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Version of Record: https://www.sciencedirect.com/science/article/pii/S0022395621001023
Manuscript_8c81a3b889149d752b915e8ed650ae73

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1. Introduction

The unfolding coronavirus disease 2019 (COVID-19) pandemic poses an unprecedented global health, social and economic crisis. Since the first case was diagnosed in Wuhan, China, in the late of 2019 (Chen et al., 2020), the epidemic outbreak has swept across China provinces and affected many other regions across the globe. Over several months, many Western European countries have become the epicentre of the pandemic. In France, where the present investigation was conducted, the first case was officially confirmed on January 24, 2020. The government announced public health emergency responses, including the national confinement on March 17 and the progressive lifting of the lockdown on May 11, 2020, with the extension of the "state of health emergency" until July 10, 2020.

The consequences of the disease are not limited to the harmful disturbances in immune, nervous and endocrine systems in patients (Jasti et al., 2020; Raony et al., 2020). Empirical knowledge has consistently revealed that the COVID-19 pandemic outbreak – unlike the SARS and Ebola epidemic outbreaks – , along with its related preventive public health measures (such as prolonged home quarantine and social distancing), have consequences for mental health and psychosocial well-being for individuals in both the short and long term (Brooks et al., 2020; Cénat et al., 2020; Cénat et al., 2021; Rogers et al., 2020). Indeed, the first longitudinal study conducted by Wang et al. (2020) in China has shown that although the escalation of the epidemic outbreak may relapse, the mental health problems may persist over several weeks and months. Wang et al. (2020) reported high levels of stress, anxiety, depression and posttraumatic stress symptoms (PTSS), with no clinically significant

declines over a 4 week period during and after the peak of the outbreak. In another longitudinal study in Spain, Ozamiz-Etxebarria et al. (2020) found that as the time spent in lockdown progressed, the levels of psychological symptoms, including stress, anxiety and depression, rose. The contrast in findings of both studies may have resulted from the very short time lag between the two-wave assessments. None of the studies assessed the mental health outcomes during and post-confinement. Furthermore, the longitudinal predictors of poor mental health outcomes are unknown.

There is evidence from trauma meta-analytic research that peritraumatic distress is one of the most powerful predictors of PTSD symptoms (Thomas et al., 2012; Vance et al., 2018). Peritraumatic distress, as conceptualized by Brunet et al. (2001), encompasses "emotional, cognitive, and physical reactions occuring during a critical incident and immediately after". This construct is measured by the Peritraumatic Distress Inventory (PDI; Brunet et al. 2001). The review by Vance et al. (2018) found that in 23 of 24 studies, both cross-sectionally and prospectively, peritraumatic distress was associated with at least one of psychiatric outcomes other than PTSD, including acute stress disorder, anxiety, depression, sleep disturbances, traumatic grief, disordered eating, pain catastrophizing, and psychological distress. In their review, Thomas et al. (2012) argued that unlike posttraumatic stress disorder (PTSD), peritraumatic distress is not a trait, but rather a state condition which is expected to diminish over time. With respect to time-point for assessments, either within the first months or in the later months following the traumatic events, the conclusion of their review suggests that both conditions tend to decline as time elapses. Thus, it can be expected, as time progressed since the potential traumatic event occurred, that peritraumatic distress will decrease.

Based on the premise of the PDI, Qiu et al. (2020) developed and used in a large Chinese sample the COVID-19 Peritraumatic Distress Index (CPDI) to assess different aspects related to the impact of the COVID-19 outbreak, including negative mood, cognition

and behavior change, somatization, and hyper arousal and irritability. In Chinese (Qiu et al., 2020) and Italian (Costantini and Mazzotti, 2020) samples, nearly a third of participants experienced symptoms of mild/moderate and severe peritraumatic distress whereas, in Iranian (Jahanshahi et al., 2020) and Brazilian (Zhang et al., 2020) samples, this prevalence reached more than 60% of the people. Female gender was consistently reported as a risk factor for peritraumatic distress severity (Costantini and Mazzotti, 2020; Jahanshahi et al., 2020; Liu and Heinz, 2020; Qiu et al., 2020; Zhang et al., 2020). Three of these studies found that young people aged between 18 and 30 (Costantini and Mazzotti, 2020; Qiu et al., 2020; Zhang et al., 2020) were likely to report greater peritraumatic distress severity. However, Jahanshahi et al.'s (2020) study did not support the influence of age in peritraumatic distress. Individuals highly educated (Qiu et al., 2020; Zhang et al., 2020) or unemployed (Jahanshahi et al., 2020) were also at risk. Jahanshahi et al. (2020) also found that participants with more children had less peritraumatic distress while Zhang et al. (2020) did not confirm this. Costantini and Mazzotti (2020) identified being worried about death due to a contagion by the virus as a severe risk factor. Besides gender and age which were consistent risk factors, other factors were mixed and heterogeneously examined. Furthermore, due to the cross-sectional data used, it was not possible to document the temporal changes in predictors of peritraumatic distress. Also, as at the time of the present study, there has been no study addressing the (temporal) predictive value of peritraumatic distress in psychopathology related to the COVID-19 pandemic.

