



Research paper

The impact of COVID-19 lockdown and of the following “re-opening” period on specific and general psychopathology in people with Eating Disorders: the emergent role of internalizing symptoms



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ABSTRACT

Background: We assessed the impact of the coronavirus disease 2019 (COVID-19) pandemic on specific Eating Disorder (ED) and general psychopathology in people with an ED diagnosis during the lockdown period and after the end of the related containment measures.

Methods: People with clinically defined diagnosis and undergoing treatment for an ED completed an online survey, which included adapted questions from standardized psychometric scales. Data relative to three different time periods (before, during and after the end of lockdown) were collected. Psychopathological changes over these periods were investigated and compared through one-way analysis of variance or covariance with repeated measures.

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Results: Three hundred twelve people completed the survey (57.4% diagnosed with Anorexia Nervosa (AN) or atypical AN, 20.2% with Bulimia Nervosa, 15.4% with Binge Eating Disorder, 7.05% with Other Specified Feeding or Eating Disorders). The severity of both specific and general psychopathology increased during the lockdown and the rise of general symptoms persisted in the following re-opening phase, except for suicide ideation. Almost all of these findings were not affected by ED diagnosis, participants' age and illness duration.

Limitations: The retrospective nature of data collection is the main limitation of the study.

Conclusions: People with EDs showed a COVID-19 emergency-induced worsening of both general and specific psychopathology. The effect on general psychopathology persisted in the re-opening period. These findings suggest a high stress vulnerability of ED individuals with important effects on internalizing symptoms, which are worth of attention by clinicians.

1. Introduction

The coronavirus disease 2019 (COVID-19) pandemic has involved important changes in daily life, with consequences on mental and physical health (Holmes et al. 2020). Since the emergence of the virus, countries around the world have adopted various measures to contain virus transmission, such as “social distancing” or “physical distancing,” that had an impact on social interactions, employment, and world economy. Several effects on mental health, such as increased levels of psychological distress, depressive symptoms, and anxiety, due to both the pandemic and the related containment measures have been highlighted in the general population (Li et al. 2020; Wang et al. 2020).

Concerning people with Eating Disorders (EDs), it was hypothesized that the pandemic would exacerbate the severity of ED symptomatology due to greater levels of anxiety, emotional dysregulation and stress promoted by social isolation and loneliness (Fernández-Aranda et al. 2020; Todisco and Donini, 2020; Touyz et al. 2020). Beyond emotional distress, Rodgers et al. (2020) suggested two further pathways that may exacerbate ED symptoms: disruptions and restrictions of daily activities and media effects. Indeed, restrictions in daily life activities and personal mobility may constitute a barrier to social support, which is an important resilience factor during stressful periods also for ED people (Leonidas and Dos Santos, 2014; Linville et al. 2012). Moreover, limitations of movement have contributed to reduced access to care, while increased media use can have exerted negative effects on ED symptoms due to the greater exposure to proposed thin ideal, diet- and culture-related messages, food advertising (Boswell and Kober, 2016; Levine and Murnen, 2009). On the other hand, people with EDs often report high scores on measures of perceived inadequacy, interpersonal distrust and rejection sensitivity (Arcelus et al. 2013; Rieger et al. 2010), which may promote heightened vulnerability not only to the imposed containment measures but also to the subsequent re-exposure to social life.

To the best of our knowledge, few studies have investigated the effects of the COVID-19 pandemic on people with EDs. Phillipou et al. (2020) investigated changes in eating and exercise behaviors in a sample of Australian individuals with EDs and in the general population reporting an increase in ED core symptoms. Moreover, a rise in eating-related concerns/anxiety, a spread of ED behaviors (i.e., restricting, binge eating, purging), and heightened psychological distress were also found in people with EDs (Castellini et al. 2020; Clark Bryan et al. 2020; Schlegl et al. 2020; Termorshuizen et al. 2020). A qualitative study (Clark Bryan et al. 2020) reported increased levels of psychological distress, ED symptoms, attempts at self-management to recover in patients with anorexia nervosa (AN) as well as heightened psychological distress in their caregivers. To date, no study has assessed either the impact of COVID-19 on general psychopathology in people with EDs and the effects of the end of the COVID-19 pandemic restrictions with the following re-exposure to social life on general and ED specific psychopathology.

