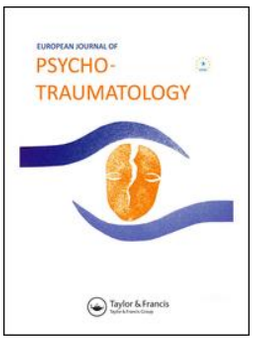

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CLINICAL RESEARCH ARTICLE



# Complex trauma, PTSD and complex PTSD in African refugees

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**ABSTRACT**

**Background**: The introduction of the diagnosis of complex posttraumatic stress disorder (CPTSD) by ICD-11 is a turning point in the field of traumatic stress studies. It's therefore important to examine the validity of CPTSD in refugee groups exposed to complex trauma (CT) defined as a repeated, prolonged, interpersonal traumatic event.

**Objective**: The objective of this study was to compare DSM-5 and ICD-11 post-traumatic stress disorder diagnoses and to evaluate the discriminant validity of ICD-11 PTSD and CPTSD constructs in a sample of treatment-seeking refugees living in Italy.

**Method**: The study sample included 120 treatment-seeking African refugees living in Italy. All participants were survivors of at least one CT. PTSD and CPTSD diagnoses were assessed according to both DSM-5 and ICD-11 criteria.

**Results**: Findings revealed that 79% of the participants met the DSM-5 criteria for PTSD, 38% for ICD-11 PTSD and 30% for ICD-11 CPTSD. Generally, ICD-11 CPTSD items evidenced strong sensitivity and negative predictive power, low specificity and positive predictive power. Latent class analysis results identified two distinct groups: (1) a PTSD class, (2) a CPTSD class. None of the demographic and trauma-related variables analysed was significantly associated with diagnostic group. On the other hand, the months spent in Italy were significantly associated with PCL-5 score.

**Conclusions**: Findings extend the current evidence base to support the discriminant validity of PTSD and CPTSD amongst refugees exposed to torture and other gross violations of human rights. The results suggest also that, in the post-traumatic phase, the time spent in a 'safe place' condition contributes to improve the severity of post-traumatic symptomatology, but neither this variable nor other socio-demographic factors seem to contribute to the emergence of complex PTSD. Further investigations are needed to clarify which specific vulnerability factors influence the development of PTSD or CPTSD in refugees exposed to complex trauma.

## Trauma complejo, TEPT y TEPT complejo en refugiados africanos

**Antecedentes**: La introducción del diagnóstico del trastorno de estrés postraumático complejo (TEPT-C) por la CIE-11 es un punto de inflexión en el campo de los estudios del estrés traumático. Por lo tanto, es importante examinar la validez del TEPT-C en los grupos de refugiados expuestos a un trauma complejo (TC) definido como un evento traumático interpersonal prolongado y repetido.

**Objetivo**: El objetivo de este estudio fue comparar los diagnósticos de trastorno de estrés postraumático del DSM-5 y la CIE-11 y evaluar la validez discriminante de los constructos del TEPT y TEPT-C de la CIE-11 en una muestra de refugiados en busca de tratamiento que viven en Italia.

**Método**: La muestra del estudio incluyó a 120 refugiados africanos que buscan tratamiento y que viven en Italia. Todos los participantes fueron sobrevivientes de al menos un TC. Los diagnósticos de TEPT y TEPT-C se evaluaron de acuerdo con los criterios del DSM-5 y de la CIE-11.

**Resultados**: Los hallazgos muestran que el 79% de los participantes cumplieron con los criterios del DSM-5 para el TEPT, el 38% para el TEPT de la CIE-11 y el 30% para el TEPT-C de la CIE-11. En general, los ítems de TEPT-C de la CIE-11 evidenciaron una fuerte sensibilidad y poder predictivo negativo, baja especificidad y poder predictivo positivo. Los resultados del análisis de clase latente identificaron dos grupos distintos: (1) grupo de TEPT, (2) grupo de TEPT-C. Ninguna de las variables demográficas y relacionadas con el trauma analizadas se asoció significativamente con el grupo de diagnóstico. Por otro lado, los meses pasados en Italia se asociaron significativamente con la puntuación de PCL-5.

**Conclusiones**: Los hallazgos amplían la base de evidencia actual para apoyar la validez discriminante del TEPT y el TEPT-C entre los refugiados expuestos a tortura y otras violaciones graves de los derechos humanos. Los resultados sugieren también que, en la fase postraumática, el tiempo pasado en una condición de "lugar seguro" contribuye a mejorar la gravedad de la sintomatología postraumática, pero ni esta variable ni otros factores sociodemográficos parecen contribuir a la aparición del TEPT-C. Se necesitan más

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Refugees; torture; complex trauma; PTSD; complex PTSD

**PALABRAS CLAVE**
Refugiados; tortura; trauma complejo; TEPT; TEPT complejo

**关键词**
难民; 折磨; 复杂性创伤; PTSD; 复杂性PTSD

**HIGHLIGHTS**

- Complex PTSD (CPTSD) diagnosis newly introduced 80 by ICD-11 has been scarcely evaluated with treatmentseeking refugees exposed to complex trauma (CT).
- This study evaluated the 85 validity of ICD-11 PTSD and CPTSD in a sample of African refugees exposed to CT and recently arrived in Italy.
- Findings indicated that 90 complex trauma leads to CPTSD in a minority of refugees only, approximately in one third of cases.
- Latent class analysis results identified two distinct groups PTSD and CPTSD supporting the ICD-11 classification.

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investigaciones para aclarar qué factores de vulnerabilidad específicos influyen en el desarrollo de TEPT o TEPT-C en los refugiados expuestos a trauma complejo.

## 非洲难民的复杂性创伤, PTSD 和复杂性 PTSD

**背景**: ICD-11引入复杂性创伤后应激障碍 (CPTSD) 诊断是创伤应激研究领域的一个转折点。因此, 考查CPTSD在遭受复杂性创伤 (CT) 的难民群体中的有效性很重要, 这些创伤被定义为反复, 长期, 人际间的创伤事件。
**目标**: 本研究旨在比较DSM-5和ICD-11创伤后应激障碍的诊断, 并评估ICD-11 PTSD和CPTSD对在意大利寻求治疗的难民样本中的判别有效性。
**方法**: 研究样本包括120名在意大利居住的寻求治疗的非洲难民。所有参与者均为至少经历过一次CT的幸存者。根据DSM-5和ICD-11标准评估PTSD和CPTSD诊断。
**结果**: 结果显示, 有79%的参与者符合PTSD的DSM-5标准, 38%符合ICD-11的 PTSD, 30%符合ICD-11 的CPTSD。总体上, ICD-11 CPTSD项目具有较强的敏感性和阴性预测能力, 而具有较低特异性和阳性预测能力。潜在类别分析结果确定了两个不同的组别: (1) PTSD类, (2) CPTSD类。分析的人口统计学和创伤相关变量均与诊断组无显著相关。另一方面, 在意大利度过的月份数目与PCL-5得分显著相关。
**结论**: 研究结果扩展了当前的证据基础, 以支持在遭受折磨和其他人权被严重侵的难民中PTSD和CPTSD的判别有效性。该结果还表明, 在创伤后阶段, 处于'安全场所'环境中的时间有助于改善创伤后症状的严重程度, 但该变量或其他社会人口统计学因素似乎均未助长复杂性PTSD的出现。需要进一步考查以弄清哪些特殊的脆弱性因素会影响遭受复杂性创伤的难民中PTSD或CPTSD的发展。

## 1. Introduction

The 11th version of the International Classification of Diseases (ICD-11; World Health Organization [WHO], 2018), has introduced the 'sibling' diagnosis of posttraumatic stress disorder (PTSD) and the newly added complex PTSD (CPTSD) (Maercker et al., 2013a). This is a turning point in the field of traumatic stress studies as it follows a long controversy concerning the nosological status and composition of a proposed construct of CPTSD (Bryant, 2012; Cloitre, 2016). The ICD-11 model of PTSD includes only six symptoms, markedly fewer than the 20 symptom model of PTSD outlined within the 5th edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (American Psychiatric Association [APA], 2013). These six symptoms are grouped into three clusters: (1) Re-experiencing of the trauma in the here and now (Re); (2) deliberate avoidance of traumatic reminders (Av); and (3) a sense of current threat (Th) (Maercker et al., 2013a, 2013b), with two symptoms represented under each cluster. CPTSD, introduced into the diagnostic nomenclature for the first time, includes the aforementioned six core PTSD symptoms and an additional three clusters of symptoms. Collectively referred to as 'Disturbances in Self-Organisation' (DSO), these additional three clusters are intended to capture the more pervasive psychological disturbances that can arise following traumatic exposure and include: (1) affective dysregulation (AD), reflecting both hyperactivation (Hyper) and deactivation (Deact) of emotional responses; (2) Negative Self-Concept (NSC), reflecting extreme negative self evaluations; and (3) disturbed relationships (DR), reflecting a tendency to avoid interpersonal relationships. It is worth noting that CPTSD was excluded from the DSM-5, following the argument of some commentators that the symptoms of CPTSD can be accommodated within the framework of existing definitions of PTSD (Resick et al., 2012). This assertion stems from the expansion of the diagnosis of PTSD in the DSM-5 to encompass symptoms such as self-blame, negative beliefs about the self and feeling alienated from others (APA, 2013).

