Longitudinal evaluation of psychological health issues in young adults during the COVID-19 pandemic

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Article info

Abstract

Background: The COVID-19 pandemic and associated restrictions negatively affected mental health, increasing the risk for mood and stress-related symptoms. We recently reported that mental health during the lockdown in Italy was worsened, affected in part by parenting and attachment. Since the pandemic continues, understanding its long-term effects on mental health is necessary. In this study, we examined how the psychopathological symptoms previously reported are modulated by the easing of restrictions and how sociorelational patterns influence this response.

Methods: 42 university students were screened for psychopathological symptoms (SCL-90-R and STAI-Y), stress perception (PSS), attachment style (RQ), and parental care and overcontrol (PBI) 6 months before the confinement (Phase 1). In the same subjects, psychopathological symptoms and stress perception were retested during the lockdown (Phase 2), November 2020 (Phase 3), and July-September 2021 (Phase 4).

Results: Psychopathological symptoms and perceived stress decreased in Phase 4, compared with Phase 2. State anxiety remained elevated during the entire pandemic. In individuals with dysfunctional sociorelational patterns (insecure attachment, low care), state anxiety was stably high over time (from Phases 1 to 4), regardless of pandemic-related environmental changes, whereas those with functional sociorelational patterns (secure attachment, high/intermediate care) experienced changes in state anxiety according to their environments.

Conclusion: The improvement in psychological health demonstrates that habituation occurred, despite the pandemic still being perceived as stressful, as in Phase 1. Moreover, the flexibility to environmental changes varied according to the sociorelational patterns, wherein individuals with functional sociorelational patterns adjusted better to their environment than those with dysfunctional sociorelational patterns.

Keywords: SARS-Cov 2, COVID-19, clinical psychology, SCL-90-R, Perceived Stress, State Anxiety, parental bonding, attachment styles, early-life experiences

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Introduction

The stress response system is designed to favor an individual's adaptation to dynamic environmental changes and react adequately to stressful situations (Del Giudice et al., 2011; Chrousos, 2009; Nesse et al., 2007; Ellis et al., 2006). This system is programmed by early-life experiences that are related to the motivational systems of care, affiliation and attachment (Wesarg et al., 2020; Khoury et al., 2019; Bunea et al., 2017; Vergara-Lopez et al., 2016; McLaughlin et al., 2015; Smyth et al., 2015). Adverse environmental conditions can influence the development of this system (Gerra et al., 2016; Gunnar et al., 2009), causing an individual's maladjustment to his environment (Smith and Pollak, 2020; Cohen et al., 2007) and changes in symptoms of psychopathology (Liu et al., 2021).

Exposure to a pandemic is a unique event that can activate individual resources to cope with stress (Huang et al., 2021; Kar et al., 2021; Mushquash and Grassia, 2021; Sameer et al., 2020). Recent findings suggest that the COVID-19 pandemic and its consequent restrictive measures have negatively affected mental health by increasing the risk for mood disorders and post-traumatic stress disorder (Hawes et al., 2021; Kar et al., 2021; Magson et al., 2021; Mushquash and Grassia, 2021; Shah et al., 2021; Wu et al., 2021; Guessoum et al., 2020; Sameer et al., 2020; Ozamiz-Etxebarria et al., 2020a; Planchuelo-Gòmez et al., 2020).

Recently, we reported that social isolation and social distancing due to the COVID-19 pandemic in Italy during the national lockdown (confinement of the entire population from March 11 to May 18, 2020—Phase 2) might significantly impact mental health in young adults (Bussone et al., 2020). Specifically, we observed an increase in depressive symptoms, phobic anxiety, distress that was related to symptoms, perceived stress, and state anxiety during the lockdown compared with previous months (Phase 1). Also, the levels of parental care and control that were experienced at early age and attachment style influenced the symptomatology in this population, wherein the high-parental-care group showed greater flexibility in their response to the environment than the low-parental-care group (Bussone et al., 2020). In line with our findings, Ferrajão (2022) recently reported that the lockdown exposure was a risk factor to develop post-traumatic stress disorder symptoms, and that this symptomatology was higher in individuals with elevated attachment anxiety. Also Russo et al. (2022), examining a sample of Italian university students, reported a lower degree of satisfaction on living arrangements, intimate and family relationships; similarly, Esposito et al. (2022) study showed that the pandemic has penalized interpersonal relationships, bringing out deep introspection and feelings of loneliness and sadness among Italian university scholars.

As the COVID-19 pandemic continues, in Italy national measures to contain the spread of contagion have changed over the past year. In November 2020, the Italian Government decided to differentiate restrictive measures, according to the severity of health emergencies, classifying regions and areas into colored zones by the rate of transmission (Phase 3; see Supplementary Material Table 1). At the end of December 2020, the newly inaugurated vaccination campaign led to greater control of the epidemiological curve (Rajaei et al.,

2021). This mitigate allowed further easing of restrictive measures in Italy from the end of May 2021, characterized by the reopening of gyms, restaurants for dinnertime, cinemas, and school for children and university students.

Another change to these measures was implemented in August 2021, with the introduction of the green pass, a code that can be obtained 1 week after the first vaccine dose, on completion of the vaccine cycle, or within 48 and 72 hours of negative results from the rapid and molecular COVID tests, respectively. Only holders of the green pass can attend gyms, cinemas, and restaurants from August 6, 2021 (Covid-19, D.p.c.m. 23 luglio 2021: Gazzetta Ufficiale n. 105 del 23.07.2021) (Phase 4).

