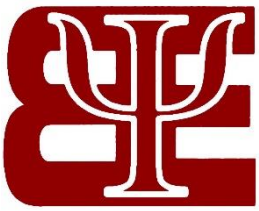

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PERITRAUMATIC DISTRESS INVENTORY IN THE COURSE OF THE COVID-19 PANDEMIC

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Abstract. The context of the present study was the COVID-19 pandemic, which has become an unprecedented global health emergency inducing a considerable degree of uncertainty, fear, concern, and worry. Peritraumatic reactions may contribute to the development of Acute Post-traumatic Stress Disorder (PTSD) and the prediction of full PTSD. The aim of this study was to validate the Peritraumatic Distress Inventory (PDI) in a Greek sample during the outbreak of COVID-19 pandemic and explore its association with PTSD as assessed by PTSD-8. A total of 2,827 patients completed the PDI along with validated scales measuring post-traumatic, anxiety and depressive symptoms. CFA confirmed both the unifactorial model, with modest fit, and the bifactorial model of PDI with acceptable fit in the Greek sample. The three- and the four-factor models were not supported. Overall, the scale demonstrated good psychometric properties in the Greek population and can be considered a useful instrument to assess elevated stress during traumatic crises.

Key words: COVID-19, Greek PDI, Peritraumatic Distress Inventory

INTRODUCTION

The rapid spread of the Coronavirus disease 2019 (COVID-19) unexpectedly changed the life of million people and led to increased uncertainty, fear, and worry worldwide. The disease outbreak is expected to have great social and psychological impact at a global scale. Past

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infectious outbreaks showed profound and long-term effects on people's mental health due to the implementation of strict control and preventive strategies such as mandatory quarantines (Brooks et al., 2020). In line with these findings, a recent study with approximately 13,000 participants from different countries and regions demonstrated the adverse mental health impact of the novel coronavirus pandemic, including posttraumatic stress disorder-related (PTSD) symptoms (Płomecka et al., 2020). Major psychosocial stressors linked to the ongoing spread of COVID-19 are expected to increase trauma-related symptomatology and even risk of suicidality, especially for the frontline workers and other vulnerable populations, indicating PTSD as a resulting effect of the pandemic (Blekas et al., 2020; Dutheil, Mondillon, & Navel, 2020; Mucci, Mucci, & Diolaiuti, 2020; Parlapani et al., 2020).

Peritraumatic distress represents an array of maladaptive reactions (i.e., emotional and physiological responses) triggered when suffering or witnessing any terrifying incident or threatening event (Brunet et al., 2001). The original Peritraumatic Distress Inventory (PDI) was developed in accordance with the posttraumatic stress disorder (PTSD) criterion A2 of the DSM-IV (Brunet et al., 2001). The A2 criterion has been omitted in the latest revision of the diagnostic manual, DSM-5 (American Psychiatric Association, 2013). However, a review by Vance, Kovachy, Dong, and Bui (2018) reflecting on the clinical evidence from various studies supports that peritraumatic distress is functioning as a potential risk factor to the progression of PTSD as well as to a range of other psychiatric outcomes.

Previous research has showed that in the case of major disasters most of the affected individuals, families and communities develop resilience and cope with exposure to traumatic stimuli without great impact on mental health (McFarlane & Williams, 2012). Despite these promising results studies have also shown that after previous pandemics such as Ebola, MERS (Middle East Respiratory Syndrome) and SARS (Severe Acute Respiratory Syndrome) there was a high prevalence of PTSD symptoms among survivors, survivors' families, health care professionals, and the general public. While most of these mental health problems dissipated after the end of the epidemic crisis, there were a significant proportion of people left with PTSD symptoms (Esterwood & Saeed, 2020; Vyas, Delaney, Webb-Murphy, & Johnston, 2016). Since this medical crisis is still ongoing worldwide, nobody can say with any certainty how many people will be affected and how by the COVID-19 pandemic. Even if with the DSM-5 criteria, the current pandemic is not classified as traumatic event (at least, not for all people), there are symptoms people are already experiencing that match the criteria for traumatic symptomatology, such as fear of infection, hyperarousal, negative ideation, avoidance behavior, impaired sleep, and worry about one's health and life (Di Crosta et al., 2020; Karatzias et al., 2020; Shevlin, Hyland, & Karatzias, 2020; Voitsidis et al., 2020).