This work was designed as a prospective investigation aiming to examine 1) the prevalence of and temporal changes in the peritraumatic distress linked to the COVID-19 pandemic and lockdown, 2) its early and follow-up predictors and the extent to which it was predictive of mental health problems. The study was conducted in France a week following the declaration of the national confinement and repeated 3-4 months later (one to two months

after the end of the confinement was announced). Thus, the two-wave longitudinal design of the current study allowed the examination of the following hypotheses:

Hypothesis 1: The peritraumatic distress levels would decrease between the two-wave assessment periods (baseline and follow-up).

Hypothesis 2: High peritraumatic distress levels at the early stage of the lockdown would strongly predict posttraumatic stress, depression and anxiety symptoms three to months.

2. Material and methods

2.1. Study design and procedures

The data collection consisted of a two-wave, online longitudinal survey conducted with a time lag of 3-4 months. Of note, the national lockdown in France spanned from March 17 to May 11, 2020. The baseline survey was conducted during a two-week period (25 March to 7 April, 2020). Participants were recruited using purposive and non-probability snowball sampling techniques. They all voluntarily completed online questionnaires via links posted on social media networks (Facebook, Twitter, LinkedIn). In order to match participants' data over the course of both waves of the study, participants were instructed to enter a personal pseudonym and their e-mail addresses. Age 18 and above was considered as eligible criterion for participation in the study. A total of 1125 participants completed the baseline survey, of whom 2 were excluded due to straight line responses to close-ended measures. Three months later, from mid-June, 525 baseline participants who provided their e-mail addresses were sent the follow-up survey questionnaires. The follow-up survey lasted 3 weeks (18 June to 10 July, 2020) and participants were sent one reminder mail. The follow-up survey respondents were 232 (response rate = 44.2%). The inclusion process at baseline and follow-up surveys is clarified in the Figure 1.

The research protocol obtained a favorable opinion from the XXX ethics committee, Amiens, France, and in accordance with the provisions of the Declaration of Helsinki, participants were informed about the purpose of the study and gave electronic informed consent as a requirement for participation. They were informed that they could terminate participation at any time during the longitudinal survey.

---------- Insert Figure 1 ----------

2.2. Assessment measures

2.2.1. Sociodemographics and health status

In the baseline survey, participants were required to provide information on sociodemographics including age, sex, educational qualification, professional status, marital status as well as the number of children they have, and the residence area. Data on preexisting mental and physical health conditions were also gathered.

2.2.2. The COVID-19 Peritraumatic Distress Index (CPDI)

At the two time assessments, participants completed the CPDI, a 24-item self-report questionnaire assessing different aspects related to the impact of the pandemic outbreak (Qiu et al., 2020). The response format is a five-point Likert scale that ranges from 0 to 4 (0= never, 1= occasionally, 2 = sometimes, 3 = often, and 4 = most of the time). The total score of CPDI ranges between 0 and 96 and scores between 28 and 51, and scores ≥ 52 indicate mild to moderate and severe distress, respectively. In the present study, the CPDI displayed good internal reliability. The Cronbach's alpha was 0.87 and 0.89 in the baseline and follow-up samples, respectively, and the stability effect of the measure yielded a large effect size (r = 0.56, $p < 0.0001$). The full psychometric validation of the French version of the CPDI is out the goals of this study.

2.2.3. COVID-19-related worry scale

This was a single item scale, ranging from 1 (not at all) to 5 (extremely), asking the participants to report the levels of their worries about the COVID-19 crisis.

2.2.4. The Impact of Event Scale-Revised (IES-R)

In the follow-up survey, participants completed the IES-R (Weiss and Marmar, 1997), which is a validated 22-item self-report measure that assesses psychological distress caused by a traumatic life event in terms of three symptomatic reactions. It assesses three factors including avoidance, intrusion, and hyperarousal. Participants were asked to rate the level of distress for each item during the previous seven days of their interview. Participants were asked to rate on a 5-point Likert scale the extent to which each item applies to their experiences during the preceding 7 days. Total score on the IES-R ranges between 0 and 88. In the present study, the IES-R showed excellent internal consistency reliability ($\alpha = 0.94$).

2.2.5. The Generalized Anxiety Disorder Scale (GAD-7)

Follow-up participants also completed the GAD-7(Spitzer et al., 2006), which was used to measure worries and anxiety symptoms. Each item of GAD-7 is rated on a 4-point Likert scale (0 = not at all to 3 = almost every day) and measures the presence of the symptoms over the past two weeks. The total score of GAD-7 ranged from 0 to 21, with increasing scores indicating more severe functional impairments as a result of anxiety. In the present sample, the internal consistency reliability of the GAD-7 was 0.91.

