond to greater levels of impairment. A score below 10 indicates absent or subclinical impairment in global functioning. A score between 10 and 20 is associated with significant functional impairment, but non-severe clinical symptoms. A score above 20 suggests a moderate or severe psychopathological condition (Mundt et al. 2002).

The Generalized Anxiety Disorder-7 (GAD-7; Spitzer et al., 2006) was used to assess the severity of anxious symptoms. Specifically, it

investigates the frequency of anxious symptoms. It is a 7-item self-report instrument. Each item is scored on a Likert scale ranging from 0 (never) to 3 (almost every day). Scores ≥ 10 indicate the presence of anxiety symptoms of moderate intensity and > 15 of severe intensity.

The Patient Health Questionnaire-9 (PHQ-9; Spitzer et al., 1999) was used to assess the presence of depressive symptoms. PHQ-9 consists of 9 items, rated from 0 (never) to 3 (almost every day). Scores > 5 indicate the presence of mild depressive disorder and higher scores indicate greater severity of the disorder; score > 20 indicates a severe depressive disorder.

The Impact of Events Scale-Revised (IES-R; Weiss and Marmar, 1997) was adopted to assess post-traumatic stress symptomatology. It includes 22 items, which can be divided into three sub-scales: intrusion, avoidance, and hyperarousal. Each item is rated on a scale ranging from 0 to 4 (0 = not at all, 4 = extremely). IES-R total score of 33 or higher identifies the probable diagnosis of post-traumatic stress disorder (PTSD), while a total score of 24 or higher indicates the presence of clinically relevant post-traumatic stress symptoms (Creamer et al., 2003). In accordance with the aims of the study, the items regarding traumatic events refer to traumatic events experienced during the COVID-19 pandemic.

The Structured Clinical Interview for the Disorders of DSM-5 (SCID-5 CV) was used to confirm the diagnoses of recruited patients.

2.3. Statistical analyses

All statistical analyses were performed using the Statistical Package for Social Science, version 26. Continuous variables were reported as mean \pm standard deviation (SD), whereas categorical variables were reported as percentages. All tests were two-tailed and a p value $< .05$ was considered statistically significant.

We used a K-Means Cluster Analysis based on the standardized WSAS total scores reported at T0, T1 and T2, in order to identify trajectories of impairment in global functioning during the three time points. Analyses were performed on patients who fulfilled all time points. We used squared Euclidean Distance for the divergence measure between cases. To classify cases, the method of iterative updating of clustered centroids was chosen, with the new clusters centers to be calculated after all cases are assigned to a given cluster. To ensure maximum efficiency, the final cluster centers estimated from a random sample were utilized as initial centers to classify the entire file. To assess the stability of a given solution, we compared results on data sorted in different ways. After comparing the results obtained for different K values, we identified as the most satisfactory solution the one that involves 4 clusters ($K = 4$). This solution ensured the minimum number of iterations before convergence criterion 0 was satisfied. Furthermore, it determined a small within-cluster variability compared to the difference between clusters, and the cluster sizes greater than 10% of the total sample size. This analysis investigates subjects' functioning at each time of observation, aggregating subjects upon their closeness in functioning outcomes at each of the three time points. For this reason, it takes into account subjects' changes over time across the three times of observation. Chi-square was computed to evaluate differences in categorical variables among groups. One-way ANOVA was utilized to compare continuous normally distributed variables among groups, and post-hoc analysis with Bonferroni correction was performed. Moreover, to compare differences in WSAS score at T2 with respect to socio-demographic and clinical characteristics, adjusted for WSAS score at T0, a one-way ANOVA was performed. In order to identify predictors of poor psychosocial functioning at T2 in the global sample multiple linear regression analyses were computed. Variables to be included as independent in the regression analyses were selected among those which resulted to be statistically relevant at the univariate ANOVA analyses, corrected to WSAS T0 scores. All statistical analyses were performed using SPSS.

3. Results

3.1. Socio-demographic characteristics

A total sample of 527 subjects was consecutively recruited at baseline. Of these, 300 patients completed the T2 assessments. The percentage of dropout in participants between the three time points was 43.1%. Reasons for drop-out were a) failure to contact research participants (46.7%); b) refusal to be reassessed (44.5%); c) difficulties in reaching the research centre (8.8%).