Having been mired in the pandemic for 1.5 years, people have become accustomed to living with basic restrictions (Armocida et al., 2020; Lazzerini and Puoto, 2020), given that wearing a mask and social distancing remain effective. Having had to adjust to this new routine, combined with a reduced perceived risk of infection, has decreased the sense of anxiety but has lowered adherence to these preventive measures (Tam et al., 2021; Habersaat et al., 2020; Harper et al., 2020). In fact, the amelioration of mental health problems, related to the ease in restrictive measures, has been reported consistently throughout the past year (Meda et al., 2021; Daly and Robinson, 2020; Parola et al., 2020).

Given its impact on our lives for the past 2 years, it has become necessary to understand how the pandemic per sè and COVID-19-related environmental changes affect mental health over time.

In this study, we examined how the response of young adults, in terms of psychological health, as measured in our previous report, before the pandemic (Phase 1) and during the lockdown (Phase 2) (Bussone et al., 2020) was further altered by implementation of the new restrictive measures (Phase 3) and by their easing and the vaccination campaign (Phase 4). Since it has been widely reported that the exposure to high care and the development of secure attachment are factors which facilitate resilience (Svendsen et al., 2022; Luthar et al., 2000; Masten, 2001), we expected to observe consistent improvement in mental health issues over time—specifically, a more "adaptive" response in high-care and securely attached individuals to confinement and restrictive measures (Bussone et al., 2020) compared with low-care (insecure) individuals.

Materials and Methods

Participants

Among the 68 participants of the previous study (phase 1-2; 29), 42 volunteer university students (phase 4, 36 women and 6 men; mean age ± SE = 25.54 ± 2.690 years) were recruited after the recall. The sample was divided into sub-groups according to attachment styles (Relationship questionnaire, RQ; Bartholomew and Horowitz, 1991; secure N=15 vs. insecure N=27), perceived parental care (Parental Bonding Instrument, PBI; 38; low care N=15 vs. intermediate care N=14, vs. high care N=13) and perceived parental control

(Parental Bonding Instrument, PBI; Parker, 1981; low control N= 22 vs. intermediate control N=10 , vs. high control N=22). None of the subjects received a COVID-19 diagnosis. When asked for "who did you spend the quarantine with?", the 25% of the sample spent the quarantine with their flat mates, the 10% with their partner, the 6% alone, and the remaining 59% with their family.

Ethical statement

No animal studies are presented in this manuscript.

The studies involving human participants were reviewed and approved by Ethical Committee of the Department of Dynamic and Clinical Psychology, Sapienza, University of Rome (Prot. n. 0000453 and Prot. n. 0000112, 2019). The patients/participants provided their written informed consent to participate in this study and received a complete description of the study. Participants were enrolled using bulletin board notices and classes in which we showed the study's purposes in the Department of Dynamic and Clinical Psychology, Sapienza, University of Rome. No potentially identifiable human images or data is presented in this study.

All procedures performed in studies involving human participants were in accordance with Ethical Committee of the Department of Dynamic and Clinical Psychology, Sapienza, University of Rome (Prot. n. 0000453 and Prot. n. 0000112, 2019) and with the 1964 Helsinki Declaration and its later amendmentsor comparable ethical standards.

Measures or Self-report instruments administration.

The online test administration was repeated at four time points: phase 1, pre-pandemic stage, on average 6 months before the pandemic; phase 2, early-pandemic stage, during the last ten days of lockdown in Italy (from 23rd of April to the 4th of May 2020); phase 3, late-pandemic stage, during the implementation of the new restrictive measures in Italy (from 26th of October to the 4th of December 2020; for more details see supplementary table 2), and phase 4, during the restrictive measures' ease and the vaccination campaign (from July to September 2021).

Anamnestic information (age, sex and level of education), psychopathological symptoms, perceived stress, attachment styles, parental care, and parental control measurements were collected on the same subjects, at these time points.

Symptom Check-List-90 Item Revised (SCL-90-R)

SCL-90-R is a 90-item self-report test, evaluating psychopathological symptoms and psychological distress in adults from general and clinical populations (Derogatis, 1994). The SCL-90-R is rated on a 4-point Likert scale from 0 (not at all) to 4 (extremely), and asks participants to report if, during the past week, they have suffered from symptoms of somatization (e.g., headaches), obsessive-compulsivity (e.g., having to check and double-check what you do), interpersonal sensitivity (e.g., feeling that people are unfriendly or dislike you), depression (e.g., feeling blue), anxiety (e.g., feeling fearful), hostility (e.g., having urges to beat, injure, or harm someone), phobic anxiety (e.g., feeling afraid to go out of your house alone), paranoid ideation (e.g., the idea that you should be punished for your sins), and psychoticism (e.g., having thoughts that are not your own). Aside from these nine primary scales, the questionnaire provides a global severity index (GSI), which is used to determine the severity of psychological distress. For the purpose of the present study, the Italian validated version of the SCL-90-R was employed (Prunas et al., 2012). The corresponding Cronbach's alpha value was 0.96.

