






BASIC RESEARCH ARTICLE



Psychometric properties of the revised Ukrainian version of the Continuous Traumatic Stress Response scale (CTSR) in the context of the Russo-Ukrainian war

Iryna Frankova ^a, Oksana Senyk ^b, Oleksandr Avramchuk ^c, Iryna Leshchuk ^a, Andrii Rudys^c, Anton Kurapov ^d and Aviva Goral^e

^aDepartment of medical psychology, psychosomatic medicine and psychotherapy, Bogomolets National Medical University, Kyiv, Ukraine; ^bDepartment of Humanities and Social Sciences, WSB Merito University in Gdansk, Gdansk, Poland; ^cDepartment of Clinical Psychology, Ukrainian Catholic University, Lviv, Ukraine; ^dDepartment of Psychology, Paris Lodron University of Salzburg, Salzburg, Austria; ^eBen Gurion University of the Negev, Be'er Sheva, Israel

ABSTRACT

Background: The Continuous Traumatic Stress Response scale (CTSR) was designed to measure symptoms associated with multiple ongoing security threats in the context of Israeli-Palestinian conflict. Since 2014, Ukraine has faced armed invasion and war, with nationwide insecurity since February 2022.

Objective: This study aimed to adapt the CTSR scale into Ukrainian and evaluate its psychometric properties within a Ukrainian sample during the ongoing war.

Method: The Ukrainian adaptation of the CTSR followed the procedure used in creating the original instrument (Goral, A., Feder-Bubis, P., Lahad, M., Galea, S., O'Rourke, N., & Aharonson-Daniel, L. (2021). Development and validation of the Continuous Traumatic Stress Response scale (CTSR) among adults exposed to ongoing security threats. *PLoS One*, 16(5), e0251724). To identify a unique context-specific factor structure relevant to the Ukrainian experience, the initial 25 items were tested in a sample of 584 Ukrainians using exploratory and confirmatory factor analyses. Subsequently, the established scale structure was assessed for homogeneity, and convergent validity using measures of depression (PHQ-9), anxiety (GAD-7), perceived stress (PSS-4), resilience (BRS), and PTSD symptoms (PCL-5).

Results: A three-factor, 9-item solution, representing the constructs of exhaustion, alienation, and helplessness, demonstrated the most acceptable fit among all the alternative CTSR models, including the original: $\chi^2 = 72.84$, $df = 24$, $p < .001$, $\chi^2/df = 3.04$, CFI = 0.94, TLI = 0.91, SRMR = 0.05, RMSEA = 0.08. Cronbach's α for internal consistency ranged from 0.68 to 0.84 for total score, and subscales. Significant positive correlations ranging from 0.41 to 0.67 with symptom severity of depression, anxiety, perceived stress, and PTSD established the convergent validity of the Ukrainian CTSR, indicating that it measures related yet distinctive psychological phenomena of reactions to continuous traumatic stress.

Conclusions: The revised Ukrainian version of the CTSR scale is a reliable and valid measure of continuous traumatic stress response, accurately reflecting its manifestation in the Ukrainian context. These findings are crucial for guiding clinical interventions and research in prolonged war environments, where understanding the nuances of ongoing trauma is essential.

Propiedades psicométricas de la versión ucraniana revisada de la Escala de Respuesta de Estrés Traumático Continuo en el contexto de la guerra ruso-ucraniana

Antecedentes: La Escala de Respuesta de Estrés Traumático Continuo (CTSR por sus siglas en inglés) fue diseñada para medir los síntomas asociados con múltiples y continuas amenazas a la seguridad en el contexto del conflicto israelí-palestino. Desde 2014, Ucrania ha enfrentado una invasión armada y una guerra, y desde el 2022 se vive una situación de inseguridad nacional.

Objetivo: Este estudio busca adaptar la escala CTSR al ucraniano y evaluar sus propiedades psicométricas dentro de una muestra ucraniana durante la guerra en curso.

