BRIEF REPORT

Preliminary Evidence for Internal Structure, Sensitivity, and Specificity of a Brief PTSD and Complex PTSD Measure in Adolescents

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Early detection of trauma-related psychopathology is fundamental for preventing symptom escalation in adolescents, and this strategy can be carried out by developing accurate measures. The aim of this study is to provide preliminary evidence for the internal structure, construct validity, reliability, sensitivity, and specificity of a brief screening instrument for posttraumatic stress disorder (PTSD) and complex PTSD (C-PTSD) in general population adolescents. 1,501 Chilean adolescents participated by responding to the Brief PTSD scale (BPTSD) along with a battery of additional questionnaires. The internal structure of the eight-item BPTSD was assessed through exploratory and confirmatory factor analyses, while criterion validity was assessed through receiver-operating characteristic (ROC) curves. Confirmatory factor analysis (CFA) demonstrated a two-dimensional internal structure that is in accordance with literature regarding C-PTSD. Our results suggest that BPTSD may measure PTSD with complex features rather than C-PTSD. The scale showed adequate reliability, and criterion validity. The BPTSD is a brief, reliable, and simply-worded measure for PTSD symptoms and C-PTSD features in adolescents.

Public Significance Statement
PTSD and complex PTSD can be severe in adolescents. Detection of PTSD symptoms is fundamental for early intervention in trauma, but it requires simple yet effective measures. The adjusted BPTSD is a short and reliable measure that assesses PTSD symptoms and complex PTSD features in the general population, adolescents, and young people.

Keywords: screening, posttraumatic stress disorder, complex PTSD, adolescents, CFA

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A recent review of the literature on posttraumatic stress disorder (PTSD) has given newfound relevance to a sibling disorder, complex PTSD (C-PTSD; Brewin et al., 2017; Hyland et al., 2017; Keeley et al., 2016). C-PTSD has been characterized by the fulfillment of all PTSD criteria along with marked disturbances in the self-organization (DSO; Cloitre et al., 2018). This diagnosis has been widely studied, but there are discordances regarding its definition and prevalence. One of the main issues that stems from these disagreements is the difficulty for the adequate measurement of the clinical characteristics in these trauma-related disorders.

As most mental disorders have their onset by adolescence and early adulthood (Mei et al., 2020), exploring the diagnosis, development, and course of trauma-related psychopathology in adolescence is particularly relevant (Berliner et al., 2020). Evidence-based interventions can benefit individuals diagnosed with PTSD (Olff et al., 2020), which require timely and accurate detection and diagnosis of simple and complex PTSD (Bisson et al., 2020).

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Accordingly, early detection of trauma-related psychopathological symptoms in adolescents is strongly encouraged nowadays (Berliner et al., 2020; Falissard, 2016). Self-report screening questionnaires for psychopathology are the most used tools for this purpose (Steel et al., 2011). However, they can present difficulties such as length, clarity, and population specificity (Steel et al., 2011), and literature has stated that an effective early detection approach requires the usage of valid, reliable, brief, and easy-to-apply measures (Brewin, 2005).

Although there are PTSD self-report questionnaires validated for adolescents (Guerra et al., 2013; Haselgruber et al., 2020; Hyland et al., 2017; Vera-Villarroel et al., 2011), these can be lengthy and regularly do not assess the complex manifestations of PTSD. Thus, we argue that screening PTSD and C-PTSD symptoms through brief measures with adequate psychometric properties could improve the early detection and intervention strategies for adolescents. Therefore, we sought to provide preliminary evidence for the internal structure, construct validity, reliability, sensitivity, and specificity of a brief screening instrument for PTSD and C-PTSD, previously developed by the National Psychotrauma Center in Netherlands, in adolescents from the general population. Additionally, we tested the external validity of the Brief PTSD Scale questionnaire analyzing the associations with comorbid clinical symptoms, such as suicidal ideation (Panagioti et al., 2015), depressive, and anxiety symptoms (Yatham et al., 2018), hypothesizing that external validity will be effectively captured using these variables, as they show relevant associations with PTSD.