This study aimed to investigate changes in general and ED-specific psychopathology in Italian people receiving treatment for an ED. To do this, we conducted an online survey after COVID-19 restrictions had

been lifted, asking participants to retrospectively rate their symptoms. Participants were asked about three time-points: before COVID-19 pandemic restrictions, during the imposition of COVID-19 pandemic restrictions (so called “Phase 1”) and during the transition from lockdown to re-opening (so called “Phase 2”). Given previous findings (Phillipou et al. 2020; Termorshuizen et al. 2020) and the proved vulnerability to stressful events of people with EDs (Arcelus et al. 2013; Jacobi et al. 2004; Monteleone et al. 2020a, 2020b), we hypothesized that individuals with an ED would report increased levels of ED core symptoms as well as of internalizing (i.e., depressive and anxious) symptoms in both Phase 1 and Phase 2 with respect to those experienced before the pandemic onset.

2. Methods

2.1. Participants

Participants were recruited from those previously admitted to specialist ED units located in different regions of Italy and diagnosed with an ED: AN or atypical AN, Bulimia Nervosa [BN], Binge-Eating Disorder [BED], Other Specified Feeding or Eating Disorders [OSFED]) according to the *Diagnostic and Statistical Manual of Mental Disorders fifth edition* (DSM-5) criteria. The diagnosis was made by expert clinical psychiatrists through face to face clinical interviews at admission to ED services. Patients already undergoing specific treatment programs for their ED before the COVID-19 lockdown were invited to take part in an anonymous online survey if they met the following inclusion criteria: a) no comorbid schizophrenia or bipolar disorder; b) no intellectual disability; c) absence of severe medical conditions not related to the ED condition. Participants were invited to participate to the survey during a 20-day period from 1st June 2020 up to and including 21st June 2020. Ethics approval was not required for this kind of survey as per local legislation and national guidelines.

2.2. Design and Measures

The online survey included a broad range of items aimed at assessing the impact of the COVID-19 pandemic on the mental health of Italian ED people.

Participants were asked to report their age, gender identity, geographic location (Italian Region), duration of illness, and undergoing treatments. In order to avoid self-reported diagnoses, four different survey data collectors (one for each main ED diagnosis) were created. Each local investigator was aware of the current ED diagnosis of patients followed at his/her ED unit and sent them an email including a hyperlink to the survey from the survey data collectors of the corresponding diagnosis.

Several questions captured COVID-19 exposure, variations in different areas of daily living and impact of lockdown on study/work, financial condition, housing, access to care, therapeutic relationships.

The survey included a range of quantitative questions regarding both general and ED-specific psychopathology. Concerning general psychopathology and dysfunctional behaviors, explored dimensions were:

anxiety, depression, post-traumatic stress (PTS) symptoms, obsessive-compulsive (OC) symptoms, panic symptoms, insomnia, suicide ideation, stress. Questions related to these dimensions were adapted from the following questionnaires: Generalized Anxiety Disorder 7 (Spitzer et al. 2006), Patient Health Questionnaire 9 (Kroenke et al. 2001), PTSD Checklist for DSM-5 (Weathers et al. 2013) and Obsessive-Compulsive Inventory (Foa et al. 1998) questionnaires. Items included in the present survey were selected as the most consistent with the DSM-5 criteria for each psychiatric disorder.

Questions specifically related to EDs psychopathology and behaviors included in the survey were adapted from the *Eating Disorders Inventory (EDI-2)* (Garner, 1991). The selected questions were representative of each EDI-2 subscale. Moreover, participants were asked to account for the use of laxatives and diuretics and the level of physical activity.

Questions adaptation consisted of referring each psychopathological item to three different periods: 1) two weeks before the spread of COVID-19 emergency (that in Italy started at the end of February 2020); 2) the lockdown period or “Phase 1” (that in Italy covered the months of March and April 2020); 3) two weeks after the end of lockdown or “Phase 2” (that in Italy started on May 4th 2020). Each general psychopathological item was rated on a 10-point scale (0: not at all, 10: maximum), while ED specific items were rated on a 6-point scale, which was consistent with the original version of the EDI-2. The digital form of the survey was set up in order to oblige participants to answer to all the survey questions so that no missing data could result. The English version of the survey is provided in the supplementary material.

