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ORIGINAL ARTICLE

Reappraising the dimensional structure of the PTSD Checklist: lessons from the DSM-IV-based PCL-C

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Objective: The dimensional structure of posttraumatic stress disorder (PTSD) has been extensively debated, but the literature is still inconclusive and contains gaps that require attention. This article sheds light on hitherto unvisited methodological issues, reappraising several key models advanced for the DSM-IV-based civilian version of the PTSD Checklist (PCL-C) as to their configural and metric structures.
Methods: The sample comprised 456 women, interviewed at 6-8 weeks postpartum, who attended a high-complexity facility in Rio de Janeiro, Brazil. Confirmatory factor analysis (CFA) and exploratory structural equation models (ESEM) were used to evaluate the dimensional structure of the PCL-C.
Results: The original three-factor solution was rejected, along with the four-factor structures most widely endorsed in the literature (PTSD-dysphoria and PTSD-numbing models). Further exploration supported a model comprised of two factors (re-experience/avoidance and numbing/hyperarousal).
Conclusion: These findings are at odds with the dimensional structure proposed in both DSM-IV and DSM-5. This also entails a different presumption regarding the latent structure of PTSD and how the PCL should be operationalized.

Keywords: posttraumatic stress disorder; psychometric tests/interviews; diagnosis and classification; epidemiology; women

Introduction

Data from 20 population surveys in the World Mental Health Survey Initiative showed a 12-month prevalence of posttraumatic stress disorder (PTSD) of 1.1%.[1] Research focused on postpartum women has shown overall prevalence rates ranging from 2 to 9%, rising to 15% in at-risk groups such as women reporting a psychiatric background, a history of trauma, or perinatal complications.[2] Identifying affected individuals is essential, given the adverse impact of PTSD on health and quality of life and the availability of effective treatments.

There are different tools to assess PTSD, some self-report and some interviewer-administered. A leading self-report scale is the Posttraumatic Stress Disorder Checklist (PCL). Developed by the U.S. National Center for PTSD,[3] the PCL has gained widespread use due to its ease and speed of administration.[4,5] While its original structure was based on the PTSD symptoms and diagnostic criteria defined in the DSM-IV-TR, the instrument has since been updated to match the new fifth edition of the DSM.[6]

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The DSM-IV-based PCL comprises 17 items addressing both the occurrence and the severity of symptoms, regardless of their relation to a specific traumatic event (Table 1).[3] In all PCL versions – C(ivilian), M(ilitary), and S(pecific), – its items have five levels indicating how much the respondent has been troubled by the symptoms in the past month. The item scoring system holds the PCL to a three-dimensional structure: re-experiencing (criterion B), avoidance and numbing (criterion C), and hyperarousal (criterion D).[7] In the revised fifth edition of the DSM, three symptoms were added, and the avoidance/numbing factor has been split into two criteria.[8] The new structure thus proposes four rather than three symptom clusters for PTSD.[6]

Among several motives and rationales, these changes have been driven by longstanding research on the dimensional structure of DSM-IV-based instruments, which has shown different configurations.[4,9,10] A review of factor-analytic studies which used the specific civilian version of the PCL applied in this study illustrates these divergences. Passos et al.[11] suggested a two-factor model, separating the symptoms into re-experiencing/avoidance and numbing/hyperarousal, whereas Conybeare et al.[12] endorsed a slightly different two-dimensional structure. Several models covering three,[13-15] four,[16,17] and even five factors[18-22] have been also put forth. Notably, of all psychometric studies carried out so far, only two effectively backed the original three-factor structure.[23,24]

Table 1 English version of the Posttraumatic Stress Disorder Checklist – Civilian Version (PCL-C)

Below is a list of problems and complaints that people sometimes have in response to stressful life experiences. Please read each one carefully, then indicate how much you have been bothered by that problem in the past month.

