



Evaluation of peritraumatic distress at the point of care: A cross-sectional study

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ARTICLE INFO

Keywords:

CPDI
Peritraumatic distress
COVID-19
Mental health
Pandemic

ABSTRACT

Background: COVID-19 related peritraumatic distress has been investigated in the general population with contrasting results probably due to the perceived risk of developing COVID-19. Our study aims to investigate this condition in individuals with ascertained or probable SARS-CoV-2 exposure.

Methods: The Coronavirus Peritraumatic Distress Index (CPDI) was administered to people attending a COVID-19 point of care. The sample was stratified for perceived risk in SARS-CoV-2 positive cases, close contacts, case relatives, undergoing screening subjects, and symptomatic subjects.

Results: 1463 subjects participated, and with a mean CPDI Score of 28.2 (SD 16.9). CPDI Scores in SARS-CoV-2 positive cases were significantly higher than case relatives ($p = 0.02$). Multiple logistic regression revealed that having had work changes ($p = 0.001$), night sleep changes ($p < 0.001$), physical activity reduction ($p = 0.002$), alcohol consumption changes ($p = 0.003$), and at least one relative lost to COVID-19 ($p < 0.001$) independently predicted higher CPDI Scores. Male sex ($p < 0.001$), age ≥ 35 years ($p < 0.001$), higher educational level ($p = 0.002$), night sleep > 7 hours ($p = 0.002$), and being physically active ($p = 0.018$) were identified as protective factors.

Limitations: Cross-sectional design and the regional recruitment area limit the generalizability of results.

Conclusions: Mean CPDI values were above the threshold for medium grade peritraumatic distress, with greater CPDI Scores in subjects who tested positive for SARS-CoV-2, compared to family members or caregivers without a clear indication to undergo the swab. Specific demographics, physical and mental health events could help in identifying individuals at greater risk of COVID-19 related peritraumatic distress that may benefit from early treatment.

1. Introduction

The COVID-19 psychological and psychiatric burden has been investigated by a conspicuous amount of literature during over a year of pandemic. Several studies have highlighted various concerns also from a psychosocial perspective (Jahanshahi et al., 2020; Mazza et al., 2020; Qiu et al., 2020). In particular, during the first phase of the pandemic in the general population, there was an increase in symptoms of anxiety, depression, sleep disorders, and phobic spectrum disorders (Huang

et al., 2020). Moreover, several studies (Abad et al., 2020; Costantini and Mazzotti, 2020; Jahanshahi et al., 2020; Qiu et al., 2020; Shrestha et al., 2020) focused on the construct of “peritraumatic distress” in relation to the ongoing pandemic. This concept refers to a constellation of behaviors, emotions, thoughts, and symptoms (fear of dying, fear of losing control, tachycardia, dissociative symptoms, and increased sweating) that occur during and immediately after the traumatic event (Brunet et al., 2001). Thus, peritraumatic distress is considered an important predictor of post-traumatic stress disorder (PTSD), known for

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greater symptom severity (Bovin and Marx, 2011; Gorman et al., 2016; Vance et al., 2018). Moreover, several authors have warned of a possible increase in pandemic-related PTSD cases (Greenberg and Rafferty, 2021; Marazziti and Stahl, 2020; Stewart and Appelbaum, 2020) and an increase in symptoms attributable to PTSD has been observed during the current pandemic crisis (Cénat et al., 2021; Megalakaki et al., 2021). Furthermore, in a review of 24 studies on this topic, peritraumatic distress was associated with at least one among a wide range of clinical conditions other than PTSD, including acute stress disorder, anxiety, depression, sleep disorders, eating disorders and pathological mourning (Vance et al., 2018). In addition, a recent longitudinal study revealed that high scores of peritraumatic distress are able to predict not only PTSD but also depressive and anxiety disorders (Megalakaki et al., 2021). Previous evidence showed that peritraumatic distress does not have a clear and defined symptom constellation, but rather fades with different clinical conditions (Brunet et al., 2001; Thomas et al., 2012; Vance et al., 2018). Unlike PTSD, peritraumatic distress can be considered a state condition (Thomas et al., 2012). Peritraumatic distress symptoms, therefore, seem to fade in relation to the time elapsed since the traumatic event and to vary according to other factors determining their maintenance, such as avoidance, stressful life factors, and lack of social support. Covid Peritraumatic Distress Index (CPDI) is considered a valid tool to assess peritraumatic distress related to COVID-19 (Costantini and Mazzotti, 2020). Indeed, several studies performed in different countries focused on its validation (Costantini and Mazzotti, 2020; Karadağ and Kokacıya, 2021; Krüger-Malpartida et al., 2020; Nagarajappa et al., 2021). Previous literature showed heterogeneous results regarding sociodemographic features, life habits, and psychological distress related to COVID-19. There is evidence of higher peritraumatic distress in both 18–30 years and over 60 years age groups (Costantini and Mazzotti, 2020; Qiu et al., 2020) compared to other age groups. Conversely, no particular association between age and peritraumatic distress emerged in other studies (Bonati et al., 2021; Megalakaki et al., 2021).

Moreover, the association between psychological distress and populations differentially exposed to SARS-CoV-2 is still uncharted. The COVID-19 pandemic has become a universal experience. Nevertheless, different restrictive levels of public health and social measures (such as quarantine, isolation, and social distancing) due to an ascertained exposure (COVID-19 confirmed cases, close contacts) or probable exposure (relatives of confirmed cases, typically symptomatic individuals) to SARS-CoV-2 are experienced. Differences in psychological distress levels among different groups of people based on different COVID-19 related experiences remain mostly unexplored.