Peritraumatic reactions, that is, reactions during the crisis, may contribute to the development of Acute PTSD (i.e., symptoms occur for longer than two days but less than a month) and the prediction of full PTSD (symptoms last for longer than a month). PDI has been used to predict the development of post-traumatic stress symptomatology (Birmes et al., 2005; Kim et al., 2018), but without agreement on the optimal cutoff point. Recommended

cutoff scores vary among studies depending on the population and purpose of administration. Specifically, cutoff scores range from 14 (Guardia et al., 2013), 19 (Rybojad, Aftyka, & Milanowska, 2019), to 23 (Bunnell, Davidson, & Ruggiero, 2018; Nishi et al., 2010). The scale has been validated in several languages (Bahari et al., 2017; Jehel, Brunet, Paterniti, & Guelfi, 2005; Kianpoor et al., 2016; Nishi et al., 2009; Rybojad & Aftyka, 2018). Regarding the factor structure of the PDI, a unidimensional solution and a two-factor solution have been found. The two-factor structure includes the "Negative Emotions" (NE) factor, with seven items, and "Perceived Life Threat and Bodily Arousal" (PT/BA), with six items, as proposed by the developers (Brunet et al., 2001; see also, Bunnell et al., 2018). Other validation studies have proposed a three-factor solution (Rybojad & Aftyka, 2018) and a four-factor solution tapping "life threat", "loss of control", "helplessness/anger", and "guilt/shame" (Simeon, Greenberg, Knutelska, Schmeidler, & Hollander, 2003).

Appraisal of the peritraumatic experience in the acute period following a distressing or frightening event is crucial. Greece is still struggling to recover from a severe financial crisis, which has inflicted emotional trauma and stress reactions in many citizens (Sochos, 2018). From a clinical perspective, comprehensive monitoring using valid screening tools is important for the early identification of individuals at risk for mental health difficulties over critical periods, as during the current pandemic crisis. The Greek validation of PDI will be useful for both clinical and research purposes in order to assess potential risk indicators as regards the severity of the perceived distress due to COVID-19 pandemic in Greece. Therefore, the aim of the present study was to translate and validate the Greek version of the PDI in the context of COVID-19 in Greece. Because of lack of consensus on the factor structure of PDI in its adaptation in various cultures, no hypothesis was formulated with regards to the Greek PDI structure.

METHOD

Translation and cultural adaptation

The forward-backward translation method was applied following established guidelines (Sousa & Rojjanasrirat, 2011; Tsang, Royse, & Terkawi, 2017). Two independent health care professionals, both fluent in English, performed the forward translation. Both Greek versions of the PDI scale were further translated back into English by one bilingual health care professional and one fluent in English, who were both blinded to the English version of the scale. In order to ensure semantic, conceptual, and content equivalence, an expert panel of four members compared all versions to the original scale considering similarity in meaning and linguistic clarity in instructions, items and response format. Due to the coronavirus lockdown restrictions, pretesting was conducted among individuals from the Papageorgiou General Hospital (PGH) medical staff and their family members. The sample consisted of 30 Greek-speaking individuals across different age groups. A dichotomous response choice

(clear - not clear) was used by the participants to assess clarity of expression and content adequacy. Recommended changes were applied to the final version by the research team.

Participants and survey procedure

The present study was conducted during April 2020 in Greece. The survey questionnaires were administered through online forums and social networking platforms, powered by Qualtrics. A sample of 2,827 individuals from the general adult Greek population completed the Greek PDI's final version. All participants were at least 18 years old and fluent in Greek (i.e., people who have completed Greek elementary school or more) according to the inclusion criteria. Only the participants who had completed the self-report measures were included in the analysis; missing values on the demographic characteristics were not considered as an exclusion criterion. All participants were asked to complete the questionnaires having in mind the COVID-19 health crisis.

Measures

Demographic information

Background information questions regarding gender, age, educational level, and residential area were used to obtain demographic data.

The Peritraumatic Distress Inventory (PDI)

PDI is a 13-item (e.g., I felt helpless to do more**)** self-report scale, developed by Brunet et al. (2001) to assess levels of distress (e.g., sadness, fear, loss of control, shame/guilt) experienced during or immediately after a critical incident or index traumatic event. In this study respondents completed the PDI with reference to COVID-19. PDI is rated on a five-point Likert-type scale ranging from 0 (not true at all) to 4 (extremely true). Total score ranged between 0 and 52; higher scores indicate higher levels of peritraumatic distress (Brunet et al., 2001).