2.3. Statistical Analysis

All statistical analyses were performed by means of JASP software (2020).

In the whole sample of participants differences in ED specific and general symptoms among the 3 investigated time periods (before COVID-19 lockdown, phase 1 and phase 2) were assessed with a one-way ANOVA with repeated measures. Subsequently, diagnosis was introduced as covariate in the analysis in order to investigate the possible contribution of ED diagnosis on psychopathological changes. Given the low number of participants with an ED diagnosis different from AN or atypical AN, people with BN, with BED or with OSFED were merged in a unique group. Finally, due to the wide range of age and illness duration values, these variables were also included as covariates.

As we aimed to conduct a broad and exploratory analysis of ED specific and general symptoms relevant for people with EDs in order to advise health service providers globally about ED service needs, we did not apply correction for multiple comparisons.

3. Results

3.1. Sociodemographic and Illness-Related Characteristics

Clinical and demographic characteristics of the study population are shown in Table 1.

Three hundred and twelve people with EDs completed the survey. Three hundred reported themselves as female, 11 as male and 1 as non-binary. Patients from thirteen different Italian regions completed the survey: 171 from Northern Italy, 49 from Central Italy and 92 from Southern Italy. The diagnostic composition of the sample was the following: 179 participants (57.4% of the sample) had a current AN or atypical AN, 63 (20.2% of the sample) had a current BN, 48 (15.4% of the sample) had a current BED, 22 (7.05% of the sample) had a current OSFED.

Twelve individuals (4%) reported having had a COVID-19 diagnosis, 35 (11.21%) reported family members who had been infected and 15 (4.8%) reported a family member had died due to COVID-19. During “Phase 1”, 30 (9.6%) participants lived alone, 226 (72.4%) lived with family members, 56 (17.9%) reported different housing conditions.

Table 1

Clinical and demographic characteristics of the participants expressed as mean ± sd or frequency.

Age (years)	29.19 ± 12.05
Illness duration (years)	3.97 ± 5.39
BMI (kg/m ²) AN BN BED OSFED	20.97 ± 8.4 17.25 ± 4.4 22.13 ± 5.59 33.54 ± 10.11 20.43 ± 8.57
Work, n (%) Paid Job Student Other	99 (31.7) 165 (52.9) 48
Marital status, n (%) Single Married or cohabitant Divorced	232 (74.3) 67 (21.5) 13 (4.2)
Housing condition, n (%) Alone With family Other Change during “phase 1”, yes	30 (9.6) 226 (72.4) 56 (18) 53 (17)
COVID-19 Diagnosis, n (%) Patient Family member	12 (4) 35 (11.2)
Treatment during “phase 1”, yes n (%)	205 (65.7)
Treatment condition, n (%) Inpatients Outpatients	29 (12.5) 273 (87.5)
Therapeutic relationship during “phase 1” (0-10)	5.68 ± 2.97

Fifty-three (17%) of responders reported some kind of change in housing condition between the time before and during “Phase 1”.

One hundred fifty-five (49.7%) participants reported a subjective generic worsening in their overall financial condition compared to the period before the COVID-19 emergency.

3.2. Covid-19-Related Impact on General Psychopathology

Variations in the general psychopathological dimensions among the 3 explored time periods are reported in Table 2.

One-way ANOVA with repeated measures in the whole sample showed a significant effect of time on symptoms of anxiety (F_{2,622}=56.94, p<0.001), depression (F_{2,622}=22.19, p<0.001), PTS symptoms (F_{1,95,608.5}=59.66, p<0.001), OC symptoms (F_{2,622}=12.99, p<0.001), panic (F_{2,622}=15.53, p<0.001), insomnia (F_{2,622}=21.7, p<0.001), suicide ideation (F_{1,87,581.6}=9.94, p<0.001), stress

Table 2

General psychopathological dimensions before COVID-19 emergency (0), during general lockdown (PHASE 1) and after reopening period (PHASE 2), expressed as mean ± sd and percentage difference between phase 1 and before COVID-19 emergency and between phase 2 and phase 1.