Relationship Questionnaire (RQ)

RQ (Bartholomew and Horowitz, 1991) was used to measure attachment style. The RQ is a single-item measure made of four short paragraphs, each describing a prototypical attachment pattern acted in close adult peer relationships. Participants are asked to rate their degree of correspondence to each prototype on a 7-point Likert scale. The four attachment patterns (i.e., secure, preoccupied, fearful, and dismissing) are defined in terms of two dimensions: anxiety (i.e., a strong need for care and attention from attachment figures coupled with a pervasive uncertainty about the willingness of attachment figures to respond to such needs) and avoidance (i.e., discomfort with psychological intimacy and the desire to maintain psychological independence). The Italian translation was used (Carli, 1995). For our purpose, we decided to use the RQ categorically, by dividing the four attachment styles in "secure attachment" and "insecure attachment," which includes fearful, preoccupied and dismissing attachment styles.

Parental Bonding Instrument (PBI)

PBI (Parker, 1981) is a retrospective questionnaire in which individuals are asked to rate how they remember their parents' care and control during their first 16 years of life. The PBI includes two versions, one assessing mother's parenting and the other one for fathers' parenting. The participants of this study were assigned to low care or high care groups based on their maternal and paternal care scores, using the suggested cut-off scores by Parker and Lipscombe (Parker and Lipscombe, 1979). Individuals who reported scores lower than 27 on PBI maternal care scale and 24 on PBI paternal care scale were classified as low care individuals, whereas the others were considered high care individuals. The requirement of both maternal and paternal care lower than the cut-off in the low care group was chosen to include individuals with severe lack of care only, while those who received adequate maternal and paternal care were placed in the high care group. Whether one of the parents' care was not adequate, individuals were included in an intermediate group. The same group creation criterion was employed for the control dimension, whereas individuals who reported scores lower than 13.5 on PBI maternal care scale and 12.5 on PBI paternal care scale were classified as low control individuals, whereas the

others were considered high control individuals. The Italian validated version of the PBI was provided by Scinto et al. (1999). Cronbach's alpha for maternal care was .88 for "care" dimension and .86 for "control" dimension; Cronbach's alpha for paternal care was .91 for "care" dimension and .83 for "control" dimension.

Perceived Stress Scale-10 (PSS-10)

PSS-10 (Cohen and Williamson, 1988) measures the degree to which one perceives aspects of one's life as uncontrollable, unpredictable, and overloading. Participants are asked to respond to each question on a 5-point Likert scale ranging from 0 (never) to 4 (very often), indicating how often they have felt or thought a certain way within the past month. Scores range from 0 to 40, with higher composite scores indicative of greater perceived stress. The PSS-10 possesses adequate internal reliability (Cohen and Williamson, 1988). In this study the Italian validated version of the PSS-10 was used, with an internal consistency estimates using Cronbach's alpha ranging from .67 to .91 (Mondo et al., 2019).

State-Trait Anxiety Inventory (STAI-Y)

STAI-Y (Spielberger et al., 1970) consists of 40 statements about the feelings of the participant, divided into two parts. Part I (20 statements), volunteers are instructed to indicate the intensity of their feelings of anxiety at a moment (state anxiety), using scores ranging from 1 (absolutely not) to 4 (very much). In Part II (other 20 statements), volunteers describe how they generally feel (trait anxiety) by reporting the frequency of their symptoms of anxiety, again using scores ranging from 1 (hardly ever) to 4 (often). The total score of each part may range between 20 and 80, with higher scores indicating higher levels of anxiety. For our aim we used Part I only to assess state anxiety, referring to the transitory emotional response involving unpleasant feelings of apprehension, tension, nervousness, and worry due to the new restrictive measures and the pandemic. For our purpose, the Italian validation of the STAI-Y was used (Pedrabissi and Santinello, 1989). Internal consistency (Cronbach's alpha) varies from 0.91 to 0.95 for the state anxiety scale (Pedrabissi and Santinello, 1989).

Statistics

In order to investigate the trend of psychopathological symptoms and stress-related variables from phase 1 to 4, repeated-measures analyses of variance (RM-ANOVA) were employed. Attachment style and parenting were used as categorical variables, while psychopathological and stress-related ones (SCL-90-R subscales score, PSS-10 score, and STAI-Y state score) were used as continuous variables. Significant RM-ANOVAs were followed by post-hoc comparisons by Duncan's test. Statistical analyses were performed with the help of Statistica software Version 12.0 (StatSoft, Tulsa, OK, USA) and SPSS for Windows, version 25.0.

Results

Anamnestic information differences among the groups.

To determine eventual differences in terms of anamnestin information among the attachment, care and control groups, chi-square analysis and T-test were performed.

No differences in terms of sex, educational level and age of the participants was found (Table 1).

Changes in symptoms over time.