The PostTraumatic Stress Disorder 8-item Inventory (PTSD-8)

PTSD-8 is a theory-driven self-report questionnaire for screening Posttraumatic Stress Symptoms (PTSS) (Hansen, Andersen, Armour, Elklit, Palic, & Mackrill, 2010). It originated from the Harvard Trauma Questionnaire (HTQ) (Mollica, Caspi-Yavin, Bollini, Truong, Tor, & Lavelle, 1992) and targets trauma population. The scale includes eight items (e.g., Sudden emotional or physical reactions when reminded of the event) that are rated on a four-point Likert-type scale from 0 (not at all) to 4 (most of the time). The overall cutoff criteria for probable PTSD is given based on the DSM-IV definition and require a combination of at least one symptom with an item score of 3 or higher for each of the three basic PTSD symptom clusters assessed by the scale, i.e., intrusion, avoidance, and hypervigilance (Hansen et al.,

2010). Recent research suggests that the PTSD-8 scale comprises all the ICD-11 PTSS within its eight items (Andersen et al., 2018). The psychometric properties of the Greek translation have been described previously (Nikopoulou et al., 2020). In this study the eight items of PTSD-8 demonstrated an overall Cronbach's alpha of .83.

The Generalized Anxiety Disorder Assessment (GAD-7)

GAD-7 was developed by Spitzer, Kroenke, Williams, and Löwe (2006) and is considered a valid screening tool for assessing symptoms of the generalized anxiety disorder**.** The scale consists of seven items (e.g., Not being able to stop or control worrying) assessing severity related to worry and anxious symptoms. It is a self-report measure rated on a four-point Likert-type scale from 0 (not at all) to 3 (nearly every day) (Spitzer et al., 2006). The clinical utility of the scale for the Greek-speaking population has been evaluated and presented high sensitivity for detecting generalized anxiety disorder and panic disorder (Skapinakis, 2007). In this study the seven items of GAD-7 demonstrated an overall Cronbach's alpha of .84.

The Patient Health Questionnaire (PHQ-9)

PHQ-9 is a brief depression diagnostic and severity self-report measure widely used in both clinical and non-clinical settings, developed by Kroenke, Spitzer, and Williams (2001). The instrument consists of nine items (e.g., *Feeling down, depressed, or hopeless*) rated on a four-point Likert-type scale from 0 (*not at all*) to 3 (*nearly every day*) assessing symptoms during the past two weeks. The validity of the scale has been documented for the Greek-speaking population and proved to be an accurate, reliable, and valid measure for major depressive disorder screening with unidimensional structure (Hyphantis et al., 2011). In this study the nine items of PHQ-9 demonstrated an overall Cronbach's alpha of .84.

Ethical considerations

Ethical approval was granted from the PGH Review Board (563/2020) and the study was performed in accordance with the Declaration of Helsinki provisions (World Medical Association, 2001). All participants provided informed consent to participate in the study and for the data to be published. The participation was voluntary, anonymous, and confidential.

Data analysis

Demographic and clinical data were summarized using descriptive statistics. Reliability of the scale was explored by computing Cronbach's alpha. A cross-validation approach was adopted. The sample was split in two equal groups and the first one (calibration sample) was used for testing the best fitting model whereas the second for verifying the findings (validation sample). Exploratory factor analysis was used with the calibration sample and Confirmatory Factor Analysis (CFA) was performed to assess the goodness of fit of the factor

structure of the scale, on the validation sample. Several indices were used to explore model fit, including Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), Tucker–Lewis Index (TLI) and Standardized Root Mean Square Residual (SRMR).

The Receiver Operating Characteristic (ROC) was used to further explore the psychometric properties of the scale. ROC is widely accepted as a method for selecting an optimal cutoff point for a test and for comparing the accuracy of diagnostic tests (Hajian-Tilaki, 2013). ROC curve analysis displays the relationship between true positives and true negatives at each value along a screening scale to differentiate two groups of interest (Somoza, Soutullo-Esperon, & Mossman, 1989). The main outcome variable is the area under the ROC curve, abbreviated AUC (Altman & Bland, 1994; Somoza et al., 1989). The AUC describes the probability that a respondent will be correctly assigned to the appropriate group. AUC directly represents the overall accuracy of the instrument in screening for PTSD. AUC value should always be between zero and one indicating random to perfect performance. Specifically, values of 0.9 - 1 indicate excellent predictive accuracy, values 0.8 - 0.9 good accuracy, values 0.7 - 0.8 fair accuracy, values 0.6 - 0.7 poor accuracy, and 0.5 - 0.6 unacceptably poor accuracy (Rice & Harris, 2005). Maximizing sensitivity (the probability of correctly classifying an individual as being a probable PTSD case or as having more posttraumatic stress symptoms) using the PDI scores and maximizing specificity (the probability of correctly classifying a respondent as not PTSD case, or having less posttraumatic stress symptomatology) is considered equally important, thus the optimal cut-off score reflects the maximum vertical distance between the ROC curve and the chance line.

