

**Validation of the French-Canadian Version of COVID-19 Peritraumatic Distress Index
with Parents of an Infant**

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Abstract

Parents of an infant may be particularly vulnerable to peritraumatic distress (e.g., psychological distress experienced during or immediately following a traumatic event) associated to events such as the COVID-19 pandemic. Since peritraumatic distress could affect both their psychological well-being and their couple relationship functioning, it is essential to measure and document these symptoms within parents. The COVID-19 Peritraumatic Distress Index (CPDI; Qiu et al., 2020) was the first validated instrument to measure COVID-19 peritraumatic distress, but it has not yet been validated in French. This study aimed to assess the psychometric properties of the French-Canadian version of the CPDI (F-CPDI) in a sample of 492 parents (58% of mothers) of an infant in Quebec Province (Canada). The factor structure, internal consistency, as well as the convergent validity of the instrument were tested. Results indicate that the F-CPDI has good internal consistency and supports the four-factor structure proposed by the authors of the original instrument. Results of correlation analyses indicated that peritraumatic distress was related to increased psychological distress, postpartum depression, and lower life satisfaction. Results indicate satisfactory psychometric qualities for the F-CPDI, providing researchers and mental health professionals access to a COVID-19 peritraumatic distress measure. This questionnaire can be used to assess peritraumatic distress in parents of an infant during a pandemic period, which is a first step towards offering adapted intervention strategies.

Keywords: COVID-19 pandemic, peritraumatic distress, parents, mental health, French-Canadian validation

Public Significance Statement: The COVID-19 pandemic is associated with an increase in mental health problems, including peritraumatic distress (Qiu et al., 2020). This study tested the validity of the French-Canadian COVID-19 Peritraumatic Distress Index (F-CPDI; Qiu et al., 2020), the first validated instrument to measure COVID-19 peritraumatic distress. Results revealed satisfactory psychometric qualities for the F-CPDI and prevalence rate of peritraumatic distress reaching 20.5% in Quebec parents of an infant.

Validation of the French-Canadian Version of COVID-19 Peritraumatic Distress Index with Parents of an Infant

Following the first outbreak in China in December 2019, the coronavirus disease (COVID-19) quickly spread to several countries at the beginning of 2020. In Quebec, the first infection cases were identified in February 2020 and increased over the following weeks (Ministry of Health and Social Services, 2020), prompting the Quebec government to impose public health measures to slow down the contagion (e.g., social distancing, closure of schools).

Peritraumatic Distress

The COVID-19 pandemic is associated with the development of peritraumatic distress in many nations (e.g., Qiu et al., 2020). Peritraumatic distress is defined as psychological distress experienced during or immediately following a traumatic event (Bunnell et al., 2018). A study carried out in China at the beginning of the pandemic using the COVID-19 Peritraumatic Distress Index (CPDI) indicates that 35% of participants reported moderate to severe levels of COVID-19 peritraumatic distress (Qiu et al., 2020). Studies conducted in Italy and in Peru, using the CPDI, showed that 30.1% to 44.8% of participants presented moderate to severe levels of COVID-19 peritraumatic distress (Costantini & Mazzotti, 2020; Krüger-Malpartida et al., 2020).

Parents of an infant may be more vulnerable to peritraumatic distress since their adaptive resources are already strained following the birth of their child, which could affect their psychological adaptation and relationship functioning (Keizer & Schenk, 2012). Drastic measures to control the spread of the virus, such as social distancing and confinement, may have added additional strains and weakened parents' quality of life and mental health (Brooks et al., 2020). Given the potential harmful effects of peritraumatic distress on parents and their infants, it is essential to measure these symptoms to study their mental health implications.