To determine whether psychopathological symptoms, as assessed by SCL-90-R, changed between Phases 1, 2, 3, and 4 and whether attachment style and parental bonding influenced these changes, RM-ANOVA was performed for each SCL-90-R subscale. (Supplementary Tables 2 and 3)
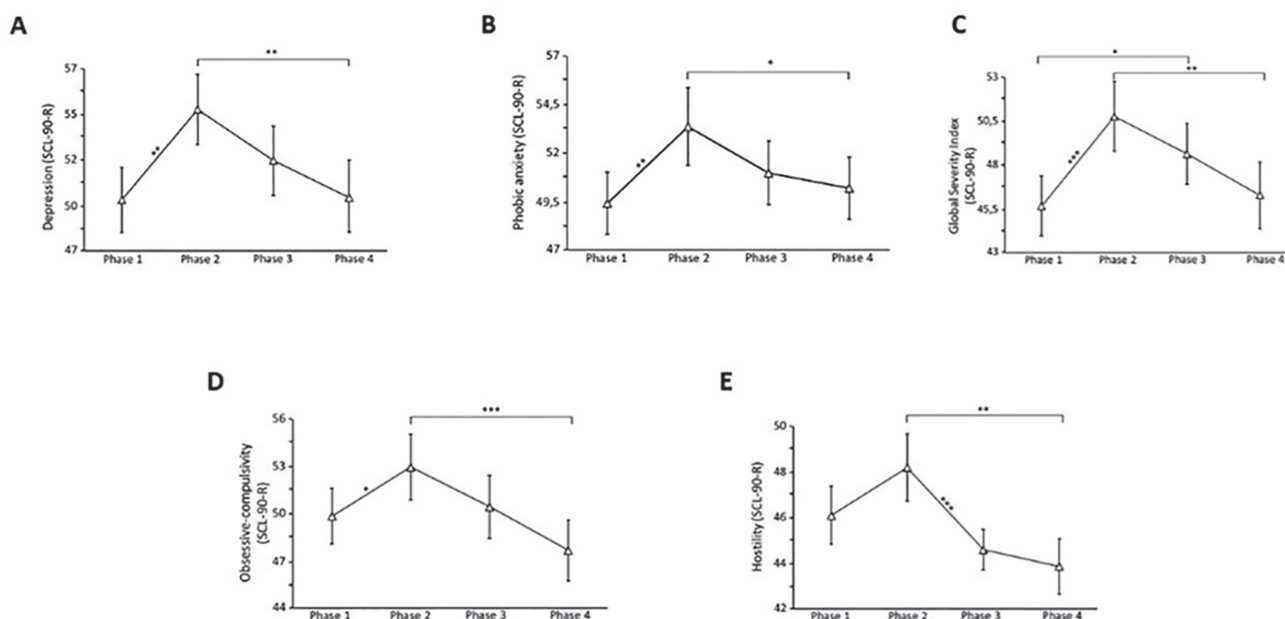
Attachment style had a significant main effect on somatization [$F_{(1, 40)} = 6.335$, $p < 0.01$, $\eta2p = 0.136$], obsession-compulsivity [$F_{(1, 40)} = 11.199$, $p < 0.001$, $\eta2p = 0.275$], interpersonal sensitivity [$F_{(1, 40)} = 9.729$, $p < 0.01$, $\eta2p = 0.227$], depression [$F_{(1, 40)} = 14.255$, $p < 0.001$, $\eta2p = 0.242$, phobic anxiety [$F_{(1, 40)} = 7.834$, $p < 0.01$, $\eta2p = 0.139$], anxiety [$F_{(1, 40)} = 8.563$, $p < 0.01$, $\eta2p = 0.134$], paranoid ideation [$F_{(1, 40)} = 7.861$, $p < 0.01$, $\eta2p = 0.171$], psychoticism [$F_{(1, 40)} = 6.626$, $p < 0.01$, $\eta2p = 0.109$], and GSI [$F_{(1, 40)} = 9.883$, $p < 0.01$, $\eta2p = 0.243$]. This effect was evidenced by significantly higher scores for all parameters in individuals with an insecure versus secure attachment style.

Tab. 1. Anamnestic information between secure versus insecure participants and between low-intermediate-high care groups.

| | Mean | s.e. | Sex | | Educational Level | | | |
			F	M	middle school diploma	high school diploma	bachelor degree	master degree
Secure attachment	25.71	0.456	19	2	0	4	4	13
Insecure attachment	24.86	0.390	32	5	1	15	8	12
Low care	24.28	0.680	14	4	0	8	4	5
Intermediate care	24.56	0.601	12	3	1	4	4	9
High care	24.14	0.471	22	0	0	7	4	11
Low control	24.07	0.446	26	3	0	10	5	14
Intermediate control	24.89	0.577	16	2	1	5	5	7
High control	24.00	0.874	9	2	0	4	2	4

Fig. 1. Effect of the pandemic over time and the new restrictive measures' ease on psychopathological symptoms measured by SCL-90-R. Overall, an improvement in mental health highlighted by a significant decline in depressive symptoms (A), phobic anxiety (B), GSI (C), obsessive compulsivity (D) and hostility (E) was detected between phase 2 vs. phase 4 (restrictive measures' ease). No differences were found between phase 3 vs. 2. Non-significant results are not shown.

Note: *p < 0.05, **p < 0.01, and ***p < 0.001.

Time had a significant main effect on depression [F(1, 41) = 4.616, $p < 0.01$, $\eta 2p$ = 0.194] phobic anxiety [F(1, 41) = 2.966, $p < 0.05$, $\eta 2p$ = 0.107], GSI [F(1, 41) = 6.202, $p < 0.001$, $\eta 2p$ = 0.228], and the obsession-compulsivity scale [F(1, 41) = 4.479, $p < 0.001$, $\eta 2p$ =0.128], reflected by higher scores for all of these scales in Phase 2 versus 1 and by significantly lower scores in Phase 4 versus 2 (Fig. 1A - 1B - 1C - 1D). GSI increased significantly in Phase 3 versus 1 (Fig. 1C). Time also had a significant main effect on hostility [F(1, 41) = 4.438, $p < 0.01$, $\eta 2p$ = 0.157], higher scores for which were observed only in Phase 2 versus 3 (Fig. 1E). No attachment style x time interaction was seen.