In addition, previous literature focused on the first period of the pandemic (Abad et al., 2020; Bonati et al., 2021; Costantini and Mazzotti, 2020; Jahanshahi et al., 2020; Qiu et al., 2020; Shrestha et al., 2020).

Hence, there is a need to investigate peritraumatic distress, which has already proved to be an important predictor of psychopathological disorders, at a different time of the pandemic. Unlike previous studies (Abad et al., 2020; Bonati et al., 2021; Costantini and Mazzotti, 2020; Megalakaki et al., 2021; Qiu et al., 2020) indiscriminately addressed the general population, it was also crucial to identify a population at greater risk of developing mental health problems.

Thus, this study aimed to estimate the prevalence of peritraumatic distress in a sample at high risk of mental distress consisting of SARS-CoV-2 positive cases (Group 1), close contacts (Group 2), case relatives (Group 3), undergoing screening subjects (Group 4), and symptomatic subjects (Group 5). Moreover, we proposed to study socio-demographic, life habits, and clinical factors as well as psychopathological manifestations associated with distress.

2. Methods

2.1. Participants

Participants were recruited in the COVID-19 Points of care (POCs) in Padua, Veneto, North-East Italy. This population was composed of people with an ascertained exposure (COVID-19 confirmed cases or close contact of a confirmed case) or probable exposure (relatives of suspected or confirmed cases, undergoing screening subjects and typically symptomatic subjects) to SARS-CoV-2. Exclusion criteria were age below 18 years and any mental condition that prevented free consent.

2.2. Study design

The current cross-sectional and observational survey involving the general adult population was conducted in Padua, Italy. Participants were recruited between February 2021 and March 2021, in a period of 8 weeks.

The current study was approved by the local Ethics Committee and undertaken in accordance with the guidelines of the Helsinki Declaration of 1975. All participants gave their written informed consent to participate in the study after they had received a complete explanation of the procedures. All surveyed participants were given an informative brochure and were asked to fill in an anonymous questionnaire. Participants were allowed to end the survey at any time.

2.3. Data collection

The informative brochure provided to all participants contained a QR code and a link to access the questionnaire, which was composed of 32 socio-demographic and life habits items, and a standardized inventory on COVID-19 related peritraumatic distress.

2.4. Socio-demographic, life habits, and clinical items

Socio-demographic factors including age, sex, marital status, family composition, educational level, and current occupation were recorded. An item aimed to differentiate five groups, based on the ascertained or probable exposure to SARS-CoV-2 was also included. In addition, changes in sleep, alcohol consumption, and occupational habits related to the pandemic emergency were collected. For COVID-19 confirmed cases and symptomatic subjects, the main clinical features were gathered.

2.5. Coronavirus peritraumatic distress index (CPDI)

CPDI derives from PDI (Peritraumatic Distress Inventory) that aims to evaluate peritraumatic distress, an important predictor of PTSD (Brunet et al., 2001; Costantini and Mazzotti, 2020). CPDI is a quick tool composed of 24 easily understandable items assessing anxiety, depression, specific phobias, cognitive change, avoidance and compulsive behavior, physical symptoms, and loss of social functioning in the past week, with a completion time of 10 minutes. Items are rated on a 5-point scale ranging from 0 ('not at all') to 4 ('extremely'). The total score ranges from 0 to 100. A score below 28 indicates no distress, between 28 and 51 mild to moderate distress, and above 51 severe distress. The Italian version of CPDI has recently been validated, also in its online version (Costantini and Mazzotti, 2020).

2.6. Sample size

Sample size estimation was performed using Raosoft software (<http://www.raosoft.com/samplesize.html>). The minimum number of subjects required for this study was 644 including 5% error, a confidence level of 99%, a response distribution of 50%, and the reference population width of 4,879,133 inhabitants (data of the Veneto population at

January 2020 provided by the Italian National Institute of Statistics, ISTAT). Given 75% as the percentage of valid answers, we estimated a minimum 830 people to be recruited for this study.

2.7. Statistical analysis

The statistical analysis was carried out using STATA Ver. 14.2 software. For descriptive statistics, data were summarized by frequency, proportions, percentages, contingency tables for binary variables (i.e., sex, hospitalization); mean, median, range, interquartile range (IQR), variance, standard deviation (SD), confidence interval (95%CI) for continuous variables (i.e., age, CPDI Score); median and mode respectively for categorical ordinal (i.e., level of education) and nominal variables (i.e., category of SARS-CoV-2 exposure).

The inferential statistics included the Pearson Chi-squared test for categorical variables and the independent samples *t*-test for continuous variables. The one-way analysis of variance (ANOVA) with multiple comparison tests between means of each group's couple was performed for a continuous variable means comparison among three or more groups. Post hoc analyses were conducted by Bonferroni or Scheffé correction test as indicated. The Bartlett test for the equivalence of variances was used to confirm the homoskedasticity assumption. When not meeting normality assumption, non-parametric tests were performed by means of Kruskal-Wallis non-parametric ANOVA and ANOVA on rank tests. In order to allow greater usability of data, and to continue the inferential analysis, continuous variables were dichotomized with their median split. For the logistic regression analysis, the response variable, CPDI Score, was dichotomized to the cut-off value for mild-to moderate peritraumatic distress. First, through univariate logistic regression, the association between the presence of peritraumatic distress and each socio-demographic, life habits, and the clinical variable was explored. Then, a multivariate logistic regression model including all covariates that had reached a $p < 0.05$ level of statistical significance at the univariate analysis was estimated. Significant predictors were selected by means of the stepwise backward elimination method. In the multivariate analysis, the threshold of significance of $p < 0.05$ was set to identify an association between the outcome variable and

covariates. Odds ratios (OR) were used as a measure of effect size.