2.2.6. The Patient Health Questionnaire (PHQ-9)

In addition, follow-up participants also completed the PHQ-9(Kroenke and Spitzer, 2002), which was used to assess symptoms corresponding to the DSM-IV diagnostic criteria for major depressive disorder (MDD). It should be noted that depression's diagnostic criteria are unchanged from DSM-IV to DSM-V (American Psychiatric Association, 2013). Unlike

the GAD-7, each item in PHQ-9 is rated on a 4-point Likert scale (0 = not at all to 3 = almost every day) and measures the presence of the symptoms over the past two weeks. Possible scores range from 0 to 27, with higher scores indicative of higher levels of depression symptoms. In this sample, the PHQ-9 displayed very good internal consistency reliability (α = 0.88).

2.3. Data analysis

In preliminary analyses, descriptive statistics served to summarize the data. There were no missing data as responses were mandatory. To examine whether the data were normally distributed, the skewness and kurtosis tests were performed and values within the range of −2.0 to +2.0 were considered as acceptable (Field, 2009; Frederick and Wallnau, 2011). Then, Pearson correlation analysis was carried out to examine the relationships between the main baseline 1 and follow-up numerical measures (CPDI, IES-R, GAD-7, and PHQ-9). In response to our first hypothesis, we determined the prevalence rates of COVID-19 peritraumatic distress using the cut-off score of 28 and above as determining clinical cases of COVID-19 peritraumatic distress (Qiu et al., 2020); this includes mild to moderate and severe distress. The rates were determined in both baseline and follow-up samples and were then compared using chi-square tests (χ^2). The 95% confidence interval (95% CI) was provided. Following this step, a series of univariate and multivariate regression analyses were performed to examine psychosocial factors predicting COVID-19 peritraumatic distress cases. Odds ratio (OR), adjusted odds ratio (aOR), and 95% CI were obtained from logistic regression models. In subsequent steps, we conducted a series of path analysis, as a set of multiple regression analyses, to examine the causal relationships between T1 CPDI scores and T2 CPDI, IES-R, GAD-7, and PHQ-9 scores, respectively, without and after controlling for psychosocial factors. Data were analyzed using R-program packages (R Team, 2016) and p-values of less than 0.05 were considered statistically significant (2-sided tests).

3. Results

3.1. Participants' characteristics

Participants in the baseline survey (N=1123) were on average 33.82 years of age (SD= 17.24, range: 18-80); females were 79.5% and males 20.5%. For reason of comparison with previous studies (Costantini and Mazzotti, 2020; Qui et al., 2020), 6 age groups, of whose participants aged from 21-30 represented the highest group (42.3%). Participants were highly educated with 85.8% having attained university level education. Among the sample, 47.6% were employed, 43% were students and 9.4% were unemployed or retired. Given to the marital status, 37.5% were single and 58% were married or in couple. Regarding number of children, 64.5% had no child and 35.5% had one child or more. Sixty percent lived in an urban setting (town with more than 10,000 inhabitants).

As noted, we then matched participants in the follow-up survey (N=232) on all above selected sociodemographics using their pseudonyms and e-mail addresses. As shown in Table 1, the profiles of attrition and non-attrition groups did not differ in terms of age, gender proportion, education, professional status, marital status, and residence area (all ps > 0.48). Both groups reported similar total scores on CPDI at Time 1 (M_{diff} = 0.38, p = 0.68). Thus, together these results suggest limited selection bias in our samples. Full descriptions of the sociodemographic variables in baseline and follow-up surveys are provided in Table 1.

---------- Insert Table 1 ----------

3.2. Preliminary analyses

Table 2 reports mean, standard deviation (SD), skewness, kurtosis and inter-correlations between primary T1 and T2 measures. All univariate skewness and kurtosis values were within the acceptable range (Field, 2009; Frederick and Wallnau, 2011), except for IES-R scores with a kurtosis value of 2.18. Subsequently, a full maximum likelihood

estimation, which is the most commonly used estimation technique for multivariate normal data (Beauducel and Yorck Herzberg, 2009; Byrne and van de Vijver, 2017), was used in regression and path analyses. As shown, CPDI scores at both time surveys were significantly intercorrelated with a large effect size ($r = 0.56$, $p < 0.0001$).

---------- Insert Table 2 ----------

3.3. Prevalence and severity of COVID-19 peritraumatic distress

In the baseline assessment, the mean score of CPDI was 24.01 (SD = 12.76, range: 0–73, N= 1123) and 17.16 (SD=12.05, range: 0–63, $n = 232$) in the follow-up assessment, thus showing statistically significant decrease between the two time points (M_{diff}= -6.850, $p < 0.0001$). With respect to the cut-off values used in previous studies (Costantini and Mazzotti, 2020; Jahanshahi et al., 2020; Liu and Heinz, 2020; Qiu et al., 2020; Zhang et al., 2020), 35.5% (95% CI: 32.7-38.4) baseline participants as against 17.2% (95% CI: 12.6-22.7) follow-up participants developed clinical cases of CPD, leading to statistically and clinically significant declines in CPD severity as time elapsed ($\chi^2 = 29.39$, $p < 0.0001$). This pattern of findings confirmed our hypothesis 1 stipulating that the peritraumatic distress levels significantly decreased between the two-wave assessment periods.