Data were analyzed using IBM SPSS Statistics for Windows, version 26, and the factorial structure of the PDI was tested using CFA, calculated with AMOS 23.0 statistic package (Arbuckle, 2014).

RESULTS

A total of 2,827 participants were included in the analysis: 2,105 females (74.5%) and 722 males (25.5%). Over half of the participants (52.3%) belonged to the age group 18-30 years, almost half (45.5%) had a university degree and an important proportion lived in urban areas (76.5%). The category over 75 years of age and elementary level of education were eliminated from further analysis due to the extremely small number of participants. Demographic characteristics are presented in Table 1.

Since in the existing literature multiple factorial models (unifactorial, bifactorial, three factorial and quad-factorial) have been suggested the sample was split in two subsamples, the calibration sample (n = 1,412, used for testing the best fitting model) and the validation sample (n = 1,415, used for verifying the findings).

***Table 1. Demographic characteristics of the sample* (*N* = 2,827)**

Characteristics	*n*	%
Gender		
Female	2,105	72.7
Male	722	24.7
Age (years)		
18-30	1,551	52.3
31-45	757	25.5
46-60	542	18.3
61-75	95	3.2
> 75	10	0.3
Educational level		
Elementary	12	0.4
Junior High	30	1.1
High school	837	29.6
University	1,287	45.5
MSc/MA	585	20.7
PhD	66	2.3
Residential Area		
Urban area	2,167	76.7
Small city	306	10.8
Rural area	3,330	11.7

At first, influential points were identified in the data by calculating Mahalanobis distances and comparing them with the quantiles of a χ^2 distribution (Newton & Rudestam, 2012). An outlier was defined as any Mahalanobis distance that exceeds 20.52, the .999 quantile of a χ^2 distribution with 5 degrees of freedom (Kline, 2015). There were 26 observations detected as outliers. Although variables should be correlated with one another to be considered suitable for factor analysis, high correlations can be problematic. Thus, prior to analysis, to assess multicollinearity, the squared multiple correlations were inspected keeping in mind that any variable with an $R^2 > .90$ can contribute to multicollinearity in the CFA model (Kline, 2015). Results showed that there were no variables that had an $R^2 > .90$ and the value of the determinant for the correlation matrix was 0.0168, indicating that there was no multicollinearity in the data (Field, 2017).

Principal component analysis was used to identify the best factorial solution for the Greek sample. Unifactorial, bifactorial, trifactorial and a quad-factorial models were tested. To analyze the validity of the factor structure, according to Costello and Osborne (2005),

communalities were examined, cross-loadings across multiple factors were checked, and the strength of the loadings was inspected (Tables 2 and 3).

Table 2. Indices of the exploratory factor analyses

Model	Eigenvalue	% of variance	χ^2	*p* value
Unifactorial			$\chi^2(65) = 1239.78$	$p < .001$
1	3.49	26.84		
Bifactorial			$\chi^2(53) = 615.34$	$p < .001$
1	2.44	18.79		
2	1.72	13.22		
Trifactorial			$\chi^2(33) = 107.55$	$p < .001$
1	1.68	13.99		
2	1.50	12.53		
3	1.23	10.27		
Quad-factorial			$\chi^2(32) = 87.85$	$p < .001$
1	1.61	12.38		
2	1.36	10.46		
3	1.11	8.54		
4	1.06	8.18		

Evaluating alternative factor-structure models

All models included items with low communalities (< .40). Specifically, the unifactorial model included 12 items with low communalities. This indicates that the unifactorial structure does not adequately describe the data and additional factors may need to be explored. The bifactorial model included 8 items with low communalities. There were no variables with cross-loadings, which suggests a factor structure that is simple and easy to interpret. Each factor had at least three significant loadings (> .32), which is indicative of a strong and solid factor. Although most items loaded on the factors of the original bifactorial model proposed by Brunnel et al. (2018), Item 1 (*I felt helpless*) loaded on Factor 2 instead of Factor 1. The trifactorial model included five items with low communalities, and Item 1 cross-loaded multiple factors. The quad-factorial model revealed the least number of items with low communalities (4), but Item 8 contained cross-loadings across multiple factors, and Factor 3 had fewer than three significant loadings, indicating a weak and unreliable factor (see Table 3).