3. Results

3.1. Socio-demographic features

A total of 1463 subjects were included in the current study. Most questionnaires were collected from subjects attending the Euganeo Stadium POC (79%, $n = 1162$), while in the rest of the cases 13% ($n = 183$) went to the "Dei Colli" Hospital center POC and 8% ($n = 118$) to other regional POCs within Padua. The mean age was 36.4 years (median 34, SD 14.5, range 3–81). Detailed sociodemographic features as sex, age class, educational level, marital and parental status are summarized in Table 1. Participants were living alone in 9% of cases ($n = 128$), with their partner in 19% ($n = 281$), with their partner and children in 30% ($n = 442$), with their family of origin in 33% ($n = 478$), in other not specified conditions in 9% ($n = 128$) and less than 1% ($n = 6$) of cases did not complete the item.

Most of the sample had a job at the time of questionnaire completion (67%, $n = 976$), otherwise 25% of the participants ($n = 367$) were students, 5% ($n = 79$) unemployed, and 3% ($n = 41$) retired. When specific job categories were indicated, participants reported being health workers in 12% ($n = 170$), professor or teacher in 7% ($n = 104$), serviceman or policeman in 6% ($n = 90$) of cases. Half of the sample (50%, $n = 729$) reported no changes in their working status, 45% ($n = 659$) switched to total or partial smart-work and 5% ($n = 75$) of cases lost their job due to the COVID-19 pandemic.

3.2. Life habits

The main habits explored, night sleep, physical activity and alcohol consumption are presented in Table 1.

Changes in life habits related to the pandemic emergency were registered. Working hours were reported as unmodified in 52% ($n = 758$) of participants, reduced in 20% ($n = 288$), increased in 28% ($n = 417$) of cases. Night sleep was reported as unmodified in 53% of participants ($n = 775$), increased in 18% ($n = 258$), and reduced in 29% ($n = 410$) of cases.

Table 1
Main socio-demographic and life habits features at the time questionnaires completion.

Socio-demographic features ^a	n (number)	% (percentage)	Life habits features ^a	n (number)	% (percentage)
<i>Age Class (years)</i>			<i>Night sleep (hours/night)</i>		
0–30	612	41.8	< 5	88	6.0
31–60	766	52.4	5–7	850	58.1
61–90	85	5.8	> 7	514	35.1
			No answer	11	0.8
<i>Sex</i>			<i>Physical activity (hours/week)</i>		
Male	680	46.5	None	522	35.7
Female	783	53.5	< 3	431	29.5
			3–5	347	23.7
<i>Marital Status</i>			6–10	126	8.6
Married	532	36.4	> 10	32	2.2
Unmarried	508	34.7	No answer	5	0.3
Single	328	22.4			
Separate	39	2.7	<i>Alcohol consumption</i>		
Divorce	47	3.2	Never	557	38.1
Widow/er	9	0.6	Up to 1 unit daily	766	52.4
			Up to 2 units daily	95	6.5
<i>Parental Status</i>			More than 2 units daily	17	1.2
No children	893	61.0	No answer	28	1.9
One child	201	13.7			
Two or more children	369	25.2			
<i>Educational level</i>					
Middle school	220	15.0			
High school	607	41.5			
Short degree	197	13.5			
Master degree	305	20.9			
Postgraduate studies	134	9.2			

^a Numbers may not add up to 1463 because of missing data. Percentages may not add up to 100 because of rounding.

= 430) of cases. More than half of the sample (52%, $n = 766$) reported a lower level of physical activity during the COVID-19 pandemic, whereas it was higher in 16% ($n = 234$) and unchanged in 32% ($n = 463$) of cases. Alcohol consumption was described mostly as unchanged (67%, $n = 980$), reduced in 20% ($n = 297$), and increased in 13% ($n = 186$) of cases.

3.3. SARS-CoV-2 exposure and clinical features

At the time of the questionnaire, an ascertained exposure to SARS-CoV-2 led to a swab test in 36% ($n = 532$) of participants. Among these, 11% ($n = 163$) of participants were COVID-19 confirmed cases (Group 1) and 25% ($n = 369$) were close contacts of a confirmed COVID-19 case (Group 2). Otherwise, a probable exposure to SARS-CoV-2 regarded 64% ($n = 931$) of subjects. Among these, 12% ($n = 176$) were relatives or carers of a suspected or confirmed COVID-19 case (Group 3). A swab test indication by the general practitioner for work/school attendance or other screening motivations occurred in 41% ($n = 593$) of cases (Group 4). COVID-19 typical symptoms onset indicated the swab test in 11% ($n = 162$) of cases (Group 5).