	Pre COVID-19	PHASE 1	PHASE 2	Post-hoc		
		Mean ± sd	% Diff	Mean ± sd	% Diff	
General functioning	5.45 ± 2.41	4.28 ± 2.67	-21.47	5.28 ± 2.67	23.36	0=2>1
Interpersonal functioning	5.44 ± 2.45	4.16 ± 2.56	-23.53	5.36 ± 2.53	28.8	0=2>1
Working functioning	5.35 ± 3.16	4.29 ± 2.94	-19.81	4.79 ± 3.07	11.65	0>2>1
Anxiety	5.16 ± 2.65	6.17 ± 2.72	19.57	6.78 ± 2.28	9.89	2>1>0
Depression	5.00 ± 2.77	6.04 ± 2.86	20.8	5.79 ± 2.72	-4.2	2=1>0
PTSS	4.29 ± 2.83	4.98 ± 3.02	16.08	5.08 ± 2.64	2.01	2=1>0
OCS	3.69 ± 3.16	4.34 ± 3.44	17.62	4.20 ± 2.93	-3.22	2=1>0
Panic (frequency)	2.07 ± 2.77	2.70 ± 3.11	30.43	2.63 ± 3.05	-2.59	2=1>0
Insomnia	4.53 ± 3.24	5.37 ± 3.39	18.54	5.50 ± 3.42	2.42	2=1>0
Suicide ideation	1.09 ± 2.18	1.67 ± 2.91	53.21	1.38 ± 2.63	-17.36	1>0=2
Stress	5.58 ± 2.90	6.39 ± 3.09	14.52	6.66 ± 2.86	4.23	2=1>0

Abbreviations: PTSS, post-traumatic stress symptoms; OCS, obsessive-compulsive symptoms.

($F_{2,622}=118.99, p<0.001$). The Holm post-hoc tests showed that: a) scores of anxiety were significantly higher in “Phase 1” than before the spread of COVID-19 pandemic ($t=6.72, p<0.001$) and significantly higher in “Phase 2” than in “Phase 1” ($t=3.76, p<0.001$); b) scores of suicide ideation were significantly higher in “Phase 1” than both in “Phase 2” and before the spread of COVID-19 pandemic ($t=2.61 p<0.02, t=4.05 p<0.001$); c) scores of depression, stress, PTS symptoms, OC symptoms, insomnia and panic symptoms were significantly higher in “Phase 1” and “Phase 2” than before the spread of COVID-19 pandemic (depression: $t=6.83 p<0.001; t=2.15 p<0.05$; stress: $t=4.36 p<0.001$; PTS: $t=5.11 p<0.001, t=5.68 p<0.001$; OC: $t=4.99 p<0.001, t=3.93 p<0.001$; insomnia: $t=5.28 p<0.001, t=5.73 p<0.001$; panic: $t=4.71 p<0.001, t=4.83 p<0.001$).

When the diagnosis was included as covariate (AN vs BN, BED and OSFED), the ANCOVA with repeated measures showed a significant effect for group on anxiety ($F_{1,310}=6.15, p=0.01$), OC symptoms ($F_{1,310}=15.06, p<0.001$) and suicide ideation ($F_{1,310}=4.47, p=0.03$), a significant effect for time on all variables and no significant time X group interaction on any variable. Individuals with AN showed significantly higher scores of anxiety, OC symptoms and suicide ideation than the other group. Instead, when age and illness duration were included as covariates, the ANCOVA with repeated measures did not show any significant effect of these variables.

3.3. Covid-19-Related Impact on ED-Specific Psychopathology

Variations in the ED-specific psychopathological dimensions among the 3 explored time periods are reported in Table 3.

In the whole sample, one-way ANOVA with repeated measures showed a significant effect of time on ineffectiveness ($F_{2,622}=10.99, p<0.001$), social insecurity ($F_{2,622}=28.25, p<0.001$), body dissatisfaction ($F_{1,76,548.8}=4.65, p=0.01$), impulse regulation ($F_{2,622}=3.56, p<0.05$), binge behavior ($F_{2,622}=4.29, p<0.05$), purge behavior ($F_{2,622}=5.39, p<0.01$), and physical activity ($F_{1,9,596.2}=7.71, p<0.001$),

Table 3

Eating Disorder specific psychopathological dimensions before COVID-19 emergency, during general lockdown (PHASE 1) and after reopening period (PHASE 2), expressed as mean ± sd and percentage difference between phase 1 and before COVID-19 emergency and between phase 2 and phase 1.

