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Title: Psychopathological risk stability and change in a sample of mothers and preschool children before, during and after the peak of COVID-19 pandemic

Running title: Psychopathology, dysregulation and COVID-19

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Abstract: Numerous studies have found that the COVID-19 epidemic and the measures to stop it have had a substantial impact on the mental health of the general population. Nevertheless, the majority of this research only looked at the variations in the degree of psychopathological symptoms in individuals before and after the first wave of the pandemic. In a sample of N=380 preschoolers and their mothers assessed through the Symptom Check-List/90-R and of the Child Behavior Check-List, the present study aimed at exploring psychopathological risk in mothers and their offspring's dysregulation levels before (T1), during (T2) and after (T3) the peak of COVID-19 pandemic. Our main results showed that mothers' relational distress increased from T1 to T2 and then increased again from T2 to T3. Moreover, maternal aggressiveness, hostility, and anxiety scores significantly decreased from T1 to T2 but slightly increased from T2 to T3. In children, dysregulation levels increased from T1 to T2 but decreased from T2 to T3. Children of mothers with clinical scores at the SCL-90/R showed significantly higher dysregulation problems at T1, T2 and T3 than children of mothers with scores below the clinical threshold. This study adds to previous literature in that it evaluates stability or change in maternal and offspring scores not only in the pre-pandemic period and during the first wave of the pandemic, but it also considers the subsequent months, focusing on a broad range of maternal symptoms, rather than assessing depressive and anxiety symptoms as most of previous research did.

Keywords: COVID-19; psychopathological risk; dysregulation; mothers and children.

Introduction

In March 2020 the whole world faced the outbreak of the first wave of the COVID-19 infection. Rather than definitively decreasing and eventually disappearing after a few weeks (as hoped), infections, symptoms and (unfortunately) deaths continued, with periodic surges and declines of cases (Vaishnav, Dalal, & Javed, 2020). With some differences, researchers traced a general worldwide trend with four major waves associated with the appearance of a new variant of the virus (Cao et al., 2022). Although the number of cases was high in all the four waves, the majority of countries adopted stringent precautions, quarantines, lockdowns and curfews especially during the first wave (which some authors have proposed to consider as the peak of the pandemic; Bhatla, & Ryskina, 2020) to diminish the transmission rate of the virus, progressively lifting them concurrently with the vaccination of the population.

Several studies have now shown that the COVID-19 pandemic and the efforts put in place to stop it have had a significant influence on the general population's mental health (Samji et al., 2022; Cogan et al., 2022). However, most of these studies considered possible differences in the levels of psychopathological symptoms in individuals only comparing their mental health before the pandemic and during the first wave (Jodaon et al., 2021; Bajo et al., 2021). Although very informative, this research did not describe the situation in the subsequent months, when the pandemic concluded its peak while being nonetheless present and virulent. A huge number of scientific articles have been published on this topic, although most of these studies focused on adults' mental health and on depression, anxiety, and PTSD symptoms. Limited attention has been given to specific components of the population, such as, for instance, parents and their children (with the exception of some important papers; see for example the seminal review by Manchia et al., 2022) and to a broader variety of symptoms.

Indeed, children's emotional and behavioral functioning severely deteriorated during the epidemic, according to the World Health Organization (2020) (Liu et al., 2021). Schools have been closed to reduce the spread of the COVID-19 virus, reducing opportunities of in-person socialization with peers, play outside, and exercise (de Lannoy et al., 2020; Moore et al., 2020), while screen time have increased (Orgiles et al., 2020). After the school cancellations, parental anxiety increased rapidly (Hiraoka & Tomoda, 2020), frequently in association with parents' financial and health issues, and the disrupting of familial routines. This phenomenon was so disturbing that 27 percent of parents and 15 percent of children's mental health has been shown to have deteriorated in the United States during the first wave in 2020 (Patrick et al., 2020). Increased depressed and externalizing symptoms were found in a recent research on preschoolers when compared to pre-COVID levels (Bignardi et al., 2021), and although children with pre-existing emotional and behavioral difficulties had the most worrying outcomes (Phelps & Sperry, 2020), COVID-19 has had an influence even on non-at-risk individuals (those who had no clinical signs prior to the pandemic) (Cerniglia et al., 2021), underlying the importance of research on the general population in this field.