Not at all (1) A little bit (2) Moderately (3) Quite a bit (4) Extremely (5)

1. Repeated, disturbing *memories, thoughts*, or *images* of a stressful experience from the past?
2. Repeated, disturbing *dreams* of a stressful experience from the past?
3. Suddenly *acting* or *feeling* as if a stressful experience *were happening again* (as if you were reliving it)?
4. Feeling *very upset* when *something reminded you* of a stressful experience from the past?
5. Having *physical reactions* (e.g., heart pounding, trouble breathing, or sweating) when *something reminded you* of a stressful experience from the past?
6. Avoid *thinking about or talking about* a stressful experience from the past or avoid *having feelings* related to it?
7. Avoid *activities* or *situations* because *they remind you* of a stressful experience from the past?
8. Trouble *remembering important parts* of a stressful experience from the past?
9. *Loss of interest* in things that you used to enjoy?
10. Feeling *distant* or *cut off* from other people?
11. Feeling *emotionally numb* or being unable to have loving feelings for those close to you?
12. Feeling as if your future will somehow be *cut short*?
13. Trouble *falling* or *staying asleep*?
14. Feeling *irritable* or having *angry outbursts*?
15. Having *difficulty concentrating*?
16. Being "*super-alert*" or watchful on guard?
17. Feeling *jumpy* or easily startled?

Among these different models, two major four-factor models have been most frequently upheld in the literature. One is the PTSD-Dysphoria model proposed by Simms et al.,[16] which combined emotional numbing with three hyperarousal symptoms to form a distinct factor named dysphoria. The other three factors were held to involve re-experiencing, avoidance, and the remaining hyperarousal symptoms, respectively. This proposal has been tested in many studies,[13,18-22,25-32] but was supported in only four instances.[26,27,31,32]

The other four-tiered model was proposed by King et al.[33] Known as the PTSD-Numbing model, this solution split the symptoms of avoidance and numbing into different sets of factors, which were added to the original re-experiencing and hyperarousal factors to form a four-dimensional structure. This model was endorsed by many studies,[25,28-30,34-38] and ultimately shaped the new DSM-5 criteria.[8] However, as with all others in the psychometric literature alluded to thus far, this structure has been favored primarily on account of uncovered adequate model fit indices, and lacks appraisal of other relevant psychometric properties, such as discriminant factor validity and content redundancy of component items.

It bears stressing that several studies identified strong factor correlations.[17,20-22,24-27,29,30,35,37,38] However, none of those sought to extend these findings further and overtly investigate factor-based discriminant validity. Factors lacking this property might not hold separate dimensions of the construct, thus implying that a single-dimensional or higher-order structure warrants investigation.[39]

As for item redundancies,[39] two studies of the PCL-C successfully reported error correlations.[23,36] However, no attempt was made to address the errors thus detected, such as by removing one of the items involved or aggregating both contents into a single item to avoid content redundancy.

As indicated before, changes from the fourth to the fifth edition of the DSM – and, by extension, to the new PCL – were partly guided by one of the competing psychometric structures proposed in the literature. However, appraisal of the PTSD-Numbing model may have missed out important evaluation steps before it was endorsed. The absence of further scrutiny could call the endorsement of this four-factor solution, and the changes in DSM-IV that followed, into question. Thus, examining the dimensional structure of the previous version of the PCL may still be timely at this point, even as it is phased out in favor of the new, DSM-5-based version. Historically competing models suggested in the literature are worth reassessing, now with a special focus on factor and residual correlations and their consequences. Seeking to draw lessons from the DSM-IV-based PCL-C and instruct future research on the PCL-5, this article attempts to shed light on those hitherto unvisited methodological issues by reappraising the configural and metric structures of several key models proposed for the PCL-C.

Method

Participants and procedures

The study participants consisted of women who gave birth at a high-risk maternity service in Rio de Janeiro, Brazil, which serves as a referral hospital for fetal complications such as hemolytic disease of the newborn, birth defects, prematurity, and intrauterine growth restriction. Interviews took place 6-8 weeks after birth, during routine postpartum visits, from February to July 2011. Contact by aerogram and telephone was attempted to reschedule postpartum consultation for mothers who missed their appointments. Five hundred and thirty-two women were scheduled, but 16 (3%) had not given birth in the hospital and were thus ineligible. Of the remaining eligible subjects, 456 (88%) were interviewed. Of those, 65% women were approached at the scheduled dates, 18% attended on rescheduled dates, and 5% were contacted by phone.