Considerable evidence is accumulating to support the proposed factorial validity of ICD-11 CPTSD (Hyland et al., 2017a; Karatzias et al., 2016) including two studies of refugees (Nickerson et al., 2016; Vallières et al., 2018). On the other hand, investigations evaluating the factor structure of PTSD and CPTSD in a sample of West Papuan refugees displaced to Papua New Guinea questioned the appropriateness of the CPTSD construct for trauma-exposed refugees (Tay, Rees, Chen, Kareth, & Silove, 2015) and suggested that refugee populations exposed to persecution and the traumas of human rights violations are distinctive in showing a general traumatic stress response in which ICD-11 specified PTSD and CPTSD features are indissolubly represented (Silove, Tay, Kareth, & Rees, 2017).

The distinction between PTSD and CPTSD has also been supported in several latent class and latent profile analyses. To date, 16 studies have been conducted across different countries, and with samples exposed to varying forms of traumatic exposure (e.g. institutional child abuse, sexual assault, bereavement, child soldiering, war prisoners). Of these sixteen studies, thirteen offer support for qualitatively distinct classes where symptom profiles are consistent with the distinction between ICD-11 PTSD and CPTSD (Ben-Ezra et al., 2018; Böttche et al., 2018; Cloitre, Garvert, Brewin, Bryant, & Maercker, 2013; Cloitre, Garvert, Weiss, Carlson, & Bryant, 2014; Elklit, Hyland, & Shevlin, 2014; Frost et al., 2019; Karatzias et al., 2017; Knefel, Garvert, Cloitre, & Lueger-Schuster, 2015; Murphy,

Elklit, Dokkedahl, & Shevlin, 2016; Palic et al., 2016; Perkonigg et al., 2016; Sachser, Keller, & Goldbeck, 2017; Zerach, Shevlin, Cloitre, & Solomon, 2019). In contrast, the remaining three studies (Eidhof et al., 2019; Glück, Knefel, Tran, & Lueger-Schuster, 2016; Wolf et al., 2015) observed classes that differed quantitatively rather than qualitatively suggesting that CPTSD is not distinguishable from PTSD and that differences in classes are best explained varying degrees of symptom severity on a single, underlying, condition (i.e. PTSD). To date, only two investigations evaluated the discriminant validity of ICD-11 PTSD and CPTSD amongst refugees; one study involved 110 Syrian refugees in Lebanon (Hyland et al., 2018) and the other a subsample of refugees (n = 308) selected from the National Epidemiological Survey on Alcohol and Related Conditions in Ireland (Frost et al., 2019). Both studies supported for two distinct trauma-based disorders, as put forward in the ICD-11.

CPTSD is considered to be especially likely to occur following exposure to complex trauma (CT) conceptualized as repeated, prolonged, interpersonal traumatic event exposure. In accordance, there is growing evidence from research in western settings supporting the validity of this disorder with individuals exposed to sustained interpersonal trauma (Perkonigg et al., 2016), institutional abuse (Knefel et al., 2015), childhood abuse (Cloitre et al., 2014), and people seeking treatment following exposure to a range of trauma types (Cloitre et al., 2013). While CPTSD was originally formulated to describe distinctive psychological responses arising from events where an individual is under the sustained and coercive control of a perpetrator (i.e. torture) (Herman, 1992), there has been scarce examination of CPTSD in individuals from non-western countries who have been exposed to displacement, torture and other gross violations of human rights. It has been suggested that CPTSD may be particularly relevant to these groups given the high frequency of CTs to which they are usually exposed (de Jong, Komproe, Spinazzola, van der Kolk, & van Ommeren, 2005; Morina & Ford, 2008; Palic & Elklit, 2014). In addition, refugees are displaced to unfamiliar environments, and may be unable to access important sources of support or established strategies for managing distress (e.g. work, leisure activities).

These experiences may have an especially strong impact on the CPTSD domains of affect regulation, interpersonal relations and self-concept. Moreover, today it is particularly important to investigate the construct of CPTSD in refugee groups considering the growing number of persons forcibly displaced worldwide (today globally estimated in 65.6 million people) and the potential relevant reduction in the global burden of suffering via the application of an effective and efficient treatment of CPTSD symptoms amongst these populations. In the last years, for example, a large number of asylum seekers and refugees arrived in Italy and in Europe from Sub-Saharan Africa (according to UNHCR data [see reference below] more than 600.000 migrants have landed in Italy crossing the Mediterranean in the period 2013–2018), most of them having suffered detention, serious violence and abuse in countries of origin or along the migratory route and particularly in Libya (Medici per i Diritti Umani [MEDU], 2017).

On the other hand, despite the growing empirical support for the ICD-11 proposed qualitative distinctions between PTSD and CPTSD, there remains insufficient evidence regarding the factors that may serve to distinguish these two different clinical responses to trauma (Hyland et al., 2017b). With regard to refugee populations, it is indeed important to begin to develop a more thorough understanding of the pre-traumatic, peri-traumatic and post-traumatic factors that can differentially predict a CPTSD response from a PTSD response

In the current study we sought to compare DSM-5 and ICD-11 post-traumatic stress disorder diagnoses and to evaluate the discriminant validity of ICD-11 PTSD and CPTSD amongst a treatment-seeking sample of African refugees living in Italy who had survived CT. To this end, the study's aims were to: (1) identify the prevalence of DSM-5 PTSD and ICD-11 PTSD and CPTSD; (2) examine the psychometric properties of individual symptoms to determine their sensitivity, specificity, positive predictive power (PPV) and negative predictive power (NPV) in relation to the DSM-5 PTSD and ICD-11 CPTSD diagnoses; (3) determine whether there were any emerging unique latent classes of refugees, and if so, whether these symptom profiles are consistent with the distinct diagnoses of the ICD-11; (4) explore whether there were any relationships between a range of socio-demographic and trauma-related variables and the observed classes or the severity of post-traumatic symptoms.

## 2. Method

### 2.1. Participants

The participants of this study were assessed from March 2016 until October 2018. They were 120 adult treatment-seeking African refugees who were receiving psychological treatment for trauma-related mental health problems at 3 outpatient units: the two clinical units for victims of torture managed by the humanitarian organization Medici per i Diritti Umani-MEDU (Doctors for Human Rights, Italy) in Rome (MEDU Psyché Centre) and Ragusa (Italy), and the psychological service in the reception centre for asylum seekers (CARA) of Bari (Italy). Inclusion

criteria for participation in the study comprised that the participants: (1) were coming from African countries, (2) were aged 18 or older, (3) were survivors of at least one repeated, prolonged, interpersonal traumatic event in their country and/or in the migratory route; (4) were in the initial clinical assessment phase and (5) should speak fluently one of the three study languages (English, French, Arabic). Exclusion criteria were presence of psychotic symptoms and inability to complete questionnaires due to mental disability. Of 137 patients considered eligible for the study, 17 did not complete the PCL-5 questionnaire therefore were not included in the sample, thereby the final sample size was 120 participants. Sex ($\chi 2$ = 0.89, p-value = 0.57) and age (two sample t-test; p-value = 0.23) distribution of the 17 patients not included did not show significant differences with the sample group of this study. In this study the following questionnaires were administered to the participants: a trauma exposure questionnaire by Nickerson et al. (2016) and PCL-5 (Weathers et al., 2013). The questionnaires were read out loud for the participants to avoid any possible reading disabilities. To all participants who fulfilled diagnostic criteria for PTSD or other trauma-related mental health problems was offered medical-psychological treatment and psycho-social support in the three outpatient units in Rome, Ragusa and Bari. All participants provided written informed consent.