At least one relative hospitalized with a COVID-19 diagnosis was reported in 31% ($n = 454$) of cases and 12% ($n = 181$) of participants had at least one among relatives or friends who died as a result of COVID-19. Of all participants, 39% ($n = 575$) reported a previous SARS-CoV-2 infection. Symptoms were reported in the 13% ($n = 198$) of the sample. Symptoms were described as light (only fever, ageusia/anosmia, headache) in 87% ($n = 173$), intermediate (respiratory or cardiac involvement) in 11% ($n = 22$), severe (hospitalization required) in 2% ($n = 3$) of cases. Most patients (10%, $n = 141$) were treated at home, only 3 patients were hospitalized in an ordinary ward and just one needed intensive care hospitalization. Only 11% ($n = 160$) of participants answered the item about the time of the last positive swab test. Time was in 2% ($n = 26$) within 48 h, in 2% ($n = 30$) within 10 days and in 7% ($n = 104$) of cases over 10 days before questionnaire completion. Only 63% ($n = 987$) of participants answered the item about quarantine or isolation measures: in 26% ($n = 382$) of cases participants were issued one of these measures in the last 10 days, in 6% ($n = 95$) at least one family member was issued to them, and in 30% ($n = 440$) of cases, neither condition occurred.

3.4. CPDI results and COVID-19 related peritraumatic distress prevalence

In our sample, the mean CPDI Score was 28.2 (SD 16.9, range 4–100, IQR 1,4–40 and median 25). The normal probability plot (Fig. 1) and histogram with overlaid kernel density estimate (Fig. 2) showed a right-skewed ($\gamma_1 = 0.9$) and leptokurtic ($\gamma_2 = 3.4$) distribution. The mean CPDI Score among males was 23.5 (SD 15.1, range 4–110, IQR 12–32, and median 19) and among females was 32.3 (SD 17.3, range 5–100, IQR 18–45 and median 30). Mean CPDI Scores among different age classes were 31.9 (SD 17.0, range 5–100, IQR 17–45 and median 30) in 0–30 years age class, 25.9 (SD 16.4, range 4–92, IQR 13–36 and median 21) in 31–60 years age class and 22.9 (SD 15.0, range 4–88, IQR 13–28 and median 18) in 61–90 years age class.

Mean CPDI Score among participants with an ascertained SARS-CoV-2 exposure was 29.3 (SD 16.5, range 4–100, IQR 14–40 and median 27) and among participants with a probable SARS-CoV-2 exposure was 27.6 (SD 17.1, range 4–10, IQR 14–38 and median 23). Mean CPDI Scores among SARS-CoV-2 exposure Groups (Fig. 1s) were 30.5 (SD 17.3, range 4–100, IQR 17–41 and median 27) in Group 1, 28.8 (SD 16.1, range 4–75, IQR 16–40 and median 26) in Group 2, 25.3 (SD 17.0, range 4–90, IQR 12–34 and median 20) in Group 3, 28.0 (SD 17.0, range 4–100, IQR 14–39 and median 24) in Group 4, 28.7 (SD 17.7, range 4–92, IQR 15–41 and median 25) in Group 5.

In 44% ($n = 645$) of our sample, a CPDI Score above the cut-off value with any degree of (or mild-to-severe) peritraumatic distress was found. Given 28 and 52 as cut-off values for mild-to-moderate and severe

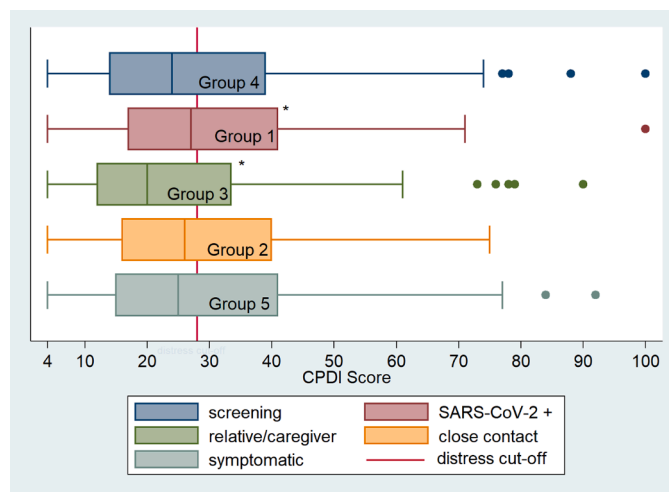


Fig. 1. CPDI Score box plot by SARS-CoV-2 exposure Groups. Each group box shows the CPDI Score median value. The analysis of variance of the Box-Cox transformation (bcCPDI) showed a significant difference between groups ($F = 2.77$, $p = 0.026$). *At the multiple comparison test, only Group 1 and Group 3 showed a significant difference ($p = 0.022$). (color).

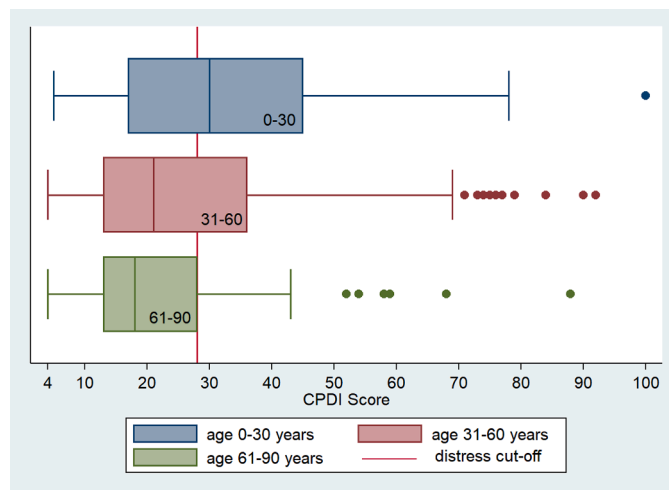


Fig. 2. CPDI Score box plot by age class. Each age class box shows the CPDI Score median value. The analysis of variance of the Box-Cox transformation (bcCPDI) showed no significant difference between SARS-CoV-2 exposure Groups in all age class 0–30 years ($F = 1.51$, $p = 0.199$), age class 31–60 years ($F = 1.23$, $p = 0.297$) and age class 61–90 years ($F = 1.01$, $p = 0.408$). (color).