According to the developmental psychopathology framework, a caregiver's emotional response to a stressful event and parental psychopathological risk can spillover on their children's emotional and behavioral functioning (Cummings, 2013). It has been posited that children acquire the capacity of managing and adjusting to emotional experiences through two interconnected but distinct components: emotion regulation and emotional lability (Shields & Cicchetti, 1997). Emotion regulation refers to a child's ability to control their emotional feelings and expressions, allowing them to engage adaptively to the environment. Conversely, emotional lability involves difficulties in recovering from negative emotional reactions and an inability to display appropriate emotional responses in emotional situations. Numerous studies have highlighted the significant influence of parents' emotion regulation abilities in guiding children's development of these two capacities via observing parents' emotional displays and interactions (Morris et al., 2007). Even in

the case of the COVID-19 pandemic, researchers have hypothesized an association between caregivers' and their children's psychological symptoms (Cimino & Cerniglia, 2021; Lucarelli, Sechi, Cimino, Chatoor, 2018). Parents and their offspring were compelled to be confined together at home during lockdowns, resulting in significant changes in everyday habits and routines (Yue, Gizem Korkmaz, & Zhou, 2020), frequently associated with higher internalizing and externalizing symptoms in youths (Cerniglia et al., 2021). On the other hand, research has shown (in most cases) that parents reacted to the pandemic increasing their psychopathology symptoms, being less capable of perceiving their children emotional distress, frequently underestimating offspring's symptoms (Taraban & Shaw, 2018). Even caregivers with no previous indicators of psychopathology have been shown to be affected by the COVID-19 pandemic, particularly mothers, who are usually the primary caretakers (Granek et al., 2014). As caregivers are the primary source of children's security and emotional regulation (Buckland et al., 2021), parents' difficulties could have impaired offspring's capacity to respond to distress during the pandemic (Stein et al., 2009). Importantly, the response to potentially traumatic experiences such as the pandemic (or other gravely stressful conditions, as natural disasters for instance) has been conceptualized as a process encompassing different phases ranging from the impact stage, when individuals and communities typically experience a sense of threat, shock, fear, helplessness or powerlessness, and anxiety, to the recovery phase, which is a period of adjustment or return to equilibrium, to the reconstruction phase when individuals and communities re-organize, although the perception of the event and the meaning assigned to it may also affect long-term psychosocial adjustment (Raphael & Wilson, 1993). For this reason, it is important to observe psychological functioning of parents and children over time.

With these premises, this longitudinal study aimed at exploring: a) psychopathological risk stability and change over time in a sample of mothers of preschooler children; b) dysregulation profile's stability and change over time in a sample of preschooler children; c) the differences in dysregulation profiles' stability and change over time in preschoolers of mothers with and without psychopathological risk during pre-pandemic period.

Method

Participants and procedure

This longitudinal study was conducted with three serial assessments. The initial assessment (T1) was administered during the pre-pandemic period, specifically six months before the beginning of the first nationwide lockdown in Italy, that is, between October and November 2019, the second assessment (T2) during the peak of the first coronavirus pandemic wave, that is, between March and April 2020, while the third assessment (T3) after this first wave, when contagions were declining, that is, between August to September 2020. The assessments took place six months apart from each other.

The sample of this study was recruited thanks to the collaboration of randomly selected Italian schools. The scientific agreements were already in place before the COVID-19 pandemic. The schools informed the families about the possibility of participating in a research project to identify risk and protective factors related to parental and children's psychological well-being in the general population. Participants were recruited to the following inclusion criteria: a) no referred psychiatric diagnosis in the mothers or their children; b) no medical condition present in the subjects at the time of recruitment; c) no current medical and/or psychological treatment; d) no COVID-19 current contagion in any member of the family and no death of any close relative associated with COVID-19. The last

criterion (d) was included after the onset of the COVID-19 pandemic. From T1 to T2 the attrition rate's participation was 15%, while no families dropped the study from T2 to T3. These missing data were excluded from the final study's sample.

By following this procedure, a total sample of $N = 380$ mothers and their preschooler children were included in the present study. Most of the mothers (92%) were of middle socio-economic status (SES) and they have mainly attended high school (73.2%), followed by university (21.1%) and by secondary school (5.7%). Children were 50.8% females and 49.2% males and their mean age at the time was 4.5 ($SD=.12$) years at T1, 5 years ($SD=1.4$) at T2, and 5.5 ($SD=1.3$) at T3. All the dyads involved in the study were connected by a consanguinity.

Once mothers provided a written informed consent for all the procedures, they were asked to complete a self-report questionnaire to assess their psychological symptoms as well as a parent-report questionnaire to assess child behavioral and emotional characteristics at T1, T2, and T3. All the assessments were completed online. Following the Declaration of Helsinki, the Ethical Committee of the Department of one of the authors authorized the study before its start ($N: 0000990$).

Tools

The Symptom Checklist-90-Revised (SCL-90-R)

The SCL-90-R is a 90-item self-report questionnaire for assessing the presence and intensity of psychological symptoms and distress experienced during the latest 7 days, across nine subscales: Somatization (SOM), Obsessive–Compulsive (O-C), Interpersonal Sensitivity (I-S), Depression (DEP), Anxiety (ANX), Hostility (HOS), Phobic Anxiety (PHOB), Paranoid Ideation (PAR) and Psychoticism (PSY) (Derogatis, 1994). In addition, there are additional items (OTHER subscale) that explore disturbances in appetite and sleep. Items are rated on a 5-point Likert scale, ranging from 0 (not at all) to 4 (extremely). The measure has been well-validated in several countries both in clinical and non-clinical samples (e.g., Rauter et al., 1996; Urban et al., 2014; Schmitz et al., 2000).