Materials and Method

Sample

We conducted a cross-sectional study with a final sample of 1,501 adolescents aged 12-20 years (M_{age} = 16.04, SD = 1.45, women = 54.1%). No participant reported being gender diverse in this study. 131 participants had been excluded due to missing data, which did not depend on demographic variables or clinical severity, addressed by the scores on depression, anxiety, and stress, as confirmed by the Little's test (Little, 1988).

Measures

Brief PTSD Scale (BPTSD)

This is a self-report scale assessing PTSD and C-PTSD symptoms. It encompasses two factors; PTSD (five items) and DSO (three items; see Supplemental Table 1). The five items assessing PTSD are based on the PCL-5 scale (Weathers et al., 2013) and Primary Care PTSD Screenfor DSM-5; PC-PTSD-5 (Prins et al., 2016). The DSO symptom cluster includes affective dysregulation, negative self-concept, and difficulties in interpersonal relationships, based on Cloitre et al. (2013) and the Structured Interview for Disorders of Extreme Stress; SIDES (Pelcovitz et al., 1997). The measure format is a 5-point Likert scale (1 = never, 2 = rarely, 3 = occasionally, 4 = often, 5 = very often). The total score is estimated by adding the score obtained in each item.

PTSD Checklist, Civilian Form (PCL-C; Weathers et al., 1994)

This is a 17-item measure of PTSD symptomatology and severity (American Psychiatric Association, 1994). Respondents rate how much each symptom has bothered them in the past month using a 5-point scale (1 = not at all to 5 = extremely). A total score is calculated by summing all items. This measure was used as it was the only brief PTSD questionnaire validated in the Chilean population at the time of the data collection (Vera-Villarroel et al., 2011). Overall Cronbach's α for this measure was .92 in our sample.

The Depression, Anxiety, and Stress Scale (DASS-21, Lovibond & Lovibond, 1995)

This is a 21-item self-report questionnaire with three subscales assessing depressed mood, clinical anxiety, and stress, organized in a 5-point scale. Overall Cronbach's α value for this measure was .94 in our sample.

The Columbia-Suicide Severity Rating Scale (Posner et al., 2011)

The Columbia-Suicide Severity Rating Scale (C-SSRS) adapted the first subscale to be used as a self-report questionnaire (Núñez et al., 2018), assesses severity of suicidal ideation, rated on a 6-point ordinal scale. Overall Cronbach's α value for this measure was .86 in our sample.

Procedure

The English version of the questionnaire was translated and adapted to the Spanish language (Muñiz et al., 2013). The items were independently translated by three Spanish-speaking psychologists (PhD). Given the high interrater agreement obtained during the first retrotranslation, no additional changes were conducted. The agreement was reached by consensus, based on panel discussion. Thus, only qualitative criteria were used. Public schools were invited to participate in the study, and written informed consents were obtained from the participants and their caregivers. Participants detected with elevated suicidality (19%) were referred to mental health professionals. All procedures were approved by the Bioethics Committee of Universidad de Talca, code 18/2018.

Data Analysis

Factor Analyses

We conducted an exploratory factorial analysis (EFA) with one half of the sample and confirmatory factor analysis (CFA) with the other (Anderson & Gerbing, 1988). We used an oblique Geomin rotation, with a weighted least square mean and variance (WLSMV) estimator. The goodness-of-fit levels were examined for each model through the comparative fit index (CFI) >95; root-mean-square error of approximation (RMSEA) <.08; standardized root-mean-square residual (SRMR) <.08; and Tucker–Lewis index (TLI) >.90 (Hu & Bentler, 1999). The CFA analysis was performed through a polychoric correlation matrix with WLSMV estimator, as our data is ordinal and without multivariate normality (Mardia's test = .000; Rhemtulla et al., 2012).To decide the best fit, we used chi-square to the degree of freedom, CFI and TLI, RMSEA, and weighted root mean square residual (WRMR; DiStefano et al., 2017), after eliminating the items that presented loading issues. Additionally, we tested EFA and CFA with a subsample of participants who had

reported a traumatic event ($n = 233$). These analyses were conducted with the Mplus 7 software (Muthén & Muthén, 1998-2012).