## 2.2. Measures

### 2.2.1. Trauma exposure

We assessed trauma exposure using a 23-item instrument developed by Nickerson and colleagues (Nickerson et al., 2016). This scale represented the compilation of trauma event lists from two standardized questionnaires, namely the Harvard Trauma Questionnaire (HTQ) (Mollica et al., 1992) and the Posttraumatic Diagnostic Scale (PDS) (Foa, 1996; Foa, Cashman, Jaycox, & Perry, 1997). This scale indexed exposure to traumatic events commonly experienced by refugees, including witnessing the murder of loved ones, torture, deprivation of food, water, shelter, etc. Participants were asked to indicate whether they had experienced or witnessed any of the events personally. Overall trauma exposure was represented by a count of the number of traumatic event types each participant experienced (possible range: 0–23).

### 2.2.2. PTSD

We assessed symptoms of PTSD using the symptom scale of PTSD Checklist for DSM-5 (PCL-5: Weathers et al., 2013; Cronbach's alpha 0,87 [0.84–-0.90]). The PCL-5 is a 20-item self-report measure that assesses the 20 DSM-5 symptoms of PTSD. Items are rated on a five-point scale (0_not at all, 1_a little bit, 2_moderately, 3_quite a bit, 4_extremely). As a first step a probable diagnosis of PTSD according to DSM-5 criteria was made by treating each item ≥ 2 as a symptom endorsed, then following the DSM-5 diagnostic rule which requires at least: one Cluster B item (questions 1–5), one Cluster C item (questions 6–7), two Cluster D items (questions 8–14), two Cluster E items (questions 15–20) (APA, 2013). As a second step a probable diagnosis of PTSD was made following ICD-11 criteria (Table 1). For this study, six items were extracted from the PCL-5 as indicators for ICD-11 PTSD symptom clusters, including re-experiencing (PCL-5 [2] and PCL-5 [3]), avoidance (PCL-5 [6] and PCL-5 [7]), and hyperarousal (PCL-5 [17] and PCL-5 [18]). To determine a probable diagnosis and examine psychometric properties of the items, we also dichotomized symptoms as '"present"' (rated as ≥ 2) or '"absent"' (rated as < 2). Participants were considered to have a probable diagnosis of PTSD if they reported at least one symptom from each cluster, and did not meet criteria for CPTSD.

### 2.2.3. CPTSD

A probable diagnosis of CPTSD was made following criteria of ICD-11 International Trauma Questionnaire (ITQ: Cloitre, Roberts, Bisson, & Brewin, 2015), a self-report measure specifically designed to capture the ICD-11 PTSD and CPTSD symptoms (Table 1) where a diagnosis of CPTSD requires PTSD and the following scores for each of the three DSO clusters. AD for consistency requires a score ≥ 10 on 5 hyper-activation (Hyper) items or a score of ≥ 8 on 4 Deactivation (Deact) items; for the NSC items a score ≥ 8 on 4 items and for DR a score ≥ 6 on 3 items are required. For this study DSO symptoms were measured using 7 items extracted from the PCL-5 (Table 1), and specifically 4 for AD (PCL-5 [11], Hyper; PCL-5 [15], Hyper; PCL-5 [16], Hyper and PCL-5 [14], Deact) 2 for NSC (PCL-5 [9] and PCL-5 [10]) and 1 for DR (PCL-5 [13]). Participants were considered to have a probable diagnosis of CPTSD, if in addition to meeting the criteria for ICD-11 PTSD, they reported the following scores for each of the three DSO clusters: for AD a score ≥ 6 on items PCL-5 [11, 15, 16] (Hyper) or a score of ≥ 2 on item PCL-5 [14] (Deact); for NSC a score ≥ 4 on items PCL-5 [9, 10] and for DR a score ≥ 2 on item PCL-5 [13]. The corresponding Cronbach's alpha of these subsets of PCL-5 items is 0.81 (0.76–0.86). Functional impairment was not specifically assessed in this study, both for PTSD and CPTSD diagnosis.

### 2.2.4. Procedure

Upon attending the study session, participants first completed written informed consent. Measures were administered within clinical setting as a standard

**Table 1.** Comparison of list of items indicated in the ICD-11 International Trauma Questionnaire and items extracted from PCL-5.

| ICD-11 International Trauma Questionnaire<br>Cloitre et al., 2015 | PCL-5<br>Weathers et al., 2013 |
|---|---|
| **PTSD criteria** | **PTSD criteria** |
| ***Re-experiencing (Re)*** | ***Re-experiencing (Re)*** |
| RE1: Upsetting dreams that replay part of the event or are clearly related to the event | PCL-5 [2]: Repeated, disturbing dreams of the stressful experience |
| RE2: Powerful images or memories that sometimes come not your mind in which you feel the event is happening again in the same here and now | PCL-5 [3]: Suddenly feeling or acting as if the stressful experience were actually happening again (as if you were actually back there reliving it) |
| ***Avoidance (Av)*** | ***Avoidance (Av)*** |
| AV1: Avoiding internal reminders of the stressful event experience (for example, thoughts, feelings, or physical sensations) | PCL-5 [6]: Avoiding memories, thoughts, or feelings related to the stressful experience |
| AV2: Avoiding external reminders of the stressful event experience (for example people, places, conversations, objects, activities, or situations) | PCL-5 [7]: Avoiding external reminders of the stressful experience (for example, people, places, conversations, activities, objects, or situations) |
| ***Sense of current threat (Th)*** | ***Sense of current threat (Th)*** |
| TH1: Being 'superalert' or watchful or on guard | PCL-5 [17]: Being 'superalert' or watchful or on guard |
| TH2: Feeling jumpy or easily startled | PCL-5 [18]: Feeling jumpy or easily startled |
| **Disturbances of Self Organization (DSO)** | **Disturbances of Self Organization (DSO)** |
| ***Affective Dysregulation (AD)*** | ***Affective Dysregulation (AD)*** |
| AD1: I react intensely to things that don't seem to affect other people so much | |
| AD2: When I am upset, it takes me a long time to calm down | |
| AD3: My feelings tend to be easily hurt [Hyper] | PCL-5 [11]: Having strong negative feelings such as fear, horror, anger, guilt, or shame [Hyper] |
| AD4: I experience episodes of uncontrollable anger [Hyper] | PCL-5 [15]: Irritable behaviour, angry outbursts, or acting aggressively [Hyper] |
| AD5: I do things that people told me are dangerous or reckless (for example, driving very fast) [Hyper] | PCL-5 [16]: Taking too many risks or doing things that could cause you harm [Hyper] |
| AD6: I feel numb or emotionally shut down | |
| AD7: I am the kind of person who has difficulty experiencing feelings of pleasure or joy [Deact] | PCL-5 [14]: Trouble experiencing positive feelings (for example, being unable to feel happiness or have loving feelings for people close to you) [Deact] |
| AD8: When I am under stress or confronted with reminders of my trauma, I often feel that the world is distant or that the worlds seem different | |
| AD9: When I am under stress or confronted with reminders of my trauma, I often feel outside of my body or feel that there is something strange with me | |
| ***Negative Self Concept (NSC)*** | ***Negative Self Concept (NSC)*** |
| NSC1: I feel like a failure | |
| NSC2: I feel worthless | PCL-5 [9]: Having strong negative beliefs about yourself, other people, or the world (for example, having thoughts such as: I am bad, there is something seriously wrong with me, no one can be trusted, the world is completely dangerous) |
| NCS3: I often feel ashamed of myself whether it makes sense or not | |
| NSC4: I feel guilty about things I have done or failed to do | PCL-5 [10]: Blaming yourself or someone else for the stressful experience or what happened after it |
| ***Disturbed Relation (DR)*** | ***Disturbed Relation (DR)*** |
| DR1: I feel distant or cut off from other people | PCL-5 [13]: Feeling distant or cut off from other people |
| DR2: I find it hard to stay emotionally close to people | |
| DR3: I avoid relationships because they end up being too difficult or painful | |

clinical assessment. Participants used to listen to each item and the range of possible responses in the three study languages (Arabic, English, French). Participants then expressed their response. The research assessment lasted about 60–90 minutes, with participants being assisted by a cultural mediator, a medical doctor and a clinical psychologist all of them with a minimum of 3 years' experience in working with mental health in refugees.