For this study, it has been used the Italian version (Prunas et al., 2010) which, differently from the original one, is composed by 69-item exploring the psychological symptoms and distress across eight dimensions: Relational Distress (RD), mainly composed of items originally belonging to the I-S subscale, reflects psychopathological symptoms that may impact relational and interpersonal functioning (i.e., paranoid ideation, social anxiety); Physical Complaints (PC), similar to the original SOM subscale, covers a range of physical symptoms (i.e., muscle pain, physical weakness, headaches), Anxiety (ANX), composed by items belonging to the original ANX and PHO subscales, captures a global dimension of anxiety; Aggressiveness/Hostility (A/H), made up of items from the original HOS and PAR subscales, covers a range of externalizing symptoms related to aggressive behavior towards others; Dysphoria (DY), not associable to any original subscales, covers an heterogeneous manifestation referring to mood alteration, both on a depressive and maniacal side, as well as items of psychomotor agitation; Depressive Ideation (DI), composed by items from DEP and OTHER subscales, measures the cognitive components of the depressive syndrome (i.e., worthlessness, guilt, hopelessness) along with suicidal risk (i.e., thoughts of death, suicidal ideation); Obsessive-Compulsive (O-C), similar to the original O-C subscale, covers a range of obsessive and compulsive symptoms (perfectionism, difficulty in making decision, tendency to check and double-check things), and Sleep Difficulties, composed by items belonging to OTHER subscales, refers to sleeping problems. As emerged, the factor structure of the Italian version did not provide support for PSY and PAR as distinct subscales. The internal coherence tested within a sample of adolescents and adults (Cronbach's alpha between .70 and .96), as well as that tested within the current sample is good (Cronbach's alpha between .75 and .95). Both in the original and in Italian version, the clinical cut-off is equal to 1, indicating the presence of psychopathological condition.

The Child Behavior Checklist (CBCL)

The CBCL is a questionnaire filled out by parents and caregivers to assess a child's abilities and his/her behavioral/emotional functioning over the last 2 months (Achenbach & Rescorla, 2001). The CBCL/1.5-5 is composed by 100 items, rated on a 3-point Likert scale, ranging from 0 (not true) to 2 (often true), which provides scores for the Internalizing Problem Scale (the result of the sum of Emotionally Reactive, Anxious/Depressed, Somatic Complaints and Withdrawn subscales scores) and for the Externalizing Problem Scale (consisting in Attention Problems and Aggressive Behavior subscales). Also, the measure provides a dysregulation profile's (DP) score resulting from the sum of AAA scales (that is, Anxious/Depressed, Attention Problems, and Aggressive Behavior subscales) that captures problems of dysregulations and, more specifically, impairments in regulating affect, behavior, and cognition (Geeraerts et al., 2015). In childhood the DP score has been recognized as a potential indicator of risk for concurrent psychosocial impairments as well as for the development of a range of psychological disorders later in life, resulting valuable for prevention and treatment (i.e., Bellani et al., 2012; Basten et al., 2012). Given its clinical relevance, in the present study, we referred to DP score.

The measure shows good psychometric properties, particularly a quite satisfactory internal consistency (alpha ranging from 0.65 to 0.96) and an excellent test-retest reliability (.85) (Achenbach and Rescorla, 2000, 2001). Similarly, the internal coherence tested within the current sample is good (Cronbach's alpha between .89 and .91).

Statistical analyses

As a preliminary step, descriptive analyses were performed to ascertain the variables' normality. Results showed that our variables are not normally distributed; however, according to the central limit theorem (whereby as the sample size got bigger the sampling distributions become more normal), the shape of our data shouldn't affect significance tests. Additionally, a post hoc power analysis was conducted using G*Power software (Mayr et al., 2007) to determine whether the current sample size of 380 was sufficient to detect a hypothesized incremental effect size of .02 (a small effect) and an alpha level of $\alpha = .05$. Results indicated the current sample size was sufficient to achieve power of .99, with a critical F value of 3.00. Lastly, to identify relevant confounder variables to include in the subsequent analyses, Multivariate ANOVA was run for exploring the impact of socio-demographic variables (infant gender, maternal level of education, maternal socio-economic status) on dependent variables, that is, on each maternal SCL-90-R dimensions' mean scores (i.e., relational distress, physical complaints, anxiety, aggressiveness/hostility, dysphoria, depressive ideation, obsessive-compulsive and sleep difficulties) and on children dysregulation profile' mean scores at T1, T2 and T3. Results did not detect any significant impact; therefore, no variables were included as confounder variables in the subsequent analyses.