Reliability and Criterion Validity

Internal consistency and homogeneity of the items were assessed through Cronbach's α, McDonald's ω, and item-total correlations. Additionally, we assessed convergent validity of the BPTSD questionnaire as correlation coefficient with PCL-C. Lastly, we conducted a receiver-operating characteristic (ROC) curve to determine the sensitivity and specificity of the BPTSD compared to the criteria of PCL-C. These analyses were carried out with Statistical Package for the Social Sciences (SPSS) version 18.

Results

Descriptive Statistics and Correlation Analyses

Descriptive data are depicted in Table 1. To evaluate the prevalence of probable PTSD as measured by PCL and BPTSD as is, answers were recorded to binary, where 0 (1–2) and 1 (3–5). PCL (17.7%) and BPTSD (15.7%) displayed a similar prevalence for PTSD (Supplemental Table 2). Probable C-PTSD (i.e., sum of all eight items) reached a prevalence of 5.6%. We observed strong and significant associations between the total scores of PCL and BPTSD ($r = .83$, $p < .001$). All associations between BPTSD scores, PCL scores, suicidality, depression, anxiety, and stress were significant (Supplemental Table 3).

Factor Analyses

An exploratory factor analysis yielded that the structure with the best fit encompasses two factors, $\chi^2(13) = 79.513$, $p < .001$, RMSEA = .084, SRMR = .027, CFI = .989, TLI = .976. Items 1–5 loaded in Factor 1, and Items 6-8 loaded in Factor 2. However, we observed items with relevant cross-loading (Items 4 and 5, and to a lesser extent, Item 8; see Table 2). Confirmatory factor analysis (CFA) model showed a subpar fit, $\chi^2(19) = 349.513$, $p < .001$, RMSEA = .150, CFI = .955, TLI = .934, Bayesian information criterion; BIC = 29209.717, with a high factor correlation ($r = 0.846$; $p = .00$). Subsequently, we tested a two-factor model excluding the Items 4, 5, and 8. This model indicated a good fit, $\chi^2(4) = 4.830$, $p = .305$, RMSEA = .016, CFI = 1.000, TLI = .999;

Table 2
EFA Loadings

Item	1	2
1. I have experienced undesired memories or unpleasant dreams about what happened.	0.714*	0.011
2. I have felt emotionally distressed when something has reminded me of what happened.	0.951*	–0.086
3. I have avoided thoughts or conversations, or things/activities/places that are related to what happened.	0.776*	0.032
4. I have had strong negative feelings, such as fear, horror, wrath, guilt, or shame.	0.479*	0.420*
5. I have felt constantly on guard, alert, or easily startled.	0.350*	0.441*
6. I tend to feel useless.	–0.050	0.866*
7. I have felt distant from other people.	0.021	0.812*
8. I have experienced outbursts I cannot control.	0.233*	0.482*

Note. EFA = exploratory factorial analysis.
* $p < .05$.