#### 2.2.5. Data analysis

The analytical plan for the current study included four steps, where each step corresponded to one of the four study objectives. First, prevalence estimates of DSM-5 PTSD and ICD-11 PTSD or CPTSD were calculated along with assessments of gender differences using a chi-square analysis. McNemar's test was used to compare the overall DSM-5 and ICD-11 diagnostic rates.

Second, we calculated the sensitivity, specificity, PPV, and NPV for each of the symptoms in relation to the DSM-5 PTSD diagnosis and to the ICD-11 CPTSD diagnosis. Sensitivity was defined as the probability of the presence of the symptom when the diagnosis is present, specificity was defined as the probability of the absence of the symptom when the diagnosis is absent, PPV was defined as the probability that the disorder is present when the symptom is present, and NPV was defined as the probability that the diagnosis is absent when the symptom is absent.

Third, an LCA was performed based on the probability of meeting the diagnostic criteria for the three PTSD (Re, Av, Th) and three DSO (AD, NSC, DR) symptom clusters. Five latent class models were tested (1–5 classes) using the EM and Newton-Raphson algorithms to maximize the latent class model log-likelihood function. The Akaike Information Criterion (AIC; Akaike, 1987), the Bayesian Information Criterion (BIC; Schwartz, 1978) were used to select the best latent class model. Moreover, the bootstrap likelihood ratio test (BLRT) with 500 bootstrap samples was also used to compare models with increasing numbers of latent classes.

Finally, a linear logistic regression model was used to assess if different covariates discriminated between the ICD-11 PTSD and CPTSD class membership. The covariates in the model included: gender (0 = male, 1 = female), age, years of education, number of months spent in Italy as refugees, number of traumatic event types and employment (0 = employed, 1 = unemployed). Moreover, also the relationship between the PCL-5 total score and the same covariates was assessed by linear regression analysis.

All the analyses were performed with the statistical software R (version 3.5.2).

## 3. Results

### 3.1. Participant characteristics

Participants in this study had a mean age of 25.1 years (SD = 6.7) with 86% (N = 103) of the sample being male. Participants were from 19 African Countries: Nigeria (N = 32, 26.7%); Ivory Coast (N = 19, 15.8%); Gambia (N = 14, 11.7%); Senegal (N = 11, 9.2%); Ghana (N = 10, 8.3%); Guinea Conakry, Sierra Leone (N = 6, 5.0%); Democratic Republic of the Congo, Libya, Somalia (N = 3, 2.5%); Cameroon, Egypt, Mali, Morocco (N = 2, 1.7%); Benin, Congo-Brazaville, Guinea-Bissau, Mauritania, Sudan (N = 1, 0.8%). Overall, participants came mainly from West Africa (N = 109, 90.8%) and in a small part from North Africa (N = 7, 5.8%) and East Africa (N = 4, 3.3%). Participants had been exposed to a mean of 7.6 (SD = 3.4) types of traumatic events with the most of the sample having experienced torture (81%; N = 97), lack of food and water (77%; N = 92) and detention (64%; N = 77). Frequency of exposure to specific trauma types is presented in Table 2. The 92% (N = 110) of the participants reached Italy from Sub-Saharan Africa, crossing both the Sahara Desert to Libya, and the Mediterranean Sea in migratory routes (e.g. pick up vehicles, makeshift dinghies) controlled by smuggling or trafficking networks. The 5% (N = 6) of migrants were coming from North Africa and they reached Italy crossing the Mediterranean Sea in makeshift dinghies. The 3% (N = 4) of migrants reached Italy by flight or by regular shipping services. Participants had lived in Italy for a mean of 11.1 months (SD = 8.9), the majority of participants were unemployed (71%; N = 86) with a mean of 7.2 years of education (SD = 5; range 0–18 years) and resided within a reception centre without family members (96%; N = 115). Regarding the legal

**Table 2.** Trauma exposure reported by refugees.

| Trauma type | N | % |
|---|---|---|
| Torture | 97 | 80,8 |
| Lack of food or water | 92 | 76,7 |
| Imprisonment | 77 | 64,2 |
| Non-sexual assault | 72 | 60,0 |
| Lack of shelter | 68 | 56,7 |
| Murder of one or more strangers | 56 | 46,7 |
| Disappearance or kidnapping | 51 | 42,5 |
| Being close to death | 48 | 40,0 |
| Serious physical injury | 42 | 35,0 |
| Ill health without access to medical care | 41 | 34,2 |
| Murder of a family member or friend | 36 | 30,0 |
| Unnatural death of a family member or friend | 29 | 24,2 |
| Forced separation from family member | 25 | 20,8 |
| Non-sexual assault by a family member or someone you know | 22 | 18,3 |
| Sexual assault by a stranger | 19 | 15,8 |
| Serious accident, fire or explosion | 17 | 14,2 |
| Enforced isolation from others | 16 | 13,3 |
| Life-threating illness | 15 | 12,5 |
| Combat situation | 14 | 11,7 |
| Sexual contact when you were younger than 18 with someone who was 5 or more years older than you | 9 | 7,5 |
| Sexual assault by a family member or someone you know | 8 | 6,7 |
| Brainwashing | 6 | 5,0 |
| Natural disaster | 1 | 0,8 |

status, only 6% (N = 7) participants got a residence permit for international protection (refugee or subsidiary protection status) or humanitarian protection, while the majority of them were still asylum seekers.

### 3.2. Diagnostic rates

Results showed that 95 participants (79%) had a probable diagnosis of PTSD according to the DSM-5 criteria. On the other hand, following the ICD-11 criteria, more than one-third of the sample (N = 46, 38%) had a probable diagnosis of PTSD while less than one-third (N = 36, 30%) met criteria for CPTSD (Table 3). The overall DSM-5 (PTSD = 79%) and ICD-11 (PTSD +CPTSD = 68%) diagnostic rates presented a statistically significant difference (McNemar's test; p = 0.009). All the patients diagnosed with CPTSD according to ICD-11 criteria are included within the total number of participants diagnosed with DSM-5 PTSD. Furthermore, the majority of participants that have been diagnosed with PTSD according to ICD-11 were included in the DSM-5 PTSD sample (N = 42) with the exception of 4 patients, which did not meet PTSD diagnosis according to DSM-5 (Figure 1). There were no significant gender differences in the diagnostic rates for DSM-5 PTSD ($\chi2$ = 0.45, df = 1, p = 0.502, OR = 0.46) and ICD-11 PTSD ($\chi2$ = 0.00, df = 1, p = 0.958, OR = 0.76) or CPTSD ($\chi2$ = 0.19, df = 1, p = 0.666, OR = 0.59).

**Table 3.** Frequencies and percentages of refugees meeting diagnostic criteria for each PTSD and DSO symptom cluster, PTSD and CPTSD diagnosis (N = 120).

| | | N | % |
|---|---|---|---|
| ICD-11 | Re-experiencing | 112 | 93 |
| | Avoidance | 116 | 97 |
| | Sense of threat | 87 | 73 |
| | Affective dysregulation | 80 | 67 |
| | Negative self-concept | 62 | 52 |
| | Disturbed relationships | 74 | 62 |
| | PTSD or CPTSD | 82 | 68 |
| | PTSD | 46 | 38 |
| | CPTSD | 36 | 30 |
| DSM-5 | Re-experiencing | 115 | 96 |
| | Avoidance | 116 | 97 |
| | Negative alterations in cognitions and mood | 110 | 92 |
| | Marked alterations in arousal and reactivity | 105 | 88 |
| | PTSD | 95 | 79 |

### 3.3. Sensitivity, specificity, PPV and NPV of symptoms in relation to DSM-5 PTSD

Sensitivity, specificity, positive predictive power and negative predictive power of all the 20 PCL-5 symptoms in relation to a probable DSM-5 PTSD diagnosis are displayed in Table 4. All the items in the re-experiencing cluster of symptoms evidenced high sensitivity (0.79 to 0.96) but low specificity (0.20 to 0.56). On the other hand, all the symptoms in this cluster evidenced relatively higher positive predictive power (0.82 to 0.87) than negative predictive power (0.41 to 0.71).