Table 3. Factor loadings of exploratory factor analysis per model tested

PDI item	Factor loadings									
	One-factor solution	2-factor solution		3-factor solution			4-factor solution			
	1	1	2	1	2	3	1	2	3	4
1	.56		.38	.34		.33		.35		
2	.61	.54				.64		.69		
3	.50	.42				.73		.73		
4	.38		.82	.80			.80			
5	.52	.42			.52					.40
6	.48	.68			.76					.85
7	.57		.38	.36			.36			
8	.62	.72			.52			.36		.37
9	.64		.36		.33					
10	.57	.47		.47			.44			
11	.39		.56		.47				.63	
12	.33		.42	.73					.76	
13	.45		.70	.34		.33	.73			

Confirmatory factor analysis

A CFA was conducted to confirm the factorial structure of PDI as found in the validation sample. The analysis was performed based on the validation sample,
that is, the sample size used to test the theoretical model. Next, the results were evaluated using the chi-square goodness-of-fit test and other standard fit indices. Lastly, the squared multiple correlations (R^2) for each endogenous variable were examined. The results of the CFA models tested are presented in Table 4.

Table 4. Confirmatory factor analysis indices per model tested

Model	RMSEA	NFI	CFI	TLI	SRMR
Reference standard	< .08	> 0.9	> 0.9	> 0.9	< 0.08
Unifactorial	.06	.89	0.80	0.94	0.05
Bifactorial	.08	.87	0.96	0.92	0.04
Trifactorial	.13	.82	0.89	0.84	0.06
Quad-factorial	.11	.79	0.86	0.81	0.07

According to the *N/q* ratio rule-of-thumb, the given sample size is sufficiently large to produce reliable results. A chi-square goodness-of-fit test was conducted to determine if the CFA model fit the data adequately. Although the results of the chi-square goodness-of-fit test were significant, unifactorial: $\chi^2(65) = 1266.44$, $p < .001$, bifactorial: $\chi^2(64) = 985.36$, $p < .001$, this index is sensitive to sample size, which causes to almost always reject the null hypothesis when the sample size is large (Hooper, Coughlan, & Mullen, 2008). For this reason, the other fit indices were taken into consideration. The major goodness-of-fit indexes indicated a modest fit to the unifactorial model and an acceptable fit for the bifactorial model (NE, Items: 2, 3, 5, 6, 8, 10; PT/BA, Items: 1, 4, 7, 9, 11, 12, and 13). The two models were compared with regards to their model fit by computing a χ^2 difference test. Chi-square difference analysis (Kline, 2015) confirmed that there was no significant difference between the two models (CD = -0.02, TRd = -887.98, $\Delta\chi^2 = 624.44$, $\Delta df = 12.00$, $p > .05$), so both models fit equally well statistically. The trifactorial and the quad-factorial model had poor fits (see Table 4).

Reliability and validity

A Cronbach's alpha coefficient was calculated for the PDI scores as one-factor scale and its subscales NE and PT/BA. PDI had a Cronbach's alpha coefficient of .85, whereas the PDI subscales had $\alpha = .79$ and $\alpha = .72$, for NE and PT/BA, respectively, indicating good internal consistency in the study sample.

To test the concurrent validity, a structural equation model (Kline, 1998) was performed with one exogenous latent variable (Impact on Mental Health) and four endogenous observation variables (Anxiety, Depressive, Peritraumatic and Posttraumatic symptomatology) to explore further the PDI scale associations. Maximum-likelihood estimation was utilized. The various measures of mental health were represented by the total score of the respective questionnaire.

The model fit was tested based on goodness-of-fit indices and residual errors (Kline, 2015). The analysis showed that the model fit the data well, RMSEA (.08, 90% CI = 0.05, 0.12); NFI = .98; CFI = .98; TLI = .99; SRMR = .02. The model confirmed one latent factor explaining the relationship between the four measured variables (GAD-7, PHQ-9, PDI, and PTSD-8), representing respectively, anxiety, depression, peritraumatic distress, and posttraumatic symptomatology. The latent variable was labelled Impact on Mental Health. The R^2 values, along with the error variances for each observed variable, are presented in Table 5.