All data were collected in a single sitting by trained female health professionals, using a standardized questionnaire. Interviews occurred in a reserved area without the presence of anyone but the interviewer and respondent. Women interviewed on the phone were also advised to do so in a secluded area. Participants gave their informed consent after anonymity and confidentiality of information were guaranteed. Women who showed high levels of symptoms of PTSD were referred to a specialized service. The study was conducted in conformity with the Declaration of Helsinki, and was approved by the hospital's research ethics committee.

The Brazilian Portuguese version of the PCL-C[40] was completed along with other instruments comprising a comprehensive multi-thematic questionnaire. In addition to exposure to a traumatic event (criterion A1, assessed through the Trauma History Questionnaire), suspicion of PTSD requires endorsing at least one clinically significant symptom (score 3 or higher) for criterion B, three for criterion C, and two for criterion D (also known as the symptom-cluster method of scoring).[3] Since the PCL-C items were not explicitly anchored to any specific trauma, any endorsement could be related to childbirth or to previous traumatic events.

Data analysis

Data analysis was carried in Mplus 7.4.[41] Preliminary analyses were conducted to examine the distributional properties of each item. The first step consisted of re-assessing the originally proposed three-factor structure based on the DSM-IV,[7] as well as the two tiers of the four-factor models proposed by Simms et al.[16] and King et al.,[33] respectively. For this purpose, a confirmatory factor analysis (CFA) was implemented. As appropriate to modeling of categorical items, all analyses employed the robust weighted least squares mean and variance adjusted estimator (WLSMV) and used polychoric correlation matrices.[39] Model fit was assessed through three indices. The root mean square error of approximation (RMSEA) is a model parsimony-adjusted fit index; values under 0.06 suggest adequate fit. The comparative fit index (CFI) and the Tucker-Lewis index (TLI) are incremental fit indices, comparing the specified model to a more restricted model. Both range from 0 to 1, and values above 0.95 indicate adequate fit.[39,42]

Factor-based discriminant validity was also evaluated in this step.[39,42] The evaluation of this property was based on the average variance extracted (AVE). The AVE assesses the amount of variance extracted in a factor compared to the amount of variance due to random measurement error, and ranges from 0 to 1. In multidimensional models, a factor is regarded as holding discriminant validity if the square root of the AVE is greater than its correlations with any other factor: $\sqrt{\rho_{ve(f_k)}} > \Phi_{(f_{(k)} f_{(k+1)})}$.[43] Differences between the square root of the AVE and factor correlations were formally tested. A statistically significant positive sign of this difference would endorse factor-based discriminant validity (i.e., non-violation), whereas a statistically significant negative sign would favor rejection. A nonsignificant difference, be it positive or negative, could be either an indication for or against a discriminant validity violation. Ninety-five percent confidence intervals (95%CIs) were obtained by the bootstrap method with 1,000 replications.

As we foresaw possible model misfit or plausible alternative dimensional structures, the next step consisted of re-evaluating the configural structure through exploratory analyses. A sequence of exploratory structural equation models (ESEMs) holding two to five factors were fitted.[39] ESEMs allow estimation of all loadings as in traditional exploratory models, but also enable assessment of other relevant features, such as item residual (error) correlations, $r_{(i_{(k)} i_{(k+1)})}$. The analyses used geomin oblique rotation.[41] Potential item residual correlations were examined through modification indices (MI), which reflect how much the overall model chi-square decreases if a constrained parameter is freely estimated. To complement the MIs, expected parameter changes (EPC) were also explored.[39]

The next step tested the "best" model identified before with a CFA model. In addition to re-evaluating factor loadings and item residual correlations in a confirmatory perspective, factor-based discriminant validity was also examined.

Results

The mean PCL-C score was 29.7 (standard deviation 11.4; range 17-81; 95%CI 28.6-30.7). By using the original DSM-IV algorithm outlined in the Methods, the prevalence of PTSD would be 9.4% (95%CI 7.1-12.5%). Mean maternal age was 25.5 years (range 13-47 years; 95% CI 24.8-26.2), and 28.1% (95%CI 24.1-32.4%) of participants were adolescents (age $<$ 20 years). Most of the participants had up to 12 years of schooling (87.7%; 95% CI 84.4-90.4%), about one-sixth were black (15.4%; 95% CI 12.3-19.0%), and almost half were first-time mothers (44.3%; 95%CI 39.8-48.9%). There were no missing values in the analyzed data set.

