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BRIEF REPORT

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The impact of COVID-19 epidemic on eating disorders: A longitudinal observation of pre versus post psychopathological features in a sample of patients with eating disorders and a group of healthy controls

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Abstract

Objective: the aim of this longitudinal study was to evaluate the impact of COVID-19 epidemic on Eating Disorders (EDs) patients, considering the role of pre-existing vulnerabilities.

Method: 74 patients with Anorexia Nervosa (AN) or Bulimia Nervosa (BN) and 97 healthy controls (HCs) were evaluated before lockdown (T1) and during lockdown (T2). Patients were also evaluated at the beginning of treatment (T0). Questionnaires were collected to assess psychopathology, childhood trauma, attachment style, and COVID-19-related post-traumatic symptoms.

Results: A different trend between patients and HCs was observed only for pathological eating behaviors. Patients experienced increased compensatory exercise during lockdown; BN patients also exacerbated binge eating. Lockdown interfered with treatment outcomes: the descending trend of ED-specific psychopathology was interrupted during the epidemic in BN patients. Previously remitted patients showed re-exacerbation of binge eating after lockdown. Household arguments and fear for the safety of loved ones predicted increased symptoms during the lockdown. BN patients reported more severe COVID-19-related post-traumatic symptomatology than AN and HCs, and these symptoms were predicted by childhood trauma and insecure attachment.

Discussion: COVID-19 epidemic significantly impacted on EDs, both in terms of post-traumatic symptomatology and interference with the recovery process. Individuals with early trauma or insecure attachment were particularly vulnerable.

KEYWORDS

attachment style, childhood trauma, Covid-19, eating disorders, epidemic, lockdown, post-traumatic stress disorder, quarantine

1 | INTRODUCTION

By the end of February 2020, some cases of pneumonia in the north of Italy were attributed for the first time to a novel form of Coronavirus (Sars-CoV-2). In few weeks, the national and regional governments imposed a progressively increasing level of isolation, with the final general lockdown on March ninth. Several scientific reports seem to indicate the importance of a particular focus on

mental health in this peculiar dramatic period (Brooks et al., 2020; Fiorillo & Gorwood, 2020; Shigemura, Ursano, Morganstein, Kurosawa, & Benedek, 2020; Yao, Chen, & Xu, 2020). Preliminary reports indicated that during epidemic or disasters many persons experience negative emotional effects, due to the fear of contagion and of the death of family members (Cao et al., 2020; Wang, Di, Ye, & Wei, 2020). Anxiety, sadness, anger and loneliness might also rise from social distancing and quarantine (Cao et al., 2020; Fernández-Aranda et al., 2020; Kavoor, 2020; Nguyen et al., 2020; Qiu et al., 2020; Wang, Di, et al., 2020). More specifically, COVID-19 epidemic may have been experienced as a traumatic event, thus, resulting in an increase of post-traumatic stress disorder (PTSD) symptoms (Liu, Gayle, Wilder-Smith, & Rocklöv, 2020; Wang et al., 2020).

However, it has been suggested that people may have heterogeneous responses to the pandemic consequences, also on the basis of pre-existing psychopathological features (Fiorillo & Gorwood, 2020), which might increase the vulnerability to the emotional consequences of any disaster-related trauma (Brooks et al., 2020). Indeed, Yao et al. (2020) underlined the necessity of evaluating the effects of pandemic and isolation on patients with psychiatric disorders, and Brooks et al. (2020) and Fiorillo & Gorwood (2020) suggested that this persons might need extra-support in this particular situation.

Persons with psychiatric disorders often report interpersonal difficulties which might exacerbate the effect of isolation, and preliminary findings seem to demonstrate that history of childhood maltreatment and attachment features predict the extent of mental health burden during the lockdown (Moccia et al., 2020). From this perspective, patients with eating disorders (EDs) seem to represent a particularly vulnerable population to the effect of the unexpected environmental conditions during the COVID-19 pandemic, considering their specific psychopathology and the need for a continuous assistance in the active phase of their disorders (Touyz, Lacey, & Hay, 2020; Weissman, Bauer, & Thomas, 2020). Indeed, the reduction of treatment implementation and the confinement have been hypothesized to possibly worsen psychological stress and the severity of ED specific symptomatology (Dalle Grave, 2020; Murphy, Calugi, Cooper, & Dalle Grave, 2020; Peckmezian & Paxton, 2020; Van den Berg et al., 2019).

Clinicians need to have clear information regarding the possible interference with the recovery process of patients with EDs already under treatment, and protocols should be optimized to manage this situation in the future. In particular, it is important to compare the longitudinal outcomes under normal treatment conditions with the ones during the lockdown, in order to understand whether adopting alternative forms of assistance (e.g., online visits) and isolation would impact health care of patients with EDs.