peritraumatic distress, respectively, 33% ($n = 483$) of participants' distress was mild-to-moderate (CPDI Score within 28 and 51), 11% ($n = 162$) was severe (CPDI Score higher than 51) and in 56% ($n = 818$) of cases no distress (CPDI Score lower than 28) was found. Among females, any degree of peritraumatic distress emerged in 55% ($n = 429$) and severe distress was found in 16% ($n = 125$) of participants, while in males in 32% ($n = 216$) and 5% ($n = 37$), respectively. Among age classes, frequencies of any degree of peritraumatic distress and severe distress were respectively 55% ($n = 337$) and 14% ($n = 87$) in 0–30 years, 37% ($n = 286$) and 9% ($n = 68$) in 31–60 years and 26% ($n = 22$) and 8% ($n = 7$) in 61–90 years age class.

3.5. COVID-19 peritraumatic distress prevalence and CPDI Scores comparison among groups

Differences in sex in prevalence of any degree and severe

peritraumatic distress showed statistically significant differences at the Pearson Chi Squared test ($p < 0.001$, $\chi^2 = 78.3$, $\chi^2 = 40.9$, respectively). Age class differences in prevalence of any degree and severe peritraumatic distress showed statistically significant difference at the Pearson Chi-Squared test ($p < 0.001$, $\chi^2 = 55$; $p = 0.005$, $\chi^2 = 10.6$, respectively).

At the independent-samples *t*-test a significant mean difference (1.7, 95%CI 3.5–0.1, $p = 0.033$) emerged in CPDI Scores between participants with ascertained versus probable SARS-CoV-2 exposure. One-way ANOVA was performed to assess differences in CPDI Score among SARS-CoV-2 exposure Groups. We used the Box-Cox transformation ($\lambda = 0.262$) of CPDI Score (bcCPDI) to transform our response variable as close to a normal distribution. Indeed, bcCPDI distribution was symmetric ($\gamma_1 = 0$) and platykurtic ($\gamma_2 = 2.2$) and was the best approximation to normality we were able to obtain.

One-way ANOVA on bcCPDI (Table 1s) showed a statistically significant difference among groups ($F = 2.77$, $p = 0.026$). Multiple comparison tests using the Bonferroni method confirmed no significant differences, except between Group 1 and Group 3: SARS-CoV-2 positive cases showed a significantly higher CPDI Scores than family members and caregivers ($p = 0.02$). Because of the normality assumption was based on the best normalizing transformation, we conducted a second analysis using non-parametric tests. Results from the Kruskal-Wallis H test ($\chi^2(4) = 12.68$, $p = 0.013$) and the ANOVA on ranks ($F = 3.19$, $p = 0.013$) confirmed this difference. In Table 2s multiple comparison tests by means of the Scheffé method revealed a significant difference between Group 1 and Group 3 ($p = 0.031$).

Since we found heterogeneity in age distribution by ANOVA among the 5 Groups ($F = 10.2$, $p < 0.001$), we performed another one-way ANOVA on ranks after having grouped our sample 0–30, 31–60, and 61–90 years age classes. We compared CPDI Scores among the 5 Groups for each age class. Results showed a loss of significance in CPDI Score differences between all groups for all three, 0–30 years ($F = 1.51$, $p = 0.199$), 31–60 years ($F = 1.23$, $p = 0.297$) and 61–90 years ($F = 1.01$, $p = 0.408$) age classes at oneway ANOVA of bcCPDI (Table 3s). Results from ANOVA on ranks confirmed that no differences exist in our sample among CPDI Score means of the 5 groups within the same age class (Table 4s).

3.6. Building a model of COVID-19 related peritraumatic distress predictors and protectors

Logistic regression analysis was run using CPDI Score dichotomized to the cut-off value for any degree of distress of 28 (Costantini and Mazzotti, 2020). In Table 2, results of univariate logistic regression analysis are presented. At univariate analysis, mild-to-severe peritraumatic distress was found positively associated with having had work changes (OR = 1.72, $p < 0.001$), work hours changes (OR = 1.66, $p < 0.001$), night sleep changes (OR = 3.27, $p < 0.001$), physical activity reduction (OR = 1.78, $p < 0.001$), alcohol consumption changes (OR = 1.65, $p < 0.001$), at least one relative hospitalized due to COVID-19 (OR = 1.29, $p = 0.027$), at least one relative lost to COVID-19 (OR = 2.01, $p < 0.001$). Mild-to-severe peritraumatic distress was found negatively associated with age ≥ 35 years (OR = 0.51, $p < 0.001$), male sex (OR = 0.38, $p < 0.001$), marital status married (OR = 0.53, $p < 0.001$), living with partner or partner and children (OR=0.54, $p<0.001$), higher educational level (OR=0.74, $p = 0.005$), working status occupied (OR = 0.61, $p < 0.001$), night sleep > 7 hours (OR = 0.70, $p = 0.001$), being physically active (OR = 0.78, $p = 0.022$), alcohol consumption (OR = 0.71, $p = 0.002$), no indication for swab test (OR = 0.62, $p < 0.005$). Results from multivariate logistic regression analysis are presented in Table 2. A positive independent association to mild-to-severe peritraumatic distress was found for work changes (OR = 1.52, $p = 0.001$), night sleep changes (OR = 2.50, $p < 0.001$), physical activity reduction (OR = 1.46, $p = 0.002$), alcohol consumption changes (OR = 1.47, $p = 0.003$), having had at least one relative lost to COVID-19 (OR = 2.26, p