Métodos: La adaptación ucraniana de la escala CTSR siguió el procedimiento empleado para la creación del instrumento original (Goral, A., Feder-Bubis, P., Lahad, M., Galea, S., O'Rourke, N., & Aharonson-Daniel, L. (2021). Development and validation of the Continuous Traumatic Stress Response scale (CTSR) among adults exposed to ongoing security threats. *PLoS One*, 16(5), e0251724). Para identificar una estructura de factores específicos exclusivos del contexto que sea relevante a la experiencia ucraniana, se probaron los 25 ítems iniciales en una muestra de 584 ucranianos empleando análisis factoriales exploratorios y

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Respuesta de estrés traumático continuo; adaptación de escala; validez; confiabilidad; guerra ruso-ucraniana

HIGHLIGHTS

- The psychological response to continuous traumatic stress is a context-specific phenomenon that reflects both the cultural characteristics of a group and the unique conditions of a given continuous traumatic situation. Therefore, it is essential to account for contextual factors when adapting psychological tools to measure continuous traumatic stress reactions.
- The Continuous Traumatic Stress Response scale was adapted into Ukrainian language, revealing an optimal factor structure that aligns with the Ukrainian experience of prolonged war-related stress. This structure consists of three factors: exhaustion, alienation, and helplessness.
- The Ukrainian version of the scale demonstrated strong convergent validity, confirming that it measures reactions to

CONTACT Oksana Senyk  oksana.senyk@gdansk.merito.pl  Department of Humanities and Social Sciences, WSB Merito University in Gdansk, al. Grunwaldzka 238A, 80-266 Gdansk, Poland

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confirmatorios. Posteriormente, la estructura de la escala establecida fue evaluada para homogeneidad y para validez convergente empleando mediciones para depresión (PHQ-9), ansiedad (GAD-7), estrés percibido (PSS-4), resiliencia (BRS) y síntomas del trastorno de estrés postraumático (PCL-5).

Resultados: Una solución de tres factores y nueve ítems representando los constructos de agotamiento, alienación e indefensión demostró el ajuste más aceptable dentro de las alternativas para el modelo de la escala CTSR, incluyendo la original: $\chi^2 = 72.84$, $df = 24$, $p < .001$, $\chi^2/df = 3.04$, CFI = 0.94, TLI = 0.91, SRMR = 0.05, RMSEA = 0.08. El α de Cronbach para la consistencia interna se encontraba en el rango de 0.68 a 0.84 para el puntaje total y para las subescalas. Las correlaciones positivas significativas, en el rango de 0.41 a 0.67, con la severidad de los síntomas de depresión, ansiedad, estrés percibido y síntomas del trastorno de estrés postraumático establecieron la validez convergente de la escala CTSR ucraniana, indicando que mide los fenómenos psicológicos relacionados, pero distintos, de reacciones ante el estrés traumático continuo.

Conclusión: La versión ucraniana revisada de la escala CTSR es un instrumento que mide la respuesta al estrés traumático continuo de forma confiable y válida, reflejando de manera precisa sus manifestaciones en el contexto ucraniano. Estos hallazgos son cruciales para guiar las intervenciones clínicas y las investigaciones en entornos de guerra prolongada, donde resulta esencial comprender los diferentes matices del trauma continuo.

continuous traumatic stress that are related to, yet distinct from, PTSD phenomena.

1. Introduction

Over recent decades, the escalation of military and armed conflicts has posed a significant challenge for the global community. Despite efforts to enhance security and foster civil society through reforms, armed conflicts persist, imposing enduring psychosocial burdens and multifaceted consequences on people's lives.

Since 2014, Ukraine has endured armed invasion and ongoing warfare. Following the expanded Russian invasion on 24 February 2022, the frontline is now in eastern and southern Ukraine. Despite this, civilian targets far from the frontline are regularly bombed, causing casualties and destroying infrastructure, including healthcare and educational institutions. This has led to a large-scale humanitarian crisis, with over 3.7 million internally displaced persons within Ukraine and many more fleeing abroad. Those in recently de-occupied areas or near the frontline face disrupted access to healthcare, education, and basic needs due to transportation and communication issues. Increasing poverty and unemployment have decreased incomes, raised utility costs, and caused housing difficulties. The direct losses among the military and civilians highlight the long-term consequences for residents living under traumatic conditions (Goto et al., 2024; Kang et al., 2023; Osokina et al., 2023; Zasiukina et al., 2023). Major sources of distress in Ukraine include family separation, fear of mobilization, grief, loss, human rights violations, difficult living conditions, homelessness, and increased risk of violence, including conflict-related sexual and gender-based violence (Frankova et al., 2024). Thus, the described situation can be defined as living in conditions of continuous war-related stress.