3.4. Predictors of baseline COVID-19 peritraumatic distress severity

In the univariate and multivariate logistic model, as shown in Table 3, baseline COVID-19 peritraumatic distress cases are predicted by being females, students, having pre-existing mental health problems, greater levels of worries about the COVID-19 crisis. We found no evidence that the COVID-19 peritraumatic distress cases were associated with age, education, marital status, number of children or residence area.

---------- Insert Table 3 ----------

3.4. Longitudinal predictive value of COVID-19 peritraumatic distress in mental health conditions

Figure 2 summarizes a series of regression models of all the prospective paths from baseline CPDI score to follow-up mental health indicators. In compliance with our hypothesis 2, baseline CPDI score uniquely predicted follow-up CPDI, IES-R, GAD-7 and PHQ-9 scores. The baseline CPDI score explained 31.6% of the variance of follow-up CPDI score, and when accounting for control variables the variance of the model reached up to 35.1% with professional status which showed significant predictive value. The T1 CPDI score explained between 14 and 20% of the variances of other follow-up mental health indicators: especially 19.6% for PTSS as measured by IES-R, 16.6% for anxiety, and 14.4% for depression. The control variables (sociodemographics, pre-existing health status, and worry about COVID-19 crisis) added respectively 6%, 12.3%, and 9.7% to the variance explained by the three models, with professional status and worries about the COVID-19 crisis predicting PTSS; marital status and pre-existing mental health problems predicting anxiety; and similarly, marital status and pre-existing mental health problems predicting depression.

In the subsequent regression analyses, we examined the effect of the follow-up CPDI levels of the three current mental health indicators, after controlling for baseline CPDI levels and other control variables. The results are presented in Table 4 and showed that the follow-up CPDI levels predicted the three investigated mental health outcomes in very high proportions: 45.6% for PTSS, 43.1% for anxiety, and 42.9% for depression symptoms. Similar pattern of significant covariates was found as previously, adding less than 10% of variances to each model.

---------- Insert Figure 2 ----------

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4. Discussion

4.1. Summary of key findings

The current prospective longitudinal study expanded on the general assumption that the intensity of the immediate physiological, emotional and cognitive reactions to the Coronavirus pandemic, conceptualized as COVID-19 peritraumatic distress (Qiu et al., 2020), contributed to the course of poor mental health conditions related to the pandemic. With regards to our first hypothesis, it was found that 35.5% (95% CI: 32.7-38.4) of the French population in our sample reported significant clinical Covid-19 peritraumatic distress in the early stage of the pandemic as evidenced by the baseline assessment of this study. However, as the peak of the pandemic decreased and after the strict national lockdown was lifted, 17.2% (95%CI: 12.6-22.7) developed clinical cases of COVID-19 peritraumatic distress. In the early stage of the pandemic in France, females, students, individuals with pre-existing health vulnerabilities, and those overwhelmed by worries about the COVID-19 crisis were the at-risk population for COVID-19 peritraumatic distress severity. Importantly, the baseline CPDI score contributed to 31.6% of the variance of follow-up CPDI scores. Among the significant baseline risk factors, only professional status emerged as predictive of the persistence of COVID-19 peritraumatic distress. In the same line, and in regards to our second hypothesis, we found that the baseline COVID-19 peritraumatic distress levels predicted the follow-up mental health conditions including posttraumatic stress, depression and anxiety and explained roughly 14% to 20% of the variances: specifically 19.6% for posttraumatic stress symptoms, 16.6% for anxiety, and 14.4% for depression. Furthermore, professional status and worries about the COVID-19 crisis predicted PTSS, and marital status and pre-existing mental health problems predicted anxiety and depression, respectively. These findings all together confirmed our hypotheses and opened notable avenues for theoretical and clinical perspectives.

4.2. Significance and comparison of findings with the literature

In our baseline sample, the prevalence of the COVID-19 peritraumatic distress is closely comparable to the 33-35% established among Chinese (Qiu et al., 2020) and Italian (Costantini and Mazzotti, 2020) populations. However, it is nearly two times lower than those reported in Iranian (Jahanshahi et al., 2020) and Brazilian (Zhang et al., 2020) populations. In agreement with previous studies, we found that females were severely at risk at the early stage of the pandemic outbreak (Costantini and Mazzotti, 2020; Jahanshahi et al., 2020; Liu and Heinz, 2020; Qiu et al., 2020; Zhang et al., 2020). We also found that students and individuals with pre-existing mental health problems, and those overwhelmed by worries about the Covid-19 crisis were more likely to experience clinical cases of COVID-19 peritraumatic distress. However, and very importantly, we observed that as the peak of the pandemic dropped, and after the strict national lockdown was lifted by May 11, 2020, there were significant decrements in COVID-19 peritraumatic distress and temporal changes in the baseline predictors. These findings are indicative of the highly traumatic impact of the pandemic outbreak in its early stage, as many countries were unprepared to fight the pandemic situation. However, as time elapsed, the access to trustworthy information about the COVID-19, the effective prevention and control measures, the strengthening of medical support and Public Health Service systems implemented by the French Government through trials and errors, might have contributed in reassuring people and alleviating the sudden fear and panic caused by the emergence of the pandemic. This series of measures might partially account for the significant decrement in the prevalence of COVID-19 peritraumatic distress.