A significant main effect of parental care was observed on obsession-compulsivity [F(2, 39) = 5.179, $p < 0.01$, $\eta 2p$ = 0.248], interpersonal sensitivity [F(2, 39) = 4.737, P < 0.05, $\eta 2p$ = 0.178], depression [F(2, 39) = 9.039, $p < 0.001$, $\eta 2p$ = 0.277], anxiety [F(2, 39) = 4.013, $p < 0.05$, $\eta 2p$ = 0.131], phobic anxiety [F(2, 39) = 5.687, $p < 0.01$, $\eta 2p$ = 0.195], psychoticism [F(2, 39) = 4.374, $p < 0.05$, $\eta 2p$ = 0.176], and GSI [F(2, 39) = 4.430, $p < 0.05$, $\eta 2p$ = 0.207]. This effect was reflected by significantly higher scores for these parameters in individuals who received low compared with high and intermediate care. There was no interaction between parental care and time.

Parental control had a significant main effect for the following subscales: somatization [F(2, 39) = 5.059, $p < 0.01$, $\eta 2p$ = 0.182], obsession-compulsivity [F(2, 39) = 3.513, $p < 0.05$, $\eta 2p$ = 0.135], interpersonal sensitivity [F(2, 39) = 5.742, $p < 0.01$, $\eta 2p$ = 0.165], depression [F(2, 39) = 4.934, $p < 0.05$, $\eta 2p$ = 0.147], phobic anxiety [F(2, 39) = 5.155, $p < 0.01$, $\eta 2p$ = 0.213], and paranoid ideation [F(2, 39) = 4.774, $p < 0.05$, $\eta 2p$ = 0.127], based on the significantly higher scores for these

parameters in individuals who experienced high versus low and intermediate parental control. No parental control x time interaction was observed.

Changes in symptoms according to attachment and parental bonding

RM-ANOVA was performed to determine whether stress-related variables, as measured by the PSS-10 and STAI-Y, changed between Phases 1, 2, and 3 and whether these variations were influenced by attachment style, parental care, and parental control.

We noted a significant main effect of attachment style on PSS-10 [F(1, 39) = 10.233, $p < 0.01$, $\eta 2p$ = 0.223] and STAI-Y scores [F(1, 39) = 7.495, $p < 0.01$, $\eta 2p$ = 0.085], which were significantly higher in individuals with an insecure versus secure attachment style. Time also had a significant main effect on PSS-10 [F(1, 41) = 3.868, $p < 0.01$, $\eta 2p$ = 0.207] and STAI-Y [F(1, 40) = 5.935, $p < 0.001$, $\eta 2p$ = 0.187], based on higher PSS-10 and STAI-Y scores in Phase 2 versus 1 and in Phase 3 versus 1 and lower perceived stress from Phases 2 and 3 to Phase 4. State anxiety, as measured by anxiety rates, rose significantly in Phase 4 versus 1. PSS-10 and STAI-Y scores did not differ between Phases 2 and 3 (Fig. 2A – 2B).

Further, the attachment style x time interaction had a significant effect on STAI-Y [F(3, 117) = 4.572, $p < 0.01$, $\eta 2p$ = 0.132], reflected by higher STAI-Y scores in individuals with insecure versus secure attachment style in Phases 1 and 3 but not Phase 2, in which these groups had similar scores (Fig. 3A). Moreover, state anxiety decreased in securely attached individuals between Phases 2 and 4 (Fig. 3A). No attachment x time interaction was seen for PSS-10.

Fig. 2. Effect of the pandemic over time, the restrictive measures' ease on PSS-10 and STAI-Y state. A significant increase in stress perception was detected in the entire sample between phase 1 (pre-pandemic) and phase 2 (early-pandemic), followed by a strong decrease between phase 3 (late-pandemic) and phase 4 (restrictive measures' ease) (A). No changes were detected at phase 3 (A). Moreover, a significant increase in state anxiety was detected in the entire sample between phase 1 vs. phase 2 (B). Furthermore, a significant worsening in state anxiety was detected between phase 1 vs. phase 3. Overall, state anxiety at phase 4 remained elevated, as highlighted by the significant difference between phase 1 vs. phase 4 (B).
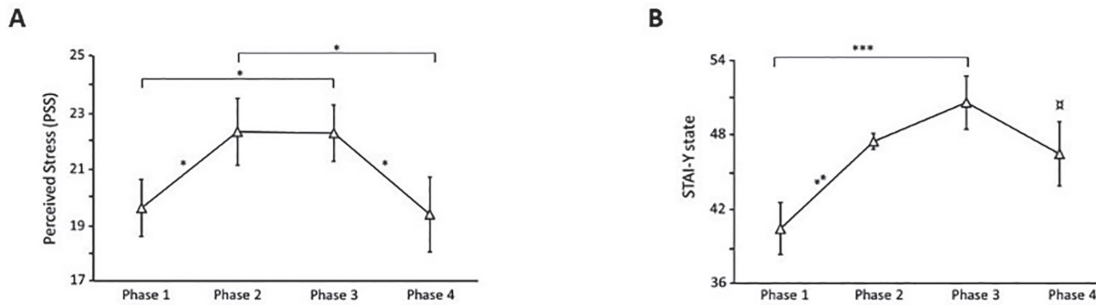
*Note: *p < 0.05, **p < 0.01, and ***p < 0.001; Phase 1 vs. phase 4, ¤ P < 0.05*