However, up to now, the available literature on psychopathological consequences of lockdown following COVID-19 epidemic did not provide reliable information regarding the pre-epidemic period, in patients with EDs already under treatment at the beginning of the pandemic. Thus, the present study attempted to overcome this limitation, adopting a longitudinal design, and testing three main hypotheses. First, the study compared a group of patients with EDs with a group of healthy controls in terms of their psychological status before and after the lockdown, in order to evaluate whether participants with EDs represented a more vulnerable population to the effects of COVID-19 pandemic (hypothesis 1). Secondly, it was investigated whether the lockdown period significantly interfered with the recovery process (hypothesis 2): thus, the study evaluated the longitudinal outcome of patients already under treatment before the pandemic, considering the psychopathological changes intervening before and during the lockdown period, and comparing the results between diagnostic categories, namely Anorexia Nervosa (AN) and Bulimia Nervosa (BN). Finally, it was hypothesized that factors preceding the pandemic might be associated with worsening of psychopathology during the lockdown (hypothesis 3). In particular, it was evaluated whether having obtained a remission from EDs before the lockdown had a protective role on the psychopathological outcome during the pandemic. Furthermore, it was evaluated whether a history of childhood trauma or particular attachment style was associated with the psychopathological outcome during the lockdown, in terms of development of COVID-19-related PTSD symptoms, and evolution of EDs symptomatology.

2 | METHODS

2.1 | Study design

This is an observational, longitudinal study of a group of patients with EDs and of Healthy Controls (HCs), both evaluated a few months before the onset of COVID-19 epidemic (T1) and during lockdown (T2). Patients with EDs were also evaluated at the beginning of treatment (T0).

The study was approved by the local Ethics Committee. All participants provided informed consent prior to study enrollment.

2.2 | Participants

Patients attending the Outpatient Clinic for EDs of the University of Florence were enrolled, providing they met the following inclusion criteria: female sex, aged 18–60 years, current DSM 5 diagnosis of AN or BN. Exclusion criteria were as follows: comorbid psychotic disorder, illiteracy, intellectual disability, severe medical conditions precluding outpatient treatment, current use of psychoactive medications except for antidepressant and benzodiazepines, which were kept stable during the study.

The control group (which was deemed adequate since it was comparable in terms of gender and age) was initially recruited from the community of Tuscany by means of local advertisements, for a study about the psychopathology of EDs. Participants provided their consent to be re-contacted for further investigations on similar topics. Inclusion criteria for control group were: absence of any lifetime ED, evaluated by means of a structured interview (SCID-5-RV, First, Williams, Karg, & Spitzer, 2015), and body mass index (BMI) between

18.5–25.0 kg/m^2, and absence of intellectual disability, illiteracy, current/lifetime Axis I psychiatric disorders.

2.3 | Procedures

The online survey was performed from April 22nd, 2020, until May third, 2020 (T2). The present time frame covered the advanced phase of the COVID-19 epidemic in Italy, starting 6 weeks after the Italian Government declaration of lockdown (Governo Italiano, Presidenza del Consiglio dei Ministri, 2020) until the last days of the so-called phase 1 of lockdown itself.

The cohort of patients was initially enrolled for the longitudinal observation performed at the clinic between January and September 2019 (T0). Patients included in the study were all under treatment, and they were regularly re-evaluated with follow-up assessments every 3 months. The last follow-up performed by each patient before the detection of the first cases of COVID-19 in Italy was included in the present study and considered as a pre-lockdown evaluation (T1). All T1 assessments were carried out between November 2019 and January 2020.

The control group was recruited from December 1, 2019 until January 15, 2020 (T1).

Of the 86 Caucasian ED patients referred, 2 were excluded, 76 were available for the pre-lockdown follow-up (T1), and 74 were available for the in-lockdown follow-up (T2), with 7 dropouts and 3 lost to follow-up. Only these patients were included into the survey (37 with AN, 37 with BN). Of the 116 Caucasian participants referred for the control group, 7 were excluded and 97 were available for the second follow-up (in-lockdown).

2.4 | Assessment

Sociodemographic and clinical data were evaluated regularly as part of the routine assessments for patients with EDs performed at the Outpatient Clinic for EDs, through a clinical interview by two expert psychiatrists (G.C., V.R.). All evaluations (T0, T1, T2) included the clinical interview and self-administered questionnaires to assess general (Brief Symptom Inventory, BSI) (Derogatis & Melisaratos, 1983) and ED-specific (Eating Disorder Examination Questionnaire, EDE-Q) (Calugi et al., 2018; Fairburn, 2008) psychopathology. T0 assessment also included questionnaires on early trauma (Childhood Trauma Questionnaire–Short Form, CTQ-SF) (Bernstein et al., 2003) and attachment style (Experiences in Close Relationships–Revised, ECR-R) (Fraley, Waller, & Brennan, 2000). Moreover, during lockdown (T2) COVID-19-related post-traumatic symptoms were evaluated by means of a version of the Impact of Event Scale-Revised (IES-R) (Weiss & Marmar, 1997) which was specifically adapted for the investigation of COVID-19-related post-traumatic stress psychopathology. Finally, a dedicated, self-report questionnaire was administered at T2 to collect different information regarding variables of interest, such as lockdown conditions and variations in different areas of daily living. All these data were coded as dummy variables (absence/presence of a condition or a moderate to severe worsening/change). During lockdown, data previously obtained through a face-to-face clinical interview were collected in the same way via a telephone or an online video call, while the self-report questionnaires were converted into digital format and administered via a dedicated online platform. The only significant difference between pre-lockdown and in-lockdown assessments was the online digital nature of the self-report questionnaires, as opposed to the previous paper format.