Figure 1). The two-factor CFA model with a subsample of participants reporting trauma ($n = 233$) is shown in Table 3.
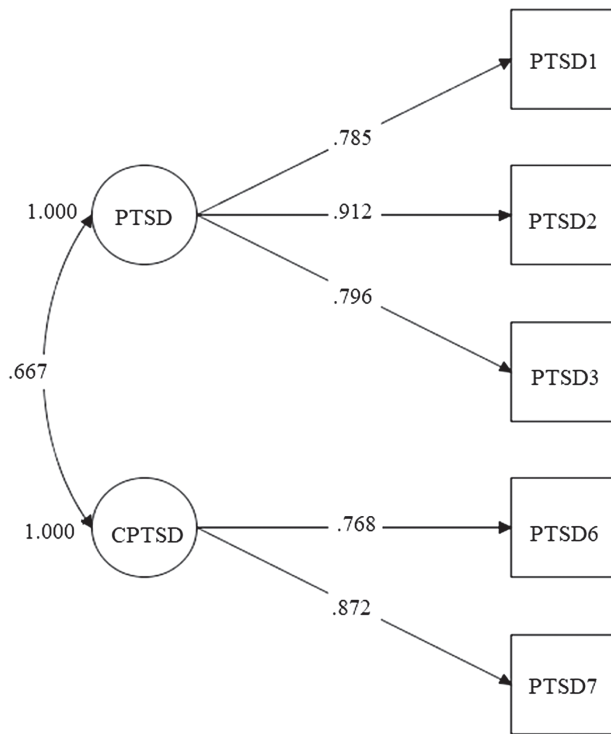
Reliability Analyses and ROC Curves

The reliability of the complete instrument was good (α = .883, ω = .884). Considering Items 1, 2, 3, 6, and 7, BPTSD showed similar results (α = .827, ω = .829). PCL showed excellent reliability (α = .922, ω = 924) in our sample. Item-test correlation indicated very good discrimination values for all items in both measures (Supplemental Table 4). The area under the curve (AUC) for Items 1, 2, 3, 6, and 7 (i.e., complete adjusted scale) was .903, while the AUC of PTSD cluster (Items 1, 2, and 3) was estimated at .858 (Supplemental Figure 1). ROC curves for the subsample that reported experiencing a traumatic event showed an AUC of .882 and .835 for C-PTSD and PTSD clusters, respectively. Sensitivity and specificity values at various cut-points are given in Table 4.

Discussion

This is the first study exploring psychometric properties of the BPTSD, a brief screening questionnaire for PTSD and C-PTSD.

Table 1
Descriptive Data of the Study's Variables

Variables	Total ($N = 1,501$)		Male ($N = 713$)		Female ($N = 788$)		$F(1, 1403)$	p	ω^2
	M	SD	M	SD	M	SD			
PCL	31.27	12.58	28.42	11.47	33.81	12.99	67.022	<.001	.04
BPTSD	11.43	4.85	10.17	4.43	12.56	4.92	89.934	<.001	.05
C-BPTSD	17.50	7.10	15.70	6.55	19.10	7.19	85.277	<.001	.05
SUIC	1.41	2.19	.83	1.64	1.94	2.47	95.566	<.001	.05
DASS-T	36.41	14.52	33.24	12.77	39.24	15.40	62.156	<.001	.04
DASS-D	12.03	5.67	10.93	4.97	13.02	6.08	48.904	<.001	.03
DASS-A	11.68	4.89	10.77	4.28	12.50	5.25	45.326	<.001	.03
DASS-S	12.69	5.41	11.54	4.83	13.72	5.68	58.775	<.001	.04

Note. PCL = PTSD scores in PCL; BPTSD = PTSD scores in BPTSD; C-BPTSD = Complex PTSD scores in BPTSD; SUIC = suicidality score; SUICLIFE = suicidality score in lifetime; SUICMONTH = suicidality score last month; DASS-T = total DASS score; DASS-D = DASS depression score; DASS-A = DASS anxiety score; DASS-S = DASS stress score.

Figure 1
CFA Model for Adjusted Brief PTSD Scale

Note. CFA = confirmatory factor analysis; PTSD = posttraumatic stress disorder; CPTSD = complex posttraumatic stress disorder.