Evidence suggests that 'Continuous Traumatic Stress' (CTS) is a complex phenomenon reflecting the cultural characteristics and history of a group or entire population (Eagle & Kaminer, 2013; Ford

et al., 2015). For Ukrainians, collective traumas such as Soviet persecution, mass exile, man-made famine, World War II, and subsequent repressions have caused millions of casualties and left enduring impacts on the community (Bertelsen, 2013). There is evidence suggesting that the trauma from these events has been passed down through generations in affected families, influencing the ability of some modern-day Ukrainians to cope, trust, and form relationships (Bezo & Maggi, 2015). Research on descendants of Holodomor survivors found that over half of the respondents displayed negative changes in mood and cognition, which can be traced back to the trauma of the Holodomor and the broader Soviet era. Participants expressed concerns about food scarcity, high levels of distrust in authorities, dissatisfaction with the government, and a tendency to prioritize family over community (Gorbu-nova & Klymchuk, 2020). These transgenerational traumas continue to affect modern Ukrainians alongside ongoing war-related stress (Bezo & Maggi, 2015; Eagle & Kaminer, 2013). As Ukraine faces ongoing armed conflict, the legacies of Soviet persecution and induced famines may intensify feelings of vulnerability, helplessness, fear and distrust, evoking memories and coping strategies induced by prior traumatic experiences of family members from previous generations. This historical context can also manifest in resistance to seeking help, as individuals may perceive authorities as untrustworthy or as a continuation of past oppressions. Given these complexities, it is crucial to consider the unique historical and cultural dimensions of trauma when examining responses to continuous traumatic stress in today's Ukraine. Incorporating this cultural context would improve the effectiveness of addressing the nuanced ways in which past traumas shape current reactions to ongoing conflict, ultimately leading to a more comprehensive understanding of the impact of sustained stress.

It is important to note that under continuous exposure, traumatization is not solely due to immediate threats as defined by Criterion A of post-traumatic stress disorder (PTSD) in DSM-5 (Dixon et al., 2023; Pat-Horenczyk & Schiff, 2019). Also, compared to classic PTSD, intrusive symptoms related to processing earlier traumatic experiences are significantly less pronounced in CTS (Hecker et al., 2017; Lahad & Leykin, 2010). Itzhaky et al. (2017) emphasize that psycho-emotional responses and psychopathological manifestations in CTS are broader than those seen in PTSD, predisposing individuals to greater vulnerability to comorbid conditions such as anxiety disorders, clinical depression, somatoform disturbances, and somatization, difficulties with anger management, and unproductive coping strategies, including substance abuse (Greene et al., 2018; Potluri & R Patel, 2021). Another issue is impaired social perception and support (Kira et al., 2013). Individuals experiencing CTS often exhibit heightened perception of potential threats, suspicion, mistrust, and persistent preoccupation with the future, resulting in mental exhaustion, reduced empathy, social withdrawal, and isolation. Key aspects of 'Continuous traumatic stress' include: (a) persistent conditions causing heightened tension and hypervigilance towards current and anticipated threats; (b) difficulty in defining clear boundaries between the onset and cessation of traumatic experiences; (c) unlike PTSD, emotional responses extend beyond individual experiences, involving shared empathy or reactions within the immediate environment; (d) disruption of daily functioning and adaptation due to anticipatory anxiety and attempts to rationalize emotional states or behaviours (Nuttman-Shwartz & Shoval-Zuckerman, 2016).