Table 5. Estimated error variances and R^2 values for each indicator variable – latent variable relationship in the model

Endogenous Variable	Standard Error	R^2
PDI	10.16	0.80
PTSD-8	9.58	0.58
GAD-7	0.45	0.98
PHQ-9	9.26	0.58

Note: PDI = Peritraumatic Distress Inventory; PTSD-8 = Post-Traumatic Stress Disorder 8-item Inventory; GAD-7 = Generalized Anxiety Disorder Assessment; PHQ-9 = Patient Health Questionnaire

Predictive validity

ROC curves were performed to explore the predictive validity of PDI for posttraumatic symptomatology. The state variable was PTSD symptomatology (as assessed by PTSD-8) and it was coded as follows: 1 = high risk for PTSD; 0 = low risk for PTSD. A cutoff point of 25 based on ROC analysis for this dimension showed a significant predictive power of the PDI scale for posttraumatic symptoms with AUC = .88, $p < .001$, 95% CI = .86 - .90, sensitivity .83, and specificity .80 (Figure 1). Based on the above results, 40.6% of the participants scored above the cutoff score indicating high peritraumatic distress whereas most participants experienced mild peritraumatic distress.

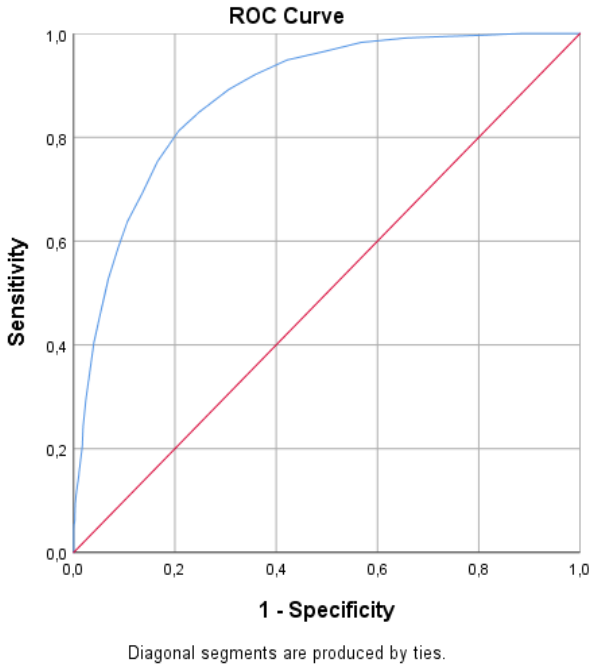

Figure 1. ROC curve of PDI scores for posttraumatic symptomatology

Individual differences in peritraumatic distress

Female participants reported higher levels of distress (M_{PDI} = 24.45, *SD* = 6.74) than males (M_{PDI} = 21.23, *SD* = 5.65), $t(2825) = -12.63$, $p < .001$, Cohen's $d = .51$, a medium effect size. There was also a significant effect of age, $F(4, 827) = 8.0$, $p < .001$, $\eta_p^2 = .04$. The Tukey post hoc analysis showed that the mean score of the participants aged 61-75 years was statistically higher than the other age categories. The partial eta squared index indicated that the effect size of age was low. Further ANOVAs showed no statistically significant differences between the mean scores of PDI among educational level and residential area groups ($p > .05$). For this reason, post hoc were tests not performed (see Table 6).