BPTSD showed similar PTSD prevalence as to the PTSD checklist, and somewhat similar C-PTSD prevalence to recent literature (Elliott et al., 2021). PTSD prevalence was similar for both measures. EFA and CFA findings indicated that the best fit for internal structure was a two-factor model. This finding was based on the removal of three items, which was maintained when testing this structure on a subsample of participants with traumatic experiences. Lastly, reliability and criterion validity were good for the measure, in both general and trauma-reporting samples.

Our EFA and CFA findings indicated that the C-PTSD construct, as measured by BPTSD, was better represented by two highly associated dimensions, probably corresponding to PTSD and symptoms regarding DSO. These results are consistent with the factorial analyses performed with other trauma measures in different samples, where the two-factor model presented the best fit (Brewin et al., 2017; Cloitre et al., 2011; Haselgruber et al., 2020). However, our

results also showed that the best fit of the two-factor model occurred when items with cross-loadings were eliminated. As frequently observed in studies on PTSD measures, we found cross-loading issues (Fresno et al., 2020), and our final model comprised five items. Although it is a considerable item reduction, our decision was based on two reasons. First, we aimed to identify a reduced number of items that represent core PTSD symptoms and allow the detection of individuals with possible PTSD, as highlighted by Franklin et al. (2018). Second, the examined model adjusts to acceptable psychometric parameters (Hu & Bentler, 1999). In our final model, distinctive symptoms of PTSD such as intrusion and avoidance are maintained (Franklin et al., 2018). Although the Item 5, assessing hyperarousal symptoms, is theoretically relevant, there is contradictory evidence regarding its factorial weight in adolescents (Thatcher & Krikorian, 2005; Wang et al., 2015). Thus, and given both its low weight in PTSD factor and its relevant cross-loading, we decided to exclude the item. However, because of its theoretical relevance, it might be included in future studies. Item 4, referring to negative feelings, such as fear, horror, wrath, guilt, or shame, was also excluded as it is not considered a PTSD core symptom (Franklin et al., 2018), and presented a relevant cross-loading. This may be due to a wording issue, since the item simultaneously includes feelings of fear and horror, as well as guilt and shame, these last two characteristics being more typical of a negative self, and therefore closer to DSO symptoms than PTSD. In the five-item model, factor two includes two of the three characteristics of DSO symptoms, a worthless self, represented by Item 6 ("I tend to feel useless"), and difficulties in relationships, represented by Item 7 ("I have felt distant from other people"). Item 8 was not considered in the final model, due to the cross-loading and the low factorial weight, and also as its wording would be closer to represent only one of the two types of affect regulation difficulties, the hyperactivation pole (Bondjers et al., 2019).

Considering that five items may not be enough to suggest a completely differentiated detection of PTSD and C-PTSD symptoms, the BPTSD is an instrument that effectively measures PTSD with complex features, rather than PTSD and complex PTSD. Similar results were found in the subsample of participants experiencing a traumatic event in their lifetime. Additionally, our results provided strong support for the validity and reliability of the measure using the modified five-item version. Notably, as measured by the AUC values, the BPTSD questionnaire performs well upon comparison with the PTSD checklist.

This study provided evidence for a brief-screening tool for PTSD symptoms in adolescents, which has been strongly encouraged (Berliner et al., 2020; Bisson et al., 2020). Moreover, the questionnaire contributes to assess PTSD and its complex presentations in children and adolescents, which is a need, considering that there are

Table 3
CFA Adjustment Parameters (WLSMV)

Tested models	χ^2	df	p	RMSEA	CFI	TLI
2-factor model (eight items)	349.513	19	0.000	0.150	0.955	0.934
2-factor model (five items)	4.830	4	0.305	0.016	1.000	0.999
PTSD subsample 2-factor model (eight items)	146.934	19	0.000	0.170	0.925	0.889
PTSD subsample 2-factor model (five items)	10.213	4	0.037	0.082	0.994	0.985

Note. CFA = confirmatory factor analysis; WLSMV = weighted least square mean and variance; RMSEA = root-mean-square error of approximation; CFI = comparative fit index; TLI = Tucker–Lewis index; PTSD = posttraumatic stress disorder.

