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Assessing Reliability and Validity of the Child PTSD Symptom Scale in Portuguese Adolescents

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Abstract:	<p>Objective - This study assessed psychometric properties of a self-reported measure of posttraumatic stress disorder (PTSD) for adolescents based on DSM-5 criteria – the Child PTSD Symptom Scale. We tested the confirmatory factor analysis (CFA), internal consistency, test-retest reliability, and convergent validity. Method - The participants were 317 Portuguese adolescents (53% females) between 13 and 17 years old who had experienced at least one traumatic event or one childhood adversity. A subset of the sample (n = 85) completed test-retest measures (interval range between 5 and 7 months). Results - The CFA confirmed the PTSD four-factor model according to the DSM-5, $\chi^2/df = 1.84$, CFI = .95, TLI = .94, SRMR = .04, RMSEA = .05 CI [.04 - .06]. Analyses also revealed good to excellent internal consistencies, moderate to good agreement test-retest reliability, and good convergent validity. Conclusions - Results supported the use of the CPSS-5 scale as a valid and reliable measure for the identification of PTSD symptoms and probable diagnosis according to DSM-5 criteria in Portuguese adolescents. These findings also provide evidence for the international validation of the Child PTSD Symptom Scale based on DSM-5 criteria.</p>
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Dear Dr. Cyril Tarquinio

Editor of the European Journal of Trauma & Dissociation

I would like to submit the following paper for possible publication in European Journal of Trauma & Dissociation, entitled “Assessing Reliability and Validity of the Child PTSD Symptom Scale in Portuguese Adolescents”. All the authors of the research have agreed to the submission of the paper and I have assumed responsibility for keeping them informed of our progress through the editorial review process, the content of the reviews, and any suggested revisions. This paper has not been submitted elsewhere.

Please let me know if you need anything further. I look forward to hearing from you.

Yours sincerely,

Ricardo Pinto, on behalf of all authors

Assessing Reliability and Validity of the Child PTSD Symptom Scale in Portuguese
Adolescents

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Abstract

Objective. - This study assessed psychometric properties of a self-reported measure of posttraumatic stress disorder (PTSD) for adolescents based on DSM-5 criteria – the Child PTSD Symptom Scale. We tested the confirmatory factor analysis (CFA), internal consistency, test-retest reliability, and convergent validity. **Method.** - The participants were 317 Portuguese adolescents (53% females) between 13 and 17 years old who had experienced at least one traumatic event or one childhood adversity. A subset of the sample ($n = 85$) completed test-retest measures (interval range between 5 and 7 months). **Results.** - The CFA confirmed the PTSD four-factor model according to the DSM-5, $\chi^2/df = 1.84$, CFI = .95, TLI = .94, SRMR = .04, RMSEA = .05 CI [.04 - .06]. Analyses also revealed good to excellent internal consistencies, moderate to good agreement test-retest reliability, and good convergent validity. **Conclusions.** - Results supported the use of the CPSS-5 scale as a valid and reliable measure for the identification of PTSD symptoms and probable diagnosis according to DSM-5 criteria in Portuguese adolescents. These findings also provide evidence for the international validation of the Child PTSD Symptom Scale based on DSM-5 criteria.

Keywords: adolescents, CPSS-5, posttraumatic stress symptoms, psychometric properties

Assessing Reliability and Validity of the Child PTSD Symptom Scale in Portuguese

Adolescents

Trauma exposure is highly prevalent in children and adolescents, with two in every three reporting having been exposed to at least one traumatic event by 16 years of age (Copeland, Keeler, Angold, & Costello, 2007). Recent findings indicate that 16% of children and adolescents exposed to trauma develop PTSD (Alisic et al., 2014). Thus, this is a high-risk group for whom assessment of PTSD is essential. The prevalence of PTSD also varies according to gender and type of trauma. A meta-analysis from Alisic and colleagues (2014) on rates of PTSD on children and adolescents, with 72 peer-review articles on 43 independent samples ($n = 3563$) reveals that overall, trauma-exposed girls (20.8%) rather than trauma-exposed boys (11.1%) are more prone to develop PTSD. Besides, the exposure to interpersonal trauma leads to higher rates of PTSD prevalence, both in boys (16.8 %) and girls (32.9%), comparatively to the exposure to non-interpersonal trauma, 8.4% and 13.3%, respectively (Alisic et al., 2014). Additionally, the prevalence of trauma exposure and PTSD among adolescents also be affected where they live and by their socioeconomic status, ethnicity, and cultural groups (e.g., Andrews et al., 2015; Kaur & Kearney, 2013; Klodnick, Guterman, Haj-Yahia, & Leshem, 2014; López et al., 2017). For instance, two previous studies with Portuguese adolescents revealed that 26.2% (Pinto et al., 2017) and 30.6% (Correia-Santos et al., 2019) of the sample met the criteria for probable PTSD, substantially higher compared with the 16% reported in the meta-analysis from Alisic and colleagues (2014).