In line with first and second aim, we performed two independent series of repeated measure analyses of variance for exploring the impact of Time, as a within-subject factor, on the dependent variables, that is, on mean scores of each maternal SCL-90-R dimensions, and of children dysregulation profile. Also, growth curve model (GCM) analysis was used to describe trajectories of these dependent variables as a function of time. With three repeated measures (i.e., T1, T2, and T3), GCM were limited to linear and quadratic models (Field, 2014): (1) a linear model with a random intercept and random slopes, which reflects linear change over time; (2) a quadratic model with a random intercept and random slopes, which reflects change that takes on a "U" or inverted "U" shape. These unconditional models —where only the intercept, linear slope, and curved slope were specified to determine the trajectories — were centered at the month during which the first data was collected (i.e., at T1) and, therefore, represented initial scores of mothers' SCL-90-R and of children dysregulation profile (see supplementary material for graphical representation of results). Model fit was evaluated using the — 2 log likelihood difference test (— 2LL).

Lastly, in line with third aim, we performed repeated measure analyses of variance for exploring the impact of specific factors, that is, of each maternal psychological dimensions at T1, alone as well as in interaction with time of assessment, on children dysregulation profile mean scores.

All statistical analyses were carried out using the IBM SPSS statistical package version 25.0.

Results

Stability and change of maternal psychological SCL-90-R dimensions

In line with first aim, that is, exploring fluctuations in maternal SCL-90-R mean scores as a function of time, results showed that, with the exception obsessive-compulsive and sleep difficulties profiles, maternal psychological dimensions significantly change over time (**Table 1**). For clarity, for each SCL-90-R subscale, we will present first the results obtained with repeated measures ANOVA and then those obtained with GCM.

-----Table 1 here-----

Particularly, relational distress scores ($F_{(1,380)} = 6.98, p < .05, \eta^2 = .15$) tended to significantly increase from T1 to T2 and T3 (Bonferroni *post hoc* test $p < 0.0001$ and $p < 0.03$, respectively) and to remain stable from T2 to T3 (Bonferroni *post hoc* test $p < 0.0001$); the — 2 log likelihood model comparison tests indicated that this pattern of change over time ($\chi^2_{(1)} = 1.46, p > .05$) was best described by a significant positive linear change over time, indicating a linear and moderately increasing trajectory ($F_{(380.000)} = 116.82, p < .001$).

Aggressiveness/hostility scores ($F_{(1,380)} = 12.71, p < .001, \eta^2 = .19$) tended to significantly decrease from T1 to T2 and T3 (Bonferroni *post hoc* test $p < 0.0001$ and $p < 0.005$, respectively) and to remain stable from T2 to T3; according to the — 2 log likelihood model comparison tests, this trajectory over time ($\chi^2_{(1)} = 26.72, p < .01$) was best described by a U-shaped pattern, characterized by a significant negative linear slope, followed by a slight rebound, indicating a positive quadratic (curved) slope ($F_{(380.001)} = 27.68, p < .001$).

Anxiety scores ($F_{(1,380)} = 4.83, p < .05, \eta^2 = .11$) tended to significantly decrease from T1 to T2 (Bonferroni *post hoc* test $p < 0.0001$) and to increase from T2 to T3 (Bonferroni *post hoc* test $p < 0.005$); the — 2 log likelihood model comparison tests suggested that, on average, their means scores over time ($\chi^2_{(1)} = 39.33, p < .01$) were best described by a significant negative linear slope and a positive quadratic (curved) slope, indicating a U-shaped pattern ($F_{(380.000)} = 21.94, p < .001$).

Physical complaints ($F_{(1,380)} = 204.84, p < .001, \eta^2 = .15$), Dysphoria ($F_{(1,380)} = 127.16, p < .001, \eta^2 = .26$) and Depressive Ideation scores ($F_{(1,380)} = 29.00, p < .001, \eta^2 = .08$) tended to remain stable from T1 to T2 and to show a significant decrease from T2 to T3 (Bonferroni *post hoc* test $p < 0.0001$ for all the above-mentioned subscales); comparing the fit of the models with the — 2 log likelihood model comparison tests, these patterns of change over time ($\chi^2_{(1)} = 40.82, p < .01, \chi^2_{(1)} = 88.31, p < .01$ and $\chi^2_{(1)} = 24.30, p < .01$, respectively) were best described by a significant positive linear slope, followed by a negative quadratic (curved) slope, indicating an inverted U-shaped pattern ($F_{(380.000)} = 41.83, p < .001, F_{(380.000)} = 95.10, p < .001$ and $F_{(380.000)} = 25.09, p < .001$, respectively).