The study findings consistently showed that the acute peritraumatic distress subsequent to the COVID-19 pandemic situation is a strong predictor in the development of poor mental health conditions 3 to 4 months later. Thus, they consolidate the longitudinal predictive value of peritraumatic distress in subsequent psychopathology, as established by previous meta-analytic studies in the field of trauma (Thomas et al., 2012; Vance et al., 2018).

Not surprisingly, we found evidence that the baseline peritraumatic distress severity following the large onslaught of the pandemic outbreak in France that led to the implementation of the national quarantine, predicted the follow-up peritraumatic distress sequalae although, as earlier mentioned, there was a significant decline by up to half of the clinical cases. Furthermore, even after accounting for the effect of the baseline peritraumatic distress, the follow-up peritraumatic distress levels predicted the current PTS, depression and anxiety symptoms. These findings highlight the clinical attention that should be paid to the acute and persistent peritraumatic reactivity in individuals as response to the COVID-19 pandemic situation. Prior research showed that the recalled peritraumatic reactions not only predict subsequent development of PTSD but were associated with poor response to treatment (Bovin & Marx, 2011; Lima et al., 2010). However, with regards to the proportion of the variance the CPD explained for each psychopathology, there may be other factors intervening in the pathogenesis of the current psychopathology.

Another key contribution of this study was the temporal changes in psychosocial factors of COVID-19 peritraumatic distress and the current psychosocial factors of PTSS, depression and anxiety. Whereas the peritraumatic distress was persistent among students, the PTSS among this group and individuals developing worries about the COVID-19 crisis, depression and anxiety severity were prevalent among single individuals and those with previous diagnoses of mental health problems. These findings are consistent with those found in recent meta-analyses on COVID-19 mental health data, establishing that adverse psychiatric outcomes were high among university students (Xiong et al., 2020) and individuals with pre-existing psychopathology (Luo et al., 2020; Vindegaard and Benros, 2020). Furthermore, one reason why depression and anxiety may have been more prevalent among single individuals is due to the fact that the nationwide lockdown and social distancing

measures put in place may further have intensified their loneliness as they most likely stayed without partners during these stressful periods.

4.3. Strengths and limitations

Due to the emergencies arising from the COVID-19 pandemic, the amount of timely data in the literature relied on cross-sectional design. The strength of the present study consisted of its prospective longitudinal design which allowed to establish causal pathways between COVID-19 peritraumatic reactions and mental health conditions. We conducted the baseline assessment within two weeks immediately after the official announcement of the nationwide lockdown. This time frame used corresponded to the methodological requirements of the assessment of peritraumatic reactions in immediate aftermath of critical incidents (Brunet et al., 2001; Thomas et al., 2012). Moreover, using the time lag of 3-4 months between the two wave assessments, where prior longitudinal studies were restricted to 4 weeks (Ozamiz-Etxebarria et al., 2020; Wang et al., 2020), this study offered the opportunity to track temporal changes in peritraumatic reactions in individuals and associated risk factors during and after the strict nationwide lockdown. Nevertheless, we invite to interpret findings cautiously. Although there were non-significant differences in any characteristics between baseline participants and follow-up participants, the retention rate was relatively important and could entail selection bias which were unable to control. Another limitation that should be considered, is related to the fact that measurements for PTSS, anxiety, and, depression, considered at the follow-up period were not included in the baseline assessments. This may result in a biased estimation of the odds of baseline CPDI scores in predicting the current mental health status. Also, it should be noted that, despite the fact that the study relied on a large sample allowing statistical power, it is not representative of the French populations due to the non-probability sample design we used. Future studies using randomized sampling methods should enable to confirm or amend the present study findings. Another limitation of

the study lies in the use of self-reporting data on mental health measures, which may introduce subjective responses to items as well as social desirability. However, unlike other recent epidemics, the COVID-19 pandemic situation challenging social research, makes online self-reporting a common administration technique used to collect data.

4.4. Implications for research, practice and public health

Notwithstanding the above mentioned limitations, the study findings have significant implications for research, practice, and public health messaging. Our findings emphasized the role of acute and persistent COVID-19 peritraumatic distress in the pathogenesis of posttraumatic stress symptomatology and comorbidities. Given the high proportions of variance it explained in their occurrence, assessing COVID-19 peritraumatic distress may have predictive usefulness in identifying higher-risk profiles. Thus these findings should be considered if designing early interventions aimed at reducing the risks of trauma-related psychopathology in the pandemic context. However, in using the CPDI as an adequate screening tool, it is recommended that future research investigates its diagnostic performance in terms of sensitivity and specificity. In addition, future studies can help in better understanding the cognitive and psychobiological mechanisms through which the persistence of COVID-19 peritraumatic distress operates in determining trauma-related psychopathology and comorbidities. Our study findings have also drawn our attention on the temporal changes in risk factors of psychological distress related to the pandemic outbreak; future studies will put forward current knowledge by considering cumulative risks in addition to pre-existing vulnerabilities as long as the health, social and economic consequences of the pandemic linger on. Thus, it can be expected that populations are being exposed to multiple co-occurring risk factors that increase the likelihood of mental health problems. Efforts to mitigate these risks, for example by reducing health care inequalities, should continue; however, efforts should be also accentuated on resilience skills and resources; the clinically significant declines in CPDI