Considering adolescents specifically, they are almost twice as likely as adults to be exposed to traumatic events and if exposed, to develop PTSD symptoms (Nooner et al., 2012). During adolescence, risk-taking behaviors increase, as a result of changes in the brain's socio-emotional system (Steinberg, 2008), as well as when they perceive their social support to be negative (Collishaw et al., 2007; Nooner et al., 2012). These risk-taking behaviors are

associated with higher risk for both trauma exposure (Collishaw et al., 2007; Pat-Horenczyk et al., 2007) and the development of PTSD symptoms (Nooner et al., 2012; Pat-Horenczyk et al., 2007). In addition, the dependence that adolescents have on their parents may also enhance their risk for PTSD since poor parenting (Kelley et al., 2010) or parental psychopathology (Pine & Cohen, 2002) can exacerbate PTSD symptoms.

Additionally, Noonan and colleagues (2012) conducted a review on factors related to posttraumatic stress disorder in adolescence, and the results showed that trauma-exposed adolescents report high comorbidity between PTSD and substance-use disorder, as well as PTSD and depression and anxiety. Moreover, the same study revealed that 33% of adolescents with PTSD also reported attempted suicide. Besides, adolescents with PTSD are at increased risk for violent behaviors (Aebi et al., 2017), and display lower academic achievement compared with children who have been exposed to trauma but have not developed PTSD (Saigh, Yasik, Oberfield, Halamandaris, & Bremner, 2006; Samuelson, Krueger, Burnett, & Wilson, 2010). Adolescents with PTSD have also shown reduced gray matter volume in fear regulatory areas, such as reduced hippocampal volume (Keding & Herringa, 2015) and reduced amygdala (Wolf & Herringa, 2016) and ventral medial prefrontal cortex (Morey, Haswell, Hooper, & De Bellis, 2016), which impaired fear regulation. In sum, these are some examples about how this particular mental disorder really harm adolescents and highlights the need for PTSD assessment to be a public health concern.

In the Diagnostic and Statistical Manual of Mental Disorders 5 (American Psychiatric Association, 2013), the PTSD diagnosis experienced some meaningful changes, when compared with DSM-IV (Zoellner, Bedard-Gilligan, Jun, Marks, & Garcia, 2013). Instead of being considered an anxiety disorder, PTSD is now categorized as a trauma and stress-related disorder (American Psychiatric Association, 2013). The DSM-5 increased the number of symptom groups from three to four and the number of symptoms from 17 to 20. These symptom

groups include intrusion, avoidance, negative alterations in cognition and mood, and alterations in arousal and reactivity. The new symptom organization separated the avoidance and numbing symptoms into different groups. The two avoidance items from the DSM-IV-TR avoidance/numbing group (criterion C) now comprise the DSM-5 avoidance group (criterion C), and the numbing symptoms are now included with cognitive symptoms and mood symptoms in the negative cognition and mood group (criterion D). With this reorganization, at least one avoidance symptom is now required for an individual to meet diagnostic criteria in the DSM-5, in contrast to DSM-IV-TR criteria which allowed a PTSD diagnosis even if no avoidance symptoms were endorsed (Pai, Suris, & North, 2017).

Considering that PTSD nosology has been altered within DSM-5, new valid and reliable measures are needed to assess the revision of PTSD diagnosis. To our knowledge, at present, there are only two measures for children and adolescents that assess PTSD according to DSM-5 criteria: the Clinician-Administered PTSD Scale for DSM-5 - Child/Adolescent Version (CAPS-CA-5; Pynoos et al., 2015), and the Child PTSD Symptom Scale for DSM-5 (Foa et al., 2017). For the CPSS-5, the authors developed both a self-report version (CPSS-V-SR) and an interview version (CPSS-5-I), that must be administered by professionals trained to assess PTSD. As trained professionals are scarce in community settings, there is an urgent need to have valid and reliable measures to detect PTSD among children and adolescent populations (Foa et al., 2017) without the need of trained professionals. The recent and only study of the psychometric properties of the new CPSS-SR-5 has shown excellent internal consistency for total symptom severity (Cronbach's $\alpha = .92$) and good test-retest reliability ($r = .80$) (Foa et al., 2017). However, considering that this is a measure based on the new four Cluster DSM-5 Model, more empirical evidence is needed to explore its validity and reliability, including cross-cultural adaptation and validation data. The previous version of CPSS has been widely used to assess PTSD symptom severity among school-aged children and adolescents of various

ethnic and cultural backgrounds (see Gillihan, Aderka, Conklin, Capaldi, & Foa, 2013), however, to our knowledge at the time of writing this paper, CPSS-SR-5 is only validated for the English-speaking American population. CPSS-SR-5 has already been translated to Portuguese, but not yet validated for the Portuguese children or adolescent population. Considering that adolescents and young adults engage in more risky behavior than any other age groups, but not all adolescents develop PTSD in the aftermath of trauma, it is essential to examine the validity and reliability of self-report scales in order to obtain an accurate and fast assessment of PTSD symptoms. This scale, as a screening tool, will allow through risk groups identify those who display the disorder or symptom severity and treat them as early as possible to increase the likelihood of a faster recovery with least possible impairment. However, the present study only focuses on adolescent population, thus, further empirical evidence is needed to explore its validity and reliability with school-aged Portuguese children as well.