Lastly, as already mentioned, obsessive-compulsive ($F_{(1,380)} = .03, p = .854$) and sleep difficulties scores ($F_{(1,380)} = .03, p = .954$) were stable over time; coherently, the — 2 log likelihood model comparison tests suggested that their pattern of change were best described by flat trajectories ($\chi^2_{(1)} = 2.32, p > .05, \chi^2_{(1)} = 1.49, p > .05$) with no trend in their means scores, that is neither a significant increasing nor a significant decreasing over time ($F_{(380.000)} = .01, p = .944, F_{(380.000)} = .03, p = .854$, respectively).

Stability and change of children dysregulation profile

According to second aim, that is, exploring fluctuations in children dysregulation profile as a function of time, results reported a significantly change in its scores (**Table 2**). Also in this case, for clarity, we will present first the results obtained with repeated measures ANOVA and then those obtained with GCM.

-----Table 2 here-----

Particularly, results ($F(1,379) = 459.15, p < .001, \eta^2 = .63$) showed a stable trend in scores' from T1 to T2 followed by a decreasing trend from T2 to T3 (Bonferroni *post hoc* test $p < 0.0001$); the — 2 log likelihood model comparison tests indicated this pattern of change over time ($\chi^2_{(1)} = 27.74, p < .01$) was best described by an inverted U-shaped pattern, characterized by a significant positive linear slope, followed by a rebound, indicating a negative quadratic (curved) slope ($F(760.000) = 238.90, p < .001$).

Impact of SCL-90-R maternal psychological dimensions at T1 on children dysregulation profile over time

With respect to third aim, we explored the impact of each maternal psychological dimensions at T1, along with its interaction with time of assessment, on children dysregulation profile mean scores.

When only the impact of maternal psychological dimensions at T1, that is, independently from time of assessment, was considered (**Table 3**), results showed that children of mothers with scores above the clinical threshold on all SCL-90-R subscales considered, that is, relational distress ($F_{(1,378)} = 312.18, p < 0.001, \eta^2 = .45$), physical complaints ($F_{(1,378)} = 361.12, p < 0.001, \eta^2 = .49$), anxiety ($F_{(1,378)} = 291.65, p < 0.001, \eta^2 = .44$), aggressiveness/hostility ($F_{(1,378)} = 248.55, p < 0.001, \eta^2 = .40$), dysphoria ($F_{(1,378)} = 531.30, p < .001, p < 0.001, \eta^2 = .58$), depressive ideation ($F_{(1,378)} = 362.47, p < 0.001, \eta^2 = .49$), obsessive-compulsive ($F_{(1,378)} = 423.30, p < 0.001, \eta^2 = .52$) and sleep difficulties ($F_{(1,378)} = 276.19, p < 0.001, \eta^2 = .42$), showed significantly higher dysregulation profile mean scores than children of mothers with scores below the clinical threshold.

When the interaction between maternal psychological dimensions at T1 and time of assessment was considered (**Table 3**), results reported, both between- and within-groups, significant differences in dysregulation profile mean scores in relation to the following subscales: relational distress ($F_{(1,378)} = 9.17, p < .01, \eta^2 = .10$), physical complaints ($F_{(1,378)} = 21.96, p < .001, \eta^2 = .08$), anxiety ($F_{(1,378)} = 27.50, p < .001, \eta^2 = .06$), aggressiveness/hostility ($F_{(1,378)} = 7.44, p < .01, \eta^2 = .06$), dysphoria ($F_{(1,378)} = 28.12, p < .001, \eta^2 = .08$), depressive ideation ($F_{(1,378)} = 5.20, p < .05, \eta^2 = .04$), and obsessive-compulsive ($F_{(1,378)} = 4.03, p < .05, \eta^2 = .04$).

-----Table 3 here-----

Particularly, regarding to between-groups differences, at T1, T2 and T3 (Bonferroni *post hoc* test $p < 0.0001$ for all the above-mentioned subscales) children of mothers with scores above the clinical threshold showed significantly higher dysregulation profile mean scores than children of mothers with scores below the clinical threshold.

Regarding to within-groups differences, children of mothers with scores above the clinical threshold showed a significant increasing in dysregulation profile scores from T1 to T2 (Bonferroni *post hoc* test $p < 0.0001$ for all the above-mentioned subscales) followed by a significant decreasing trend from T2 to T3 (Bonferroni *post hoc* test $p < 0.0001$ for all the above-mentioned subscales). Differently, children of mothers with scores below the clinical threshold showed a stable trend from T1 to T2 followed by a significant decreasing from T2 to T3 (Bonferroni *post hoc* test $p < 0.0001$ for all the above-mentioned subscales).

On the contrary, no significant differences, nor between neither within-groups, were observed in dysregulation profile mean scores according to the interaction between maternal sleep difficulties at T1 and time of assessment ($F_{(1,378)} = .79, p = .374$).