severity as time elapsed lay support for this perspective. At a socio-ecological level, the access to timely and more high-quality information about the effective prevention and control measures, the rapid availability of diagnostic tests and face masks, and the reinforcement of medical support and resources are ingredients to reinforce resilience skills and feelings of controllability of the pandemic situation and to foster adaptation to the harsh conditions it causes. At both family and individual levels, encouraging emotional and material support and family cohesion, using of distraction strategies and self-care methods (e.g., home-based relaxation techniques) may strengthen resilience and promote optimal coping styles (Chen and Bonanno, 2020).

5. Conclusion

In conclusion, our study hypotheses were supported by the present results based on a two-wave, prospective longitudinal data. The high prevalence rates of COVID-19 peritraumatic distress in the baseline sample, similar to those reported in Chinese- and Italian-based samples, are indicative of the severe impact of the pandemic outbreak in France. Although these rates clinically declined by half in our follow-up sample after the progressive end of the strict nationwide lockdown, the persistent COVID-19 peritraumatic distress robustly predicted poor mental health outcomes. Further findings revealed temporal changes in baseline predictors, thus reflecting the dynamic, non-linear, and multi-level factors of COVID-19 peritraumatic distress. The insights gleaned from the current longitudinal study will advance clinical efforts in terms of assessment, clinical intervention and public health messaging which should be allocated to the predictive role of acute and chronic COVID-19 peritraumatic distress in the subsequent development of PTS symptoms and comorbidities as long as the pandemic and its consequences linger on.

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Table 1. Characteristics of baseline and follow-up samples

	Baseline sample (T1, N=1123)		Follow-up sample (T2, n= 232)	
	n	%	n	%
Age, M(SD)	33.8 (17.2)		34.4 (15.8)	
18-20	196	17.5	34	14.7
21-30	475	42.3	97	41.8
31-40	131	11.7	24	10.3
41-50	122	10.9	26	11.2
51-60	134	11.9	32	13.8
61 et plus	65	5.8	19	8.2
Gender				
Male	230	20.5	51	22.0
Female	893	79.5	181	78.0
Marital status				
Single	421	37.5	88	37.9
In relationship	327	29.1	63	27.2
Married	325	28.9	70	30.2
Separated/divorced/widowed	48	4.3	11	4.7
Education qualification				
College	143	12.7	26	11.2
High school	203	18.1	38	16.4
Undergraduate	324	28.9	61	26.3
Postgraduate	402	35.8	94	40.5
Doctorate	51	4.5	13	5.6
Professional status				
Employed	535	47.6	106	45.7
Students	483	43.0	103	44.4
Unemployed/retired	105	9.3	23	9.9
Number of children				
0	726	64.6	149	64.2
1 and more	397	35.4	83	35.8
Residence area				
Urban area	849	75.6	88	37.9
Rural area	274	24.3	63	27.2
Pre-existing mental health problems				
Yes	256	22.8	57	24.6
No	867	77.2	175	75.4
Pre-existing physical health problems				
Yes	201	17.9	43	18.5
No	922	82.1	189	81.5

Table 2. Mean, normal distribution tests, and zero-order correlation between the main study variables

	Mean	SD	Skewness	Kurtosis	T1 CPDI	T2 CPDI	T2 IES-R	T2 PHQ-9	T2 GAD-7
T1 CPDI	24.01	12.76	0.78	0.49	1.00				
T2 CPDI	17.16	12.05	1.00	0.79	0.56***	1.00			
T2 IES-R	14.11	15.46	1.53	2.18	0.44***	0.68***	1.00		
T2 PHQ-9	5.62	5.22	1.11	0.87	0.38***	0.66***	0.62***	1.00	
T2 GAD-7	4.89	4.78	1.13	0.85	0.41***	0.66***	0.66***	0.78***	1.00

Note1: T1= Time 1 (baseline); T2 = Time 2 (follow-up); CPDI = Covid-19 peritraumatic distress index; IES-R = Impact of Event Scale-Revised (posttraumatic stress symptoms); GAD-7 = Generalized Anxiety Disorder Scale (anxiety); PHQ-9 = Patient Health Questionnaire (depression).