Table 6. PDI mean scores and comparisons of different demographic groups

Demographic character-istics	PDI *M (SD)*	Statistic value	PDI-NE *M (SD)*	Statistic value	PDI-PT/BA *M (SD)*	Statistic value
Gender						
Female[a]	24.45 (6.74)	$t(2825) = -12.63$, $p = .001$, $d = 0.51$	12.04 (4.15)	$t(1407) = -9.56$, $p = .00$, $d = 0.39$	12.58 (3.46)	$t(1382) = -12.83$, $p = .001$, $d = 0.54$
Male	21.23 (5.65)		10.50 (3.57)		10.82 (3.03)	
Age (years)						
18-30	23.57 (6.84)		11.77 (4.22)		11.89 (3.47)	
31-45	23.31 (6.38)		11.31 (3.88)		12.15 (3.35)	
46-60	24.12 (6.25)	$F(3, 2828) = 2.82$, $p = .037$	11.77 (3.94)	$F(3, 1410) = 3.08$, $p = .01$	12.73 (3.41)	$F(3, 1400) = 4.42$, $p < .001$
61-75[a]	25.01 (7.02)		12.30 (4.09)		12.97 (3.57)	
Educational level						
Elementary and Junior High school	25.17 (7.06)		12.56 (4.10)		13.11 (3.79)	
High school	23.44 (6.60)	$F(4, 2828) = 1.22$, $p = .298$	11.62 (4.01)	$F(4, 1381) = 2.63$, $p = .066$	11.98 (3.53)	$F(4, 1365) = 1.06$, $p = .374$
University	23.81 (6.79)		11.77 (4.20)		12.22 (3.45)	
MSc/MA	23.62 (6.33)		11.52 (3.94)		12.21 (3.28)	
PhD	22.65 (6.59)		11.20 (4.05)		11.79 (3.37)	
Residential Area						
Urban area	23.72 (6.70)		11.75 (4.11)		12.15 (3.48)	
Small city	23.28 (6.55)	$F(2, 2801) = 0.92$, $p = .398$	11.35 (3.95)	$F(2, 1395) = 1.83$, $p = .172$	12.03 (3.43)	$F(2, 1402) = .172$, $p = .842$
Rural area	23.47 (6.23)		11.47 (3.98)		12.15 (3.27)	

[a] Group with statistically significant higher mean score

DISCUSSION

The aim of this study was to evaluate the psychometric characteristics of the PDI measure in the Greek community. PDI is an instrument that taps elevated stress levels during a traumatic crisis or a critical event. Exploring its reliability and validity while the coronavirus crisis still goes on, will facilitate research and diagnosis in the Greek context. The Greek version of PDI was found to be psychometrically sound with satisfactory internal consistency (Cronbach's alpha above acceptable level of .70). CFA confirmed both the unifactorial model with modest fit and the bifactorial model with acceptable fit in the Greek sample. Although both models provide an adequate fit to the observed data, the two-factor structure may be preferable when trying to detect separate indexes (i.e., negative emotions; perceived life threat and bodily arousal), whereas the one factor structure may be more useful in clinical settings in order to distinguish clinically relevant cases from non-cases using the cutoff score.

The three and the four-factor structures (Rybojad & Aftyka, 2018; Simeon et al., 2003) were not supported. Our findings are in line with previous research regarding the factor structure for all items, except Item 1, for the two-factor solution (Bunnell et al., 2018), which in the present study loaded onto the PT/BA factor. A possible explanation of this finding could be that in the current public health emergency helplessness was perceived mainly in relation to health status and less as an emotional reaction by the participants.

In this study the proposed cutoff score of the Greek version was found to be 25, higher than proposed cutoff scores in previous studies, that is, 23 (Bunnell et al., 2018; Nishi et al., 2010), 19 (Rybojad et al., 2019), and 14 (Guardia et al., 2013). Even with a higher cutoff point score, 41% of the participants reported high peritraumatic distress. Although peritraumatic distress does not always result in PTSD and it may be related to symptoms of adjustment disorder rather than PTSD (Boden, Fergusson, Horwood, & Mulder, 2015), elevated peritraumatic distress reflects a potential risk for the continuation and/or maintenance of clinically significant psychiatric symptoms (Vance et al., 2018). The adverse psychosocial consequences of the current pandemic have been described in relation to several stressors (Pfefferbaum & North, 2020). However, although the COVID-19 related research is not conclusive at this point, it is indicative of potential long-lasting negative mental health effects in a global scale (Rajkumar, 2020; Torales, O'Higgins, Castaldelli-Maia, & Ventriglio, 2020).

In this study significant differences emerged regarding gender. Recent findings in the course of COVID-19 regarding PDI scores and gender revealed no significant differences (Kroska, Roche, Adamowicz, & Stegall, 2020), however being a female has been considered as a potential risk factor for reported heightened peritraumatic distress during the pandemic (Schäfer et al., 2020). In previous studies gender differences in PTSD prevalence and response to traumatic stress have been explained in relation to various contributors including biological factors and epigenetic mechanisms (Christiansen & Berke, 2020; Kornfield, Hantsoo, & Epperson, 2018; Seligowski, Harnett, Merker, & Ressler, 2019). With regards the age groups in our study, the only significant results were observed among the participants

aged 61 to 75 in the subscale towards PT/BA responses. As there is evidence that the risk to develop symptoms compatible with COVID-19 virus infection increases with age (Niu et al., 2020; Liu, Chen, Lin, & Han, 2020), this probably explains the findings, since individuals 65 years old and over are considered more susceptible to severe health implications and are advised to take extra precautions and strictly follow the social distancing guidelines.