Discussion

Rooting on the Developmental Psychopathology and System Theory (Masten, 2006; Thelen & Smith, 1998) and on Bronfenbrenner's ecological model of development (Bronfenbrenner, 2006), this study intended to verify whether parents' psychopathological symptoms and children's dysregulation problems were stable or changed from pre-COVID-19 period (T1) to the peak period (T2) and then to the post-peak period (T3) of the pandemic. We also aimed at understanding the impact of pre-pandemic clinical and non-clinical maternal psychological symptoms on children's dysregulation profiles over time.

The above theoretical frameworks posit that children's adaptive functioning and emotion regulation in stressful situations greatly rely on the quality of the attachment relationships the child has, because caregivers usually act as auxiliary regulatory systems. Essentially, parents offer a "scaffold" for the development of self-regulation. If parents fail to guarantee this support, for instance because they themselves show psychopathological symptoms, offspring can lack an important asset sustaining their resilience during potentially traumatic experiences (Masten & Cicchetti, 2010).

The first result we found was that mothers' relational distress scores increased from the pre-pandemic period to the peak period and then moderately increased again from T2 to T3. The relational distress sub-dimension of the SCL-90/R mainly taps symptoms such as paranoid ideation and social anxiety (Prunas et al., 2012). Social anxiety can be characterized by subjective distress experienced by the subject in crowded places, and feeling lonely and isolated (Zhao et al., 2020). We speculate that subjects could have felt the proximity of other people as particularly distressing during the pandemic, and especially during the peak of it when individuals were asked to maintain social distancing and to avoid unnecessary contacts. Thus, preoccupation for possible contagion and physical problems may have exacerbated relational distress symptoms. Besides, the uncertainty about the dangerousness of the virus and its possible complications could have augmented the paranoid ideation about the menace represented by others. It is noteworthy that these possible effects were not confined to the peak period of the pandemic but lasted afterwards, even when restrictions to social interactions were gradually lifted.

Moreover, maternal aggressiveness and hostility scores significantly decreased from T1 to T2 but to slightly increased from T2 to T3. The decrease of scores from T1 to T2 is consistent with previous literature that posited how the condition of necessary isolation from others during the lockdowns has frequently caused in the general population the experience of being protected from the day-to-day

interpersonal conflicts, therefore reducing feelings of resentment and anger towards others (Talbot & Briggs, 2021). Instead, the increase of the levels of aggressiveness after the peak of the pandemic (although mild) could be associated with the realization of its duration, which in someone's perception could have been caused by the improper use of personal protective equipment (masks) and low rate of vaccination in part of the population (Morgenstern-Kaplan et al., 2020).

The same trend characterized maternal anxiety scores, which significantly decreased from T1 to T2 and increased from T2 to T3. We hypothesize that, as elaborated above, the imposed restrictions could have resulted in a sense of safeness and protection from the outside dangers represented by the presence of the virus and its possible transmission from one to another person. This could have led to reduced anxiety levels; however, when the restrictions have been lifted and subjects were required to return to work in presence, travel and interact with others, they suffered an increase in these symptoms. After several months of "new normality" as it was frequently called by media, it is possible that some individuals found it difficult and distressing to go back to direct encounters with colleagues and relatives (Fancourt, Steptoe & Bu, 2020).

Physical complaints, Dysphoria and Depressive Ideation scores remained substantially stable from T1 to T2 and to show a significantly decrease from T2 to T3. Contrary to previous literature, in this study we did not find increased physical, dysphoric and depressive symptoms from the pre-COVID period to the peak phase of the pandemic (Ubillos-Landa, Puente-Martínez & González-Castro, 2021). We instead found significantly less of these problems after the peak. Specifically, subjects at T3 showed significantly less symptoms than T2 and even than T1, that is in our sample individuals experienced less problems in these areas than before the pandemic. As the SCL-90/R is a self-report questionnaire tapping perceived (not observed) symptoms, we speculate that the ending of the peak period could have allowed a sense of enthusiasm in individuals, consistently with the studies of Kelly, Hofbauer, and Gross (2021), thus reducing preoccupation, lack of hope for the future, and sadness.

Not in line with previous literature (Zaccari et al., 2021), besides, we did not find an increase in obsessive-compulsive, neither from T1 to T2 nor from T2 to T3. In fact, scores in this area were stable over time, showing a flat trajectory. We hypothesize that this result could be due to the nature of the rules imposed to stop the spreading of the virus (for instance frequently washing hands and sanitizing surfaces). These behaviors, in the pre-pandemic world, had been associated with obsessive-compulsive functioning (Ong et al., 2019). Now, in the new reality, they are socially accepted, or even strongly encouraged, with powerful media campaigns. This normalization of behaviors previously recognized as maladaptive may have caused a shift from an ego-dystonic to an ego-syntonic experience of these conducts. Therefore, although obsessive-compulsive behaviors could have increased, subjects could have not recognized them as such in the self-report measure SCL-90/R.