This study aims to examine the psychometric properties of the self-report CPSS-5 in a Portuguese sample of adolescents exposed to traumatic events and childhood adversities. We first tested the structural validity of the 4-factor DSM-5 Model using confirmatory factor analysis. We additionally investigated the internal consistency, test-retest reliability, and convergent validity of the CPSS-5.

Method

Participants

We contacted 738 adolescents, aged between 13 and 17 years old, and invited them to participate in the study. Three hundred and fifty-six (48.24%) were from institutions run by Child Protective Services (CPS), and 382 (51.76%) were from attending vocational schools. We selected these two settings for participants' recruitment because of the high-risk nature of the adolescents involved in these programs. From these, 372 (50.41%) participants were eligible for the study after returning the signed informed consent from parents or legal

guardians. Upon assessment completion, only those who fulfilled the criterion of being exposed to at least one traumatic event or one childhood adversity (physical or sexual abuse) were included in analyses of the present study, and 325 (87.4%) of the adolescents met this final criterion. However, eight (2.5%) of the protocols were not properly completed, so the final sample size was 317 participants. One hundred and fifteen (36.3%) of these adolescents were living in institutions run by CPS and 202 (63.7%) adolescents were attending vocational schools. This sample included 148 (46.7%) males and 169 (53.3%) females and the mean age was 15.93 years old ($SD = 1.23$) and ranged between 13 and 17 years old. Among this final sample of 317 participants, 158 (49.8%) adolescents had been previously identified by CPS due to exposure to childhood abuse, neglect, domestic violence or other family dysfunction. Regarding the level of education, the mean was 9.21 years ($SD = 1.53$), which corresponds to 9th grade level, and ranged from the 5th grade to the 12th grade level. The monthly family income of this sample ranged between 250€ and 2,000€, however, most of the adolescents ($n = 66$, 20.8%) reported a monthly household income between 250€ and 500€. Almost half the adolescents reported have being exposed to at least five traumatic events ($n = 156$; 46.1%). The event that most participants reported as “Happened to me” was “Serious accident at school, home, or during recreational activity” ($n = 74$; 23.3%). The event that most participants reported as “Witnessed it” was “Physical assault (for example, being attacked, hit, slapped, kicked, beaten up), with 62 (19.6%) participants reporting this event. The event that most participants reported as “Learned about it” was “Fire or explosion” ($n = 64$; 20.2%). Besides, 282 adolescents (91.6%) reported at least one childhood abuse, and 169 (54.7%) adolescents reported at least three types of childhood abuse. The most reported adversities reported were divorced parents ($n = 150$; 47.3%), living with anyone who was a problem drinker or alcoholic or who used street drugs ($n = 120$; 37.9%) and having a household member depressed or

mentally ill or that attempt suicide ($n = 114$; 36%). Table 1 shows the reported number of traumatic events and/or adverse experiences.

Procedure

After obtaining permission from the authors to perform the adaption of the CPSS-5 scale, we started by doing a translation of the original instrument into European Portuguese by two independent bilingual translators (i.e. fluent in both English and Portuguese language). An expert in the field of PTSD was additionally recruited. The aim was to examine the first translated version and provide suggestions to maintain semantic equivalence for the Portuguese population. The resultant version of the scale comprising the suggestions made by the expert was tested by the “thinking aloud” procedure (Shaughnessy, Zechmeister, & Zechmeister, 2015) with 15 individuals, to test how well it worked regarding instructions, response format and the clarity of the items. Minor linguistic adjustments were made and the resultant version after those adjustments was back-translated by a professional fluent in Portuguese and English, who did not have access to the original scale. After the completion of this process, both translation and back-translation were sent to the authors of the original scale who gave with positive feedback.

The present study is part of a larger longitudinal research project on the impact of traumatic events on adolescents in the North of Portugal. All procedures performed in this study were in accordance with the APA ethical standards. The study was approved by the ethics committee of the [removed for blind review]. In order to recruit participants, 14 institutions run by Child Protective Services (CPS) and 16 vocational schools were contacted. The CPS institutions and vocational schools were initially contacted by e-mail and then by telephone with the purpose of scheduling an initial interview. Upon acceptance by CPS institutions and vocational schools a second meeting was the professionals in the institutions and schools contacted the adolescents, gave them a general explanation of the purposes of the study and

invited them to participate in the study. Upon acceptance from the participants, the researchers scheduled the interviews, to provide more detailed information about the study, including the methods and procedures. The adolescents who agreed to participate were given a written informed consent to be signed by themselves and by parents or legal guardians, to legitimate the participation in the study. The informed consent was obtained before beginning administration of the questionnaires. In order to ensure the confidentiality, the questionnaires were filled in a private room with one trained psychologist at disposal in case of need to answer questions or clarify any doubts, or afterwards in case of wanted talk with the researcher about any information contained in the protocol. In addition, adolescents were able to send an email to the researchers if they wished to have access to their results or felt the need to talk with the researchers.