COVID-19 Peritraumatic Distress Index

Developed and validated in a sample of 50,000 Chinese participants from 36 provinces of China, the 24-item CPDI is a self-reported questionnaire measuring the frequency of peritraumatic distress symptoms experienced during the pandemic (Qiu et al., 2020). It includes items assessing anxiety, depression, specific phobias, cognitive change, avoidance and compulsive behaviour, physical symptoms, and loss of social contact in the past week, and specific to the COVID-19 pandemic (e.g., universal mask use, surface, and environmental disinfection). The CPDI has been validated at the Shanghai Mental Health Center ($\alpha = .95$; Qiu et al., 2020). The authors confirmed a four-factor structure (Qiu, 2021): *Negative Mood* (NM; feelings of anxiety, sadness, and helplessness); *Cognitive and Behaviour Change* (CC; compulsive thinking and avoidance behaviours related to COVID-19); *Somatization* (SO; physical symptoms); and *Hyperarousal and Irritability* (HI; increase in hypervigilance and social disruptions).

Besides the original version, an Italian version in Italy (Costantini & Mazzotti, 2020) and a Spanish version in Peru (Pedraz-Petrozzi et al., 2021) were developed. These translations presented satisfactory internal consistency (.92 and .93, respectively), and a committee of experts rated the content validity as satisfactory. However, no study has yet explored CPDI's factorial structure nor computed internal consistency specific to each factor.

Given its satisfactory psychometric qualities and its rapid administration time (less than 10 minutes), as well as the inclusion of specific aspects of the COVID-19 pandemic, the CPDI seems suitable for measuring peritraumatic distress related to the pandemic. It therefore seems promising to validate the French version of the instrument on a population of French-Canadian parents of infants, who might be more vulnerable to the stress caused by COVID-19.

Variables Potentially Related to Peritraumatic Distress

Studies indicated that peritraumatic distress experienced during the COVID-19 pandemic was correlated with depression and anxiety symptoms (Megalakaki et al., 2021). A study conducted in China showed that 35% of the 7,236 participants reported anxiety symptoms, 20% had depressive symptoms, and 18% suffered from sleep problems, suggesting psychological distress related to the pandemic (Huang & Zhao, 2020). In addition, stressful events could be associated with a decrease in the level of life satisfaction (Hamarat et al., 2001). Such data suggests that the links between mental health and peritraumatic distress could be used to measure the convergent validity of this questionnaire.

Research Aims and Hypotheses

The purpose of this study was to assess the psychometric properties of the French CPDI version (F-CPDI) as well as peritraumatic distress prevalence in parents of an infant. Four hypotheses were postulated: (1) the factor structure of the F-CPDI would replicate the four-factor model of the original instrument; (2) the F-CPDI would present satisfactory internal consistency; (3) higher levels of peritraumatic distress would be correlated with higher psychological distress and postpartum depression, and lower life satisfaction; and (4) Quebec parents would present similar rates of peritraumatic distress than participants in previous studies.

Method

Participants and Procedure

This study is part of a larger project examining the psycho-relational health of parents of an infant. Both parents of an infant were randomly selected from the records of new births on the Quebec Parental Insurance Plan list, based on the following criteria: 1) being a parent of an infant under six-months-old, 2) being in a couple relationship with the child's other parent, 3)

being 18 years of age or older, and 4) reading French fluently. Parents were contacted by telephone and invited to complete an online questionnaire between April and November 2020 (response rate = 58%). To respect data independence (Kenny & Judd, 1986), only one member of each couple was randomly selected. The sample consisted of 492 French-Canadian participants ($M_{\text{age}} = 30.49$, $SD = 5.84$): 58.3% self-identified as women ($n = 287$) and 41.7% as men ($n = 205$). Parents reported having on average 1.71 children ($M_{\text{age}} = 2.55$ months, $SD = 1.44$), and 78% ($n = 275$) reported an annual income above 40 000 CAD. The project was approved by the institution's ethics committee of the University of Quebec in Montreal.