There is ongoing debate among specialists about whether CTS should be recognized as a distinct clinical diagnosis alongside PTSD, requiring specialized interventions and support protocols. Long-term traumatic stress analysis reveals that ongoing threats present significant adaptation challenges amid limited physical and psychological resources, which further manifest through distorted situation assessments, and challenges in decision-making (Nuttman-Shwartz & Shoval-Zuckerman, 2016; Stevens et al., 2013). Alternatively, some argue for viewing CTS as a 'non-pathological response,' where continuous exposure to danger triggers natural and adaptive processes, advocating for the development of flexible coping strategies and emotional responses, instead of focusing on the necessity to just 'cure' (Diamond et al., 2013).

In practice, particularly in Ukraine, assessments of individuals enduring long-term traumatic stress often use PTSD screening tools and scales. However, Goral et al. (2017) argue that these tools may not adequately capture the complex symptoms of chronic stress. Cultural sensitivity towards traumatic experiences

and traditional coping strategies further complicates the use of PTSD assessments in these contexts, requiring validation and adaptation of relevant methods.

As of early 2024, only one publication in Ukraine has adapted methodologies for studying 'Continuous Traumatic Stress Response' (CTSR; Zasiakina et al., 2024). This adapted scale, originally designed to identify exhaustion-detachment, rage-betrayal, and fear-helplessness, showed excellent psychometric properties including clear factor structure of the tool, homogeneity, and concurrent and construct validity (Goral et al., 2021). However, in the study on the Ukrainian adaptation of the scale conducted by Zasiakina et al. (2024) the original factor structure of the CTSR was not replicated in Ukrainian data (Zasiakina et al., 2024). Moreover, a correlation between latent factors pointed to lack of discriminant validity between them ($r = 0.85$; Brown, 2015). Additionally, check of convergent validity showed poor discrimination from the symptom severity of depression and PTSD in Ukrainian sample (correlation coefficients of 0.72 and over). A poor fit of the original structure of the CTSR into Ukrainian context suggests that mental representations of prolonged traumatic stress may vary based on situational and cultural-historical contexts (Eagle & Kaminer, 2013; Ford et al., 2015; Nuttman-Shwartz & Shoval-Zuckerman, 2016; Pat-Horenczyk & Schiff, 2019). Therefore, different language adaptations of the CTSR should probably be conducted with particular attention to cultural differences in mental representation of continuous trauma.

Given the need for cultural sensitivity, contextual adaptations of the CTSR are essential. This study aimed to provide a Ukrainian adaptation of the CTSR scale while explicitly considering cultural context of the ongoing trauma. We hypothesized that the original three-factor model would show an acceptable fit for the Ukrainian data. However, we also hypothesized that an alternative factor structure might better fit the Ukrainian data, reflecting culturally specific reactions to CTS in the context of Russo-Ukrainian war. Additionally, we expected CTSR scores to positively correlate with measures of depression, anxiety, perceived stress and PTSD, while showing a negative correlation with resilience.

2. Materials and methods

2.1. Data collection and sample

A sample of the Ukrainian population was recruited from May to November 2023. The sample included Ukrainians currently living in Ukraine as well as those living abroad. Nearly 70% of those living abroad fled the war following exposure to continuous war-related stress and may have experienced displacement

related trauma as well. Those who lived abroad before the invasion reported increased stress, anxiety, and sleep problems due to concerns for relatives in Ukraine. Thus, all Ukrainians, regardless of place of residence, were assumed to be affected by the war and its continuous stress.

Inclusion criteria were age 16 or older, fluency in Ukrainian, and signed informed consent. Participants were recruited via snowball sampling method and social media posts (e.g. Facebook, Instagram, Telegram). To address potential self-selection bias, diverse social media platforms were used to advertise the study. Additionally, nearly half of the participants were recruited in person by directly approaching target groups (e.g. groups of internally displaced persons). Of the 587 participants recruited, 3 were excluded for not meeting inclusion criteria by age, resulting in 584 participants. Most were females (79%), most ($n = 486$, 83%) residing in various regions of Ukraine, 98 (17%) participants were Ukrainians residing abroad. Mean age was 39.72 years ($SD = 12.55$, range 17 to 75 years).