Patients were considered in full remission, when they did not meet the DSM 5 criteria for any ED at T1 and T2 (including EDs not otherwise specified). In particular, the criteria adopted by Turner et al. (BMI > 18.5; no reported objective binges, vomiting, or laxative use in the past 28 days, EDE-Q total score under one SD above the community mean) were considered (Turner, Marshall, Stopa, & Waller, 2015). Crossover was defined as a diagnostic change toward a different ED diagnosis (this outcome variable also included those AN restricting type patients who developed binge/purge behaviors). The aforementioned variables were defined according to the DSM 5 criteria and were collected by means of a structured interview performed by two expert psychiatrists (G.C., V.R.) (First et al., 2015).

2.5 | Treatment

During the pre-lockdown period, eligible patients were provided with an individual Enhanced Cognitive Behavioral Therapy (Fairburn, 2008), with a frequency of one session per week (which varied according to the treatment phase). During the lockdown, patients received online medical examinations to assess their general psychopathological and clinical conditions, and psychotherapy sessions delivered via internet using a webcam, with the same therapists and the same frequency with which they were carried out before the lockdown. In the T0-T1 period, the patients included in the study had performed on average 30 psychotherapy sessions, while in the T1-T2 period they performed on average 16, of which the last 6 or 7 were online via webcam due to the lockdown measures.

2.6 | Statistical analyses

In order to evaluate whether patients with EDs represented a more vulnerable population to the effects of COVID-19 pandemic (hypothesis 1), comparisons between patients and controls were performed, in terms of COVID-19-related post-traumatic stress symptoms and longitudinal variations of psychopathology and pathological eating behaviors (T1-T2). Between groups comparisons were performed using Analysis of Covariance (ANCOVA) with post-hoc testing, whereas for dichotomous variables Binomial Logistic Regression was used. A repeated measures approach was adopted for longitudinal analyses, using Linear Mixed Model with random intercepts and Time, Group and Time*Group as fixed effects. All the analyses were adjusted for age and education.

A similar repeated measures approach with Linear Mixed Models was used in order to test for changes in the longitudinal course of all clinical variables before and after the lockdown (T0-T1-T2), among patients with AN and BN (hypotheses 2); Time*Group interaction effect was inserted in all models to test for differences between the two diagnoses. Post hoc analyses were carried out to identify the variations at each timepoint, to study whether the COVID-19 pandemic and the lockdown occurred in the T1-T2 period could cause symptomatic relapses.

Finally, it was evaluated whether the clinical status before the lockdown, COVID-19-related environmental conditions and the CTQ and ECR-R scores were associated with psychopathological changes and onset of PTSD symptoms during lockdown (hypothesis 3). Therefore, these variables were entered as covariates in Linear Mixed Models (along with their interaction with Time), with BSI, EDE-Q, objective binge eating and physical exercise as dependent variables, and linear and binomial logistic regression analyses were used to study their effect on COVID-19-related post-traumatic psychopathology. Statistical analyses were performed using IBM SPSS Statistics v.25 (IBM Corp., 2017).

3 | RESULTS

3.1 | Comparisons between patients and controls in terms of psychopathological outcomes

Table 1 shows data regarding the socio-demographic characteristics of the sample at T2. Only two patients reported having received a screening test for COVID-19 (both resulted negative), while none of the HCs performed a screening test or received a confirmed COVID-19 diagnosis. Within environmental factors, ED patients reported more frequently that they lived alone and did not have a partner and greater fear for the safety of loved ones as compared with HCs.

Longitudinal data are illustrated in Figure 1.

Table 2 reports the comparisons between patients and HC of the changes in psychopathology, pathological eating behaviors and BMI occurring after the lockdown (T1-T2 period). According to Linear Mixed Models (Time*Group interaction) patients and HC reported a different pre-post lockdown variation of objective binge eating and compensatory physical exercise: in particular, an increase in the two pathological behaviors was observed for ED patients, while no difference between T1 and T2 emerged for the control group (Table 2). No significant effect was observed for BSI scores.

Considering COVID-19-related post-traumatic stress symptoms scores developed the during lockdown period, patients reported higher total IES-R scores and hyperarousal symptoms as compared with the other participants (Table 2).

3.2 | Psychopathological variations before and during the lockdown

Mixed Model indicated a significant improvement in general psychopathology during the pre-lockdown period for both EDs diagnoses (Cohen's *d* for AN: 0.66; Cohen's *d* for BN: 0.78), while no significant changes were observed after the lockdown measures (Figure 1a). Considering ED-specific psychopathology, BN patients showed a significant reduction at the first follow-up (Cohen's *d*: 0.52), but no change at the next one; conversely, AN patients showed an improvement in both T0-T1 (Cohen's *d*: 0.39) and T1-T2 comparisons (Cohen's *d*: 0.26) (Figure 1b).