	Pre COVID-19	PHASE 1		PHASE 2		Post hoc
		Mean ± sd	% Diff	Mean ± sd	% Diff	
Ineffectiveness	3.53 ± 1.89	3.89 ± 1.84	10.2	3.93 ± 1.92	1.03	2=1>0
Social Security	2.77 ± 1.91	2.07 ± 1.88	-25.27	2.58 ± 1.90	24.63	2=0>1
Body Satisfaction	1.76 ± 1.85	1.51 ± 1.74	-14.2	1.68 ± 1.82	11.25	2=0>1
Perfectionism	3.77 ± 1.94	3.60 ± 2.07	-4.51	3.70 ± 2.00	2.78	0=1=2
Emotional alienation	3.45 ± 1.97	3.52 ± 2.01	2.05	3.38 ± 2.04	-3.97	0=1=2
Impulse regulation	2.17 ± 1.89	2.39 ± 1.96	10.14	2.36 ± 1.99	-1.25	2=1>0
Weight concern	3.75 ± 2.11	3.95 ± 2.07	5.33	3.95 ± 2.11	0	0=1=2
Binge	1.52 ± 1.98	1.69 ± 2.15	11.18	1.44 ± 1.96	-14.8	1>2; 0=1,2
Purging	1.60 ± 2.27	1.84 ± 2.37	15.0	1.77 ± 2.29	-3.8	2=1>0
Shame for bodily needs	2.69 ± 2.21	2.68 ± 2.27	-0.37	2.71 ± 2.23	1.12	0=1=2
Physical activity (hours/day)	1.25 ± 1.51	1.24 ± 1.55	-0.8	1.02 ± 1.22	-17.7	0=1>2
Laxative/ diuretics (weekly use)	0.61 ± 1.50	0.56 ± 1.42	-8.2	0.54 ± 1.36	-3.57	0=1=2

but not on perfectionism, emotion expression, shame of body needs and use of diuretics and laxatives. The Holm post-hoc tests showed that ineffectiveness, impulsivity and self-induced vomiting scores were higher in “Phase 1” and “Phase 2” than before the spread of COVID-19 pandemic (ineffectiveness: $t=3.74 p<0.001, t=4.21 p<0.001$; impulsivity: $t=2.25 p<0.05$; purging: $t=3.11 p<0.01, t=2.25 p<0.05$); social insecurity and body dissatisfaction were higher in “Phase 1” than “Phase 2” and before the spread of COVID-19 pandemic (social security: $t=5.37 p<0.001, t=6.88 p<0.001$; body satisfaction: $t=2.55 p<0.05, t=2.78 p<0.05$); binge eating behavior and physical activity scores were significantly higher in “Phase 1” than in “Phase 2” ($t=3.00 p<0.01, t=3.61 p<0.01$, respectively).

When the diagnosis was included as a covariate, the ANCOVA with repeated measures showed a significant effect of diagnosis on physical activity ($F_{1,310}=13.03, p<0.001$) and binge symptoms ($F_{1,310}=33.37, p<0.001$), a significant effect of time on all variables and no significant time X diagnosis interaction on any variable. Indeed, people with AN exhibited higher levels of physical activity and lower binge eating scores than the other group. Instead, when age and illness duration were included as covariates, the ANCOVA with repeated measures did not show any significant effect of these variables.

4. Discussion

We investigated the impact of the COVID-19 emergency on both general and specific psychopathology in a large population of Italian patients treated for an ED in specialized ED centers. The main results showed a worsening of ED specific psychopathology in Phase 1 and of general psychopathology in both the lockdown period (Phase 1) and the following re-opening period (Phase 2). Indeed, while in Phase 2 the severity of most of the ED core symptoms tended to return to levels experienced before COVID-19 lockdown, the heightened levels of general psychopathology, with the exception of suicide ideation, persisted. Most of these findings were not affected by the specific ED diagnosis, pointing to a transdiagnostic vulnerability to the COVID-19 emergency in people with EDs.