Measures

Peritraumatic Distress

Peritraumatic distress was measured using the 24-item F-CPDI (Qiu et al., 2020). Items are answered on a 5-point Likert scale ranging from 0 = never to 4 = most of the time. Mean scores are computed and multiplied by 25 to obtain total scores ranging from 0 to 100. A score below 28 indicates no distress, scores between 28 and 51 indicate mild to moderate distress, and scores above 51 indicate severe distress (Qiu et al., 2020). The original authors provided an English version of the CPDI, which was translated into French using the back-translation procedure (Vallerand, 1989) with a committee of three researchers ascertaining correspondence and adaptation. The original version showed satisfactory internal consistency ($\alpha = .95$).

Psychological Distress

Psychological distress was measured using the French version of the 6-item (e.g., “During the past 30 days, how often did you feel restless or fidgety?”) Kessler Psychological Distress Scale (Kessler et al., 2003) on a 5-point Likert scale. Total score ranges from 0 to 24, with a higher score indicating higher psychological distress ($\alpha = .81$).

Postpartum Depression

Postpartum depression was measured using the 10-item (e.g., “*In the past 7 days I have been so unhappy that I have been crying*”) French Edinburgh Postnatal Depression Scale (Cox et al., 1987; Guedeney & Fermanian, 1998), on a 4-point Likert scale. Total score ranges from 0 to 30, where a higher score reflects higher symptoms of postpartum depression ($\alpha = .80$).

Life Satisfaction

Life satisfaction was measured using the 5-item (e.g., “*The conditions of my life are excellent*”) Satisfaction With Life Scale (Blais et al., 1989; Diener et al., 1985), answered on a 7-point Likert scale. Total score ranges from 5 to 35, with higher scores indicating higher satisfaction ($\alpha = .85$).

Results

Descriptive Analyses

The mean total score of F-CPDI was 18.88 ($SD = 12.10$) in our sample. Using the thresholds proposed by Qiu et al. (2020), 20.5% of participants ($n = 101$) presented peritraumatic distress (18.9% moderate and 1.6% severe). As expected for an instrument measuring distress in a non-clinic population, items were non-normally distributed and showed low endorsement rates (see Table S1 in Supplemental Material).

Confirmatory Factorial Analysis (CFA)

CFA was conducted on Mplus v7.4 (Muthén & Muthén, 2015) on the 24 items of the F-CPDI. Items were treated as categorical. The weighted least square mean and variance adjusted estimator was used, as it considers the non-normality of the data distribution. Models were assessed with the following goodness-of-fit indices: $CFI \geq .90$, $TLI \geq .90$; $RMSEA \leq .08$ with 90% confidence intervals; $SRMR \leq .08$; and $\chi^2 (p > .05$; Hu & Bentler, 1999). Since chi-square tends to be significant in large samples (Caron, 2018), the ratio of chi-square to the number of

degrees of freedom (χ^2/df) is computed with values of 5 or less indicating satisfactory adjustment to the data ($\chi^2/df \leq 5$; Ullman, 2001). Factor loading coefficients above .30 are deemed satisfactory (Field, 2018).

Results revealed acceptable model fit to the data, $\chi^2(246) = 794.77$; $p < .001$; $\chi^2/df = 3.23$; CFI = .94; TLI = .93; RMSEA = .07, 90% CI (.06; .07); SRMR = .06. One item (Qiu et al., 2020's item 21) presented low and not significant factor loading ($\lambda < .30$; see Table S2 in Supplemental Material). A second model was tested without this item and results revealed satisfactory fit to the data, $\chi^2(224) = 734.41$; $p < .001$; ratio $\chi^2/df = 3.28$; CFI = .94; TLI = .94; RMSEA = .07, 90% CI (.06; .07); SRMR = .06, with all factor loadings equal or above .30 (see Table 1).