Considering monthly objective binge eating, BN patients reported a significant reduction from baseline to T1 (Cohen's *d*: 1.06) and a significant increase after the lockdown measures (Cohen's *d*: 0.32), while participants with AN only showed a significant T0-T1 variation (Cohen's *d*: 0.41), with no change at T2 (Figure 1c). All patients showed a significant increase in exercise after the lockdown with

TABLE 1 Sociodemographic characteristics and COVID-19-related environmental conditions of the sample during lockdown (T2) for patients and HCs. For dichotomous variables, data are reported with frequencies and percentages, and differences between patients and HCs were studied using Binomial Logistic Regression (adjusted for age and education). Age is reported as mean ± *SD* and was compared using ANOVA. All statistical analyses were adjusted for age and education; statistically significant comparisons are indicated in bold

	Patients (*n* = 74)	HCs (*n* = 97)	Effect size
Age (years)	31.74 ± 12.76	30.45 ± 10.89	
Graduates[a]	**22 (29.7)**	**61 (62.9)**	**OR = 0.25 [0.13–0.48]**
Having a partner	**40 (54.0)**	**71 (73.2)**	**OR = 0.39 [0.20–0.78]**
Living alone	**12 (16.2)**	**5 (5.2)**	**OR = 4.37 [1.39–13.79]**
Not working	51 (68.9)	49 (50.5)	
Having a loved one with COVID-19	6 (8.1)	8 (8.2)	
Reporting a moderate to severe economic damage	15 (20.3)	10 (10.3)	
Intensification of household arguments	9 (12.2)	3 (6.7)	
Fear for the safety of loved ones	**25 (33.8)**	**23 (23.7)**	**OR = 2.14 [1.02–4.48]**

Abbreviations: ANOVA, analysis of variance; BMI, body mass index; HCs, healthy controls; OR, odds ratio.
[a]Adjusted only for age.

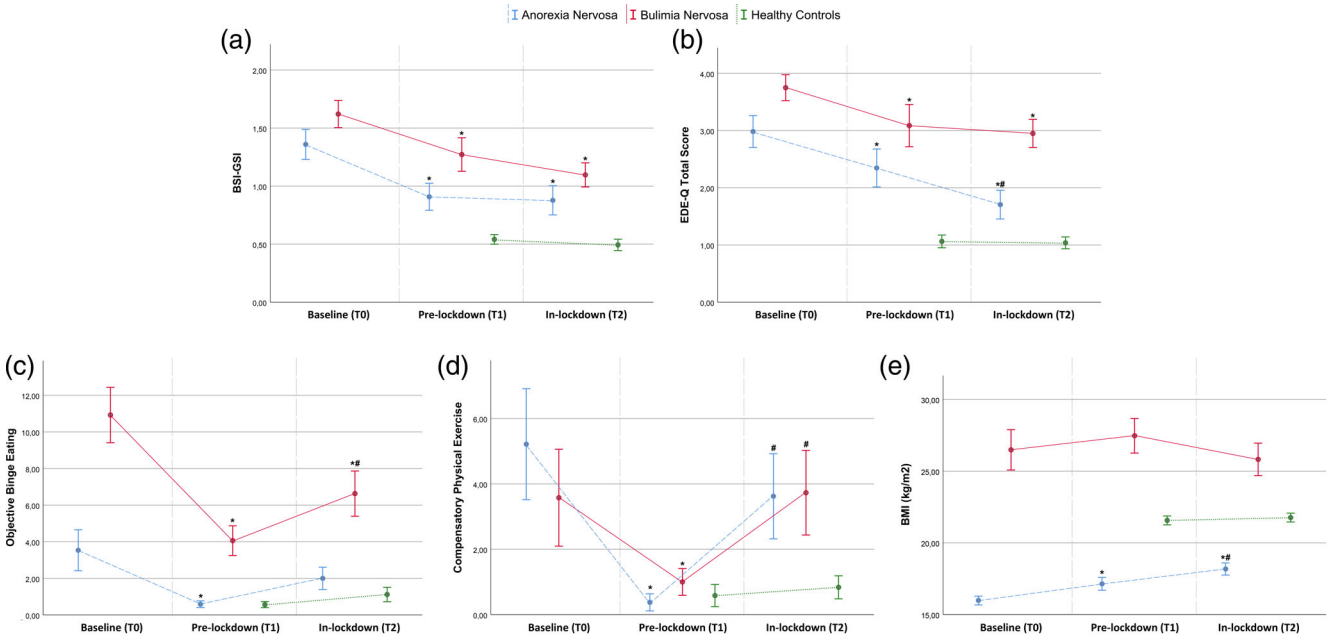

FIGURE 1 Longitudinal course of general psychopathology (panel a), eating disorder psychopathology (panel b), objective binge-eating monthly episodes (panel c), and compensatory physical exercise monthly episodes (panel d), divided by diagnoses. Error bars represent standard errors. For ED patients, post hoc comparisons between timepoints for each group are reported as following: *Significantly different from T0 ($p < .05$). #Significantly different from T1 ($p < .05$). BMI, body mass index; BSI-GSI: Brief Symptom Inventory—Global Severity Index; EDE-Q: Eating Disorder Examination Questionnaire [Color figure can be viewed at wileyonlinelibrary.com]