To assess temporal reliability, approximately one-third ($n=100$) of the sample was randomly selected at T1 for CPSS-5 be administered at T2. It was used an online random number generator (www.randomization.com), and the randomization was made by a researcher who did not participate in assessments and who had no contact with schools/institutions. From this initial subsample randomly selected, only 85 participants completed the questionnaire at both T1 and T2; the time elapsed between the test and the retest was about six months (range between 5 and 7 months). In order to invite these randomly selected adolescents to participate in a two-wave study, the professionals of the institutions or schools scheduled a group meeting with them, where two researchers were present at that meeting to explain the purposes of study and ethical procedures (e.g., all personal data was coded to ensure the anonymity).

Measures

A demographic questionnaire, composed of multiple-choice questions, was used to collect information about age, gender, educational level, and family information (i.e., number of household, educational level of the parents, income and housing changes). This measure

also included items about current residence (e.g. with parents, with grandparents, institution, etc) and if the adolescent ever was identified by Child Protective Services (CPS).

The Life Events Checklist for DSM 5 (LEC-5) (Weathers, et al., 2013; portuguese version Correia-Santos, et al., 2017;) is a self-report measure developed to assess traumatic events in an individual's life according to the DSM 5. It assesses exposure to 16 potentially traumatic events (e.g., natural disasters, accidents, sexual assault) and includes an additional item where respondents could report another traumatic event that was not listed in the 16 previous items. For each event, respondents indicate their level of exposure (e.g. direct experience; witnessing). Additionally, participants were asked to select the most traumatic event they had experienced, and to indicate how long ago it had happened. The LEC-5 has been demonstrated to be a good measure of exposure to traumatic events and has convergent validity with measures of trauma related psychopathology (Gray, Litz, Hsu, & Lombardo, 2004). The study of the original version showed Pearson coefficients ranging from 0.44 to 0.48 between LEC and PTSD symptom severity, and 0.27 and 0.32 between LEC and measures of anxiety and depression, respectively. The Portuguese version showed significant Pearson coefficients between LEC and PTSD symptoms of .50, and between LEC and depression and anxiety, .65 and .64 respectively (Pinto et al., 2017). The Pearson coefficients for the present sample are reported in Table 2.

Adverse Childhood Experiences Study Questionnaire (ACE: Felitti et al., 1998; Portuguese version of Pinto, Correia, & Maia, 2014) is a retrospective self-report measure which assesses the occurrence of adverse experiences in childhood. This questionnaire includes detailed information on 10 adverse childhood experiences (e.g., emotional abuse, physical abuse, sexual abuse, exposure to domestic violence, substance abuse in the family environment, divorce or parental separation, family member, mental illness or suicide, physical neglect and emotional neglect), organized into two areas: children's experiences and household

dysfunction (Silva & Maia, 2008). Responses range from 0 (never) to 5 (very often), with the exception of sexual abuse, for which a dichotomous response (yes or no) was given and all items were dichotomized based on how often the experiences occurred (see Felitti et al., 1998). We then computed a total score of the adverse experiences exposure for each subject ranged from zero to 10. The study of the original scale demonstrated good to moderate test-retest reliability, with kappa values ranging from .46 to .86 (Dube, Williamson, Thompson, Felitti, & Anda, 2004) as well as in the Portuguese version, showing Intraclass Correlations Coefficients ranging from .96 to .62 (Pinto, Correia, & Maia, 2014). In the present study, the internal consistency was .82.

The Child PTSD Symptom Scale – V (CPSS-V; Gillihan et al., 2013; Portuguese version of Correia-Santos, et al., 2017) is a self-report measure that aims to assess the severity of PTSD symptoms presented in the past month by children and adolescents after having being exposed to a traumatic event. The inventory comprises 20 items corresponding to PTSD symptoms according to the criteria of the DSM-5, which can be divided into four subscales, namely intrusion (criterion B - five symptoms), avoidance (criterion C - two symptoms), negative alterations in cognition and mood (criterion D - seven symptoms), and alterations in arousal and reactivity (criterion E - six symptoms). Participants rate the frequency that they experience each symptom using a 4-point Likert scale, ranging from 0 (never), to 4 (6 or more times per week/ almost always), yielding a total score of 80 possible points, indicating PTSD symptom severity. Examples of items are “Having feelings in your body when you remember what happened (for example, sweating, heart beating fast, stomach or head hurting)” and “Trying not to think about, talk about, or have feelings about it [the event]”. The original study demonstrated an excellent internal consistency for the total score (.92), and the internal consistency for each scale ranged from acceptable to good, meaning: for criterion B (.81), for criterion C (.63); for criterion D (.86) and for criterion E (.72) (Foa et al., 2017).

Brief Symptom Inventory (BSI) (Derogatis, 1993; Portuguese version of Canavarro, 1999) is a well-established self-report questionnaire that assesses nine symptom subscales of psychological distress. The inventory comprises 53 items on a 5-point rating scale that ranges from 0 (not at all) to 4 (extremely) and describe how they were affected by symptoms in the past 7 days. For the present study, we used the depression and anxiety subscales. Examples of items are “Feeling no interest in things” and “Feeling tense or keyed up”. Higher scores are correlated with higher depression and anxiety symptoms. The Portuguese version of the scale demonstrates good internal consistency for both depression scale (.73) and anxiety scale (.77). This study also demonstrated strong reliability for depression scale (.87) and anxiety scale (.84).