Table 2 shows the results of the initial CFAs. The original three-factor model (A) showed a borderline fit, unlike the four-factor models B and C, which fit adequately. However, some factor correlations exceeded the values of the square root of AVE, suggesting lack of factorial discriminant validity. The statistical significance of the differences between the square root of AVE per factor and the related factor correlations are shown in Table 3. In model A, the statistically significant negative signs concerning the second and the third factors suggest lack of discriminant validity. There was evidence of discriminant validity violation in the third and fourth factors of model B. Model C showed only one nonsignificant negative sign (third factor), which could be either an indication for or against a discriminant validity violation. Item 16 showed loadings $<$ 0.35 in all three models. The loading of item 17 reached 1.0 in model C, which indicates an estimation problem entailing model misspecification. The MIs suggested residual correlations between items 6,7 and 16,17, projecting EPC values of 0.46 and 0.31, respectively.

Subsequent one- to five-factor ESEMs were first implemented without specifying any residual correlation.

Table 2 Confirmatory factor analysis of the dimensional structure of the Posttraumatic Stress Disorder Checklist – Civilian Version (PCL-C)

	Model A (DSM-IV) Three-factor CFA				Model B (PTSD-numbing) Four-factor CFA					Model C (PTSD-dysphoria) Four-factor CFA				
	f1 $\lambda_{i(1)}$*	f2 $\lambda_{i(2)}$	f3 $\lambda_{i(3)}$	δ_i†	f1 $\lambda_{i(1)}$	f2 $\lambda_{i(2)}$	f3 $\lambda_{i(3)}$	f4 $\lambda_{i(4)}$	δ_i	f1 $\lambda_{i(1)}$	f2 $\lambda_{i(2)}$	f3 $\lambda_{i(3)}$	f4 $\lambda_{i(4)}$	δ_i
i1	0.77			0.41	0.77				0.41	0.77				0.41
i2	0.69			0.53	0.69				0.53	0.69				0.53
i3	0.81			0.35	0.81				0.35	0.81				0.35
i4	0.85			0.27	0.85				0.27	0.85				0.27
i5	0.75			0.45	0.75				0.44	0.75				0.44
i6		0.54		0.71		0.75			0.43		0.75			0.43
i7		0.56		0.69		0.76			0.43		0.76			0.43
i8		0.56		0.69			0.58		0.66			0.57		0.68
i9		0.63		0.60			0.66		0.56			0.65		0.58
i10		0.72		0.48			0.75		0.43			0.74		0.46
i11		0.74		0.45			0.77		0.40			0.76		0.43
i12		0.72		0.48			0.75		0.44			0.74		0.46
i13			0.69	0.53				0.69	0.53			0.68		0.54
i14			0.71	0.50				0.71	0.50			0.70		0.52
i15			0.72	0.48				0.73	0.48			0.71		0.49
i16			0.24	0.94				0.24	0.94				0.33	0.89
i17			0.67	0.55				0.67	0.55				1.0	0.00
$\sqrt{\rho_{ve(f\cdot)}}$‡	0.775 (0.740-0.811)	0.644 (0.599-0.689)	0.710 (0.670-0.750)		0.775 (0.740-0.811)	0.754 (0.694-0.815)	0.708 (0.661-0.756)	0.710 (0.670-0.750)		0.775 (0.740-0.811)	0.754 (0.694-0.815)	0.694 (0.652-0.735)	0.790 (0.486-1.09)	
$\Phi_{(f1,f2)}$§	0.809 (0.741-0.877)				0.695 (0.584-0.807)					0.695 (0.583-0.807)				
$\Phi_{(f1,f3)}$	0.735 (0.650-0.820)				0.727 (0.638-0.816)					0.745 (0.669-0.822)				
$\Phi_{(f1,f4)}$	-				0.735 (0.651-0.820)					0.465 (0.288-0.642)				
$\Phi_{(f2,f3)}$	0.916 (0.853-0.978)				0.489 (0.345-0.633)					0.513 (0.385-0.641)				
$\Phi_{(f2,f4)}$	-				0.540 (0.412-0.669)					0.373 (0.201-0.544)				
$\Phi_{(f3,f4)}$	-				0.916 (0.845-0.986)					0.591 (0.406-0.777)				
RMSEA	0.059 (0.051-0.068)				0.039 (0.029-0.048)					0.034 (0.024-0.044)				
CFI	0.947				0.978					0.983				
TLI	0.938				0.974					0.979				

CFA = confirmatory factor analysis; CFI = comparative fit index; PTSD = posttraumatic stress disorder; RMSEA = root mean square error of approximation (in brackets, 90% confidence intervals); TLI = Tucker-Lewis index.