Table 4

Cut-Off Points for BPTSD in the Total Sample and Subsample

Samples	Sensitivity	Specificity	Positive if >	AUC	Std. error
Total sample					
PTSD	0.919	0.679	6.5	0.858	0.011
	0.845	0.719	7.5		
	0.714	0.815	8.5		
C-PTSD	0.901	0.755	12.5	0.903	0.009
	0.835	0.816	13.5		
	0.739	0.867	14.5		
Trauma-exposed sample					
PTSD	0.886	0.607	7.5	0.835	0.026
	0.773	0.690	8.5		
	0.693	0.814	9.5		
C-PTSD	0.955	0.6	12.5	0.882	0.022
	0.886	0.676	13.5		
	0.807	0.766	14.5		
	0.739	0.828	15.5		

Note. BPTSD = brief posttraumatic stress disorder scale; AUC = area under the curve; PTSD = posttraumatic stress disorder; C-PTSD = complex posttraumatic stress disorder.

effective and reliable measures for PTSD and C-PTSD in clinical and general populations (Olff et al., 2020), but not for young people (Hawkins & Radcliffe, 2006). Therefore, and because of the detrimental effects trauma can have on every aspect of their development (Alisic et al., 2020; Lewis et al., 2019), our findings have clear clinical implications. The reliability and succinctness of this measure allow for its use in mass and public health settings, where extensive application times are not possible. This is regarded as one of its main advantages. Some limitations deserve mention. As the BPTSD has fewer items, these tend to be more general than the ones portrayed in other trauma exposure measures (Carlson et al., 2011). Thus, the scale might not adequately capture some PTSD symptoms. It is assumed that the symptoms of PTSD and C-PTSD are associated with a potentially traumatic event; however, this information was not available in our study. This implies that the participants may be reporting symptoms that are not necessarily associated with a traumatic event, affecting the fit of the model.

In conclusion, our results showed that this questionnaire is a reliable measure for PTSD with complex features in adolescents from the general population. This measure can be included in screenings aimed at detecting adolescents at risk for psychopathology in educational settings, contributing to necessary early detection processes. Further research is needed to expand upon these results using clinical populations.

Résumé

La détection précoce de psychopathies liées aux traumatismes est fondamentale pour prévenir l'escalade des symptômes chez les adolescents, et cette stratégie peut être réalisée en développant des mesures précises. L'objectif de cette étude est de fournir des preuves préliminaires de la structure interne, de la validité de construction, de la fiabilité, de la sensibilité et de la spécificité d'un bref instrument de dépistage du trouble de stress post-traumatique (PTSD) et du TSPT complexe (C-PTSD) chez des adolescents de la population générale. 1 501 adolescents chiliens ont participé à l'étude en répondant à la brève échelle du TSPT (BPTSD) ainsi qu'à une batterie de questionnaires supplémentaires. La structure interne de l'échelle BPTSD à huit items a été évaluée par des analyses factorielles exploratoires et confirmatoires, tandis que la validité des critères a été évaluée par des courbes de fonction d'efficacité du récepteur (ROC pour receiver-operating characteristic). L'analyse factorielle confirmatoire (CFA) a démontré une structure interne bidimensionnelle qui est en accord avec la littérature concernant le TSPT complexe. Nos résultats suggèrent que le BPTSD pourrait mesurer le TSPT avec des caractéristiques complexes plutôt que le TSPT complexe. L'échelle a montré une fiabilité et une validité de critère adéquates. Le BPTSD est une mesure brève, fiable et simple pour les symptômes du TSPT et les caractéristiques du TSPT complexe chez les adolescents.

Mots-clés : dépistage, trouble de stress post-traumatique, TSPT complexe, adolescents, CFA

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