[Insert Table 1]

Internal Consistency and Convergent Validity

Internal consistency was evaluated using Cronbach's alpha coefficient ($\alpha \geq .70$ acceptable; Nunnally, 1978) and convergent validity was measured using Pearson correlations ($r \geq .10$ weak; $\geq .30$ moderate; $\geq .50$ strong; (Cohen, 1988) on SPSS v25. Cronbach's alphas were satisfactory for the overall F-CPDI score ($\alpha = .89$) as well as three factors (NM $\alpha = .76$, SO $\alpha = .76$, HI $\alpha = .86$), and lower for the CC factor ($\alpha = .62$). Most items showed moderate to strong inter-item correlations (i.e., $r = .30$ to $.70$) without multicollinearity ($r \leq .70$), except for CC factor's items that showed weak inter-item correlations (i.e., $r = .03$ to $.29$; see Table S3 in Supplemental Material). As expected, the F-CPDI and its four subscales were associated with higher psychological distress and postpartum depression, and lower life satisfaction with small to medium effect sizes (i.e., $r = -.11$ to $.45$; see details in Supplemental Material Table S4).

Discussion

This study aimed to validate the F-CPDI within a French-Canadian sample of parents of an infant. Results support the quadripartite factorial structure proposed by Qiu et al. (2020). One item (“I talk to my family and loved ones”) showed low factor loading, which might be explained by the likelihood that parents maintain contact with their families and loved ones to share news of their infant or seek psychological support (e.g., telephone, videoconference).

Results indicated satisfactory internal consistency for the total score, paralleling results from the original study (Qiu et al., 2020) and the Italian and Spanish validation studies (Costantini & Mazzotti, 2020; Pedraz-Petrozzi et al., 2021). Our results also revealed satisfactory internal consistency for the F-CPDI scales, except for the CC scale. The low endorsement rate of the items and their small inter-item correlations ($r = .03$ to $.34$) may have contributed to the lower Cronbach's alpha of this scale. For example, items 6 (“I feel helpless and angry about people around me, the government, or the media”) and 7 (“I am losing faith in the people around me”) both present small inter-item correlations, indicating that they are poorly related to the other items in the factor ($r = .03$ to $.31$). Considering that those items are less COVID-specific than the others, it is possible that they represent more general cognitive changes rather than behavioural and cognitive changes specifically related to the pandemic. Results therefore suggest that the F-CPDI overall score, as well as the NM, SO, and HI scale scores should be used, but question the relevance of the CC scale score in itself, for which more investigation should be done.

Correlation analyses generally supported convergent validity. F-CPDI total score was correlated with higher psychological distress and postpartum depression, which concur with previous studies showing association between peritraumatic distress and psychiatric outcomes such

as anxiety and depression (Vance et al., 2018). Except for the HI scale, all scales presented weak correlation, suggesting that factors other than COVID-19 distress are associated with parents' lower levels of well-being. The higher correlation between HI scale and psychological distress and postpartum depression could be explained by an overlap between their respective items given that the HI scale is formed by items depicting symptoms of anxiety and depression. The F-CPDI was weakly related to lower life satisfaction. The Satisfaction With Life Scale (Diener et al., 1985) assesses long-term evaluation of one's satisfaction towards their life, which is less likely to be significantly affected by short-term states, potentially explaining this weak correlation.

Prevalence of peritraumatic distress among parents of an infant in Quebec was lower than prevalence found in other studies (20.5% vs 35%, 30.1% and 44.8% respectively in China, Italy and Peru samples; Costantini & Mazzotti, 2020; Krüger-Malpartida et al., 2020; Qiu et al., 2020). This lower prevalence in the Quebec sample could be explained by the particularity of our sample of parents of an infant, who are on parenting leaving and may have been less affected by some of the measures adopted by the government (e.g., already spending time at home with their infant). Moreover, this result may reflect different values, perception, and expression of emotions across cultures. Westerners are more likely to increase their positive emotions and decrease negative emotions after a negative event, which could result in a tendency to report less distress than Asians (Miyamoto et al., 2014). Systemic factors may also explain this result, including the constraints imposed by the government that were less severe in Quebec than in other countries, the governmental support (e.g., federal financial support) and social support (e.g., #çavabienaller movement). Lastly, the questionnaire was administered in the beginning of the pandemic to participants from China and Italy, and later in Quebec which could also explain the different rates.