Data Analysis

Descriptive statistics were calculated to characterize the study variables using the SPSS version 20 for Windows (United States, New York, IBM Corporation). In order to test correlations between variables, Pearson’s r was used. To test correlations between dichotomous variables and continuous variables Point-biserial correlations were used. Fisher’s r to z transformations were performed to compare the strength of relationships using online software from Lee and Preacher (2013). In order to establish the cutoff point as proposed by Foa and colleagues (2017), we then dichotomized the PTSD total score, as 0 for those participants that scored 30 or less points and 1 for those that scored 31 points or higher. The same cutoff score was already tested in the PCL-5 (Bovin et al., 2016), a similar measure to assess PTSD among adults (Bovin et al., 2015), which revealed a valid cutoff score for diagnosing PTSD. The “probable” PTSD diagnostic was calculated according to DSM-5 criteria, which the participant needed to report at least one symptom of Intrusion, one symptom of Avoidance, two symptoms of negative alterations in cognition and mood, and two symptoms of alterations in arousal and reactivity. The meaning of “probable” is because we did not use

a structured clinical interview to determine a clinical PTSD diagnostic. Then, two MANOVAs were used to compare two groups based on the cutoff point and probable PTSD diagnostic, regarding depression and anxiety symptoms, and two independent samples t-test regarding the total score of adversity. We computed Intraclass Correlations Coefficient (ICC; McGraw & Wong 1996) to estimate the test-retest reliability of the CPSS-5 responses at the first and second assessments. ICC is the most appropriate measure to assess reliability parameter for repeated measurements on a continuous scale (de Vet, Terwee, Knol, & Bouter, 2006). ICCs are designated as ≤ 0.40 poor to fair agreement, 0.41 – 0.60 moderate agreement, 0.61 – 0.80 good agreement, and 0.81 – 1.00 excellent agreement. Additionally, Cohen's kappa (Cohen, 1960) was computed to assess the percentage of agreement between the cutoff point and probable PTSD diagnostic on total sample. The same analyses were conducted for test-retest reliability. We used the benchmarks proposed by Landis and Koch (1977) to interpret the results: poor ($<.00$), slight (.00-.20), fair (.21-.40), moderate (.41-.60), substantial (.61-.80), and almost perfect (.81-1.00).

The confirmatory factor analysis (CFA) was performed using Mplus statistical modeling software (Version 6.12; Muthen & Muthen, 2011), using the robust maximum likelihood estimation (MLR) (Yuan and Bentler, 2000). In order to assess the goodness of fit for each model, a range of fit statistics were examined including the comparative fit index (CFI; Bentler, 1990), and the Tucker-Lewis Index (TLI; Tucker and Lewis, 1973), Root Mean Square Error of Approximation (RMSEA; Steiger, 1990), Standardised Root-Mean Square Residual (SRMR: Joreskog and Sorbom, 1996), and the chi-square adjustment adequacy test, where the null hypothesis is an indicator of good adjustment. However, the chi-square test is extremely sensitive to the size of the sample, and in large samples ($N > 200$) the test result tends to reject the null hypothesis. For this reason, due to the restrictiveness of the Model Chi-Square, researchers have sought alternative indices to assess model fit (Hooper, Coughlan, & Mullen,

2008). Therefore, the relative chi-square test χ^2/df (Wheaton, Muthén, Alwin, & Summers, 1977) has been used, in which a value lower than two is indicative of good adjustment (Byrne, 1989; Byrne, 2001; Tabachnick & Fidell, 2012). The extant literature suggests that a CFI/TLI above 0.95 indicate a good fit between the model and the data, and RMSEA values less than 0.05 indicate close fit. For the Standardized Root-Mean Square Residual (SRMR: Joreskog and Sorbom, 1996), values less than 0.06 indicating excellent fit and values less than 0.08 indicative of acceptable model fit. Finally, we examined the internal consistency of each subscale with composite reliability (CR), as this is a more appropriate measure of internal consistency in the context of latent variable modelling (Raykov, 1998). Evidence of internal consistency is obtained when CR is higher than 0.70. Convergent validity was obtained by assessing the Average Variance Extracted (AVE) of the factors. Convergent validity is supported if a CR has values of 0.70 or higher and AVE presents values of 0.50 or higher for all subscales (Fornell & Larcker, 1981). No missing data were analyzed because we removed the protocols that were not fully completed (2.5%).