Note 2: ***: $p < .001$

Table 3. Univariate and multivariate analyses of variables predicting baseline clinical CPD cases

	Univariate (unadjusted odds ratio)		Multivariate (adjusted odds ratio)	
	OR	95%CI	aOR	95%CI
Age-groups				
18-20	1.28	[0.72, 2.27]	0.91	[0.35, 2.38]
21-30	0.84	[0.49, 1.44]	0.59	[0.24, 1.42]
31-40	0.76	[0.41, 1.40]	0.65	[0.30, 1.43]
41-50	0.67	[0.36, 1.26]	0.40	[0.18, 0.89]
51-60	0.81	[0.44, 1.50]	0.49	[0.23, 1.05]
61 et plus	ref	ref	ref	ref
Gender				
Male	ref	-	ref	-
Female	3.09***	[2.15, 4.44]	2.17***	[1.43, 3.28]
Marital status				
Single	1.06	[0.56, 2.00]	1.01	[0.57, 1.79]
In relationship	1.25	[0.66, 2.38]	1.47	[0.94, 2.29]
Married	1.02	[0.54, 1.95]	0.97	[0.51, 1.85]
Separated/divorced/widowed	Ref	-	ref	-
Education qualification				
College	1.41	[0.71, 2.78]	1.35	[0.59, 3.09]
High school	1.78	[0.93, 3.42]	1.59	[0.72, 3.53]
Undergraduate	1.34	[0.71, 2.52]	1.09	[0.50, 2.40]
Postgraduate	0.86	[0.46, 1.61]	0.90	[0.42, 1.92]
Doctorate	Ref	-	ref	-
Professional status				
Employed	1.29	[0.84, 2.01]	1.01	[0.57, 1.79
Students	1.59**	[1.22, 2.05]	1.47	[0.94, 2.29
Unemployed/retired	ref	-	ref	-
Number of children				
0	ref.	-	ref	-
1 and more	0.84	[0.65, 1.09]	1.22	[0.67, 2.21]
Residence area				
Urban area	1.15	[0.86, 1.53]	1.26	[0.89, 1.77]
Rural area	ref.	-	ref.	-
Pre-existing mental health problems				
Yes	3.51***	[2.63, 4.70]	3.23***	[2.31, 4.50]
No	ref.	-	ref.	-
Pre-existing physical health problems				
Yes	1.42*	[1.04, 1.94]	1.08	[0.74, 1.57]
No	ref.	-	ref.	-
Worry related to Covid-19 crisis	2.79***	[2.37, 3,27]	2.76***	[2.33, 3.27]
			Nagelkerke R^2 = 0.335	

Note. *: p < .05; **: p < .01; ***: p < .001; ref: reference.

Table 4. Summary of hierarchical linear regression models of baseline variables and T2 CDPI predicting T2 posttraumatic stress, anxiety, and depression symptoms

	T2 IES-R scores				T2 GAD-7 scores				T2 PHQ-9 scores			
	b	SE	*ß*	p-value	*b*	SE	*ß*	p-value	*b*	SE	*ß*	p-value
T2 CDPI	0.78	0.07	0.61	0.001***	0.23	0.02	0.59	0.001***	0.26	0.03	0.61	0.001***
T1 CDPI	0.04	0.08	0.03	0.63	-0.01	0.02	-0.03	0.59	-0.01	0.03	-0.03	0.69
Age	-0.01	0.08	-0.01	0.95	-0.02	0.02	-0.08	0.32	-0.01	0.03	-0.03	0.74
Gender	1.63	1.86	0.04	0.38	-0.27	0.57	-0.02	0.64	0.31	0.64	0.03	0.63
Education	1.29	0.71	0.09	0.07	0.13	0.22	0.03	0.54	-0.09	0.25	-0.02	0.70
Occupation	-2.24	1.27	-0.10	0.08	-0.27	0.39	-0.04	0.49	-0.35	0.44	-0.04	0.42
Residence area	2.49	1.75	0.07	0.16	-0.59	0.53	-0.05	0.27	-0.09	0.60	-0.01	0.88
Marital status	-1.28	1.08	-0.08	0.24	-0.73	0.33	-0.14	0.03*	-1.05	0.37	-0.19	0.01**
Number of children	2.55	2.69	0.08	0.34	0.80	0.82	0.08	0.33	0.77	0.93	0.07	0.41
Pre-existing mental health problems	1.47	0.97	0.07	0.13	1.44	0.29	0.24	0.01**	0.78	0.33	0.12	0.02*
Pre-existing physical health problems	1.43	1.94	0.04	0.46	-0.50	0.59	-0.04	0.40	0.75	0.67	0.06	0.26
Worry related to Covid-19 crisis	2.17	0.89	0.14	0.001***	0.44	0.27	0.09	0.10	0.27	0.31	0.05	0.38
	R^2 = 49.8%, p < 0.0001				R^2 = 51.5%, p < 0.0001				R^2 = 47.8%, p < 0.0001			

T1= Time 1; T2 = Time 2; CPDI = Covid-19 peritraumatic distress index; IES-R = Impact of Event Scale-Revised (posttraumatic stress symptoms); GAD-7 = Generalized Anxiety Disorder Scale (anxiety); PHQ-9 = Patient Health Questionnaire (depression). *: p < .05; **: p < .01; ***: p < .001.