Study information and digital informed consent were provided to all study participants prior to completing self-report measures. Anonymity, confidentiality, and data protection were ensured. The study was approved by the local ethics committee (Protocol # 165 by Commission on Biomedical and Research Ethics, Bogomolets National Medical University, 05.12.2022) and conducted according to the Declaration of Helsinki and ethical principles of the Ukrainian Catholic University and Bogomolets National Medical University.

2.2. Measures

2.2.1. Sociodemographic information

Participants' sociodemographic characteristics (age, gender, and area of residence) were measured using a self-constructed questionnaire. High and low exposure communities were matched by residence area (East, South, Central, North, West of Ukraine, and outside Ukraine).

2.2.2. Continuous Traumatic Stress Response

The Continuous Traumatic Stress Response scale (CTSR) measures symptoms associated with exposure to ongoing, multiple continuous security threats, originally focusing on exhaustion, detachment, rage, betrayal, fear, and helplessness, which are not alien to PTSD but are specific to context and culture (Goral et al., 2021).

The original CTSR comprises 11 items rated on a four-point Likert scale (0-Not at all to 3-Severe), with three subscales: Exhaustion and Detachment (ED), Rage and Betrayal (RB), and Fear and Helplessness (FH). The structure of the questionnaire was

derived from an initial pool of 25 items using exploratory factor analysis (EFA) and then confirmed by confirmatory factor analysis (CFA) indicating excellent goodness of fit between the suggested model and the observed data (Goral et al., 2021). Initial analysis showed internal consistencies of 0.90 for the total scale, 0.86 for ED, 0.82 for RB, and 0.74 for FH, with mild to moderate correlations between factors. Consequently, all 25 items which laid the foundation of the original CTSR scale were translated into Ukrainian. This step was undertaken to determine whether the original factor structure would replicate in the Ukrainian sample or if a culturally specific structure of CTSR would emerge, reflecting Ukrainians' unique reactions to CTS in the context of the ongoing war.

Two psychologists independently translated the 25 items into Ukrainian. Both versions were compared for discrepancies and merged through consensus into one Ukrainian version, which was subsequently backtranslated. The translation's accuracy was verified by the author of the original instrument. A pilot test with 32 participants confirmed the clarity and understanding of the items, so no further adjustments were needed. The final revised Ukrainian version of the CTSR is provided in Appendix A.

2.2.3. Mental health symptoms

The Patient Health Questionnaire-9 (PHQ-9, Kroenke et al., 2001): consists of nine items for screening depression and assessing its severity. The Ukrainian translation by the Ukrainian Institute of Cognitive-Behavioral Therapy (2012) showed good internal consistency in our sample (Cronbach's $\alpha = 0.86$; Taber, 2018). We hypothesized significant positive correlations between CTSR and PHQ-9 scores, as many studies report a link between continuous traumatic events and depressive symptoms (Neria et al., 2010).

A Brief Measure for Assessing Generalized Anxiety Disorder (GAD-7, Spitzer et al., 2006): This seven-item tool screens for Generalized Anxiety Disorder. The Ukrainian adaptation showed an internal consistency of 0.88 (Aleksina et al., 2024). In line with prior research showing associations between continuous traumatic stress and anxiety symptoms (Neria et al., 2010), we assumed CTSR would positively correlate with GAD-7 scores.

The 4-item Perceived Stress Scale (PSS-4, Cohen et al., 1983): This short version of the 14-item PSS self-report questionnaire measures the extent to which situations in one's life are perceived as stressful. We used the validated Ukrainian translation by Veldbrecht and Tavrovetska (2022). Cronbach's α in our study was 0.66, comparable to 0.60 in the original instrument (Cohen & Williamson, 1988). Consistent

with our hypotheses, we anticipated that CTSR would positively correlate with PSS-4 scores.

The Brief Resilience Scale (BRS, Smith et al., 2008): This six-item scale assesses the ability to bounce back or recover from stress. As no Ukrainian adaptation of this tool exists, two independent translations into Ukrainian were provided and merged into a single version used in this study. Cronbach's α for the translated BRS was 0.81, indicating adequate internal consistency. Based on the conceptual nature of resilience, we hypothesized that CTSR would negatively correlate with BRS scores.