Results

The mean of PTSD total score was 24.52 ($SD = 20.43$) ranging between zero and 73, in 80 possible points. Considering the cutoff of 31 established by Foa and colleagues (2017), 107 (33.8%) adolescents met or exceeded this value, which may indicate a PTSD diagnosis. Examining the PTSD diagnosis according to DSM-5 clusters assessment, 97 (30.6%) of the adolescents met the criteria. Comparing the participants who may have PTSD through the cutoff score and those who may have PTSD through DSM-5 clusters assessment, 84 of the adolescents met both criteria, demonstrating high agreement ($\kappa = .74$; 78.5%) between both forms of assessing PTSD. Additionally, considering the correlations between the CPSS-5 (PTSD total score and Criterion B, Criterion C, Criterion D, and Criterion E) and other study variables, all correlated significantly, except with age (Table 2).

The confirmatory factor analysis showed a good fit to the data, $\chi^2/df = 1.84$, CFI = .95, TLI = .94, SRMR = .04, RMSEA = .05 CI [.04 - .06] confirming the four-factor model according to the DSM-5 PTSD criteria. The loading factors are presented in Table 3 and ranged between .50 and .86 values.

Table 4 presents values for both CR and AVE for each criterion of the model. As CR is higher than .70 in all subscales, internal consistency is assumed. Convergent validity is also supported, as all measures meet the recommended levels, with CR values ranging from .76 to .90, and AVE values ranging from .50 to .62. Additionally, the PTSD total score significantly correlated to the exposure to traumatic events, as well as with the childhood adversities. PTSD total score also correlated significantly with depression and anxiety subscales of the BSI (Table 2). Fisher's r to z transformations indicated that the correlation between PTSD total score and depression was not stronger than the correlation between PTSD total score and anxiety ($z = 1.159$; $p = .246$). PTSD total score had smaller, yet still significant correlation with gender.

Additionally, two groups (i.e. above and below the cutoff point for probable PTSD diagnosis) were compared on depression and anxiety symptoms (Table 5). Significant differences were found between the two groups, *Pillai's Trace* = .37, $F(2,314) = 93.56$, $p < .001$, *partial* $\eta^2 = .37$. Adolescents with cutoff point above 31 reported significantly more depression and anxiety symptoms. When we compared the adolescents using DSM-5 diagnostic criteria, we also found significant differences between groups, *Pillai's Trace* = .28, $F(2,314) = 61.54$, $p < .001$, *partial* $\eta^2 = .28$. Adolescents with probable PTSD diagnostic reported significantly more depression and anxiety symptoms.

Finally, we compared adolescents in the two groups based on the cutoff point and the two groups using the DSM-5 diagnosis on their total score of adversity. Adolescents with cutoff point above 31 reported significantly more childhood adversity ($M = 34.28$; $SD = 22.76$) than adolescents with cutoff point below 31 ($M = 18.38$; $SD = 14.66$), $t(306) = -7.40$,

$p < .001$, 95CI [-20.12, -11.67], $d = 0.83$. Similarly, adolescents meeting DSM-5 diagnostic criteria reported significantly more childhood adversity ($M = 33.05$; $SD = 22.37$) than adolescents who did not ($M = 19.58$; $SD = 16.15$), $t(306) = -5.95$, $p < .001$, 95CI [-17.93, -9.02], $d = 0.69$.

Test-retest reliability was good for the PTSD total score as well as for each subscale (Table 6). The test-retest reliability for PTSD cutoff point was moderate ($\kappa = .54$) with a 68% agreement between T1 and T2. Additionally the test-retest for probable PTSD according to DSM-5 assessment was also moderate ($\kappa = .40$) with a 55% agreement between T1 and T2.

Discussion

The purpose of this study was to examine the psychometric properties of the Child PTSD Symptom Scale (CPSS-5) in a Portuguese sample of adolescents who met a DSM-5 Criterion A trauma. It is noteworthy that over 50% of participants reported being exposed to several traumatic events, as well as having experienced several childhood adversities, consistent with what has been reported by previous research (e.g. Nooner et al., 2012). Moreover, although clinical PTSD diagnostic is not possible – as it would need a structured clinical interview - considering both the cutoff point proposed by Foa and colleagues (2017) and PTSD according to DSM-5 criteria, over 30% of the sample have a probable PTSD diagnosis. This data illustrates the importance of having reliable measures to assess PTSD in Portuguese youth.

A previous psychometric study of the CPSS-5 in English-speaking American children and adolescents found strong psychometric support for the use of this scale (Foa et al., 2017). However, this original study of the scale only assessed the internal consistency, test-retest reliability, and convergent and discriminant validity (Foa, Asnaani, Zang, Capaldi, & Yeh, 2018). We further explored the examination of the new structure of the 4-factor DSM-5 model, and our findings showed a good fit to the data. To our knowledge, our study is the first to report

the psychometric properties of CPSS-5 with confirmatory factor analysis. CFA allows the researcher to test a priori hypothesis that a relationship between the observed variables and their underlying latent constructs/factor(s) exists, which is often the analytic tool of choice for assessing construct validity (Jackson, Gillaspay Jr, & Purc-Stephenson, 2009). The CFA of the CPSS was recently examined in Spanish adolescents but the scale was based on the DSM-4-TR (Meyer, Gold, Beas, Young, & Kassam-Adams, 2015; Serrano-Ibáñez, Ruiz-Párraga, Esteve, Ramírez-Maestre, & López-Martínez, 2018). Curiously, the authors found better fit of the four-factor model than the three factor, similar to other studies with different samples (e.g. Asmundson, Frombach, & Mcquaid, 2000; Friedman et al., 2011; Gudiño & Rindlaub, 2014; Kilpatrick et al., 2013). Thus, our study reinforces the suitability of CPSS-5 according to the new nosology defined by DSM-5.