Sociodemographic and clinical characteristics of the T0 and T2 samples are reported in Tables 1 and 2. No statistically significant differences have been detected among the two samples. Of the T2 sample, 186 (62.0%) patients were female, with a mean age of 42.70 ± 16.56. Diagnoses of the T2 sample patients were major depressive disorder (MDD) in 38.7% of cases, bipolar disorder in 20.3% of cases, psychotic spectrum disorder in 8% of cases, anxiety spectrum disorder in 8.3% of cases, feeding and eating disorder in 4.7% of cases, obsessive compulsive disorder in 4.7% of cases and 8% reported other diagnoses.

With respect to COVID-19 pandemic related variables (Table 2), 84 subjects (28.2%) reported physical comorbidities which can increase the risk of COVID-19 complications (e.g., diabetes mellitus or cardiovascular and respiratory diseases). 27 patients (9.0%) were positive at the COVID-19, 37 (12.3%) experienced a period of self-isolation and 61 (20.3%) of quarantine. 75 participants (25%) reported economic problems (job loss, significantly lower earning, financial difficulties) due to the COVID-19 pandemic. 133 subjects (44.3%) had a relative infected by COVID-19 and 30 (10.0%) experienced a loss of a close one due to COVID-19.

3.2. Cluster analysis

As initial clusters, we used the final centers estimated by a preliminary application of a k-means cluster analysis on a random sample of 150 subjects, to reduce the distance calculations and to select a good set of initial clusters. The second K-means cluster analysis applied to the entire data file met criterion 0 of convergence at the third iteration. We defined the 4 groups of subjects determined by the second K-means cluster analysis: the “High, Stable Functioning” group (N = 77), the Improvement Functioning group (N = 62), the Progressive Impairment group (N = 83) and the Persistent Severe Impairment group (N = 78). The four groups were quite homogeneous from a quantitative point of view. Table 3 shows the initial cluster centers, the final cluster centers and the dispersion analysis. The minimum distance between the initial centers among cluster was 1.47. In the dispersion analysis, the WSAS score at T1 presented the greatest influence in forming the clusters, while the WSAS score at T2 had the least influence.

The Persistent Severe Impairment group presented higher WSAS

Table 1

Socio-demographic and clinical characteristics of the sample at T0 (N = 527) and T2 (N = 300).

	T0 sample (N = 527)	T2 sample (N = 300)
Age, M±SD	41.97 ± 16.69	42.69 ± 16.89
Gender, Female, N (%)	329 (62.4%)	186 (62.0%)
Marital Status, Single, N (%)	329 (62.4%)	191 (63.7%)
Living alone, yes, N (%)	104 (19.7%)	55 (18.3%)
High school degree, yes, N (%)	385 (73.1%)	225 (75.0%)
Employed, yes, N (%)	243 (46.1%)	132 (44.0%)
Diagnosis, N (%)		
Major Depressive Disorder	168 (31.9%)	116 (38.7%)
Bipolar Disorder	107 (20.3%)	61 (20.3%)
Psychotic Spectrum Disorder	32 (6.1%)	24 (8.0%)
Obsessive-Compulsive Disorder	23 (4.4%)	14 (4.7%)
Anxiety Disorder	59 (11.2%)	25 (8.3%)
Eating Behaviour Disorder	76 (14.4%)	36 (12.0%)
Others	62 (11.8%)	24 (8.0%)

Table 2

COVID-19 related variables in the global sample at T0 (N = 527) and (N = 300).

	T0 sample (N = 527)	T2 sample (N = 300)
High risk medical conditions, yes, N (%)	140 (26.6%)	84 (28.2%)
Close-one at high risk for COVID-19, yes, N (%)	84 (15.9%)	49 (16.3%)
Remote working, yes, N (%)	121 (23.0%)	66 (22.1%)
Giving up going to work, yes, N (%)	190 (36.1%)	93 (31.1%)
Economic Loss due to COVID-19, yes, N (%)	131 (24.9%)	75 (25.0%)
Quarantine, yes, N (%)	107 (20.3%)	61 (20.3%)
Self-Isolation, yes, N (%)	74 (14.0%)	37 (12.3%)
COVID-19 infection, yes, N (%)	46 (8.7%)	27 (9.0%)
Relatives or friends infected, yes, N (%)	236 (44.8%)	133 (44.3%)
Bereavement due to COVID-19, yes, N (%)	48 (9.1%)	30 (10.0%)

Table 3

K-Means Cluster Analysis features. Initial cluster centers, final cluster centers, and dispersion analysis in the Improvement Functioning group (N = 62), Progressive Impairment group (N = 83), High Stable Functioning group (N = 77) and Persistent Severe Impairment group (N = 78).