* Loadings (standardized).

† Measurement errors (uniqueness).

‡ Square root of the average variance extracted; in brackets, 95% confidence intervals.

§ Factor correlations; in brackets, 95% confidence intervals.

Table 3 Differences between factor square roots of average variances extracted and related factor correlations

	$\sqrt{\rho_{ve(f1)}}$*	$\sqrt{\rho_{ve(f2)}}$	$\sqrt{\rho_{ve(f3)}}$	$\sqrt{\rho_{ve(f4)}}$
Model A (DSM-IV)				
$\Phi_{(f1,f2)}$†	-0.034	-0.165‡	-	-
$\Phi_{(f1,f3)}$	0.040	-	-0.025	-
$\Phi_{(f2,f3)}$	-	-0.272‡	-0.205‡	-
Model B (PTSD-Numbing)				
$\Phi_{(f1,f2)}$	0.080	0.059	-	-
$\Phi_{(f1,f3)}$	0.049	-	-0.019	-
$\Phi_{(f1,f4)}$	0.040	-	-	-0.025
$\Phi_{(f2,f3)}$	-	0.266§	0.219§	-
$\Phi_{(f2,f4)}$	-	0.214§	-	0.170§
$\Phi_{(f3,f4)}$	-	-	-0.207‡	-0.205‡
Model C (PTSD-Dysphoria)				
$\Phi_{(f1,f2)}$	0.080	0.059	-	-
$\Phi_{(f1,f3)}$	0.030	-	-0.052	-
$\Phi_{(f1,f4)}$	0.311‡	-	-	0.325
$\Phi_{(f2,f3)}$	-	0.242§	0.181§	-
$\Phi_{(f2,f4)}$	-	0.382‡	-	0.417§
$\Phi_{(f3,f4)}$	-	-	0.102	0.198

PTSD = posttraumatic stress disorder.
* Square root of the average variance extracted.
† Factor correlations.
‡ $p < 0.001$;
§ $p < 0.05$.

Again, MIs suggested residual correlations in both pairs, which were then freely estimated. As shown in Table 4, the one-dimensional model (D) showed poor fit. Most of the items loaded on the first two factors in the three- (F), four- (G), and five-factor (H) models. The other factors involved cross loadings and, in some cases, were composed of a single item, lacking theoretical intelligibility. The two-factor model (E), in turn, grouped items 1 to 7 on the first factor and items 8 to 17, except for item 16, in the second. Like the other three more complex solutions, this model also fit well.

Next, this bi-dimensional structure was tested in a confirmatory perspective (Table 5), which showed good fit and no additional residual correlations beyond those detected before. However, the $\sqrt{\rho_{ve(f_k)}}$ for both factors were lower than their correlation, with statistically significant negative differences, suggesting violation of factor-based discriminant validity.

Discussion

The PCL is an important tool for assessing PTSD and has been widely used in epidemiological studies. However, considering the extensive literature on the PCL-C, several unaddressed issues remain regarding dimensional properties and how to cluster the symptom set of PTSD.[5,9,10] To shed light on the debate, this study aimed to revisit the dimensional structure of the DSM-IV-based PCL-C. Reiterating the point made in the Introduction, this is not only important for proper use of the instrument and to understand the PTSD construct per se, but also to raise questions in regards to the currently recommended PCL-5.

Our results, as those of several previous studies,[4,9,10] did not support the three-factor model originally proposed in the DSM-IV.[7] Even more relevant is that, beyond adequate model fit, no support was found for either of the most tested and hitherto endorsed four-factor models – PTSD-Dysphoria[16] and PTSD-Numbing.[33] Despite the borderline factor-based discriminant validity found in these models, indications of residual correlations and model misspecification led us to explore alternative solutions.