There was a significant main effect of parental care on PSS-10 [$F(2, 39)$ = 7.262, $p < 0.01$, $\eta 2p$ = 0.096], and STAI-Y [$F(2, 38)$ = 4.496, $p < 0.05$, $\eta 2p$ = 0.104], increasing PSS-10 and STAI-Y scores in individuals who received low versus high or intermediate care. Further, there was a significant interaction between parental care and time for STAI-Y [$F(6, 114)$ = 2.379, $p < 0.05$, $\eta 2p$ = 0.092, reflected by higher STAI-Y scores in those with low compared with intermediate care in Phases 1, 3, and 4; these groups had similar scores in Phase 2 (Fig. 3B). Moreover, in Phase 4, low-care individuals had the highest scores versus high-care subjects. High-care individuals experienced a significant increase in state anxiety in Phase 2 versus 1, which was maintained in Phase 3 versus 1. No differences in state anxiety were seen between Phases 2 and 3 in any group. State anxiety fell significantly in high-care individuals in Phase 4 versus 3. No parental care x time interaction was observed for PSS-10.

There was no effect of parental control on PSS-10 or STAI-Y, nor was there one for the parental control x time interaction on these variables.

Discussion

The emerging need to understand the long-term effects of the COVID-19 pandemic has prompted many longitudinal studies. Our study is among the few to encompass various phases over 1.5 years—most importantly, pre-pandemic (6 months before the outbreak), early-pandemic (during the strict lockdown in Italy from March to May 2020), late-pandemic (during the implementation of new restrictive measures in Italy from October to December 2020), and the final phase, which witnessed an easing of restrictions and the vaccination campaign (July to September 2021).

Our results have shown a differential effect of time on 2 psychopathological parameters: those that are related to the most recent psychopathological status and those on stress-related variables. Particularly, robust improvements were seen in depressive symptoms, phobic anxiety, symptom-related distress, obsessive-compulsivity, and hostility during the restrictions' ease with respect to the strict lockdown.

The recent literature has generated consistent evidence on COVID-19-related psychopathological outcomes. Studies have reported the detrimental effects of the pandemic on mental health status (Pan et al., 2021; Kuhn et al., 2021; Czeisler et al., 2021; Czeisler et al., 2020), especially in university students who are more prone to develop psychosocial problems (Odriozola-González et al., 2020; Wan Mohd Yunus et al., 2021; El-Monshed et al., 2022). In fact, university students from Arts & Humanities and Social Sciences & Law (Odriozola-González et al., 2020) displayed elevated scores in anxiety, depression, and stress (Odriozola-González et al., 2020; Wan Mohd Yunus et al., 2021), and in general dysfunctional coping strategies (El-Monshed et al., 2022), with work-life

Fig. 3. Effect of the pandemic over time, the restrictive measures' ease and attachment styles and care on PSS-10 and STAI-Y state.
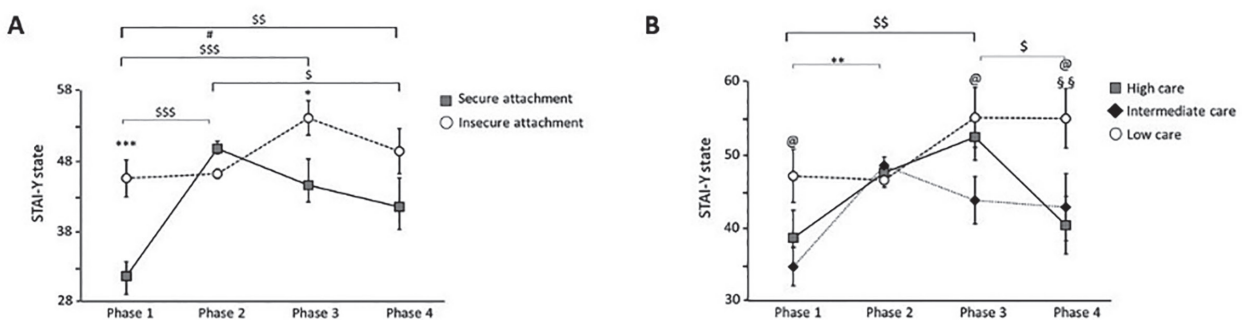
balance affecting the risk to experience negative emotional symptoms (Wan Mohd Yunus et al., 2021). Moreover, female university students (Jiang, 2020), reported a worsening in psychopathological symptoms, such as depressive and obsessive-compulsive symptoms. Consistent with these results, other studies have recorded increases in depressive symptoms, anxiety, worry, loneliness, and obsession-compulsivity in healthy individuals and psychiatric patients during the early phase of the pandemic (lockdown, Guzick et al., 2021; Pan et al., 2021; Czeisler et al., 2021; Czeisler et al., 2020). During the late-pandemic phase (October-December 2020), young healthy adults reported elevated levels of depressive, anxiety, stress-related disorder symptoms, and substance use, compared with the pre-pandemic stage (Czeisler et al., 2021). Depressive symptoms during the early pandemic phase, which recovered several weeks after the end of the lockdown, also worsened in healthy adults (Meda et al., 2021; Charles et al., 2021; Fancourt et al., 2020). Further, obsessive-compulsive symptomatology was exacerbated during the strict lockdown (Guzick et al., 2021), declining after the easing of restrictions (September 2020, Khosravani et al., 2021; Ji et al., 2020), in individuals with obsessive-compulsive disorder and the general population (Guzick et al., 2021).