	Improvement Functioning (N = 62)	Progressive Impairment (N = 83)	High Stable Functioning (N = 77)	Persistent Severe Impairment (N = 78)
Initial Cluster centers				
WSAS T0, Z score	0.86	-0.51	-1.10	1.02
WSAS T1, Z score	-0.26	-0.03	-1.07	1.27
WSAS T2, Z score	-0.19	0.26	-1.07	1.05
Final Cluster centers				
WSAS T0, Z score	0.85	-0.46	-1.07	0.93
WSAS T1, Z score	-0.18	-0.05	-1.11	1.27
WSAS T2, Z score	-0.20	.21	-1.10	1.09
Dispersion analysis				
	Cluster mean square	Standard error	F	p
WSAS T0, Z score	72.67	0.278	261.32	<.001
WSAS T1, Z score	74.59	0.262	284.28	<.001
WSAS T2, Z score	64.01	0.360	177.86	<.001

WSAS: Work and Social Adjustment Scale.

score than the other three groups at T0, T1 and T2, presenting stable scores in the three times. The Progressive Impairment Group showed a small yet significant increase in WSAS score from T0 to T2, presenting lower scores than the Persistent Severe Impairment group at all three time-points, a lower score at T0, but higher scores at T1 and T2 than the Improvement Functioning Group, and consistently higher scores than the High, Stable Functioning group. The Improvement Functioning group presented decreasing WSAS scores from T0 to T2, consistently higher than those obtained by the High, Stable Functioning group, consistently lower than those of the Persistent Severe Impairment group and higher than the scores of the Progressive Impairment group only at T0.

The High, Stable Functioning group showed consistently lower WSAS than those found in the other three groups and characterized by small but significant progressive improvement. Differences in WSAS