Exploratory and confirmatory analyses to test for such solutions endorsed the tenability of a model comprised of only two specific factors, with two residual correlations involving items 6,7 and 16,17. The first factor encompassed symptoms of re-experiencing and avoidance, while the second clustered symptoms of numbing and hyperarousal. This solution suggested a group of symptoms directly related to the memory of the traumatic event per se (re-experiencing and avoidance), and another sharing several reactions to the trauma threat (numbing and hyperarousal).

This dimensional structure may not be a one-off. Although shown here for the first time in a civilian population, the same configuration was previously identified by Passos et al.[11] when assessing the PCL-C applied to a military sample. There is also some theoretical backing. Foa et al.[44] mentions the interconnectedness of these two dimensions, discussing how avoidance arises as a defense mechanism to repeated re-experiencing of a traumatic incident, and, similarly, how numbing and desensitizing effects emerge as a response to constant hyperarousal and stimulation. Further research showing that hyperarousal symptoms were the best predictors of numbing provides additional support for the present findings.[45] Our results are also in line with the criticisms to the increased number of latent factors and speculations about a more parsimonious latent structure of PTSD pointed out by Armour.[46]

The issue of residual correlations has been underexplored in the literature on the DSM-IV based PCL-C. The correlations between item pairs 6,7 and 16,17 are notable. Item 6 (avoid thinking about or talking about a stressful experience from the past or avoid having feelings related to it) and 7 (avoid activities or situations because they remind a stressful experience from the past) refer to very similar situations and are likely conditionally correlated due to content redundancy. From a substantive point of view, it would be inappropriate for any two indicators sharing the same content to be qualified as distinct and independent manifests. In this sense, neither the PTSD-Numbing nor the PTSD-Dysphoria models seem to express a faultless configural structure, precisely because they allocate these two items in a separate factor regardless of their content overlap. When the residual correlation between these two items was freely estimated as in Model I, both items localized fairly well to the first factor. To address this issue, a potential solution would be to remove one of the redundant items and assume that its informativeness carries over to the other. However, while possibly efficient from an operational stance, this option could lead to substance loss, since both types of avoidance are not totally exchangeable. This concern could be handled by merging the content (information) of both into

Table 4 Analysis of the dimensional structure of the Posttraumatic Stress Disorder Checklist – Civilian Version (PCL-C) using exploratory structural equation models