In the avoidance cluster, all the two items evidenced high sensitivity (0.86 to 0.90) versus very low specificity (0.24 to 0.36). Both of these symptoms evidenced relatively higher PPV (0.82 to 0.84) than NPV (0.40 to 0.41).

In the negative alterations in cognitions and mood cluster the item *Feeling distant or cut off from other people* evidenced the best balance between sensitivity (0.73) and specificity (0.72) and a very high PPV (0.91). Two items (*Loss of interest in activities that you used to enjoy; Trouble experiencing positive feelings*) evidenced high specificity (0.80 and 0.76) and relatively lower sensitivity (0.69 and 0.66). Two items (*Having strong negative beliefs; Having strong negative feelings*) evidenced high sensitivity (0.77 and 0.94) and lower specificity (0.60 and 0.44). All these cluster symptoms evidenced greater PPV (0.86 to 0.93) than NPV (0.29 to 0.65).

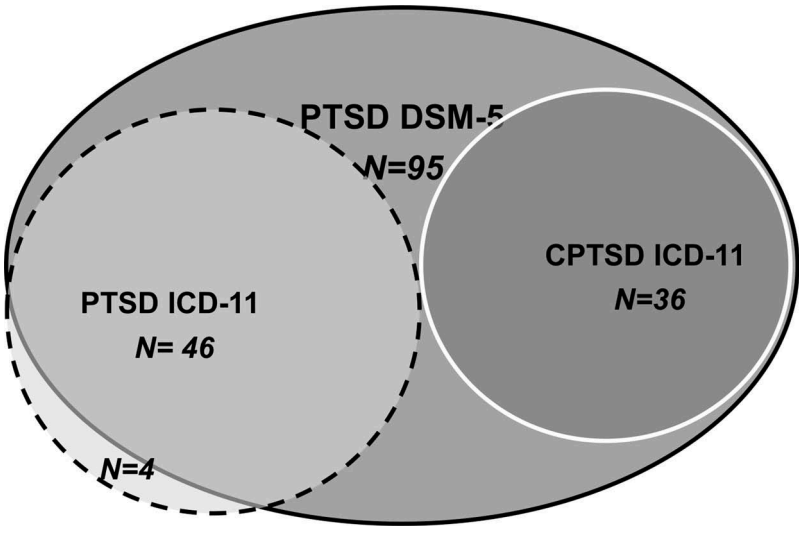



**Figure 1.** Venn diagram representing the distribution of particpants diagnoses according to both DSM-5 and ICD-11 criteria.

**Table 4.** Frequency, sensitivity, specificity, positive predictive power and negative predictive power of PTSD symptoms in relation to DSM-5 PTSD diagnosis. Sensitivity: The probability of the presence of the symptom when PTSD diagnosis is present. Specificity: The probability of the absence of the symptom when PTSD diagnosis is absent. Positive predictive power: The probability of the presence of PTSD diagnosis when the symptom is present. Negative predictive power: The probability of the absence of PTSD diagnosis when the symptom is absent.

| Symptom | | Frequency N (%) | Sensitivity | Specificity | Positive predictive power | Negative predictive power |
|---|---|---|---|---|---|---|
| **PTSD symptoms** | | | | | | |
| ***Cluster B: Re-experiencing symptoms*** | | | | | | |
| ***PCL-5 item*** | | | | | | |
| 1 | Repeated, disturbing, and unwanted memories of the stressful experience | 110 (91.7%) | 0.95 | 0.20 | 0.82 | 0.50 |
| 2 | Repeated, disturbing dreams of the stressful experience | 92 (76.7%) | 0.84 | 0.52 | 0.87 | 0.46 |
| 3 | Suddenly feeling or acting as if the stressful experience were actually happening again | 86 (71.7%) | 0.79 | 0.56 | 0.87 | 0.41 |
| 4 | Feeling very upset when something reminded you of the stressful experience | 106 (88.3%) | 0.96 | 0.40 | 0.86 | 0.71 |
| 5 | Having strong physical reactions when something reminded you of the stressful experience | 100 (83.3%) | 0.90 | 0.44 | 0.86 | 0.55 |
| ***Cluster C: Avoidance*** | | | | | | |
| 6 | Avoiding memories, thoughts, or feelings related to the stressful experience | 105 (87.5%) | 0.90 | 0.24 | 0.82 | 0.40 |
| 7 | Avoiding external reminders of the stressful experience | 98 (81.7%) | 0.86 | 0.36 | 0.84 | 0.41 |
| ***Cluster D: Negative alterations in cognitions and mood*** | | | | | | |
| 8 | Trouble remembering important parts of the stressful experience | 62 (51.7%) | 0.57 | 0.68 | 0.87 | 0.29 |
| 9 | Having strong negative beliefs about yourself, other people, or the world | 82 (68.3%) | 0.77 | 0.64 | 0.89 | 0.42 |
| 10 | Blaming yourself or someone else for the stressful experience or what happened after it | 77 (64.2%) | 0.70 | 0.60 | 0.87 | 0.35 |
| 11 | Having strong negative feelings such as fear, horror, anger, guilt, or shame | 103 (85.8%) | 0.94 | 0.44 | 0.86 | 0.65 |
| 12 | Loss of interest in activities that you used to enjoy | 71 (59.2%) | 0.69 | 0.80 | 0.93 | 0.41 |
| 13 | Feeling distant or cut off from other people | 76 (63.3%) | 0.73 | 0.72 | 0.91 | 0.41 |
| 14 | Trouble experiencing positive feelings | 59 (57.5%) | 0.66 | 0.76 | 0.91 | 0.37 |
| ***Cluster E: Marked alterations in arousal and reactivity*** | | | | | | |
| 15 | Irritable behaviour, angry outbursts, or acting aggressively | 69 (57.5%) | 0.66 | 0.76 | 0.91 | 0.37 |
| 16 | Taking too many risks or doing things that could cause you harm | 25 (20.8%) | 0.26 | 1.00 | 1.00 | 0.26 |
| 17 | Being 'superalert' or watchful or on guard | 70 (58.3%) | 0.70 | 0.88 | 0.96 | 0.44 |
| 18 | Feeling jumpy or easily startled | 75 (62.5%) | 0.74 | 0.80 | 0.93 | 0.44 |
| 19 | Having difficulty concentrating | 85 (70.8%) | 0.80 | 0.64 | 0.89 | 0.46 |
| 20 | Trouble falling or staying asleep | 102 (85.0%) | 0.93 | 0.44 | 0.86 | 0.61 |

In relation to the alterations in arousal and reactivity, three items (*Irritable behaviour; Being 'superalert'; Feeling jumpy*) evidenced a good balance between specificity and sensitivity presenting high specificity (0.76, 0.88 and 0.80) and fairly high sensitivity (0.66, 0.70 and 0.74). The item *Taking too many risks* evidenced very high specificity (1.00) and very low sensitivity (0.26). Two items (*Having difficulty concentrating; Trouble falling or staying asleep*) evidenced high sensitivity (0.80 and 0.93) and lower specificity (0.64 and 0.44). All these cluster symptoms evidenced greater PPV (0.86 to 1.00) than NPV (0.26 to 0.61).

### 3.4. Sensitivity, specificity, PPV and NPV of symptoms in relation to ICD-11 CPTSD

Sensitivity, specificity, positive predictive power and negative predictive power of the 13 PCL-5 symptoms in relation to a probable ICD-11 CPTSD diagnosis are displayed in Table 5.