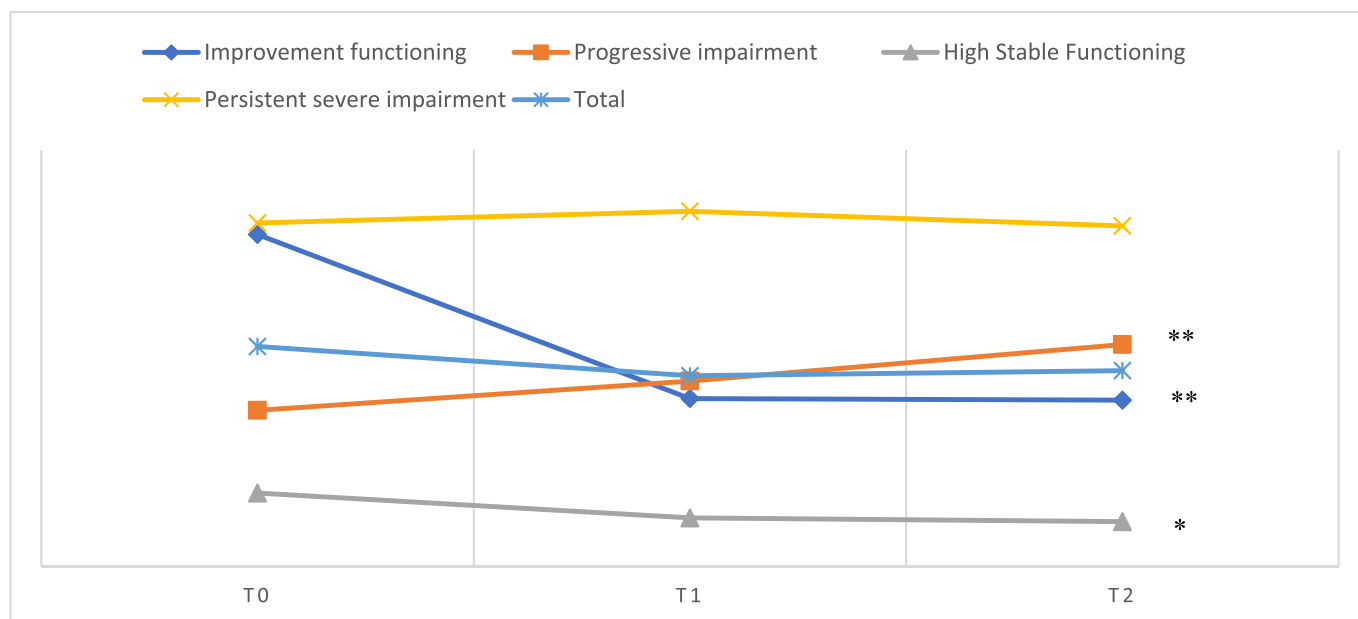


Fig. 1. Mean scores of WSAS scores between T0, T1 and T2 in the total sample (N = 300) and in the Improvement Functioning (N = 62), Progressive Impairment (N = 83), High Stable Functioning (N = 77) and Persistent Severe Impairment (N = 78) groups *p<.01; **p<.001.

scores in the total sample and in the four subgroups are reported in Fig. 1, along with relevant p values.

3.3. Socio-demographic and clinical characteristics' comparison between the four groups

Significant differences emerged in the following characteristics among the four groups with regard to some of the included socio-demographic and clinical variables. Mean age was significantly higher in the High, Stable Functioning group than in the Persistent Severe Impairment group (46.34 ± 16.67 vs. 38.63 ± 16.22, p < .05); moreover, patients were less frequently single compared to the other groups (39% in the High, Stable Functioning group vs. 40% in Improvement Functioning, 54% in Progressive Impairment and 58% in Persistent Severe Impairment groups, p < .05). Individuals who experienced an economic loss due to COVID-19 were significantly overrepresented in all

Table 4
Comparison of Psychiatric diagnoses among the Improvement Functioning (N = 62), Progressive Impairment (N = 83), High Stable Functioning (N = 77) and Persistent Severe Impairment (N = 78) groups.

	Total	Improvement Functioning	Progressive Impairment	High Stable Functioning	Persistent Severe Impairment
MDD	116 (38.7%)	21 (18.1%)	38 (32.8%)	32 (27.6%)	25 (21.6%)
BD	61 (20.3%)	18 (29.5%)	17 (27.9%)	14 (23.0%)	12 (19.7%)
PD	24 (8.0%)	2 (8.3%)	6 (25.0%)	9 (37.5%)	7 (29.2%)
OCD	14 (4.7%)	4 (28.6%)	2 (14.3%)	6 (42.9%)	2 (14.3%)
AD	25 (8.3%)	3 (12.0%)	9 (36.0%)	9 (36.0%)	4 (16.0%)
FED	36 (12.0%)	8 (22.2%)	5 (13.9%)	5 (13.9%)	18 (50.0%)
Other	24 (8.0%)	14 (25.0%)	6 (25.0%)	2 (8.3%)	10 (41.7%)

MDD: Major Depressive Disorder; BD: Bipolar disorder; PD: Psychotic disorders; OCD: Obsessive-compulsive disorder; AD: Anxiety disorders; EBD: Feeding and Eating Disorders.

groups except in the High, Stable Functioning group (12% in the High, Stable Functioning group vs. 20% in Improvement Functioning, 18% in Progressive Impairment and 25% in Persistent Severe Impairment groups, p < .05). No statistically relevant differences were reported with respect to diagnoses among the four groups (Table 4).

Post-hoc comparisons revealed that in the progressive impairment group, GAD-7, PHQ-9 and IES mean scores were significantly higher than those in the resilience group in all three assessment times and significantly lower than those in the Persistent Severe Impairment group at T0, T1 and T2 (p < .001), except for the IES mean score at T2. In the High, Stable Functioning group, the GAD-7, PHQ-9 and IES mean scores were significantly lower than in all other groups at all three times (p < .001), with the exception of the T2 score, which was not significantly lower compared with the Improvement Functioning group (p < .001). In the persistent severe impairment group, the mean GAD-7 scores were significantly higher than those observed in the other groups at the three times (p < .001), except when compared with the Improvement Functioning group at T0 and the Persistent Severe Impairment group at T2; in this group PHQ-9 mean scores were significantly higher than those of the other three groups in all three assessment points and IES mean scores significantly higher than those of the other groups in the three times (p < .001), except compared with the Improvement Functioning group at T0 and the Progressive Impairment group at T2.