In our study, symptoms began to exacerbate during the strict lockdown but improve soon after the end of the confinement, reflecting a response to short-term acute stress that strained individuals' well-being. The improvement in general mental health in these subjects might be attributed to adaptation to the more structured routine during management of the pandemic.

We also noted an effect of time on stress-related variables. In particular, stress perception did not vary between the early- and late-pandemic phases, but this parameter improved substantially over the past year (from Phase 2 to 4). Conversely, no significant change was detected for state anxiety between the lockdown and the late-pandemic phase, but a significant increase in state anxiety was noted in the late-pandemic phase and during the ease of restrictions versus the pre-pandemic phase. These results highlight that the pandemic is still perceived as being stressful and activating as during the lockdown, consistent with other studies that have reported that individuals have and continue to experience significant stress and anxiety during the lockdown (Pan et al., 2021; Gupta et al., 2021; Czeisler et al., 2021; Adams et al., 2020). Another explanation that could be considered is related to the worry about students' academic future, as highlighted by the works of Maftei et al. (2021) and Dadaczynski et al., 2022.

Yet, individuals becoming accustomed to the pandemic and its subsequent restrictive measures. Several studies have shown that despite an increase consistent stress during the early pandemic (Adams et al., 2020; Elmer et al., 2020; Ozamiz-Etxebarria et al., 2020b; Shanahan et al., 2020), stress perception declined and general stress trended downward in the late phase (50), remaining chronically elevated compared with the pre-pandemic phase (Adams et al., 2020). Similar to these results, a recent survey from the American Psychological Association (APA, 2020) highlighted the rapid decline in stress in the US population from the early pandemic to June-July 2020 in nations that experienced a decrease in coronavirus cases, whereas stress levels rose in countries in which in coronavirus cases increased (APA, 2020). Further, data on the association between students' perception of the pandemic and their well-being demonstrate how pandemic-related worries are a potential mechanism by which the outbreak negatively affects psychological well-being, at least in the early-pandemic stage (Charles et al., 2021). Another explanation is based on theories about general life satisfaction, which suggest that individuals have a stable baseline of life satisfaction that circumstances can change and recalibrate, according to the situation (Fujita and Diener, 2005).

Unlike the results of a previous study (Bussone et al., 2020), which showed an effect of attachment and parenting on stress-related variables, we found that this effect was weakened. The remaining significant effects were those of attachment and parental care on state anxiety. Individuals with insecure attachment have anxious responses that remain elevated over time (from the lockdown to the ease of restrictive measures and vaccination campaign). Conversely, individuals with secure attachment experienced minor anxiety in the late-pandemic phase, which decreased from the lockdown to the easing of measures.

Studies that support our findings show that insecure attachment patterns, such as anxious and avoidant attachment, increase and predict the risk for moderate to severe psychological distress, anxiety, and mood symptoms during the lockdown (Vowels et al., 2022; Wagerman et al., 2021; Moccia et al., 2020). Moreover, mood and anxiety symptoms tended to improve over time in those with low versus high attachment anxiety (Vowels et al., 2022). Finally, Coulombe and Yates (2021) reported that attachment security promotes and predicts an adolescent's protective behaviors and mental health in response to the pandemic.

Notably, the attachment-dependent trend in anxiety over time could be due to the differential development of stress response systems during childhood (Thompson et al., 2018). Early-life relational events promote the development of attachment styles (Thompson et al., 2018), which has psychophysical consequences by programming the development and function of the stress response system and the subsequent cortisol release in response to stressful events during one's lifespan (Howland et al., 2017). Accordingly, insecure individuals are more likely to use hyperactivating strategies that require more emotional resources to cope with stressful events (Cassidy, 1994), such as the pandemic. Overall, securely attached individuals develop good stress response systems that adequately adapt and react to environmental stimuli. In our case, the lockdown was an objective stressor that increased the stress response (Bussone et al., 2020).

Conversely, we have become accustomed to living with the pandemic and its mild restrictions (Armocida et al., 2020; Lazzerini and Puoto, 2020), causing stress perception to decline rapidly. In this context, securely attached individuals adjusted better to the pandemic and this has resulted in a better adaptation to environmental conditions.

In contrast, insecurely attached individuals, who early-life events programmed to overreact strictly to stressful situations (Thompson et al., 2018; Mikulincer and Shaver, 2012), showed a lack of flexibility in their stress response over time,

from the lockdown to the easing of restrictive measures. These findings highlight the importance of attachment in supporting individuals' mental health in response to stressors.

Similar results were obtained for parental care. Low-care individuals developed anxious responses that remained elevated over time (from the lockdown to the ease in restrictive measures and vaccination campaign), whereas such responses worsened in high-care individuals soon after the lockdown that decreased significant during the ease of restrictive measures. Notably, intermediate-care individuals lessened their anxiety, starting from the end of the lockdown; their greater adaptation in anxious responses suggests a compensatory effect of care from a more loving parent on another who is perceived as neglectful (Johnstone and Hinde, 2006). Further, the differences between individuals with high/intermediate versus low care appear to reflect the same trends in secure versus insecure attachment. This result can be explained by the finding that the constructs of parental care and attachment style are mutually reciprocal and indispensable in the construction of more complex systems of meaning (Bretherton, 1993), individual experiences (Bretherton, 1993) and responsiveness to stress and subsequent psychopathological risk (Engert et al., 2010; Bretherton, 1993).