This study contributes to the French validation of the CPDI and fills a gap being the first to examine the factorial structure of the instrument. Yet, some limitations need to be considered. First, the F-CPDI is a self-reported questionnaire and may reflect retrospective or social desirability bias. The use of parallel observational methods (e.g., observational data) could provide complementary information on the convergent validity of the F-CPDI. Moreover, test-retest studies should be conducted to study the temporal stability of the F-CPDI. Finally, the F-CPDI was translated from an English version provided by the original authors (which was translated from Chinese), but future studies should also validate the English CPDI.

Overall results indicate that the F-CPDI presents satisfactory psychometric qualities in a population of parents of an infant. It provides researchers with a validated questionnaire that is adapted to the COVID-19 pandemic context, offering the possibility to study peritraumatic distress experienced during a worldwide stressful event. By identifying the most psychologically vulnerable parents early during a pandemic period, intervention strategies such as parental coaching can be offered to help them manage their stress and avoid negative consequences for their child. These measures would reduce the risk of these parents developing mental health problems that would be harmful to their own well-being as well as that of their infant.

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Table 1*Final Factorial Solution Obtained by the Confirmatory Factorial Analysis (n=492)*

Items	Factor loading			
	NM	CC	SO	HI
1. Compared to usual, I feel more nervous and anxious.	.88			
2. I feel insecure and bought a lot of masks, medications, sanitizers, gloves and/or other home supplies.	.66			
3. I can't stop myself from imagining myself or my family being infected and feel terrified and anxious about it.	.71			
4. I feel empty and helpless no matter what I do.	.81			
5. I feel sad about the COVID-19 patients and their families.	.30			
6. I feel helpless and angry about people around me, the government, or the media.	.63			
7. I am losing faith in the people around me.	.66			
8. I collect information about COVID-19 all day. Even if it's not necessary, I can't stop myself.	.39			
9. I will believe the COVID-19 information from all sources without any evaluation.	.40			
10. I would rather believe in negative news about COVID-19 and be skeptical about the good news.	.64			
11. I am sharing news about COVID-19 (mostly negative news).	.45			
12. I avoid watching COVID-19 news, since I am too scared to do so	.65			
18. I feel dizzy or have back pain or chest distress.			.77	
19. I feel stomach pain, bloating, or other stomach discomfort.			.82	
21. I cannot sleep well, or dream about myself or my family being infected by COVID-19.			.77	
22. I lost my appetite.			.83	
23. I noticed changes when I go to the bathroom (constipation, diarrhea, frequent urination).			.76	
13. I am more irritable and have frequent conflicts with my family and loved ones.				.72
14. I feel tired and sometimes even exhausted.				.83
15. Due to feelings of anxiety, my reactions are becoming sluggish.				.91
16. I find it hard to concentrate.				.87
17. I find it hard to make any decisions.				.81
20. I feel uncomfortable when communicating with others.				.61

Note. NM = Negative Mood; CC = Cognitive and Behavioural Change; SO = Somatization; HI =

Hyperarousal and Irritability.