To the best of our knowledge, this is the first study evaluating psychopathology changes not only during lockdown but also during the re-opening period in people with EDs. Overall, a significant worsening of general psychopathological symptoms (i.e., anxiety, depression, PTS symptoms, OC symptoms, panic, insomnia) was found in both phase 1 and phase 2. This is in line with the observed higher levels of stress, anxiety, depression, frustration, and uncertainty described in the general population as a consequence of the COVID-19 outbreak (Serafini et al. 2020) and with a marked increase in general anxiety, OC behaviors and concerns about the impact of COVID-19 on mental health reported in people with EDs (Clark Bryan et al. 2020; Temorshuizen et al. 2020). However, our study is the first to evaluate a wide range of general psychopathological dimensions in ED sufferers through a survey including questions adapted from standardized and widely used psychometric scales. Concerning ED-specific psychopathology, previous authors evaluated the COVID-19 impact on mental health of people with EDs describing a global impairment in ED symptomatology, increased concerns for food, exercise, or generic worsening of the illness, heightened dietary restriction and more frequent compensatory behaviors (Castellini et al. 2020; Clark Bryan et al. 2020; Phillipou et al. 2020; Temorshuizen et al. 2020). As previously pointed out for general psychopathology, we evaluated the impact of COVID-19 lockdown on ED symptoms through questions adapted by a specific and well validated psychometric tool assessing ED symptomatology, the EDI-2 questionnaire (Garner, 1991). Furthermore, this is the first study assessing COVID-19-related psychopathology changes in people who had previously received an ED diagnosis through a face to face interview and in accordance to the DSM-5 criteria. Indeed, in all previous studies the diagnoses were self-reported thus hampering data validity.

Overall, the present findings corroborate the role of stress in the

pathophysiology of EDs (Chami *et al.* 2019). The effects of stress in people with EDs have been experimentally studied at multiple levels of analysis, including emotional and biological levels (Monteleone *et al.* 2018; Monteleone *et al.* 2020a, 2020b), and stressful events are widely recognized to contribute to ED onset in vulnerable individuals (Jacobi *et al.* 2004). The COVID-19 pandemic is characterized by uncertainty, social isolation, loneliness, worries about one's own health and that of loved ones, financial losses and lifestyle disruptions. Such an event is clearly a stress-inducing one and likely to lead to internalizing symptoms (Shanahan *et al.* 2020). Italy was one of the first countries to impose severe social distancing measures to control the spread of COVID-19. This means that lockdown in our country can be considered longer and probably more unpredictable than lockdown measures in many other areas, and results in our study may reflect this stress. Although the social isolation (Arcelus *et al.* 2013; Cardi *et al.* 2018) experienced during the lockdown may have significantly contributed to increase the levels of perceived stress during that period, our findings do not allow to ascertain if other kinds of stressors connected with the COVID-19 pandemic had an impact on people with EDs.

Another specific aim of our study was to explore changes in general and specific psychopathology during Phase 2, after lockdown restrictions. In this period, we observed that while suicide ideation tended to improve, most dimensions (depression, stress, PTS, OC, insomnia and panic symptoms) did not substantially change or underwent a further progressive worsening (anxiety) compared with the lockdown period. Instead, some ED specific psychopathological dimensions, including body dissatisfaction, binge eating and physical activity improved while ineffectiveness, impulse regulation and self-induced vomiting persisted higher than those observed before the lockdown period. These findings show a partial clinical improvement of ED specific psychopathology at the end of the lockdown restrictions. However, the persistence of worsened general psychopathological symptoms and the further worsening of anxiety ones may indicate a slow recovery from the stressful period and/or a peculiar vulnerability of ED people to the resumption of activities inducing social exposure (Arcelus *et al.* 2013; Cardi *et al.* 2018; Rieger *et al.* 2010). Overall, these findings may corroborate the hypothesis that EDs can be conceptualized as emotional disorders (Mallorqui-Bague *et al.* 2018; Marzola *et al.* 2020; Oldershaw *et al.* 2019) thus including in their psychopathology internalizing symptoms in addition to ED specific symptoms (Monteleone *et al.* 2019; Solmi *et al.* 2018).