3.4. Differences in WSAS scores at T2 and regression analyses

WSAS scores at T2, adjusted for WSAS score at T0, were significantly higher in patients living alone (18.3 ± 10.8 vs. 13.8 ± 11.5 p < .01), aged less than 42 years (18.1 ± 11.1 vs. 14.6 ± 11.3, p < .05), single (17.8 ± 11.0 vs. 13.8 ± 11.6, p < .05), being already in charge to the local mental health centre before the recruitment (17.1 ± 11.4 vs. 14.4 ± 10.9, p < .05) and with a PHQ score at baseline >10 (19.7 ± 11.1 vs. 11.1 ± 9.7, p < .01) (Tables 5 and 6).

When entered in the regression models, predictors of higher WSAS score at T2 were a higher T0 WSAS score (B = 0.43, 95% CI: 0.32 to 0.55, p < .001) and a PHQ score >10 at baseline (B = 2.89, 95% CI: 0.28 to 5.49, p < .05), while not living alone was found to be a protective factor (B = -2.5, 95% CI = -4.73 to -0.26, p < .05) (Table 7).

Table 5

WSAS scores at T2 among socio-demographic characteristics in the whole sample adjusted for WSAS scores at T0 (ANOVA).

Socio-demographic characteristics	WSAS Total score T2 mean ± SD
Living alone	
Yes	18.35 ± 10.82**
No	13.82 ± 11.49
Age	
<42	18.14 ± 11.09*
≥42	14.65 ± 11.34
Education	
Diploma, yes	16.35 ± 11.00
Diploma, no	16.25 ± 12.34
Civil status	
Single	17.76 ± 10.98*
Engaged	13.84 ± 11.56
Work	
Employed	15.08 ± 11.77
Not employed	17.28 ± 10.92
Covid infection	
Yes	15.37 ± 11.49
No	16.45 ± 11.33
Quarantined	
Yes	17.99 ± 11.21
No	15.86 ± 11.34
Economic difficulties	
Yes	17.32 ± 11.51
No	16.00 ± 11.28
First access	
Yes	14.43 ± 10.90*
No	17.12 ± 11.44

*p < .05; **p < .01.

Table 6

WSAS scores at T2 among diagnosis, GAD, PHQ AND IES-R cut-offs in the whole sample adjusted for WSAS scores at T0 (ANOVA).

	WSAS T2 mean ± SD
Schizophrenia and other primary psychosis	
Yes	14.12 ± 12.20
No	16.51 ± 11.26
Bipolar Disorder	
Yes	17.70 ± 12.79
No	15.98 ± 10.94
Major Depression	
Yes	15.06 ± 10.87
No	17.13 ± 11.58
Anxiety Spectrum Disorders	
Yes	13.15 ± 10.95
No	16.62 ± 11.34
Obsessive Compulsive disorder	
Yes	14.50 ± 9.98
No	16.41 ± 11.40
Eating disorders	
Yes	19.69 ± 10.38
No	15.87 ± 11.40
Personality disorders	
Yes	15.83 ± 7.27
No	16.35 ± 11.48
Substance abuse	
Yes	18.20 ± 3.114
No	16.29 ± 11.419
GAD-7>10	
Yes	19.24 ± 10.89
No	12.34 ± 10.81
PHQ T0>10	
Yes	19.74 ± 11.10**
No	11.14 ± 9.67
IES-R T0>33	
Yes	20.22 ± 10.75
No	13.89 ± 11.03

*p < .01; GAD-7: Generalized anxiety disorders-7; PHQ: Patient Health Questionnaire; IES-R: Impact of Event Scale-Revised.

Table 7

Linear regression analysis. Dependent variable: WSAS score at T2.

	B (ES)	β	95.0% CI	
			Lower bound	Upper bound
Constant	7.599 (1286)**		5.069	10.129
WSAS, total score, baseline	.434 (.057)**	.434	.322	.546
Partnered	-2.498 (1.136)*	-.110	-4.733	-.262
PHQ>10, Baseline	2.891 (1.323)*	.125	.287	5.494
First access	-	.085	-	-
IES-R>33, Baseline	-	.059	-	-
Age>42 years	-	-.061	-	-

*p < .05; **p < .001; WSAS: Work and Social Adjustment Scale; PHQ: Patient Health Questionnaire; IES-R: Impact of Event Scale-Revised.