To differentiate CTSR from PTSD symptoms, we also assessed our study participants using the **PTSD Checklist for DSM-5 (PCL-5,** Weathers et al., 2013), a 20-item self-report measure of DSM-5 PTSD symptoms. We utilized the Ukrainian translation by Bezsheiko (2016), which showed excellent internal consistency (Cronbach's $\alpha = 0.93$) in our sample. Consistent with previous research (Dixon et al., 2023; Itzhaky et al., 2017; Pat-Horenczyk & Schiff, 2019), which emphasizes the distinction between PTSD symptoms and reactions to CTS, we hypothesized that positive correlation between CTSR and PCL-5 scores would not exceed 0.70. This would suggest that less than 50% of the variance in CTSR scores could be explained by the symptom severity of PTSD.

All 584 participants completed the 25 items describing possible reactions to ongoing traumatic stress, as well as the PHQ-9 and GAD-7 questionnaires. Of these, 393 participants additionally completed the PSS-4 and BRS scales, and 138 participants completed the PCL-5 for PTSD screening.

2.3. Analyses

Following the cross-validation procedure applied in Goral et al. (2021), participants were randomly assigned to two groups of 292 participants each: one group for EFA to derive an optimal factor structure reflecting Ukrainians' reactions to CTS, and the other for CFA to evaluate the fit statistics of the established factor structure. If the derived structure differed from the original CTSR scale established in an Israeli sample by Goral et al. (2021), fit statistics were compared across models, including the original model, a viable one-factor total score model, and the two-factor model established in a Ukrainian sample by Zasiakina et al. (2024). The two groups did not differ significantly in terms of age, gender, and place of residence.

The EFA was performed in R software (psych v.2.1.9). Bartlett's test of sphericity was used to ensure that the correlation matrix was not random, and the Kaiser-Meyer Olkin measure was employed to verify the sampling adequacy. Once the correlation matrix was deemed factorable, the data were analyzed using EFA based on the polychoric correlation matrix,

given the ordinal nature of the CTSR's 4-point response scale (Goral et al., 2021; Yang & Xia, 2015). Following best practices, we used principal axis factoring with oblique rotation, given the assumption that the investigated constructs were correlated (Fabrigar & Wegener, 2012; Watkins, 2018). To determine the number of factors to retain, parallel analysis and a visual scree test were employed. The following criteria guided the final factor structure: (1) each factor had to include at least three items with salient factor loadings (of 0.40 and higher), (2) items with complex or cross-loadings were removed to achieve a simple structure representing reactions to CTS, (3) each factor's items needed to meaningfully reflect different aspects of a specific response to CTS, ensuring theoretical interpretability, and (4) the retained factors collectively had to explain over 50% of the total variance in the observed data (Le et al., 2010; O'Rourke & Hatcher, 2013; Watkins, 2018). We also aimed at retaining as many items as possible from the original CTSR version, which measured constructs of exhaustion, detachment, fear, helplessness, rage, and betrayal (Goral et al., 2021).

The CFA, specifically modelled for the ordinal data using diagonally weighted least squares (DWLS; Li, 2016) was next performed in R Studio (lavaan package v.0.6-9). This analysis assessed the established factor solution and alternative CTSR structures. To compare models, the following metrics were used: (1) an absolute fit index of chi-square value relative to degrees of freedom (χ^2 / df): a lower ratio (of ≤ 2) and higher p -value indicate a superior fit between the hypothesized model and the observed data (Alavi et al., 2020; Cole, 1987; Kline, 2023). (2) The Comparative Fit Index (CFI) and the Tucker-Lewis Index (TLI) were used to assess how well a hypothesized model fits the sample data compared to a baseline or minimal model that specifies no relationships between the variables. A CFI or TLI value of 0.95 and higher indicates a good model fit, while values between 0.90 and 0.95 suggest a suboptimal fit. (3) Conversely, the Root Mean Square Error of Approximation (RMSEA) and the Standardized Root Mean Square Residual (SRMR) were used to assess the extent to which the tested model deviates from the observed data. For these indices, lower values indicate better fit, with coefficients below 0.05 reflecting a good fit and values between 0.08 and 0.05 suggesting a suboptimal fit (Hu & Bentler, 1999). (4) Additionally, the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC) were analyzed to compare the tested models. For these criteria, lower values signify a 'better' model among the group of alternatives.