TABLE 2 Longitudinal data on psychopathology, pathological behaviors and weight status, for patients and HCs, together with in-lockdown COVID-19-related post-traumatic stress symptoms scores. For longitudinal data, variables that changed over time differently between patients and controls (as indicated by a statistically significant Time*Group interaction in the Linear Mixed Model) are marked in bold

	Patients (n = 74)		HCs (n = 97)		
	Pre-lockdown (T1)	In-lockdown (T2)	Pre-lockdown (T1)	In-lockdown (T2)	Effect size
BSI-GSI	1.11 ± 0.72	0.99 ± 2.33	0.54 ± 0.41	0.49 ± 0.48	
EDE-Q Total score	2.72 ± 1.72	2.33 ± 1.63	1.06 ± 1.09	1.04 ± 1.01	
Objective binge eating	**2.33 ± 2.51**	**4.32 ± 7.17**[a]	**0.57 ± 1.52**	**1.12 ± 3.61**	Cohen's d = 0.53
Compensatory physical exercise	**0.69 ± 1.84**	**3.53 ± 7.72**[a]	**0.58 ± 3.33**	**0.84 ± 3.47**	Cohen's d = 0.39
BMI (kg/m^2)	22.31 ± 7.06	21.99 ± 6.19	21.56 ± 3.04	21.79 ± 2.96	
IES-AV	—	0.94 ± 0.67	—	0.82 ± 0.61	
IES-IN	—	0.90 ± 0.81	—	0.71 ± 0.56	
IES-HY	—	**1.23 ± 0.91**	—	**0.96 ± 0.72**	Cohen's d = 0.33
IES-total score	—	**22.07 ± 15.90**	—	**17.96 ± 11.41**	Cohen's d = 0.30

Notes: IES scores were compared by means of ANCOVA. All statistical analyses were adjusted by age and education. For statistically significant variations and comparisons the effect size is reported (*Cohens' d*).
Abbreviations: ANCOVA, Analysis of Covariance; AV, Avoidance; HCs, Healthy Controls; HY, Hyperarousal; IES, Impact of Event Scale; IN, Intrusion.
[a]Post hoc are reported as significant variation from T1 ($p < .05$).

respect to T1 (Cohen's d for AN: 0.32; Cohen's d for BN: 0.30) (Figure 1d). Finally, BMI increased significantly with each follow-up in AN (T0-T1 Cohen's d: 0.54; T1-T2 Cohen's d: 0.71), while it remained substantially stable in BN (Figure 1e). Data on psychopathological and behavioral measures and BMI for patients at each follow-up are reported in Table S1.

Considering diagnostic changes before and after the lockdown, at T1, 10 patients had obtained a full remission (5 from AN, 5 from BN) and 19 a partial remission (3 from AN and 16 from BN). However, at T2 10 of these remitted individuals reported a relapse into BN (of which 2 had an initial diagnosis of AN and 8 of BN). Relapse rate was not associated with baseline diagnosis (Fisher's exact test p = .67). A total of 8 patients who met criteria for AN at T1 experienced a diagnostic crossover to BN during the lockdown period. At the final follow-up, 11 participants reported full remission and 17 partial remission, whereas 21 still reported a diagnosis of AN and 25 of BN.

3.3 | Pre-lockdown predictors of psychopathological outcome during the pandemic in patients with EDs

Having obtained remission at T1 did not affect the trend of psychopathology or physical exercise in the subsequent T1-T2 period. Indeed, Time*Remission interaction was not found to be significant when inserted in the model. However, a significant interaction was found in the binge-eating model, indicating that most of the patients who had achieved remission at the previous follow-up showed a relapse of binge eating symptomatology at T2 (T1: 0.75 ± 0.94, T2: 4.24 ± 5.79; Cohen's *d*: 0.64) (Figure S1).

Considering environmental factors, household arguments were associated with a higher increase in pathological physical exercise during the lockdown (T1: 0.53 ± 1.34, T2: 2.33 ± 5.76 vs. T1: 0.94 ± 1.61, T2: 7.56 ± 11.34, p = .014, Cohen's d for patients reporting this factor: 0.62), while fear for the safety of loved ones predicted a higher increase in binge-eating episodes (T1: 1.39 ± 2.13, T2: 2.24 ± 5.17 vs T1: 0.83 ± 1.47, T2: 5.05 ± 6.99, p = .012, Cohen's d for patients reporting this factor: 0.67).