4. Discussion

To our knowledge, this is the first longitudinal study, carried out with in-person, clinician-led assessments aiming to assess psychosocial functioning of patients with pre-existing mental disorders across different waves of the COVID-19 pandemic encompassing more the one year of follow-up.

Strengths of the study include: 1) the multicenter and longitudinal design allowing, for a broader representation of patients and capturing changes over time; 2) the use of standardized assessment instruments to assess psychosocial functioning, anxiety, depressive and post-traumatic stress symptoms, ensuring reliability and comparability with previous research.

The results of the study identified a significant functional impairment persisting across the three times in the overall sample. Interestingly, based on their trajectories of impairment in global functioning over time, four groups of patients could be identified: High, Stable Functioning group, improvement functioning group, progressive impairment group, and persistent severe impairment group. The High, Stable Functioning group showed consistently low levels of impairment and gradual improvement over time, while the persistent severe impairment group reported high levels of impairment throughout the study period. The progressive impairment group showed a significant increase in impairment, while the improvement functioning group demonstrated a decrease in impairment over time with a cross trend when compared to the former group with an opposite trend in mean functioning levels at T0 with respect to T2. This result is of particular relevance since not all patients present the same trajectories of functioning across nearly one year follow-up and react to different waves of COVID-19 pandemic in the same way. It has to be noted that the most significant changes to WSAS score occur from T0 to T1 and, with the exception of patients in the progressive impairment groups, trajectories of functioning show a relative stability from T1 to T2, suggesting that COVID-19 pandemic could have only a small influence in influencing those trajectories. However, it has to be noticed that confinement measures during the first lockdown (i.e., the T0 assessments) were more stringent compared to those existing during the 4th wave of COVID pandemic (i.e., the T2 assessments) and therefore this could have had a different impact on patients' psychosocial functioning. Moreover, this result can be also interpreted in light of the consideration that, when established, impairments in psychosocial functioning can be particularly persistent, even when patients receive adequate treatments (i.e., psychosocial interventions). Thus, it is possible that we did not detect changes from T1 to T2 since, according to the naturalistic design of the study, no specific rehabilitative interventions have been proposed to patients in this frame-time.

Several differences have been detected that could potentially help to identify those patients at higher risk to progressively present a reduction

of functioning or reported a persistent low functioning both when strict containment measures are in place and during the epidemiological regression of the viral spread. In particular, younger patients are more represented in the group characterized by a persistent impairment of functioning across the three-assessment point. This is in line with previously available reports in which younger age has been identified as a potential risk factor for psychosocial consequence of COVID-19 pandemic (Fleischmann et al., 2021; Klokgieters et al., 2023). Several factors could explain this association. In fact, young people with pre-existing severe mental disorders reported increased feelings of fear and anxiety compared to older patients (Pogany et al., 2020) and are more frequently unemployed (Barber and Kim, 2021). Moreover, younger individuals with mental disorders might be more vulnerable to social restrictions in place during COVID-19 waves, and might present reduced skills to cope with adversities, which are reported to increase with age (Gooding et al., 2012), and are four to five times more likely to report loneliness compared with older adults (Sampogna et al., 2021; van Amelsvoort and Leijdesdorff, 2022; Salazar de Pablo et al., 2020). Another possible explanation of this data may be due by the fact that COVID-19 pandemic affected less the daily routine of older individuals than of younger persons.