Another notable result of our study is the significant decline in hostility, which was stable across the pre-pandemic and early-pandemic stages and then decreased over the past year, as the Italian restrictive measures eased. This result contrasts the recent literature, which has reported detrimental effects for hostility (Xie et al., 2021; Lee, Kim, and Kelsey, 2021). Conversely, many studies focused on the early-pandemic phase, highlighting no changes in hostility (Jiang, 2020; Zhang et al., 2021).

Hostility is an emotion that activates adversity-driven attitudes and behaviors, subsequent to a lack of trust toward others (Berkout et al., 2019; Ramirez and Andreu, 2009). The pandemic has changed our way of living, especially our social life. Although an increase in hostility due to death-related thinking and lack of hope was reported in individuals who were likely to collect COVID-19 pandemic information via conservative media (Lee, Kim, and Kelsey, 2021), the results reported in our study are completely different. The significant decline in hostility might be addressed to the cultural level of the sample of this study, as it is composed of a majority of postgraduate and doctoral students, who have been reported in the literature as major users of liberal media (Scheurich et al., 2022; Lee et al., 2021), along with the subsequent increase of hope (Lee et al., 2021; Motta et al., 2020). On the other hand, the restrictive measures might have led us to understand that every individual gesture is essential to achieving common well-being (Katila et al., 2020; Knollman-Porter & Burshnic, 2020; Schlögl & Jones, 2020). Since we are part of a social network, in which we must cooperate in order to support each other. It is therefore clear that hostility, contrary to what we might have expected, could decrease in relation to the common objective of a global well-being.

This study has several limitations. Few subjects were enrolled with respect to the previous study (Bussone et al., 2020), and the sample comprised primarily female university students who are studying psychology at Sapienza University of Rome. Another limitation is that this study was conducted entirely in Sapienza University of Rome, reducing the generalizability of our results to the general population, because each nation implemented

its own restrictive measures. Nevertheless, our report is among the few longitudinal studies in which a pre-pandemic phase was evaluated. Moreover, despite it being a single-nation study, our results mirror those of studies from other nations, which have highlighted the decrease in depressive symptoms and anxiety after the lockdown over 1 year.

Future longitudinal studies should address the trends in psychopathological symptoms and stress-related variables over time to determine how the implementation of restrictive measures and the pandemic affect psychological well-being.

Conclusion

Recent findings suggest that the COVID-19 pandemic, social isolation and social distancing have negatively affected mental health in young adults. In Italy national measures to contain the spread of contagion have changed over the past year, according to the severity of health emergencies. In this study, we examined how the pandemic per sè and the measures used to contain the contagion affect mental health over time (pre-pandemic, early-pandemic, late-pandemic and final phase) in a population of high-care and securely attached individuals vs low-care and insecure attached individuals.

Overall, we found that psychopathological status improved overtime from the early pandemic phase to the final phase, demonstrating the adaptation to the more structured routine during management of the pandemic.

Moreover our findings highlighted the importance of attachment in supporting individuals' mental health in response to stressors, revealing that individuals with insecure attachment had anxious responses that remain elevated over time; conversely, individuals with secure attachment experienced minor anxiety in the late-pandemic phase, which decreased from the lockdown to the easing of measures. Since the lockdown was an objective stressor, this study further confirmed that securely attached individuals adjusted better to the changes in the measures to contain the spread of contagion; conversely insecurely attached individuals showed a lack of flexibility in their stress response over time.

Because of parental care and attachment style are mutually reciprocal and indispensable in the construction of more complex systems of meaning, individual experiences, responsiveness to stress and subsequent psychopathological risk, we also highlighted that the differences between individuals with high/intermediate versus low care appear to reflect the same trends in secure versus insecure attachment.

Finally our study found a significant decline in hostility, probably because during the pandemic people understood that they must support each other to be part of a social network, and the levels of hostility decreased in relation to the common objective of a global well-being.

Author Contributions

Silvia Bussone: Contributed to perform data collection, to analyze data and interpret the results and to write the

manuscript. Chiara Pesca: Contributed to collect the data, to interpret the results and to write the manuscript. Valeria Carola designed the study and wrote the manuscript. She also analyzed and interpreted the data and prepared the figures. Renata Tambelli: Assisted with writing and editing the paper. All authors have read and approved the manuscript.

Ethical Approval
No animal studies are presented in this manuscript. The studies involving human participants were reviewed and approved by Ethical Committee of the Department of Dynamic and Clinical Psychology, Sapienza, University of Rome (Prot. n. 0000453 and Prot. n. 0000112). The patients/participants provided their written informed consent to participate in this study. No potentially identifiable human images or data is presented in this study.
All procedures performed in studies involving human participants were in accordance with Ethical Committee of the Department of Dynamic and Clinical Psychology, Sapienza, University of Rome (Prot. n. 0000453 and Prot. n. 0000112) and with the 1964 Helsinki Declaration and its later amendmentsor comparable ethical standards.

Supplementary Material
Supplementary material may be retrieved at the following link:
https://osf.io/cdmqx/?view_only=23b7cf0fce164773984d6015c44dbdc4

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