Childhood trauma significantly predicted COVID-19-related post-traumatic symptomatology in patients with an initial diagnosis of AN (β = 0.34, p = .031), in particular considering emotional (β = 0.40, p = .012) and sexual abuse (β = 0.50, p = .001). Taking into account the adult attachment style, a distinct pattern was found according to the two EDs diagnoses: in patients with AN, avoidance was significantly associated with in-lockdown post-traumatic psychopathology (β = 0.38, p = .044), while a positive association was found for anxious attachment in BN (β = 0.57, p = .005).

4 | DISCUSSION

This is one of the first studies which provided preliminary evidences for the psychopathological impact of COVID-19 epidemic, by means of a longitudinal observation of patients with EDs, before and during the lockdown period. Overall, the main hypotheses of the study were partially supported. Not all the patients with EDs seemed to report a specific increase of distress as compared with what happened to controls, under similar conditions. Some patients appeared to be more vulnerable to the impact of lockdown, in terms of relapses into pathological eating behaviors, namely patients with BN, and those experiencing household arguments and fear for the loved ones, while participants with a history of childhood trauma and insecure attachment styles were more likely to report COVID-19-related post-traumatic stress symptoms.

More in details, the lockdown follow-up showed that for patients with BN the difficulties associated with the COVID-19 period significantly interfered with the recovery process, in terms of lack of further reduction of psychopathology, exacerbation of binge eating and compensatory physical exercise. The positive trajectory of improvement observed before the lookdown was clearly interrupted during the pandemic period, thus showing an inverse tendency of what we would expect in a normal condition of treatment. The present results were largely expected, considering that the government limitations made the face-to-face programs really challenging, shifting most of the clinical activity toward video conferencing (telehealth) (Fernández-Aranda et al., 2020). Different explanations have been already suggested for binge eating onset or worsening during the pandemic. From one side, the "food insecurity" mechanism has been proposed (Weissman et al., 2020), with pervasive media coverage about threats of food shortages (Rasmusson, Lydecker, Coffino, White, & Grilo, 2019). Furthermore, it is also possible that the intense use of social media might heightened awareness of bodily self, having a toxic influence on the objectification of the thin ideal (Fernández-Aranda et al., 2020), thus exacerbating the binge eating vicious cycle, as well as the concerns about health and fitness during confinement. It is also possible that high binge eating represented an epiphenomenon of pervasive emotion dysregulation, exacerbated by the preoccupations about one's own and other's safety, or about the worsening economic conditions (Weissman et al., 2020), and by the obstacles in treatment protocols. A further confirmation to this interpretation is represented by the association between environmental conditions during the lockdown such as household arguments and the fear for the safety of loved ones with the increase of symptoms severity during the pandemic. Indeed, fear and adverse conditions during the forced cohabitation might increase stress, consequently promoting binge eating.

The interpretation of results in the group of patients with AN appeared to be more controversial. From one side these patients showed a further improvement of ED psychopathology and a progressive weight gain during lockdown. Furthermore, for some important variables such as EDE-Q scores, all groups did not report any decline at T2 as compared with T1, and in the case AN they even show further improvements. This result could be explained as a kind of consequence of the efficacy of the treatment patients continued to receive. Therefore, this is a further confirmation of the importance of e-therapy for patients with eating disorders in a period of lockdown and difficulties to access to public services (Weissman et al., 2020). On the other hand, patients with AN experienced an exacerbation of compensatory physical activity, and a non-negligible number of them experienced diagnostic crossover. Thus, even though the quarantine appeared to have less impact on patients with AN as compared with BN, both groups of patients reported a worsening of pathological behaviors, which could represent a possible hint of an imminent exacerbation of the disease.

According to previous observations on general population (Qiu et al., 2020; Wang, Di, et al., 2020), a non-negligible number of HCs reported a self-perceived worsening of their mental health status from different points of view, including anxiety, sadness, and sleep. However, in the present sample, patients with EDs did not report a more severe increase of these symptoms as compared to HC. This result could be interpreted considering that participants with EDs who often report a severe social isolation might have been less sensitive to the lockdown effects, and thus to its psychopathological consequences. Regarding the lack of significant worsening of ED-specific psychopathology in patients, putative positive meaning of confinement might

be the reduced exposition to the gaze of the others, and to the judgment or criticisms from friends, doctors, or other family members. Accordingly, this point might explain the lack of significant increase of weight and shape concern in a period of less-intense treatment.

As far as COVID-19-related post-traumatic stress symptoms are concerned, an increase of interpersonal and family conflicts, probably exacerbated by the forced cohabitation during lockdown, was found to be associated with greater symptomatology, as measured by IES. In particular, it is interesting to note that among patients with AN IES scores were predicted by greater emotional and sexual abuse as well as avoidant attachment style, while anxious attachment style predicted IES scores in BN patients. According to previous observations (Brady, 2008; Striegel-Moore, Dohm, Pike, Wilfley, & Fairburn, 2002), it is reasonable to conclude that individuals with a history of childhood abuse may be particularly vulnerable to emotion dysregulation associated with increased family conflicts during forced cohabitation, thus reporting greater PTSD symptoms.