So far, we discussed the results concerning maternal psychological functioning over the three periods (T1, T2 and T3). Now, we will focus on the stability and change of children's dysregulation scores.

Our results showed a significant increase of dysregulation levels from T1 to T2 followed by a decrease trend from T2 to T3. As noted in the tools section, the dysregulation profile is composed by internalizing and externalizing problems; a large amount of studies has now demonstrated that the pandemic has caused a strong increase in these difficulties in children, especially in offspring as young as in our sample (see for example: Du et al., 2021; Lionetti et al., 2022). Emotion regulation in preschoolers is crucial for positive outcomes in later life therefore this result rises serious concerns about possible negative consequences in the development of an entire generation of children (as every child in the world has been exposed, more or less directly, to the effects of the pandemic). Meanwhile, the decrease of dysregulation symptoms after the peak period of the pandemic allows prudent hope about the fact that its effects could be acute but not chronic. Future studies should evaluate this hypothesis. The improvement in these problems from T2 to T3 could also be due to the

enhancement in mothers' emotional-behavioral functioning in the same period (particularly in term of a decreasing in physical complaints, depressive ideation, and mood alterations) that could have had the effect of a positive protecting factor on offspring regulation processes, as posited in previous literature (Cimino et al., 2018; Cimino et al., 2019; Cole, Mitchell & Teti, 1994).

After evaluating the individual characteristics of mothers and children's psychological functioning at the three assessment points, we investigated the possible impact of pre-existing maternal psychopathological risk on their children dysregulation problems over time.

We found that offspring of mothers with scores above the clinical threshold at the SCL-90/R (especially relational distress, physical complaints, anxiety, and aggressiveness/hostility at T1) showed significantly higher dysregulation problems at T1, T2 and T3 than children of mothers with scores below the clinical threshold. This confirms consolidated results of previous studies, which had underlined the key role of clinically relevant maternal symptomatology in predicting negative outcomes in their children, especially when they must face distressing experiences (e.g. the pandemic). In fact, psychopathology in mothers is often associated with an impaired quality of caregiver-child interactions, which is indeed crucial for the development of an adaptive emotional-behavioral functioning in young children (Calkins & Hill, 2007).

Noteworthy, children of mothers with scores above the clinical threshold showed a significant increase in dysregulation problems from T1 to T2 followed by a significant decrease from T2 to T3. Conversely, children of mothers with scores below the clinical threshold showed a stable trend from T1 to T2 followed by a significant decrease at T3. Regarding to the increasing observed at T2 in children of clinical mothers, we speculate that mothers with clinically relevant symptoms failed to protect children from the development of psychological problems subsequent the pandemic outbreak, due to their own impaired capacity of recognizing signs of distress in offspring and/or react contingently and sensitively to those cues (Licata et al., 2016). In other words, it could be that mothers with relevant psychopathological symptoms could have exposed their children to an adjunct risk factor (their own psychopathology) besides the environmental risk represented by the pandemic. On the contrary, mothers without significant psychopathological risk seem to have protected their offspring from the potentially negative outcomes of the pandemic and from the consequences of the imposed restrictions (school closures, isolation, etc.). It could be that when mothers were not engaged in coping with their own problematic symptoms, they could hold back the potentially distressful influence of the pandemic protecting their children's psychological well-being.

Finally, we found that in both children of mothers exceeding the clinical cut-off and in the offspring of non-clinical mothers, dysregulation problems at T3 (after the peak of the pandemic) decreased. This could be due to the re-opening of schools and to the renewed possibility of interpersonal contacts with peers, which previous studies have shown as strong protective factors against psychopathological problems (Ye et al., 2022).

This study has some limitations. First, the tools adopted to measure maternal psychopathological symptoms and children's dysregulation problems were respectively self-report and report form questionnaires. We did not use clinical interviews or observational procedures administered by an expert in the field, which could have guaranteed a more objective assessment and more robust results. On the other hand, the measures we chose are widely used in the scientific literature and are fully validated for the Italian population. Second, we did not consider the possible role of fathers as protecting or risk factors mediating or moderating the effect of maternal psychopathology on offspring dysregulation. Third, the sample of this study is relatively small and it is not representative of Italian population. Notwithstanding these limitations, this study has several strengths. It uses a longitudinal design, allowing hypothesizing causal effects rather than describing mere correlations or associations between variables. Moreover, it adds to previous literature in that it evaluates stability or change in maternal and offspring scores not only in the pre-pandemic period and during the first wave of the pandemic, but it also considers the subsequent months. Moreover, it focuses on a broad range of maternal symptoms, rather than assessing

depressive and anxiety symptoms as most of previous research did. Finally, it can have implications for future research and suggest general considerations useful to face possible new pandemics or other crises. During a flu pandemic, bioterrorism event, natural disaster, it seems crucial to consider systemic responses to the stressful event, valuing the reactions, the vulnerabilities and/or the resiliencies of the whole family, rather than the individual liabilities and strengths. In line with Masten and Obradovic (2008) authoritative position, children in families with poor or malfunctional social network and those in families with high levels of conflict between parents are the most vulnerable to crises and on these populations should intervention resources be directed primarily.