Table 2
Univariate logistic regression analysis of factors associated to mild-to-severe peritraumatic distress (CPDI Score ≥ 28).

CPDI Score ≥ 28	OR (95% CI)	p
Age ≥ 35 years	0.51 (0.41–0.63)	<0.001*
Sex (male)	0.38 (0.31–0.48)	<0.001*
Marital status (married)	0.53 (0.43–0.66)	<0.001*
Family status (living with partner or partner and children)	0.54 (0.44–0.67)	<0.001*
Parental status	0.50 (0.41–0.63)	<0.001*
Educational level (bachelor degree or higher)	0.74 (0.60 –0.91)	0.005*
Working status (occupied)	0.61 (0.49–0.75)	<0.001*
Working changes (job loss or switch to smart-working)	1.72 (1.39–2.11)	<0.001*
Health worker	0.89 (0.65–1.24)	0.498
Night sleep (> 7 h/night)	0.70 (0.56–0.87)	0.001*
Physically active (any activity)	0.78 (0.63–0.96)	0.022*
Physical activity > 2 h/week	0.87 (0.70–1.08)	0.194
Alcohol consumption	0.71 (0.57–0.88)	0.002*
Work hours changes (increased or decreased)	1.66 (1.34–2.04)	<0.001*
Night sleep changes (increased or decreased)	3.27 (2.63–4.05)	<0.001*
Physical activity reduction	1.78 (1.44–2.19)	<0.001*
Alcohol consumption changes (increased or decreased)	1.65 (1.32–2.05)	<0.001*
At least one relative hospitalized due to Covid-19	1.29 (1.03–1.61)	0.027*
At least one relative lost to Covid-19	2.01 (1.47–2.76)	<0.001*
Previous positive swab test	1.17 (0.95–1.11)	0.146
SARS-CoV-2 ascertained exposure	1.23 (0.99–1.53)	0.006
Group 1 (COVID-19 confirmed cases)	1.18 (0.86–1.64)	0.305
Group 2 (close contacts)	1.18 (0.93–1.50)	0.160
Group 3 (probable/confirmed case’s relative or carer)	0.62 (0.45–0.86)	0.005*
Group 4 (screening)	1.02 (0.83–1.26)	0.867
Group 5 (COVID-19 typically symptomatic)	0.96 (0.69–1.34)	0.811
Multivariate logistic regression analysis of factors associated to mild-to-severe peritraumatic distress (CPDI Score ≥ 28)		
CPDI Score ≥ 28	OR (95% CI)	p
Age ≥ 35 years	0.54 (0.42–0.68)	<0.001*
Sex (male)	0.37 (0.29–0.47)	<0.001*
Educational level (bachelor degree or higher)	0.68 (0.54–0.86)	0.002*
Working changes (job loss or switch to smart-working)	1.52 (1.20–1.93)	0.001*
Night sleep (> 7 hours/night)	0.67 (0.52–0.86)	0.002*
Physically active (any activity)	0.74 (0.59–0.95)	0.018*
Night sleep changes (increased or decreased)	2.50 (1.96–3.16)	<0.001*
Physical activity reduction	1.46 (1.16–1.86)	0.002*
Alcohol consumption changes (increased or decreased)	1.47 (1.14–1.88)	0.003*
At least one relative lost to COVID-19	2.26 (1.60–3.21)	<0.001*

* Statistical significance ($p < 0.05$).

< 0.001). A negative independent association was finally found for age ≥ 35 years (OR = 0.54, $p < 0.001$), male sex (OR = 0.37, $p < 0.001$), higher educational level (OR = 0.68, $p = 0.002$), night sleep > 7 hours (OR = 0.67, $p = 0.002$), being physically active (OR = 0.74, $p = 0.018$).

4. Discussion

The mean CPDI value of the entire sample was above the threshold for medium-grade peritraumatic distress, thus confirming our hypothesis that the population accessing the POC had an increased risk of psychological distress.

Despite the absence of clear differences between the categories of users, our study found increased CPDI values in subjects who tested positive for SARS-CoV-2, compared to family members or caregivers without a clear indication to undergo the swab. Factors independently associated with an increased CPDI Score were work changes (job loss or switch to smart working), night sleep changes (both increased or decreased), physical activity reduction, alcohol consumption changes, and at least one relative lost to COVID-19. Conversely, protective factors included male sex, age > 34 years, higher educational level, night sleep > 7 hours, and being physically active.