In this study, most of the participants reported mild to moderate peritraumatic distress during the period of the total lockdown in Greece in April 2020. Exposure to the pandemic may range from traumatic for some people (e.g., patients, relatives of patients, healthcare professionals exposed to individuals with COVID-19) to merely inconvenient (e.g., individuals who are irritated because they need to wear a mask or cannot go to a restaurant).

To sum up, the findings of the present study suggest the need for monitoring and screening of peritraumatic stress in the general population, and particularly the vulnerable groups, during the evolution and in the aftermath of the COVID-19 pandemic. This will allow healthcare professionals to provide appropriate care and treatment at an early stage acting towards mental health promotion and mental disorder prevention.

Limitations

Several limitations of this study should be highlighted. This survey was conducted online using self-report measures, therefore the potential impact of self-reporting bias (Althubaiti, 2016) as well as self-selection bias (Bethlehem, 2010) should be acknowledged. The final sample may not necessarily be representative of the Greek population due to convenience sampling that may indicate overrepresentation of specific sub-groups. Moreover, as a result of the cross-sectional design of the present study, associations between variables do not provide insight into causal or possible mediator or moderator variable effects. Furthermore, the present study did not examine the stability of PDI scores over time; test-retest reliability measures should be included in future studies.

Conclusions

This article presented the translation and validation of the PDI in a large sample of Greek adults. The results suggest that the Greek version of the PDI has adequate psychometric properties and can be used among Greek-speaking individuals to assess peritraumatic psychological and physiological reactions.

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APPENDIX

Peritraumatic Distress Inventory (Greek version)

Ερωτηματολόγιο Περιτραυματικής Δυσφορίας

Σημειώστε το βαθμό στον οποίο ισχύουν για σας οι παρακάτω δηλώσεις.

Νιώθω αβοήθητος,-η.
1.Καθόλου 2. Λίγο 3. Αρκετά 4. Πολύ 5. Πάρα πολύ

Είμαι θλιμμένος,-η.
1.Καθόλου 2. Λίγο 3. Αρκετά 4. Πολύ 5. Πάρα πολύ

Νιώθω αγανάκτηση και θυμό, επειδή δεν υπάρχει τίποτα παραπάνω να κάνω.
1.Καθόλου 2. Λίγο 3. Αρκετά 4. Πολύ 5. Πάρα πολύ

Φοβάμαι για τη δική μου ασφάλεια.
1.Καθόλου 2. Λίγο 3. Αρκετά 4. Πολύ 5. Πάρα πολύ

Νιώθω ένοχος,-η.
1.Καθόλου 2. Λίγο 3. Αρκετά 4. Πολύ 5. Πάρα πολύ

Ντρέπομαι για τις συναισθηματικές μου αντιδράσεις.
1.Καθόλου 2. Λίγο 3. Αρκετά 4. Πολύ 5. Πάρα πολύ

Ανησυχώ για την ασφάλεια των άλλων.
1.Καθόλου 2. Λίγο 3. Αρκετά 4. Πολύ 5. Πάρα πολύ

Έχω την εντύπωση ότι θα χάσω τον έλεγχο των συναισθημάτων μου.
1.Καθόλου 2. Λίγο 3. Αρκετά 4. Πολύ 5. Πάρα πολύ

Δυσκολεύομαι στον έλεγχο των λειτουργιών της ουροδόχου κύστης
και του παχέος εντέρου.
1.Καθόλου 2. Λίγο 3. Αρκετά 4. Πολύ 5. Πάρα πολύ

Είμαι τρομοκρατημένος,-η από αυτά που βλέπω.
1.Καθόλου 2. Λίγο 3. Αρκετά 4. Πολύ 5. Πάρα πολύ

Έχω σωματικές αντιδράσεις, όπως ιδρώτα, τρέμουλο και αυξημένους παλμούς.
1.Καθόλου 2. Λίγο 3. Αρκετά 4. Πολύ 5. Πάρα πολύ

Νιώθω ότι μπορεί να λιποθυμήσω.
1.Καθόλου 2. Λίγο 3. Αρκετά 4. Πολύ 5. Πάρα πολύ

Σκέφτομαι ότι μπορεί να πεθάνω.
1.Καθόλου 2. Λίγο 3. Αρκετά 4. Πολύ 5. Πάρα πολύ