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Table 1. Means (standard deviation) of mothers’ SCL-90-R subscales by time of assessment

SCL-90 -R subscales	Time of Assessment			F
	T1	T2	T3	Time of Assessment
RD	.41 ±.57	.45 ±.55	.47 ±.61	6.98*
PC	.53 ±.72	.53 ±.74	.35 ±.54	204.84***
AN	.42 ±.62	.38 ±.61	.49 ±.74	4.83*
A/H	.45 ±.54	.35 ±.55	.37 ±.56	12.71***
DY	.60 ±.68	.63 ±.77	.32 ±.46	127.16***
DI	.50 ±.74	.50 ±.74	.34 ±.57	29.00***
O-C	.46 ±.64	.44 ±.64	.46 ±.73	.03
SD	.40 ±.65	.37 ±.67	.39 ±.68	.03

Note. SCL-90-R = Symptoms Checklist-90-Revised. RD = Relational Distress; PC = Physical Complaints; AN = Anxiety; A/H = Aggressiveness/Hostility; DY = Dysphoria; DI = Depressive Ideation; O-C = Obsessive-Compulsive; SD = Sleep Difficulties.

p* < .05. ** *p* < .01. **p* < .001.

Table 2. Means (standard deviation) of children’ dysregulation profile (DP) by time of assessment

Time of Assessment				
	T1	T2	T3	F
DP means scores	17.71 ±9.58	18.97 ±10.98	8.56 ±8.71	459.15***

Note. DP = Dysregulation Profile.

****p* < .001.

Table 3. Means (standard deviation) of children’ dysregulation profile (DP) by mothers’ SCL-90-R subscales at T1 and time of assessment

		DP				F	
SCL-90 scales at T1		DP	T1	T2	T3	SCL-90 scales at T1	SCL-90 scales at T1 x Time of Assessment
RD	< 1	12.35 ±.36	15.20 ±.46	15.87 ±.50	5.98 ±.39	312.18***	9.17**
	> 1	26.95 ±.74	28.61 ±.95	32.46 ±1.05	19.77 ±.81		
PC	< 1	12.32 ±.43	15.64 ±.48	15.73 ±.48	5.59 ±.34	361.12***	21.96***
	> 1	27.74 ±.74	27.20 ±1.03	33.82 ±1.03	22.20 ±.72		
AN	< 1	12.81 ±.35	15.86 ±.47	16.16 ±.47	6.40 ±.38	291.65***	27.50***
	> 1	28.80 ±.87	28.87 ±1.15	35.93 ±1.16	21.59 ±.94		
A/H	< 1	13.01 ±.36	16.04 ±.47	16.54 ±.50	6.44 ±.37	248.55***	7.44**
	> 1	28.77 ±.93	28.74 ±1.21	35.00 ±1.28	22.56 ±.96		
DY	< 1	11.03 ±.33	14.46 ±.49	14.69 ±.52	3.94 ±.28	531.30***	28.12***
	> 1	25.41 ±.53	25.99 ±.78	29.89 ±.83	20.34 ±.45		
DI	< 1	12.12 ±.35	15.19 ±.47	15.60 ±.50	5.56 ±.36	362.47***	5.20*
	> 1	26.92 ±.69	27.76 ±.94	32.43 ±1.00	20.55 ±.73		
O-C	< 1	12.13 ±.33	15.15 ±.45	15.65 ±.48	5.59 ±.35	423.30***	4.03*
	> 1	27.91 ±.69	28.83 ±.94	33.42 ±1.01	21.46 ±.73		
SD	< 1	12.77 ±.36	15.33 ±.43	16.63 ±.53	6.35 ±.39	276.19***	.79
	> 1	28.16 ±.85	31.16 ±1.03	32.23 ±1.25	21.10 ±.92		

Note. SCL-90-R = Symptoms Checklist-90-Revised. RD = Relational Distress; PC = Physical Complaints; AN = Anxiety; A/H = Aggressiveness/Hostility; DY = Dysphoria; DI = Depressive Ideation; O-C = Obsessive-Compulsive; SD = Sleep Difficulties. DP = Dysregulation Profile.

The size of the clinical and non-clinical samples of mothers were respectively: N= 71 and N= 309 for RD; N= 68 and N= 312 for PC; N= 54 and N= 326 for AN; N= 50 and N= 330 for A/H; N= 107 and N= 273 for DY; N= 76 and N= 304 for DI; N= 71 and N= 309 for O/C; N= 57 and N= 323 for SD.

p* < .05. ** *p* < .01. **p* < .001.