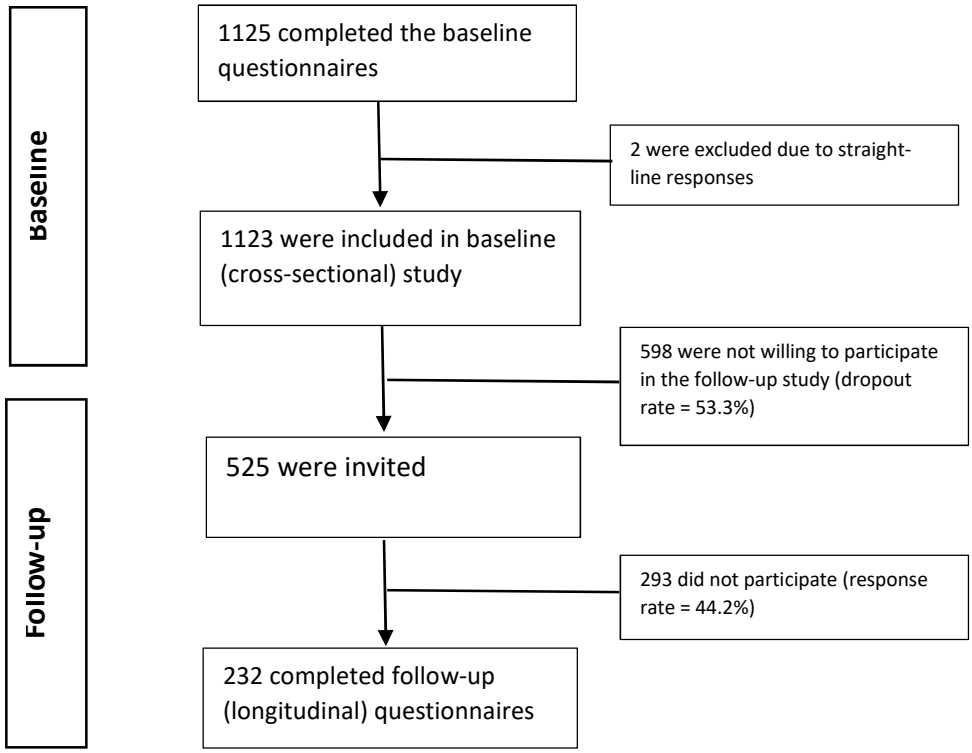

Figure 1. Flowchart of participants in baseline and follow-up study samples

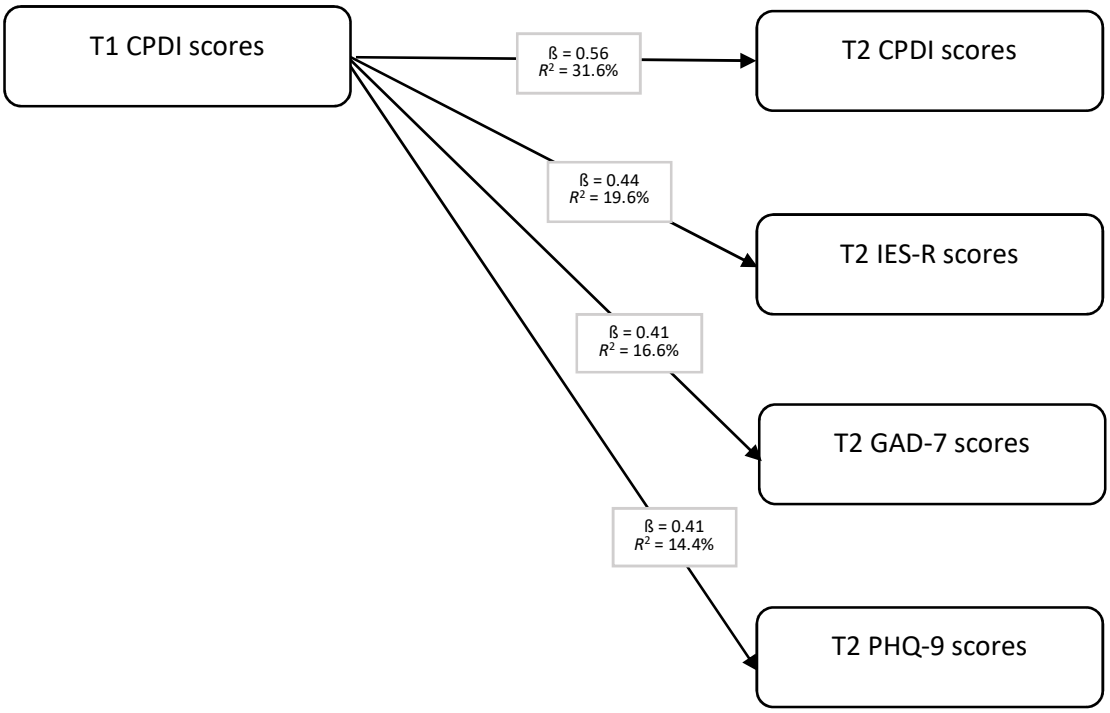

Figure 2. Path model with standardized coefficients (without control variables) from T1 CPDI to T2 mental health measures. T1 = Time 1 (baseline); T2 = Time 2 (follow-up); CPDI = Covid-19 peritraumatic distress index; IES-R = Impact of Event Scale-Revised (posttraumatic stress symptoms); GAD-7 = Generalized Anxiety Disorder Scale (anxiety); PHQ-9 = Patient Health Questionnaire (depression). All standardized coefficients were significant at $p < 0.0001$ level.