When our findings were analyzed taking into account the effect of the different ED diagnoses (AN or other ED diagnoses), general psychopathology differences were detected only in anxiety, obsessive-compulsive symptoms, and suicide ideation, which resulted more impaired in people with AN than in those with other EDs. The results relative to anxiety and OC symptoms are not surprising given the strong link between these symptoms and AN (Levinson *et al.* 2019; Marzola *et al.* 2020; Yilmaz *et al.* 2018). As for suicide ideation, our findings seem to suggest that individuals with AN were more prone than other ED people to face the COVID-19 stressful period with a suicide ideation. However, the comparison in our study was made between AN (restricting and binge-purging subtypes) versus all others EDs and this could have influenced this specific result, which is only partially consistent with earlier literature (Bulik *et al.*, 2008; Smith *et al.* 2018). More in general, the lack of differences between people with AN and people with other EDs in the time patterns of all the assessed psychopathological variables allows us to confirm a trans-diagnostic vulnerability to stress exposure in EDs (Fairburn *et al.* 2003; Monteleone *et al.* 2020b; Solmi *et al.* 2018).

Limitations of this study need to be acknowledged. First, the methodology of data collection may have affected the study findings for several reasons. Indeed, the large number of questions in the survey, with some of them that can be considered as "leading" questions and thus possibly causing contamination, and the retrospective nature of the study design introduce a possible recalling bias. Although the short

duration of time that elapsed between the beginning of COVID-19 restrictions and data collection partially reduces this collection bias, the salience of the COVID-19 lockdown period may vary across participants in relation to subjective events (e.g., the lost of a family member due to the pandemic) and may have promoted memory errors in the ratings. Furthermore, given the method employed for the survey dissemination, we were not able to verify if people with EDs who did not accept to participate in this study differ in their clinical condition (i.e., access to care or psychopathology severity) from those included in the study: thus, we cannot rule out a selection bias. Second, the low number of participants with ED diagnosis other than AN reduces the generalizability of our results relatively to the lack of significant differences between different ED diagnoses. Third, the lack of a control group (healthy people and/or people with other psychiatric conditions) does not make possible to ascertain whether these findings characterize specifically people with EDs. Finally, due to the relatively short time available to conduct the survey, the test-retest reliability of the whole questionnaire could not be assessed; however, since we built the survey by adopting questions from validated psychometric questionnaires, we are confident that this limitation had a slight impact on our findings, although we cannot completely rule out this bias.

The main strength of this study is the inclusion of participants with a well-defined ED diagnosis, ascertained by expert clinicians.

5. Conclusions

The impact of COVID-19 outbreak has been strongly felt by people with EDs and persistence of psychological consequences after the end of the lockdown period suggests long lasting effects on their mental health. Moreover, the worst trend of general psychological symptoms compared to specific ED ones further supports the idea of a re-conceptualization of ED psychopathology as a broad spectrum of reciprocal relationships among psychiatric and ED specific symptoms. This point is worth to be considered by clinicians suggesting the need to extend clinical interventions for EDs on the increased vulnerability to stressful events as well as on the internalizing symptoms, which follow stress exposure. Future studies are needed to explore protective and risk factors which may have contributed to the observed vulnerability to the COVID-19 emergency.

Declaration of Competing Interest

None

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Contributors

A.M. Monteleone, F. Marciello, G. Cascino and P. Monteleone designed the study, wrote the protocol, and wrote the manuscript.

G. Abbate-Daga, S. Anselmetti, M. Baiano, M. Balestrieri, E. Barone, S. Bertelli, B. Carpiniello, G. Castellini, G. Corrivetti, S. De Giorgi, A. Favaro, C. Gramaglia, E. Marzola, P. Meneguzzo, F. Monaco, M.G. Oriani, F. Pinna, M. Rania, C. Renna, V. Ricca, P. Salvo, C. Segura-Garcia, F. Scarabel, P. Todisco, U. Volpe, P. Zeppegnò collected data.

G. Cascino did statistical analyses.

All the authors contributed to and approved the final version of the manuscript.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.jad.2021.02.037](https://doi.org/10.1016/j.jad.2021.02.037).

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