	Model D One-factor		Model E Two-factor			Model F Three-factor				Model G Four-factor					Model H Five-factor					
	f1 $\lambda_{i(1)}$*	δ_i †	f1 $\lambda_{i(1)}$	f2 $\lambda_{i(2)}$	δ_i	f1 $\lambda_{i(1)}$	f2 $\lambda_{i(2)}$	f3 $\lambda_{i(3)}$	δ_i	f1 $\lambda_{i(1)}$	f2 $\lambda_{i(2)}$	f3 $\lambda_{i(3)}$	f4 $\lambda_{i(4)}$	δ_i	f1 $\lambda_{i(1)}$	f2 $\lambda_{i(2)}$	f3 $\lambda_{i(3)}$	f4 $\lambda_{i(4)}$	f5 $\lambda_{i(5)}$	δ_i
i1	0.72	0.48	0.77	0.00	0.41	0.77	-0.00	0.19	0.37	0.78	0.02	-0.11	-0.01	0.37	0.89	0.02	-0.24	-0.03	0.03	0.32
i2	0.64	0.59	0.67	0.02	0.53	0.68	0.01	0.16	0.51	0.72	0.02	-0.16	-0.14	0.46	0.71	0.18	-0.05	-0.19	-0.03	0.46
i3	0.76	0.43	0.74	0.07	0.37	0.72	0.09	0.10	0.36	0.74	0.09	-0.04	-0.01	0.36	0.69	0.17	0.07	-0.02	-0.06	0.36
i4	0.80	0.37	0.94	-0.09	0.23	0.89	-0.01	-0.08	0.22	0.87	-0.03	0.16	0.03	0.22	0.89	-0.14	0.04	0.07	0.06	0.23
i5	0.70	0.51	0.67	0.08	0.47	0.62	0.14	-0.01	0.47	0.63	0.12	0.09	0.03	0.47	0.59	0.09	0.13	0.06	-0.01	0.47
i6	0.48	0.77	0.61	-0.09	0.70	0.57	-0.02	-0.13	0.68	0.54	-0.04	0.20	0.08	0.67	0.54	-0.17	0.11	0.12	0.03	0.66
i7	0.49	0.76	0.45	0.09	0.74	0.40	0.17	-0.27	0.65	0.40	0.11	0.30	-0.04	0.66	0.23	0.00	0.68	-0.03	0.01	0.36
i8	0.54	0.71	0.05	0.53	0.68	-0.01	0.59	-0.11	0.66	0.05	0.52	0.16	-0.04	0.66	-0.00	0.33	0.28	0.05	0.18	0.63
i9	0.61	0.63	0.03	0.62	0.59	0.01	0.62	0.08	0.59	0.00	0.61	0.06	0.32	0.51	0.03	0.35	0.00	0.46	0.05	0.49
i10	0.69	0.52	-0.02	0.76	0.44	-0.02	0.73	0.19	0.43	-0.04	0.76	-0.07	0.36	0.32	-0.02	0.56	-0.01	0.44	0.01	0.34
i11	0.72	0.49	0.02	0.74	0.43	0.00	0.74	0.12	0.43	0.08	0.70	-0.07	0.01	0.43	0.03	0.61	0.18	0.06	0.11	0.40
i12	0.70	0.51	-0.01	0.75	0.45	0.00	0.68	0.44	0.30	0.09	0.70	-0.37	0.01	0.30	0.07	0.80	-0.06	0.03	-0.04	0.31
i13	0.64	0.59	0.08	0.60	0.56	0.09	0.57	0.24	0.52	0.15	0.56	-0.18	0.01	0.52	0.17	0.54	-0.04	0.04	0.06	0.52
i14	0.66	0.57	0.14	0.57	0.55	0.03	0.70	-0.26	0.44	0.10	0.59	0.30	-0.06	0.45	0.27	0.03	0.02	0.08	0.55	0.42
i15	0.67	0.55	-0.15	0.86	0.42	-0.20	0.90	-0.01	0.41	-0.12	0.88	0.03	-0.26	0.29	-0.01	0.52	0.08	-0.13	0.48	0.32
i16	0.19	0.96	0.20	0.00	0.96	0.20	0.00	0.04	0.96	0.16	0.01	0.05	0.29	0.88	0.06	0.08	0.11	0.32	-0.26	0.86
i17	0.61	0.63	0.09	0.57	0.60	-0.01	0.68	-0.21	0.53	0.03	0.60	0.28	0.05	0.52	0.20	0.04	-0.04	0.20	0.49	0.49
$r_{(i6i7)}$ ‡	0.445		0.411			0.380				0.383					0.448					
$r_{(i16i17)}$	0.304		0.331			0.370				0.360					0.426					
RMSEA	0.065 (0.057-0.073)		0.037 (0.026-0.047)			0.029 (0.014-0.047)				0.025 (0.000-0.038)					0.022 (0.000-0.038)					
CFI	0.937		0.982			0.991				0.994					0.996					
TLI	0.926		0.976			0.985				0.989					0.991					

CFI = comparative fit index; RMSEA = root mean square error of approximation (in brackets, 90% confidence intervals); TLI = Tucker-Lewis index.
* Loadings (standardized).
† Measurement errors (uniqueness).
‡ Residual correlations

Table 5 Confirmatory factor analysis of a bi-dimensional structure for the Posttraumatic Stress Disorder Checklist – Civilian Version (PCL-C)

	Model ITwo-factor CFA		
	f1 $\lambda_{i(1)}$*	f2 $\lambda_{i(2)}$	δ_i †
i1	0.77		0.41
i2	0.69		0.53
i3	0.81		0.35
i4	0.85		0.27
i5	0.74		0.45
i6	0.53		0.72
i7	0.53		0.72
i8		0.57	0.68
i9		0.65	0.58
i10		0.74	0.46
i11		0.75	0.43
i12		0.73	0.46
i13		0.68	0.55
i14		0.69	0.52
i15		0.71	0.49
i16		0.20	0.96
i17		0.65	0.58
$\sqrt{\rho_{ve(f\cdot)}}$ ‡	0.675 (0.641-0.709)	0.636 (0.597-0.674)	
$r_{(i6i7)}$ §	0.404		
$r_{(i16i17)}$	0.300		
$\Phi_{(f1f2)}$ ‖	0.751 (0.674-0.828)		
$\sqrt{\rho_{ve(f1)}} - \Phi_{(f1f2)}$	-0.076¶		
$\sqrt{\rho_{ve(f2)}} - \Phi_{(f1f2)}$	-0.115¶		
RMSEA	0.033 (0.022-0.043)		
CFI	0.984		
TLI	0.981		