Results indicated that all items demonstrated high sensitivity (>0.86), with the exception of the item *Taking too many risks* (0.50). In contrast, items demonstrated relatively lower specificity. In particular, the re-experiencing and avoidance items had respectively low (0.30 to 0.37) and very low (0.13 to 0.24) specificity. Among the items relating to affect dysregulation, the symptom *Taking too many risks* (which was endorsed by 21% of participants only) evidenced very high specificity (0.92). The items *Having strong negative feelings* (hyperactivation) and *Trouble experiencing positive feelings* (deactivation) evidenced very high sensitivity (0.94 to 1.00) and, respectively, very low (0.20) and relatively low (0.58) specificity. The items relating to negative self-concept and interpersonal problems had very high sensitivity (0.94 to 1.00) and low specificity (0.43 to 0.49 for negative self-concept and 0.52 for interpersonal problems). Most items evidenced low PPV, with avoidance symptoms being particularly low (0.30 to 0.35). All items evidenced high NPV (0.81 to 1.00).

## 4. LCA results

All fit indices (AIC, BIC, BLRT) favoured a two-class solution (Table 6). The profile plot for the two-class solution is displayed in Figure 2. Class 1 (41.7%, n = 50)

**Table 5.** Frequency, sensitivity, specificity, positive predictive power and negative predictive power of CPTSD symptoms in relation to ICD-11 CPTSD diagnosis. Sensitivity: The probability of the presence of the symptom when CPTSD diagnosis is present. Specificity: The probability of the absence of the symptom when CPTSD diagnosis is absent. Positive predictive power: The probability of the presence of CPTSD diagnosis when the symptom is present. Negative predictive power: The probability of the absence of CPTSD diagnosis when the symptom is absent.

| Symptom | | Frequency N(%) | Sensitivity | Specificity | Positive predictive power | Negative predictive power |
|---|---|---|---|---|---|---|
| **PTSD symptoms** | | | | | | |
| ***PCL-5 item*** | | | | | | |
| ***Re-experiencing symptoms*** | | | | | | |
| 3 | Suddenly feeling or acting as if the stressful experience were actually happening again | 86 (71.7%) | 0,92 | 0,37 | 0,38 | 0,91 |
| 2 | Repeated, disturbing dreams of the stressful experience | 92 (76.7%) | 0,92 | 0,30 | 0,36 | 0,89 |
| ***Avoidance*** | | | | | | |
| 6 | Avoiding memories, thoughts, or feelings related to the stressful experience | 105 (87.5%) | 0,89 | 0,13 | 0,30 | 0,73 |
| 7 | Avoiding external reminders of the stressful experience | 98 (81.7%) | 0,94 | 0,24 | 0,35 | 0,91 |
| ***Arousal*** | | | | | | |
| 17 | Being 'superalert' or watchful or on guard | 70 (58.3%) | 0,86 | 0,54 | 0,44 | 0,90 |
| 18 | Feeling jumpy or easily startled | 75 (62.5%) | 0,89 | 0,49 | 0,43 | 0,91 |
| **Disturbances in self-organization** | | | | | | |
| ***Affect dysregulation*** | | | | | | |
| 11 | Having strong negative feelings such as fear, horror, anger, guilt, or shame *(Hyper)* | 103 (85.8%) | 1.00 | 0.20 | 0.35 | 1.00 |
| 15 | Irritable behaviour, angry outbursts, or acting aggressively *(Hyper)* | 69 (57.5%) | 0.89 | 0.56 | 0.46 | 0.92 |
| 16 | Taking too many risks or doing things that could cause you harm (Hyper) | 25 (20.8%) | 0.50 | 0.92 | 0.72 | 0.81 |
| 14 | Trouble experiencing positive feelings (Deact) | 69 (57.5%) | 0.94 | 0.58 | 0.49 | 0.96 |
| ***Negative self-concept*** | | | | | | |
| 9 | Having strong negative beliefs about yourself, other people, or the world | 82 (68.3%) | 0.94 | 0.43 | 0.41 | 0.95 |
| 10 | Blaming yourself or someone else for the stressful experience or what happened after it | 77 (64.2%) | 0.94 | 0.49 | 0.44 | 0.95 |
| ***Interpersonal problems*** | | | | | | |
| 13 | Feeling distant or cut off from other people | 76 (63.3%) | 1.00 | 0.52 | 0.47 | 1.00 |

**Table 6.** Fit indices for LCA (N = 120). Note: AIC, Akaike Information Criterion; BIC, Bayesian Information Criterion; sample size-adjusted BIC; BLRT, Bootstrap likelihood ratio test; Best-fitting model in bold.

| Classes | log-likelihood | AIC | BIC | BLRT (*p*) |
|---|---|---|---|---|
| 1 | −365,755 | 743,509 | 760,234 | - |
| **2** | **−335,754** | **697,508** | **733,745** | **<0,001** |
| 3 | −334,321 | 708,642 | 764,392 | 0,352 |
| 4 | −332,602 | 719,204 | 794,466 | 0,425 |
| 5 | −328,953 | 725,905 | 820,680 | 0,728 |

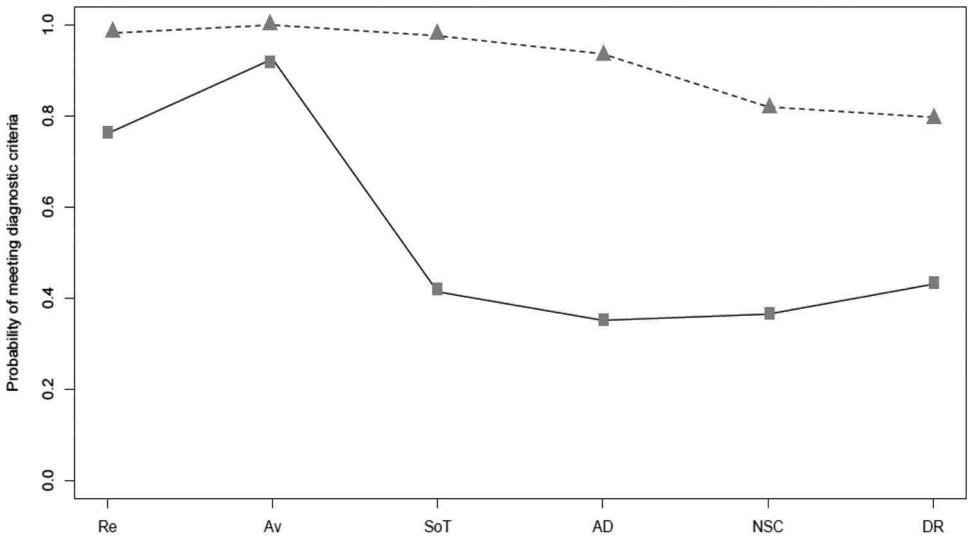
was the smallest class and was characterized by: (1) high probabilities of meeting the diagnostic criteria for Re-experiencing and Avoidance PTSD symptom clusters; (2) relatively lower probabilities of meeting the diagnostic criteria for Sense of threat PTSD symptom cluster; (3) low probabilities of meeting the diagnostic criteria for each of the DSO symptom clusters (AD, NSC and DR). This class was labelled the 'PTSD' class. Class 2 (58.3%, n = 70) was the largest class and was characterized by high probabilities of meeting the diagnostic criteria for each of the PTSD and DSO symptom clusters. This class was labelled the 'CPTSD' class.

## 5. Correlates of class membership and PCL-5 score

A linear logistic regression was performed to determine the relationships between each of the demographic and trauma-related variables (legal status, gender, age, years of education, months spent in Italy, total number of traumatic event types, employment status) and one's class membership. Of the six predictor variables analysed, no one was significantly associated with diagnostic group (see Table 7). A linear regression analysis was also performed to determine the relationships between each of the 7 demographic variables and the PCL-5 total score (see Table 8). In multiple regression model, only the months spent in Italy were significantly associated with PCL-5 score at the multivariate analysis (B = −0.33, p-value = 0.02); therefore, for each additional month of stay in Italy it is expected a PCL-5 total score 0.33 lower. Furthermore, the model does not fit well the data ($R^2$ = 0.107) suggesting that indeed there are other unobserved variables that explain the variation of total PCL-5 score.