In our sample, patients reporting an economic loss due to COVID pandemic are more represented in all groups, except in the High, Stable Functioning group, as well as those not married, in line with available reports, in which the presence of a stable social network and of financial stability can be considered protective factors against the effects of the COVID-19 pandemic on the mental health of the general population and of vulnerable groups (Pazderka et al., 2022). Economic difficulties are usually related to frustration, anxiety, and lower mood, increasing fears about socioeconomic consequences of COVID-19 pandemic. Additionally, patients with mental disorders have a lower socioeconomic status and higher rates of unemployment than the general population, making them more vulnerable in times of financial instability (Fleischmann et al., 2021; Mei et al., 2021; Geddes, 2021). Moreover, it has been reported that psychosocial functioning, social contacts and economic stability are deeply interconnected. In fact, a reduced psychosocial functioning is associated with poor working skills and productivity (Ba et al., 2022), reduced social contacts, and increased feelings of loneliness (Léda-Rêgo et al., 2020; Holt-Lunstad, 2021). Conversely, dissatisfaction in several aspects of life (i.e., work, family, social life) could affect occupational competitiveness and patients' motivation to be engaged in social and leisure activities and to maintain regular contacts with family members and other relevant others, thus affecting overall psychosocial functioning (Bonnín et al., 2019; Jiménez-López et al., 2019; Knight et al., 2020).

Interestingly, the different discrete diagnostic categories did not differ significantly among the four WSAS trajectories. Of note, both at correlation analyses and at multivariate analyses, psychiatric diagnoses were not statistically associated with global functioning. On one hand, this suggests that global levels of functioning do not significantly differ, at all time-points of the study, among patients with psychotic, affective, anxiety and feeding disorders. On the other hand, this result implies that the different psychopathological dimensions – including depressive, anxiety and post-traumatic stress – are more strongly correlated to psychosocial functioning than diagnostic entities, and that they can be useful to identify patients who will develop a clinically relevant deterioration in global functioning over time, especially during crisis period, such as the COVID-19 pandemic. This is in line with previous reports in which anxiety and depressive symptoms were found to be strong predictors of functional impairments (Carmassi et al., 2022a; Carmassi et al., 2022b; An et al., 2022). However, it has to be noted that this interpretation should be viewed also in light of the reduced sample size of each trajectory. In fact, the reduced sample size could have masked differences in functioning over time among the different diagnostic entities. Therefore, its interpretations remain speculative which needs to be replicated in larger samples.

Results coming from post-hoc analyses have been partially confirmed by the linear regression analysis carried out in the whole sample to identify predictors of psychosocial functioning after one year of COVID-19 pandemic in patients with mental disorders. We found that living alone, being younger, being single, and having higher levels of depressive symptoms at baseline were predictor of poor psychosocial functioning after one year, while living with someone is considered a protective factor for good psychosocial functioning.

The finding that the levels of depressive symptoms can be considered a predictive factor for long-term poor psychosocial functioning during COVID-19 pandemic is of particular relevance since depressive symptoms are very common among patients with mental disorders, also when diagnostic criteria for an affective episode are not satisfied (Lewinsohn et al., 2000). This result could be linked to the fact that the loss of positive experiences and activities during the COVID-19 pandemic could greatly contribute to increase symptoms such as sadness, loss of energy and lack of interest, which can potentially have a major impact on subsequent patients' psychosocial functioning, even when social restriction are removed. Further, economic problems may also negatively burden depressive symptoms, triggering worse functional outcomes as suggested by our results.

In our study we adopted the WSAS to assess psychosocial functioning. It was specifically developed for the evaluation of workability and social functioning in patients with mental health problems (Mundt et al., 2002). Despite this instrument has several strengths, such as its understandability and the fact that it requires few minutes to be completed, it has several limitations, such as its self-reported nature and the absence of an adaptation of cut-offs to patients' age.

The present study has several limitations. In our sample we reported a high dropout rate at T2 (43.1%), which may introduce bias and affect the generalizability of findings. It is important to recall that the study is based on voluntary responses during routine control visits, and this may have affected retention rates. Understanding the reasons for the high dropout rate and addressing them could strengthen future studies. Moreover, despite multicentric, the study was conducted in Italy only, and the findings may not be directly applicable to other populations or cultural contexts since it has been reported that cultural and contextual factors may influence the psychosocial impact of the pandemic. Moreover, to assess participants' experience to traumatic events, we used the IES-R; participants were invited to compile items with respect to possible traumatic events experienced during the COVID-19 pandemic. If on one hand this allowed us to focus more on detail about psychological response to COVID-19 pandemic, we were not able to assess the possible impact of any other trauma, other than those related to pandemic.