This study also showed good internal consistency of this new measure. Specifically, the scale as a whole demonstrated a high level of internal consistency, as well as each subscale. These results are similar not only to several studies that used the former CPSS for DSM-IV criteria with various ethnic and cultural groups (e.g. Bustos, Rincón, & Aedo, 2009; Goodkind, LaNoue, & Milford, 2010; Gudiño & Rindlaub, 2014; Jaycox et al., 2002; Kohrt, 2008; Zahradnik et al., 2010) but also with the results presented by Foa and colleagues (2017), for CPSS-5. However, to our knowledge, this seems to be the first study to assess the validity and reliability of the CPSS-5 in a population other than the English-speaking American population.

Our results of the internal consistency and convergent validity are encouraging, as attested by the CR and AVE results. These results were also supported through the positive and significant correlations between PTSD total score and the variables that assess trauma exposure (i.e. exposure to traumatic events and childhood adversity), as well as with internalizing symptoms (depression and anxiety). Additionally, the adolescents who met criteria for probable PTSD diagnostic and scored or exceeded the cutoff point of 31 reported more

depression and anxiety symptoms, as well as childhood adversity. These results are in line with the literature, that demonstrates high comorbidity between PTSD and depression (Macdonald, Danielson, Resnick, Saunders, & Kilpatrick, 2010; Nooner et al., 2012), as well as PTSD and childhood adversities (Macdonald et al., 2010; Suliman et al., 2009). Additionally, these results seem to resemble not only those found in previous studies (e.g. Fowler et al., 2009; Gudiño & Rindlaub, 2014), but also with the changes in the PTSD diagnosis within DSM-5 that categorizes PTSD as a “Trauma and Stress-Related Disorder” (American Psychiatric Association, 2013), a choice that perhaps indicates an increasing recognition of the heterogeneity of psychopathology associated with trauma exposure.

Finally, our findings on the temporal reliability of the instrument are also encouraging and additionally demonstrated that the symptoms of PTSD persist over time. This finding is consistent with the literature on trauma that has shown that the symptoms of PTSD persist for a long time (Dunmore, Clark, & Ehlers, 2001), in some cases persist over many years (e.g. Alisic et al., 2014). The persistence of the symptoms in our sample may be due to the high exposure to trauma and childhood adversity. We assessed the temporal reliability for proposed cutoff point and PTSD according to DSM-5 criteria and we found moderate agreement for both. It is possible that the longer interval time in our study, compared to the study of Foa and colleagues (2017), which was two weeks, was the cause for us to find only a moderate agreement, whereas the original study found good agreement.

Overall, the results suggest strong psychometric properties of the CPSS-5 for Portuguese adolescents, mainly supported by construct validity. However, some considerations must be taken into account. First, the sample only consisted of adolescents from high-risk contexts. Further research should consider an increased heterogeneity of participants, such as community and clinical settings in order to replicate and extend these findings. Second, our data relied only in self-reported measures and so the absence/presence of the symptoms cannot

be clinically confirmed. Therefore, it is vital that future investigations include clinical interviews, in order to further explore the psychometric properties of the scale. Lastly, the time elapsed between T1 and T2 assessments may have been too long to be able to test the temporal reliability for the proposed cutoff point and PTSD according to DSM-5 criteria, which may be contributing to the agreement values do not seem to be very promising.

In summary, this study begins to widen the scope of utility of this instrument beyond the English-speaking American adolescent population, which is important for both research and clinical usage around the world. The results show that CPSS-5 proved to be a valid measure for the identification of probable diagnosis of PTSD in Portuguese adolescent. The results support the construct validity, internal consistency, convergent validity, and temporal reliability. The lack of assessment of unrelated constructs to determine discriminant validity is a limitation of this study. Additionally, the sample of the study was restricted to adolescents, lacking the assessment of the psychometric properties of this scale among children. Future research should address these limitations.

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Table 1

Reported Number of Traumatic Events and/or Adverse Experiences

	Traumatic events / LEC-5	Adverse Experiences / ACE
0	115 (36.3%)	26 (8.2%)
1	71 (22.4%)	54 (17%)
2	56 (17.7%)	59 (18.6%)
3	35 (11%)	47 (14.8%)
4	16 (5%)	46 (14.5%)
5	13 (4.1%)	24 (7.6%)
6 or more	11 (3.4%)	52 (16.4%)
Missing values	0	9 (2.8%)