## 6. Discussion

The current sample reflects, in terms of sex and age, the distribution of refugees who have reached Italy by sea in the last three years. Indeed, according to UNHCR (2019), in 2018 the percentages of male and female adult migrants arrived by sea in Italy are respectively 88% and 12% (in our sample 86% and 14%). The mean age our sample (25.1) is also consistent with the mean age indicated in two recent




| | Re | Av | SoT | AD | NSC | DR |
|---|---|---|---|---|---|---|
| Class 1 CPTSD N=70 (58%) | 0.98 | 1.00 | 0.97 | 0.93 | 0.82 | 0.79 |
| Class 2 PTSD N=50 (42%) | 0.76 | 0.92 | 0.41 | 0.35 | 0.36 | 0.43 |

**Figure 2.** Profile plot based on the best-fitting two-class solution from the LCA.

**Table 7.** Multinomial logistic regression results predicting PTSD and CPTSD class membership (N = 120).

| | Univariate | | Multivariate | |
|---|---|---|---|---|
| Predictor variables | OR (95% CI) | p-value | OR (95% CI) | p-value |
| Legal status | 1.233 (0.253–8.895) | 0.807 | 1.039 (0.181–8.627) | 0.967 |
| Gender (M) | 0.589 (0.157–1.808) | 0.384 | 0.599 (0.13–2.284) | 0.474 |
| Age (years) | 1.028 (0.969–1.096) | 0.380 | 1.023 (0.953–1.104) | 0.539 |
| Years of education (years) | 0.944 (0.871–1.02) | 0.151 | 0.921 (0.831–1.013) | 0.099 |
| Time spent in Italy (months) | 1.004 (0.963–1.052) | 0.846 | 0.995 (0.947–1.048) | 0.842 |
| Number of trauma type | 0.981 (0.875–1.103) | 0.846 | 0.995 (0.947–1.048) | 0.842 |
| Employment | 1.486 (0.608–3.846) | 0.396 | 1.443 (0.531–4.126) | 0.480 |

**Table 8.** Linear regression ($R^2$ = 0.107) results predicting 20 items PCL-5 score.

| | Univariate | | Multivariate | |
|---|---|---|---|---|
| Predictor variables | Estimate | p-value | Estimate | p-value |
| Legal Status | −4.196 | 0.428 | −1.054 | 0.846 |
| Gender (M) | −5.627 | 0.113 | −5.956 | 0.135 |
| Age (years) | 0.177 | 0.347 | 0.215 | 0.325 |
| Years of education (years) | −0.348 | 0.168 | −0.227 | 0.421 |
| Time spent in Italy (months) | −0.261 | 0.059 | −0.320 | 0.035* |
| Number of trauma | 0.541 | 0.134 | 0.215 | 0.612 |
| Employment | −0.414 | 0.883 | −0.259 | 0.930 |

articles investigating socio-demographic variables of asylum seekers and refugees in Italy which were respectively 30 (Ortensi, 2015) and 27.4 (Nante et al., 2016).

According to DSM-5 criteria the rate of probable PTSD (79%) was high in the current sample but consistent with findings of other previous studies investigating samples of treatment-seeking refugees resettled in Europe which reported DSM-IV PTSD rates of 82% (Teodorescu, Heir, Hauff, Wentzel-Larsen, & Lien, 2012) and 94% (Teegen & Vogt, 2002). According to ICD-11 criteria, the rates of probable PTSD and CPTSD were respectively 38% and 30% in the current sample. Meta-analytic findings suggest that the prevalence of PTSD in refugee groups is approximately 30% (Steel et al., 2009). As a general consideration, the high rates of PTSD and CPTSD in our study is likely due to the fact that the sample was composed of treatment-seeking complex trauma survivors. Notably the DSM-5 PTSD rate (79%) was statistically higher than total ICD-11 PTSD+CPTSD rate (68%). This confirm that the new ICD-11 criteria identify fewer cases of PTSD than DSM-5 (for a review on the issue see Brewin et al., 2017), probably in consequence of the more stringent ICD-11 diagnostic requirements for re-experiencing (Hyland et al., 2016; Morina, van Emmerik, Andrews, & Brewin, 2014) and hyperarousal (Hyland et al., 2016; Stammel et al., 2015) clusters.

Overall, the total PTSD+CPTSD prevalence rate (68%) in our sample is consistent with previous findings reported in Syrian treatment-seeking refugees resettled in Lebanon (61%, broken down as follows: 25% for PTSD and 36% for CPTSD, ICD-11 diagnostic criteria; Hyland et al., 2018) and is higher than previous studies conducted with trauma-affected young adults in Uganda (55%, broken down as follows: 34% for PTSD and 21% for CPTSD, ICD-11 diagnostic criteria; Murphy et al., 2016) and with two culturally diverse, help-seeking sample of refugees who resettled in Switzerland (53%, broken down as follows: 20% for PTSD and 33% for CPTSD, ICD-11 diagnostic criteria; Nickerson et al., 2016 and 54%, of which 33% for PTSD and 21% for CPTSD, ICD-11 diagnostic criteria; Hecker, Huber, Maier, & Maercker, 2018). Either way, the similarity in prevalence rates of PTSD/CPTSD amongst culturally diverse clinical samples, including among a sample of African refugees living in Italy, offers tentative support for the international applicability and cross-cultural validity of the ICD-11 diagnoses of PTSD and CPTSD, although additional investigations across the world are necessary before any firm statement regarding cross-cultural validity can be made.

Comparing rates of CPTSD in our study with other treatment-seeking samples, we find, for example, that in some studies conducted with treatment-seeking childhood abuse survivors, 38% (Cloitre et al., 2014) and 43% (Hyland et al., 2017b) of the samples had a probable CPTSD diagnosis. These still limited data could confirm the hypothesis (Ter Heide, Mooren, & Kleber, 2016) that, on one side, the exposure to repeated, prolonged, interpersonal traumatic events leads to complex PTSD in a minority of refugees only (almost in one third of cases accordingly to our study) and, on the other side, treatment-seeking refugees are at relatively lower risk of having complex PTSD than treatment-seeking survivors of childhood trauma.

There were no significant gender differences in the diagnostic rates of both DSM-5 PTSD and ICD-11 PTSD or CPTSD. Although in contradiction with most of the trauma literature (Christiansen, Hansen, & Elklit, 2014), this finding is interestingly consistent with two recent studies among child soldiers in Uganda (Murphy et al., 2016) and Syrian refugees living in Lebanon (Hyland et al., 2018) which found no gender differences in risk for PTSD and CPTSD diagnosis. Hyland and colleagues hypothesized that, given the high rates of PTSD and CPTSD in both samples, it is possible that any gender variation was nullified at these extreme levels of distress. This hypothesis would also be confirmed in our study characterized by a sample of complex trauma survivors with high rates of PTSD and CPTSD. Alternatively, it is possible that in culturally distinct context, as in those investigated in refugee studies, the regularly observed gender differences in PTSD/CPTSD amongst West populations are not so prevalent.