PERITRAUMATIC DISTRESS INDEX: A FRENCH VALIDATION

Table S1

Items Univariate and Multivariate Descriptive Statistics

Univariate descriptive statistics					
Item	<i>M</i>	<i>SD</i>	Range	Skewness	Kurtosis
1.	2.43	1.12	4	.38	-.62
2.	1.68	.88	4	1.44	2.05
3.	2.25	1.03	4	.68	-.01
4.	1.68	.88	4	1.37	1.55
5.	3.22	1.11	4	-.27	-.56
6.	2.04	1.08	4	.85	-.01
7.	1.99	.99	4	.88	.31
8.	1.59	.89	4	1.62	2.28
9.	1.46	.78	4	2.12	5.36
10.	1.60	.78	4	1.36	2.02
11.	1.46	.73	4	1.81	3.73
12.	1.62	.97	4	1.80	2.91
13.	1.58	.80	4	1.25	.83
14.	2.20	1.11	4	.60	-.48
15.	1.59	.92	4	1.58	1.93
16.	1.85	1.04	4	1.05	.25
17.	1.80	1.00	4	1.17	.70
18.	1.47	.83	4	1.80	2.67
19.	1.42	.80	4	2.04	3.72
20.	1.75	1.01	4	1.26	.79
21.	1.90	.98	4	1.36	1.98
22.	1.24	.61	4	3.07	10.49
23.	1.14	.45	4	3.50	12.96
24.	1.27	.67	4	2.70	7.21
Mardia's multivariate skewness and kurtosis					
	b		p-value		
Skewness	140.201		.000		
Kurtosis	873.630		.000		

PERITRAUMATIC DISTRESS INDEX: A FRENCH VALIDATION

Table S2

First Factorial Solution Obtained by the Confirmatory Factorial Analysis (n=492)

Items	Factor loading			
	NM	CC	SO	HI
1. Compared to usual, I feel more nervous and anxious.	.88			
2. I feel insecure and bought a lot of masks, medications, sanitizers, gloves and/or other home supplies.	.66			
3. I can't stop myself from imagining myself or my family being infected and feel terrified and anxious about it.	.71			
4. I feel empty and helpless no matter what I do.	.81			
5. I feel sad about the COVID-19 patients and their families.	.30			
6. I feel helpless and angry about people around me, the government, or the media.		.63		
7. I am losing faith in the people around me.		.66		
8. I collect information about COVID-19 all day. Even if it's not necessary, I can't stop myself.		.39		
9. I will believe the COVID-19 information from all sources without any evaluation.		.40		
10. I would rather believe in negative news about COVID-19 and be skeptical about the good news.	.64			
11. I am sharing news about COVID-19 (mostly negative news).	.46			
12. I avoid watching COVID-19 news, since I am too scared to do so	.65			
18. I feel dizzy or have back pain or chest distress.			.77	
19. I feel stomach pain, bloating, or other stomach discomfort.			.82	
22. I cannot sleep well, or dream about myself or my family being infected by COVID-19.			.77	
23. I lost my appetite.			.83	
24. I noticed changes when I go to the bathroom (constipation, diarrhea, frequent urination).			.76	
13. I am more irritable and have frequent conflicts with my family and loved ones.				.72
14. I feel tired and sometimes even exhausted.				.83
15. Due to feelings of anxiety, my reactions are becoming sluggish.				.91
16. I find it hard to concentrate.				.87
17. I find it hard to make any decisions.				.81
20. I feel uncomfortable when communicating with others.				.61
21. I talk to my family and loved ones (*)				-.02

Note. NM = negative Mood; CC = cognitive and behavioural change; SO = somatization; HI = hyperarousal and irritability. (*) Item reversed.

PERITRAUMATIC DISTRESS INDEX: A FRENCH VALIDATION

Table S4

Convergent Validity of the F-CPDI (n between 485 and 491)

	Psychological distress	Postpartum depression	Life satisfaction
F-CPDI	.37**	.36**	- .17**
<i>F-CPDI factors</i>			
NM	.17**	.21**	- .02
CC	.22**	.19**	- .17**
SO	.26**	.26**	- .11*
HI	.45**	.42**	- .22**

Note. NM = negative mood; CC = cognitive and behavioural change; SO = somatization; HI = hyperarousal and irritability. $r \geq .10$ weak; $\geq .30$ moderate; $\geq .50$ strong.

* $p < .05$, ** $p < .01$.