Note: N = 317

Table 2

Correlations of Key Measures

Variables	1	2	3	4	5	6	7	8	9	10	11
1. LEC ^{a)}	-										
2. ACE ^{a)}	.27***	-									
3. PTSD Total Symptoms ^{a)}	.34***	.47***	-								
4. Criterion B ^{a)}	.26***	.37***	.90***	-							
5. Criterion C ^{a)}	.26***	.28***	.75***	.67***	-						
6. Criterion D ^{a)}	.34***	.49***	.94***	.79***	.62***	-					
7. Criterion E ^{a)}	.31***	.42***	.90***	.72***	.58***	.78***	-				
8. Depression ^{a)}	.33***	.52***	.70***	.58***	.49***	.72***	.61***	-			
9. Anxiety ^{a)}	.39***	.48***	.67***	.55***	.46***	.66***	.64***	.78***	-		
10. Age ^{a)}	.13*	.05	-.01	.04	-.02	.03	-.07	.04	.04	.02	-
11. Gender ^{b)}	.11*	.10	.21***	.18**	.17**	.26***	.11	.19**	.21***	.09	.20***

Note: $N = 317$. Gender = boys coded as 0 and girls as 1; LEC = Life Events Checklist;

ACE = Adverse Childhood Experiences; PTSD = Posttraumatic Stress Disorder; PTSD

Criterion C = Avoidance; PTSD Criterion D = Change in Cognition and Mood; PTSD

Criterion B = Intrusion; PTSD Criterion E = Arousal and Hyperreactivity. a) Pearson

correlation. b) Point-Biserial Correlation

* $p < 0.05$, two-tailed. ** $p < 0.01$, two-tailed. *** $p < 0.001$, two-tailed.

Table 3

Loading Factors of the Child PTSD Symptoms Scale

CPSS-5 items	DSM-5	Loading Factors
1. Upsetting thoughts	IN	(.82)
2. Bad dreams	IN	(.71)
3. Flashbacks	IN	(.77)
4. Upset reminders	IN	(.83)
5. Feelings in the body	IN	(.79)
6. Avoid reminders	A	(.74)
7. Avoid thinking	A	(.83)
8. Trouble have feelings	NACM	(.50)
9. Emotional distance	NACM	(.80)
10. Loss of interest	NACM	(.73)
11. Strong bad feelings	NACM	(.83)
12. Thinking it's one's fault	NACM	(.86)
13. Bad thoughts	NACM	(.70)
14. Cannot remember	NACM	(.80)
15. Trouble falling asleep	AAR	(.70)
16. Trouble paying attention	AAR	(.55)
17. Jumpy	AAR	(.67)
18. Lookout for danger	AAR	(.78)
19. Things that may hurt themselves	AAR	(.76)
20. Getting angry easily	AAR	(.76)

Note. $N = 317$. CPSS-5 - Child PTSD Symptoms Scale. IN = Intrusion; A = Avoidance; NACM = Negative Alteration in Cognition and Mood; AAR = Alterations in Arousal and Reactivity. Factors loadings are significant at $p < .001$.

Table 4

Reliability and Validity Statistics

Model	CR	AVE	MSV	ASV
DSM5				
Intrusion	.89	.62	.76	.71
Avoidance	.76	.61	.68	.59
NACM	.90	.57	.78	.70
AAR	.86	.50	.78	.66

Note: NACM – negative alterations in cognitions and mood. AAR – alterations in arousal and reactivity. EB – externalizing behaviors. CR - composite reliability. AVE - average variance extracted. MSV - maximum shared variance. ASV – average shared square variance

Table 5

MANOVA Comparison Between Two Groups of Adolescents Based on the Cutoff Point and Probable PTSD Diagnosis in Terms of Depression and Anxiety Symptoms

	Cutoff point below 31 (<i>n</i> = 210)		Cutoff point above 31 (<i>n</i> = 107)		<i>F</i>	η^2
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
	95% CI		95% CI			
Depression	5.00	4.19	12.19	5.56	165.60***	.35
	[4.36-5.64]		[11.29-13.08]			
Anxiety	3.40	3.30	9.21	5.20	145.83***	.32
	[2.86-3.95]		[8.44-9.98]			
	Without probable PTSD (<i>n</i> = 220)		With probable PTSD (<i>n</i> = 97)		<i>F</i>	η^2
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Depression	5.49	4.53	11.84	5.95	108.21***	.26
	[4.82-6.15]		[10.84-12.83]			
Anxiety	3.76	3.65	8.99	5.38	101.63***	.24
	[3.20-4.33]		[8.14-9.84]			

Note. Cutoff point proposed by E. B. Foa, A. Asnaani, Y. Zang, S. Capaldi, and R. Yeh, 2017, *Journal of Clinical Child and Adolescent Psychology*, 47, 38–46; probable PTSD = according to DSM-5 criteria; CI = Confidence Interval.

****p* < .001, two-tailed.

Table 6

Intraclass Correlations Coefficients for PTSD Criteria

PTSD Criteria	ICC	95% CI
Criterion B	.73***	[.567 - .818]
Criterion C	.73***	[.579 - .824]
Criterion D	.63***	[.431 - .760]
Criterion E	.72***	[.569 - .820]
PTSD Total Score	.78***	[.651 - .854]

Note: $N = 85$. PTSD = Posttraumatic Stress Disorder; CI = Confidence Interval; ICC = Intraclass Correlations Coefficient.