CFA = confirmatory factor analysis; CFI = comparative fit index; RMSEA = root mean square error of approximation (in brackets, 90% confidence intervals); TLI = Tucker-Lewis index.
* Loadings (standardized).
† Measurement errors (uniqueness).
‡ Square root of the average variance extracted; in brackets, 95% confidence intervals.
§ Residual correlations.
‖ Factor correlation; in brackets, 95% confidence interval.
¶ $p < 0.05$.

a single item. Future research, especially focusing on the PCL-5, could profit from assessing the clinimetric adequacy of effectively joining these items' semantic contents rather than simply merging the items in the data processing stage.

A similar strategy could be used to address content redundancy involving items 16 (being "super-alert" or watchful on guard) and 17 (feeling jumpy or easily startled). However, the limited reliability of item 16, as expressed by its small loading, suggested exclusion. In fact, previous studies using the Brazilian version of the PCL-C had already pointed out shortcomings in this item,[11,30] and speculated that semantic issues particular to the Portuguese version of the instrument would underlie this problem. However, a U.S.-based study by Shelby et al.[17] had also revealed poor reliability for this item, weakening the hypothesis of a mere local linguistic idiosyncrasy. Still, the residual correlation involving items 16 and 17 requires examination and corroboration before any radical measure is taken.

As noted in the Introduction, strong factor correlations have been identified by several studies.[17,20-22,24-27,29,30,35,37,38] Nevertheless, none of the studies inspected the potential lack of factorial discriminant validity. Comparing the square root of the AVE to factor correlation values allowed us to identify violations in this validity, suggesting factors that might not hold separate dimensions of the construct and implying that a single-dimensional or higher-order structure warranted investigation.[39]

These findings have direct implications for how the PCL measures are operationalized, be it as adjunctive tools for diagnosing PTSD or as instruments for epidemiological research. Based on the evidence that the dimensional structure proposed in the DSM-IV may not hold, by extension, using the respective symptom cluster criteria for PTSD may also be inadequate. Finding an alternative diagnostic proposal based on a bi-dimensional symptom structure could be an interesting development. To strengthen this, however, the present findings need replication in studies using the PCL-5, carried out in different socio-linguistic and cultural contexts and including men and women outside the postpartum period. Furthermore, new research will be necessary to evaluate appropriate cutoff points for classifying individuals into broad yet class-homogenous groups, especially in light of the added set of items proposed for the PCL-5.

The results of this study should be viewed with its limitations in mind. First, generalization of the current findings requires caution. Since this study was restricted to postpartum women attending a high-risk maternity facility and no validation sample was involved, further evidence is still needed to establish whether measurement invariance and stability would hold across other population domains as well, including populations with different estimates of PTSD prevalence. However, it should be noted that the PCL-C items were not anchored to any specific event; thus, the measured symptoms could be related to different traumas. Therefore, the pattern of symptoms presented in this sample should not differ much from that of the base population. Second, although a thorough cross-cultural adaptation process was followed for the Portuguese version used herein,[40] translation issues may have affected response patterns and assessment of the instrument's dimensional structure. However, as mentioned above, the small loadings of item 16 across the board may be revealing.

Although we assessed an instrument based on DSM-IV-defined symptoms and diagnostic criteria, which precluded any inferences about DSM-5, our findings still point to a very different dimensional structure from that built into this last edition of the Manual. As brought up earlier, the reformulation of the diagnostic criteria in this version, which adopted the PTSD-Numbing model, was partly based on studies that, to the best of our understanding, fell short in evaluating important properties such as factorial discriminant validity and residual correlations. In light of the configural structure uncovered in the current study, it seems prudent not only to examine the updated PCL-5,[6] but also to revisit the dimensional structure of the underlying DSM-5 from this new perspective.

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Disclosure

The authors report no conflicts of interest.

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