Findings from a DSM-5 PTSD classification analysis indicated that all re-experiencing (cluster B) and avoidance (cluster C) symptoms demonstrated high sensitivity but almost all (with the partial exception of item 3-*Flashbacks*) presented low or very low specificity. On the other hand, the items that have demonstrated both high specificity and positive predictive power belong to the cluster E (5 out of 6 symptoms) and D (5 out of 7 symptoms). These findings suggest that although in the sample of this study the re-experiencing symptoms and even more the avoidance ones, are common complex trauma sequelae, they are not necessarily indicative of PTSD while the arousal (cluster E) and negative cognitions and mood symptoms (cluster D) are more indicative of DSM-5 PTSD diagnosis. Among clusters E and D, the items that demonstrated the best balance with high sensitivity, specificity and PPV are: *Feeling distant or cut off from other people; Being 'superalert'* and *Feeling jumpy or easily startled*. The presence of these symptoms can thus be useful from a clinical point of view to suppose a PTSD diagnosis, at least in individuals with characteristics similar to the sample of this study. The findings of this study are somewhat different from a previous study (Schnyder et al., 2015) with traumatized refugees resettled in Switzerland from different countries of origin (Turkey, Iran, Sri Lanka, Bosnia, Iraq, Afghanistan and others) and living in the host country for a much longer period than our sample (9.01 yrs vs. 0.9 yrs). The main differences concern the specificity of avoidance symptoms (high in Schnyder study, very low in our study), the new symptoms introduced by DSM-5 in cluster D (in Schnyder study all demonstrated relatively high sensitivity, specificity, PPV and NPV while in our findings the item *Having strong negative beliefs* evidenced low NPV, the item *Blaming yourself or someone else for the stressful experience* relatively low specificity and low NPV and the item *Having strong negative feelings* low specificity). Moreover, our sample presented a much higher DSM-5 PTSD diagnostic rate than Schnyder sample (79% vs. 49,3%) which is reflected in a different pattern of PPV and NPV (in our study PPV is higher than NPV in all items, in Shnyder study the opposite). On the other hand, the two studies evidenced also similar results such as the high sensitivity and low specificity of re-experiencing symptoms or the very high specificity and low sensitivity of the item *Taking too many risks*. Further investigations across culturally diverse refugee groups worldwide are needed to understand if and how cultural elements, characteristics of traumatic events or other sociodemographic factors influence the symptomatic pattern of PTSD.

When using the ICD-11 criteria, analysis of the sensitivity, specificity, PPV and NPV of items in relation to the CPTSD diagnosis indicated that the items generally performed better in terms of sensitivity and NPV than specificity and PPV. This is consistent with findings by a previous investigation with the same refugee sample of Schnyder study (Nickerson et al., 2016). Notably re-experiencing symptoms and even more avoidance symptoms evidenced high and very high sensitivity, low specificity and PPV in the current sample. This is consistent with our investigation of DSM-5 PTSD symptoms in the same sample, suggesting that while these symptoms are common complex trauma sequelae, they are not necessarily indicative of PTSD or CPTSD. With regard to the DSO cluster, all items evidenced very high sensitivity and lower specificity (although globally higher than PTSD cluster) with the only exception of item *Taking too many risks* that evidenced very high specificity, high PPV and NPV and relatively low sensitivity indicating that the presence of this symptom is a good predictor of CPTSD. Similarly to Nickerson study, the negative self-concept items demonstrated very high sensitivity and NPV but low specificity and PPV suggesting that these symptoms reported in two-thirds of the sample are not well able to discriminate those with or without CPTSD. As in the Nickerson investigation, more than 80% of our sample had been tortured so that it is possible that changes in self-concept arose from the specific experiences of the sample rather than being specifically associated to CPTSD. Indeed, some authors have highlighted the link between torture and changes in identity (Nickerson, Bryant, Rosebrock, & Litz, 2014). Finally, the only item regarding interpersonal problems investigated in this study evidenced again a pattern of frequency, sensitivity, specificity, PPV and NPV very similar to Nickerson study.

The LCA findings were all in favour of a two-class solution, supporting the discriminant validity of ICD-11 PTSD and CPTSD. In this two-class solution, the largest class (58.3%) was characterized by high probabilities of meeting the diagnostic criteria for each of the PTSD and DSO symptom clusters; a symptom profile consistent with CPTSD. In contrast, a smaller (41.7%) class displayed a symptom profile whereby the probabilities of meeting the diagnostic criteria for the PTSD symptom clusters was high, and the probabilities of meeting the diagnostic criteria for the DSO symptom clusters was low; a symptom profile consistent with PTSD. Indeed, the results of this study are consistent with most of the investigations on clinical samples, which have identified only 2 or 3 classes (on the contrary, four or more classes have been identified in larger community samples), which typically represented a PTSD profile, a CPTSD profile, and, in some cases, a third profile low on all symptoms, describing what might be viewed as a resilient group (Brewin et al., 2017). Moreover, also the other two studies with refugee samples evidenced two classes characterized by symptom profiles that were consistent with ICD-11 CPTSD and PTSD formulations (Frost et al., 2019; Hyland et al., 2018). Therefore, the findings of the present study – the first on a sample of African refugees living in a western country – add to a large and growing empirical literature supporting the discriminant validity of PTSD and CPTSD amongst multiple samples taken from culturally and trauma diverse backgrounds (see references in the introduction).

The results of the logistic regression analysis found that none of the examined variables (legal status, gender, age, years of education, months spent in Italy, total number of traumatic event types, employment status) significantly predicted ICD-11 PTSD or CPTSD class membership. These findings are consistent with a previous study among Syrian refugees (Hyland et al., 2018). Notably, these results suggest that in this group of adulthood complex trauma survivors the outcome in more pervasive forms of post-traumatic disorders is not due to the quantity of traumatic events types but rather to the specific characteristics of each single traumatic event as well as to other several risk factors. Such findings beg future investigations of which specific vulnerability factors in pre-traumatic, peri-traumatic and post-traumatic phases influence the development of PTSD or CPTSD in refugees exposed to complex trauma. Particularly, childhood interpersonal trauma, which was not specifically investigated in this study, seems to be a relevant risk factor for CPTSD (Hyland et al., 2017b; Karatzias et al., 2017). It can therefore be assumed that the early developmental trauma could constitute also a significant vulnerability factor for the development of a complex traumatic response in an adult exposed to interpersonal traumatic events. Moreover, as some studies show higher predisposition to PTSD symptoms in individuals with certain personality characteristics (Bachar, Hadar, & Shalev, 2005; Gunderson & Sabo, 1993; Marzillier & Steel, 2007), it would also be worth investigating the role of pre-traumatic personality traits in the development of CPTSD. It is worth recalling that some important post-traumatic vulnerability factors (uncertainty about the outcome of the asylum application, residence in a reception centre without family members) were present in almost all participants of our sample.

On the other hand, the multiple linear regression analysis found that only months spent in Italy significantly predicted PCL-5 score; that is to say that, in our sample, the longer was the time spent in Italy by the refugees in an overall 'safe place' condition, the lower was the severity of their post-traumatic symptoms. Moreover, in contrast to the dose-response effect shown by other studies (Kolassa et al., 2010; Neugebauer et al., 2009), in our sample the severity of post-traumatic symptoms was not predicted by the number of traumatic event types.

In conclusion, if on one hand these results suggest that, in the post-traumatic phase, the time spent in a 'safe place' condition contributes to improve the severity of post-

traumatic symptomatology, on the other hand neither this variable nor other socio-demographic factors seem to contribute to the emergence of complex PTSD. To understand therefore which risk factors have a role in the development of CPTSD in a group of refugees who have survived repeated, prolonged, interpersonal traumatic events, it will be necessary to investigate other possible variables such as childhood trauma experiences or pre-traumatic personality traits.

The current study had a number of limitations. The two most relevant are the small sample size that limits the interpretability and generalizability of the findings and the fact that the items indexing DSO symptoms in the current study were derived from a scale not validated for the measure of this construct. Notably, we could use only one item to assess disturbed relationship. Nevertheless, a number of the studies investigating CPTSD to date have employed a similar strategy, using archival data or items from a variety of scales to examine these symptom constellations (Cloitre et al., 2013, 2014; Hyland et al., 2016; Nickerson et al., 2016; Perkonigg et al., 2016). Furthermore, we did not examine other diagnoses (e.g. depression and borderline personality disorder), and it would be useful in future studies to assess the discriminant validity of the CPTSD construct. Finally, we did not specifically assess for exposure to childhood trauma, and thus it is not possible to determine the extent to which symptoms of CPTSD or PTSD may have been attributable to these experiences. On the other hand, a strength of the study is that it is one of the few contemporary investigations focusing on CPTSD in a refugee population exposed to extreme forms of persecution and human rights violations. Furthermore, the sample of this study presented a comparatively greater cultural, geographical and anamnestic homogeneity with respect to other similar studies.

To our knowledge, at the date this is the first study investigating PTSD in traumatized refugees, using both DSM-5 and ICD-11 diagnostic criteria. This is also the first investigation examining complex trauma outcome in a group of refugees recently arrived (11 months on mean) in a western country.

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