The present study had some limitations: the sample size is quite small, and patients included were all under treatment. The T1-T2 interval included some weeks preceding the beginning of the lockdown, thus it is not possible to completely separate the change occurring before and after the lockdown. However, it is important to note that given the extraordinary and unpredictable nature of the COVID pandemic, it was impossible to plan a study with closer follow up time points. Furthermore, considering that only patients received a treatment and that HCs did not receive any form of support during the lockdown, it might not be possible to separate treatment effects from the virus/lockdown effects. The lockdown phase was mostly evaluated with online questionnaires. Finally, no baseline levels of the Impact of Event Scale-Revised (IES-R) were available, considering that this instrument was administered in order to assess the specific COVID-19-related post-traumatic stress psychopathology.

Overall, the study highlighted that quarantine during COVID-19 epidemic interfered with the recovery process of patients with ED, in terms of relapses of pathological eating behaviors.

Bulimic patients and those without remission seem to be more vulnerable, while participants with a history of childhood abuse were more likely to report PTSD symptoms related to the pandemic.

The implementation of technological interventions to provide telemedicine and online treatments (including family psychoeducation) might allow clinicians not just to maintain the good results of the previous interventions but also to monitor potentially damaging adverse environmental factors.

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None.

CONFLICT OF INTEREST

The authors declare no potential conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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REFERENCES

Bernstein, D. P., Stein, J. A., Newcomb, M. D., Walker, E., Pogge, D., Ahluvalia, T., … Zule, W. (2003). Development and validation of a brief screening version of the childhood trauma questionnaire. *Child Abuse & Neglect*, *27*, 169–190. https://doi.org/10.1016/S0145-2134(02)00541-0

Brady, S. (2008). The impact of sexual abuse on sexual identity formation in gay men. *Journal of Child Sexual Abuse*, *17*(3–4), 359–376. https://doi.org/10.1080/10538710802329973

Brooks, S. K., Webster, R. K., Smith, L. E., Woodland, L., Wessely, S., Greenberg, N., & Gideon, J. R. (2020). The psychological impact of quarantine and how to reduce it: Rapid review of the evidence. *Lancet*, *395*(10227), 912–920. https://doi.org/10.1016/S0140-6736(20)30460-8

Calugi, S., Sartirana, M., Milanese, C., El Ghoch, M., Riolfi, F., & Dalle Grave, R. (2018). The clinical impairment assessment questionnaire: Validation in Italian patients with eating disorders. *Eating and Weight Disorders*, *23*(5), 685–694. https://doi.org/10.1007/s40519-018-0477-2

Cao, W., Fang, Z., Hou, G., Han, M., Xu, X., Dong, J., & Zheng, J. (2020). The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry Research*, *287*, 112934. https://doi.org/10.1016/j.psychres.2020.112934

Dalle Grave, R. (2020). Coronavirus disease 2019 and eating disorders. Eating Disorders: The Facts. https://www.psychologytoday.com/us/blog/eating-disorders-the-facts/202003/coronavirus-disease-2019-and-eating-disorders.

Derogatis, L. R., & Melisaratos, N. (1983). The brief symptom inventory: An introductory report. *Psychological Medicine*, *13*(03), 595–605. https://doi.org/10.1017/S0033291700048017

Fairburn, C. G. (2008). *Cognitive behavior therapy and eating disorders*. New York: Guildford Press.

Fernández-Aranda, F., Casas, M., Claes, L., Bryan, D. C., Favaro, A., Granero, R., … Treasure, J. (2020). COVID-19 and implications for eating disorders. *European Eating Disorders Review: The Journal of the Eating Disorders Association*, *28*(3), 239–245. https://doi.org/10.1002/erv.2738

Fiorillo, A., & Gorwood, P. (2020). The consequences of the COVID-19 pandemic on mental health and implications for clinical practice. *European Psychiatry*, *63*(1), e32. https://doi.org/10.1192/j.eurpsy.2020.35

First, M. B., Williams, J. B. W., Karg, R. S., & Spitzer, R. L. (2015). *User's guide for the structured clinical interview for DSM-5 disorders, research version (SCID-5-RV)*. Arlington: American Psychiatric Association.

Fraley, R. C., Waller, N. G., & Brennan, K. A. (2000). An item response theory analysis of self-report measures of adult attachment. *Journal of Personality and Social Psychology*, *78*, 350–365.

Governo Italiano, Presidenza del Consiglio dei Ministri. (D.L. 9 marzo 2020 n.14). Disposizioni urgenti per il potenziamento del Servizio sanitario nazionale in relazione all'emergenza COVID-19. (20G00030). *Gazzetta Ufficiale della Repubblica Italiana*, Serie Generale n.62.

IBM Corp. (2017). *IBM SPSS statistics for windows*, Version 25.0. Armonk, NY: IBM Corp.