The present study contributes to the existing scientific literature on the psychosocial impact of the COVID-19 pandemic on individuals with psychiatric disorders. By assessing longitudinal changes in psychosocial functioning and comparing different trajectories of impairment, the study provides insights into the resilience and vulnerability of individuals with psychiatric disorders during times of crisis. The findings can contribute to a better understanding of the specific needs of this population and inform interventions and support strategies.

Available studies of the impact of COVID-pandemic have focused mainly of levels of symptoms, while little is known about trajectories of functioning of patient with mental disorders over time. Results of our study can be of particular relevance from a clinical perspective since they support the notion that some subgroup of patients can be, during times of global crisis, at particular high risk to present a significant impairment in psychosocial functioning, which can persist over time, even when environmental stressors are reduced. Since the impairment in autonomy and global functioning is strongly correlated to long-term outcome, empowerment, and sense of self-efficacy (Di Vincenzo et al., 2022), it should be adequately treated with ad hoc psychosocial interventions, as it happens with psychiatric symptoms (Davidson and Tondora, 2022). To this end, it has been reported that several barriers to

the implementation of psychosocial interventions exist in routine care, including lack of financial resources, the insufficient staff/patients ratios, heavy workloads, the low availability of training opportunities and professionals' attitudes more experienced in prescribing psychopharmacological therapy than psychosocial interventions (Fiorillo et al., 2016). At policy level, finding of our study emphasize the need to consider aspects such as redistribution of caseloads, incentives for the staff, and acknowledgment of professional competencies in the implementation process, in order to routinely provide integrated treatments to patients with mental disorders and to improve patients' psychosocial functioning in clinical settings (Magliano and Fiorillo, 2007). Moreover, digital interventions could implement, in order to provide interventions in routine care and to overcome organizational barriers (Heinz An et al., 2022; Taher et al., 2023; Kishimoto, 2023)

In conclusion, this multicenter study provides valuable insights into the psychosocial functioning of individuals with psychiatric disorders during the COVID-19 pandemic. Despite some limitations, the study's longitudinal design, use of standardized assessment instruments, and focus on psychiatric patients make it a relevant contribution to the scientific literature. Further research is needed to confirm and expand upon these findings, considering the specific contextual and cultural factors that may influence the psychosocial impact of the pandemic.

CRedit authorship contribution statement

M. Luciano: Formal analysis, Investigation, Methodology, Writing – original draft. **C. Carmassi:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Supervision, Writing – original draft. **G. Sampogna:** Formal analysis, Writing – original draft. **C.A. Bertelloni:** Data curation, Formal analysis, Writing – original draft. **G. Abbate-Daga:** Conceptualization, Investigation, Methodology, Writing – review & editing. **U. Albert:** Conceptualization, Investigation, Methodology, Writing – review & editing. **G. Castellini:** Conceptualization, Investigation, Methodology, Writing – review & editing. **B. Della Rocca:** Formal analysis, Investigation, Writing original draft. **S. Fantasia:** Data curation, Formal analysis, Writing – review & editing. **M. Menchetti:** Conceptualization, Investigation, Methodology, Writing – review & editing. **V. Pedrinelli:** Data curation, Formal analysis, Writing – review & editing. **M. Pompili:** Conceptualization, Methodology, Writing – review & editing. **M.S. Signorelli:** Conceptualization, Investigation, Methodology, Writing – review & editing. **S. Tosato:** Conceptualization, Investigation, Methodology, Writing – review & editing. **Leonardo Massoni e Debora Andreoli:** Conceptualization, Methodology, Project administration, Supervision, Writing – original draft. **Francesca Maria Clesi:** Investigation, Writing – review & editing. **Vittoria Bastanzetti:** Investigation, Writing – review & editing. **Paola Longo:** Investigation, Writing – review & editing. **Matteo Panero:** Investigation, Writing – review & editing. **Sofia Burato:** Investigation, Writing – review & editing. **Marco Faldi:** Investigation, Writing – review & editing. **Giorgia Marchesoni:** Investigation, Writing – review & editing. **Matteo Di Vincenzo:** Investigation, Writing – review & editing. **Lucia Tretola:** Investigation, Writing – review & editing. **Chiara Possidente:** Investigation, Writing – review & editing. **Nicola Cosentini:** Investigation, Writing – review & editing. **Isabella Berardelli:** Investigation, Writing – review & editing. **Denise Erbutto:** Investigation, Writing – review & editing.

Declaration of competing interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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