We found a prevalence of mild-to-severe COVID-19 related peritraumatic distress of 44% in our sample. International literature has shown heterogeneous results in the prevalence of COVID-19 related peritraumatic distress ranging from 14.1 to 94.5% (Marzo et al., 2021b). Other studies aimed at the general population in Italy estimated a prevalence of 48.6%, close to ours (Bonati et al., 2021; Costantini and Mazzotti, 2020). In our sample the prevalence of severe distress (CPDI Score equal to or greater than 52) was twice greater compared with two earlier Italian studies. These findings confirmed our hypothesis that the population accessing the POCs is more likely to experience mental health problems compared to the general population.

In our sample, the mean CPDI Score was above the threshold for any degree of peritraumatic distress of 28. In participants with ascertained SARS-CoV-2 exposure, the mean CPDI Score was 29.3, while in subjects with probable exposure was 27.6 and the difference in mean CPDI Score between these groups was statistically significant ($p = 0.033$). Among SARS-CoV-2 exposure groups, CPDI mean score was 30.5 in COVID-19 confirmed cases and 28.8 in close contact. COVID-19 typically symptomatic participants mean CPDI Score of 28.7 was above the cut-off too. A close to the threshold mean CPDI Score of 28.0 was found in participants undergoing the swab test for screening, while in relatives or caregivers with no indication of being tested, the mean score of 25.3 was under the threshold. Overall, higher levels of peritraumatic distress trends were present in subjects with a clinical indication to have a nasal swab due to ascertained SARS-CoV-2 exposure or typical symptomatology (Groups 1, 2, and 5), intermediate levels of distress in people being tested for mandatory routine screening for epidemiological reasons such as healthcare professionals, or law enforcement (Group 4) and lower levels in people with no indication for being tested (Group 3). This is not entirely surprising if we think of the "peritraumatic distress" construct as a defined time window, which could overlap with an epidemiological or clinical condition indicating a swab test due to an increased risk of contracting or having contracted the disease. Anyway, CPDI Scores comparison among the SARS-CoV-2 exposure Groups showed a significant mean difference only between COVID-19 confirmed cases and relatives or cares of COVID-19 cases ($p = 0.02$). No differences emerged between the other groups.

This difference among groups could be explained by several factors. Individuals who underwent a mandatory nasal swab for screening were in contact with subjects affected by SARS-CoV-2 in the workplace, and the fact of having to undergo a swab is probably itself a source of increased stress for them. On the other hand, the group of caregivers and

relatives did not have to undergo a nasal swab: this group was made up of careers of frail subjects or children. The fact that subjects in critical clinical conditions did not access the POC could have contributed to having reduced levels of CPDI in caregivers.

Multivariate logistic regression revealed protective factors in age > 35 years, the male sex, higher educational level, night sleep > 7 hours, and being physically active. Regarding the role of age, previous evidence revealed controversial results (Parlapani et al., 2021), with some studies showing old age as a risk factor for peritraumatic distress (Qiu et al., 2020; Shrestha et al., 2020), while other studies identified it as a protective factor (Al-Hanawi et al., 2020; Costantini and Mazzotti, 2020; Gloster et al., 2020; Jiménez et al., 2021; Ramasubramanian et al., 2020), or did not find any significant association with age (Megalakaki et al., 2021). A possible explanation for the decrease in the risk of peritraumatic distress with advancing age could be the greater knowledge of the older population with respect to epidemic events. On the other hand, our findings tend to support previous evidence where the younger age group could have a higher risk for mental health problems for their greater exposure to social media, and forced lockdown at home (Al-Hanawi et al., 2020).

With regard to sex, being male was found to be a protective factor for peritraumatic distress, and this is consistent with the existing literature (Al-Hanawi et al., 2020; Bonati et al., 2021; Gloster et al., 2020; Jiménez et al., 2021; Kafle et al., 2021; Marzo et al., 2021a, 2021b; Qiu et al., 2020; Shrestha et al., 2020). Numerous studies have also shown a higher prevalence of symptoms of depressive and anxious spectrums in women (Ribeiro et al., 2021). Probably several factors may be responsible for a significant difference in risk between the sexes, including hormonal, social, and economic differences. Similar to findings from other works, a sex demographic bias has to be taken into consideration, with a greater percentage of women answering the questionnaire (Bonati et al., 2021). Despite heterogeneous evidence in the literature, some studies agreeing with our results of higher educational level as a protective factor from peritraumatic distress (Gloster et al., 2020), and others that, differently, revealed an association in increased distress levels with more advanced education (Marzo et al., 2021b; Qiu et al., 2020; Shrestha et al., 2020). A change in nighttime rest periods was the factor associated with peritraumatic distress with the greatest effect size (OR = 2.50) in our study. This result is consistent with previous evidence (Costantini and Mazzotti, 2020); it is therefore not surprising that an effective night's rest (more than 7 hours), on the contrary, resulted as a protective factor. The study confirms the importance of physical exercise also in the context of the pandemic situation, similarly to other studies carried out in Italy (Maugeri et al., 2020).

Conversely, several studies have also highlighted how a low socio-economic status is associated with a greater psychological impact (Ribeiro et al., 2021). Nevertheless, the specificity relationship between SES and mental disorders remains to be investigated.