Kavoor, A. R. (2020). COVID-19 in people with mental illness: Challenges and vulnerabilities. *Asian Journal of Psychiatry*, *51*, 102051. https://doi.org/10.1016/j.ajp.2020.102051

Liu, Y., Gayle, A. A., Wilder-Smith, A., & Rocklöv, J. (2020). The reproductive number of COVID-19 is higher compared to SARS coronavirus. *Journal of Travel Medicine*, *27*(2), 1–4. https://doi.org/10.1093/jtm/taaa021

Moccia, L., Janiri, D., Pepe, M., Dattoli, L., Molinaro, M., De Martin, V., … Di Nicola, M. (2020). Affective temperament, attachment style, and the psychological impact of the COVID-19 outbreak: An early report on the Italian general population. *Brain, Behavior, and Immunity*, *87*, 75–79. https://doi.org/10.1016/j.bbi.2020.04.048

Murphy, R., Calugi, S., Cooper, Z., & Dalle Grave, R. (2020). Challenges and opportunities for enhanced cognitive behaviour therapy (CBT-E) in light of COVID-19. *The Cognitive Behaviour Therapist*, *13*, 1–31. https://doi.org/10.1017/S1754470X20000161

Nguyen, H. C., Nguyen, M. H., Do, B. N., Tran, C. Q., Nguyen, T., Pham, K. M., … Duong, T. V. (2020). People with suspected COVID-19 symptoms were more likely depressed and had lower health-related quality of life: The potential benefit of health literacy. *Journal of Clinical Medicine*, *9*(4), 965. https://doi.org/10.3390/jcm9040965

Peckmezian, T., & Paxton, S. J. (2020). A systematic review of outcomes following residential treatment for eating disorders. *European Eating Disorders Review: The Journal of the Eating Disorders Association*, *28*(3), 246–259. https://doi.org/10.1002/erv.2733

Qiu, J., Shen, B., Zhao, M., Wang, Z., Xie, B., & Xu, Y. (2020). A nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic: Implications and policy recommendations. *General Psychiatry*, *33*(2), e100213. https://doi.org/10.1136/gpsych-2020-100213

Rasmusson, G., Lydecker, J. A., Coffino, J. A., White, M. A., & Grilo, C. M. (2019). Household food insecurity is associated with binge-eating disorder and obesity. *International Journal of Eating Disorders*, *52*(1), 28–35. https://doi.org/10.1002/eat.22990

Shigemura, J., Ursano, R. J., Morganstein, J. C., Kurosawa, M., & Benedek, D. M. (2020). Public responses to the novel 2019 coronavirus (2019-nCoV) in Japan: Mental health consequences and target populations. *Psychiatry and Clinical Neurosciences*, *74*(4), 281–282. https://doi.org/10.1111/pcn.12988

Striegel-Moore, R. H., Dohm, F. A., Pike, K. M., Wilfley, D. E., & Fairburn, C. G. (2002). Abuse, bullying, and discrimination as risk factors for binge eating disorder. *The American Journal of Psychiatry*, *159* (11), 1902–1907. https://doi.org/10.1176/appi.ajp.159.11.1902

Touyz, S., Lacey, H., & Hay, P. (2020). Eating disorders in the time of COVID-19. *Journal of Eating Disorders*, *8*, 19. https://doi.org/10.1186/s40337-020-00295-3

Turner, H., Marshall, E., Stopa, L., & Waller, G. (2015). Cognitive-behavioural therapy for outpatients with eating disorders: Effectiveness for a transdiagnostic group in a routine clinical setting. *Behaviour Research and Therapy*, *68*, 70–75. https://doi.org/10.1016/j.brat.2015.03.001

Van den Berg, E., Houtzager, L., de Vos, J., Daemen, I., Katsaragaki, G., Karyotaki, E., Cuijpers, P., & Dekker, J. (2019). Meta-analysis on the efficacy of psychological treatments for anorexia nervosa. *European Eating Disorders Review: The Journal of the Eating Disorders Association*, *27*(4), 331–351. https://doi.org/10.1002/erv.2683

Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., McIntyre, R. S., … Ho, C. (2020). A longitudinal study on the mental health of general population during the COVID-19 epidemic in China. *Brain, Behavior, and Immunity*, *87*, 40–48. https://doi.org/10.1016/j.bbi.2020.04.028

Wang, Y., Di, Y., Ye, J., & Wei, W. (2020). Study on the public psychological states and its related factors during the outbreak of coronavirus disease 2019 (COVID-19) in some regions of China. *Psychology, Health & Medicine*, *30*, 1–10. https://doi.org/10.1080/13548506.2020.1746817

Weiss, D. S., & Marmar, C. R. (1997). The impact of event scale-revised. In J. P. Wilson & T. M. Keane (Eds.), *Assessing psychological trauma and PTSD* (pp. 399–411). New York, NY: Guilford Press.

Weissman, R. S., Bauer, S., & Thomas, J. J. (2020). Access to evidence-based care for eating disorders during the COVID-19 crisis. *International Journal of Eating Disorders*, *53*(5), 369–376. https://doi.org/10.1002/eat.23279

Yao, H., Chen, J. H., & Xu, Y. F. (2020). Patients with mental health disorders in the COVID-19 epidemic. *Lancet Psychiatry*, *7*(4), e21. https://doi.org/10.1016/S2215-0366(20)30090-0

SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.

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