A change in work habits has proved to be a risk factor in our sample. In this context, previous literature revealed divergent results regarding specific occupational categories so far (Al-Hanawi et al., 2020; Kafle et al., 2021; Krüger-Malpartida et al., 2020; Shrestha et al., 2020; Zapata-Ospina et al., 2021). In line with our findings, peritraumatic distress seems to be more related to work changes, including demotion or job loss, rather than to a specific occupational category itself, even if it is at risk or exposes people to contagion. The association between unemployment and increased peritraumatic distress was previously found in Italy (Bonati et al., 2021). A change in recreational habits such as alcohol consumption was found to be a factor associated with peritraumatic distress. Although some studies have correlated a worse psychological condition and alcohol consumption during the pandemic (Jacob et al., 2021; Lechner et al., 2020; Stanton et al., 2020), to the best of our knowledge, our study was the first to investigate a possible association between a change in alcohol consumption and peritraumatic distress. This finding has clear implications from a possible prevention perspective and could suggest further studies aimed at investigating a

possible correlation between alcohol use disorder and peritraumatic distress. The loss of a relative due to COVID-19 emerged as a factor independently associated with peritraumatic distress and it confirms what has already been found by other studies (Krüger-Malpartida et al., 2020).

The current study has several limitations. First, although a paper-based questionnaire exists, it was not possible to collect responses in this modality. This is mainly due to the specific location where the questionnaires were distributed, where the risk of contagion was undoubtedly high. Second, the cross-sectional design of the present survey limits our ability to make inferences about the causality of the findings, so our results are predictive and not causal.

Third, the current survey took place on a regional basis. Thus, the sample may not be representative of the general population.

Finally, a further limitation of the study is that the questionnaire did not investigate the presence of an anxiety disorder or the presence of a major psychiatric disorder.

The international scientific literature agrees in underlining an urgent need for research to address how mental health consequences for vulnerable groups can be mitigated under pandemic conditions (Holmes et al., 2020; Hotopf et al., 2020; Kesner and Horáček, 2020; Strous and Gold, 2020; Thombs et al., 2020), consequently, prevention and intervention approaches to attenuate the psychosocial impact should be an integrated component of the pandemic emergency crisis responses (Ghebreyesus, 2020; Röhr et al., 2020). Notwithstanding the aforementioned limitations, the results of this study highlighted the importance of providing easy access to psychological help to the population exposed to the virus undergoing the necessary diagnostic and public health pathways with their emotional impact. A high level of CPDI, which recent studies have shown to be a reliable predictor not only of PTSD, but also of anxiety and depressive disorders (Megalakaki et al., 2021), characterized the population in question, and the POC proved to be a unique place to intercept the presence of peritraumatic distress related to COVID-19. Further studies could shed light on the relationship between anxiety and depressive spectrum disorders, of which peritraumatic distress has been shown to be an important predictor, and individual resilience strategies during the current pandemic crisis.

This could direct policymakers to rationalize health resources, in order to effectively prevent the onset of major psychiatric disorders such as PTSD or mood disorders, possibly by leveraging modern technologies such as telemedicine (Arafat et al., 2020; Reay et al., 2020). An easily and quickly available consultation with a specialist, even in video mode, would in fact be able to promptly assess and manage the onset of symptoms, often unnoticed, even if closely related to peritraumatic distress.

5. Conclusion

In a vast literature that is trying to determine the psychological effects of the pandemic (Brooks et al., 2020; Ettman et al., 2020; Li et al., 2020; Shi et al., 2020), our study sought to estimate COVID-19 related peritraumatic distress prevalence and its differences among groups based on their ascertained or probable exposure to SARS-CoV-2 of a population at increased risk of mental health problems as well as the factors closely related to the development of peritraumatic distress, in a peculiar clinical-diagnostic setting.

The mean CPDI Score of our sample was above the threshold for mild-to-moderate peritraumatic distress, and a significant difference emerged between those who tested positive for COVID-19 and the category of family members/caregivers without indication to undergo the swab.

The following independent variables associated with high levels of distress included the loss of relative due to the pandemic, alterations in night rest, in the habitual work patterns or leisure habits such as alcohol consumption, and a reduction in physical activity. On the other hand, some factors such as older age, higher level of education, performing any

type of physical activity, and male sex have proved protective against peritraumatic distress.

Other studies with a prospective longitudinal design are needed to confirm our results, possibly integrating these with other investigation methodologies for better characterizing the population at risk of peritraumatic distress, such as an evaluation of coping strategies implemented during the pandemic crisis.

Funding

None.

CRediT authorship contribution statement

Giancarlo Pontoni: Conceptualization, Writing – original draft, Formal analysis. **Stefano Caiolo:** Conceptualization, Writing – original draft, Investigation. **Alessandro Miola:** Conceptualization, Writing – original draft. **Chiara Moriglia:** Investigation, Writing – original draft. **Tommaso Lunardi:** Writing – original draft. **Sergio Garofalo:** Writing – original draft. **Fabio Sambataro:** Supervision, Writing – review & editing.

Declaration of Competing Interest

GP, SC, AM, CM, TL, and SG have no conflict of interest to declare. FS has been a consultant for Jansenn.

Acknowledgments

A fraternal thanks to Captain Matteo Sancineto who, with his invaluable technical support, actively contributed to the creation of the online questionnaire. Thanks also go to Warrant Officer Michele Comida, Warrant Officer Bianca Celeste Verzella and Warrant Officer Giuseppe Aquino and all the medical personnel, military and civilian, of the Sars-CoV-2 diagnostic POC of the Euganean stadium, Padua. A heartfelt thanks to dr. Fabio Verlato, director of the district 1 of ULSS 6 "Euganea", who made this work possible.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jad.2021.12.101.

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