Following the CFA, descriptive and homogeneity analyses were performed for the factors comprising the 'championed' model, as well as for the total score. Convergent validity of the scale was assessed

by computing correlations between the Ukrainian version of the CTSR and the PHQ-9, GAD-7, PSS-4, BRS, and PCL-5 questionnaires. These analyses were conducted using Jamovi (Version 2.3.28.0).

3. Results

1. Exploratory factor analysis

There was no missing data among 292 participants assigned to the EFA. Bartlett's test of sphericity was significant, indicating that the correlation matrix was not random, $\chi^2(300) = 2894$, $p < .001$. The KMO measure of sampling adequacy for the 25-item pool was 0.90, well above the minimum standard for EFA. The parallel analysis and the scree test suggested a three-factor solution, like the original Israeli version of the CTSR scale (Goral et al., 2021). However, stepwise deletion of items resulted in a slightly different factor structure: items 1, 2, and 4 composed the *exhaustion* subscale (e.g. 'I feel mentally exhausted'); items 6, 7, and 10 formed the *alienation* subscale (an equivalent of the *detachment* construct in the original scale, but we argue that *alienation* better captures the meaning of this factor, reflecting isolation from others, e.g. 'I find it hard to trust the people around me'); and items 11, 17, and 25 composed the *helplessness* subscale (e.g. 'I feel that I cannot protect those who depend on me'). Thus, a three-factor structure was retained, with each factor saliently loaded by three items representing meaningful aspects of specific reactions to CTS (see Appendix B).

The first factor accounted for 18.81%, the second for 16.97%, and the third for 14.49% of the total variance, collectively explaining 50.27% of the variance in the observed data. Inter-factor correlations ranged between 0.64 and 0.70, indicating a sufficient level of discrimination between them (< 0.85 ; Brown, 2015). Based on these results the retained three-factor structure was deemed an optimal representation of the investigated phenomena.

2. Confirmatory factor analysis

Next, CFA was performed to test the properties of the established factor structure. There was no missing data among 292 participants assigned to the CFA. To

avoid overfitting, no correlated errors were added to the model. The statistics indicated a suboptimal fit between the model and the observed data: $\chi^2 = 72.84$, $df = 24$, $p < .001$, $\chi^2/df = 3.04$, CFI = 0.94, TLI = 0.91, SRMR = 0.05, RMSEA = 0.08, AIC = 5622, BIC = 5699. The correlations between latent factors equalled 0.73, 0.76 and 0.83. Item loadings for this model ranged from 0.42 to 0.68 (see Appendix C for details).

The obtained results were then compared with the fit statistics of the original CTSR model established in the Israeli sample by Goral et al. (2021), as well as with the alternative one-factor models comprising the items included in the Israeli and Ukrainian versions of the CTSR, respectively. Additionally, the model established in the Ukrainian sample by Zasiiekina et al. (2024) was tested. For ease of comparison, the fit statistics for all models are presented in Table 1.

As shown in Table 1, the factor structure established in the current study demonstrates the best fit statistics compared to other viable alternative models, including the original Israeli model (Goral et al., 2021) and the alternative Ukrainian model (Zasiiekina et al., 2024). It is worth noting that the fit statistics of the established model improve substantially after adding of just one correlated error, an adjustment used in the original CTSR scale and consistent with other scale construction studies (Diotaiuti et al., 2021; Goral et al., 2021): $\chi^2 = 45.84$, $df = 23$, $p = .003$, $\chi^2/df = 1.99$, CFI = 0.97, TLI = 0.95, SRMR = 0.03, RMSEA = 0.06, AIC = 5615, BIC = 5729.

Given these results the established three-factor solution was accepted as the most appropriate representation of the Ukrainians' reactions to CTS and was subsequently tested for reliability and convergent validity. Descriptive statistics were also calculated.

3. Internal consistency of the Ukrainian CTSR

The internal consistency of the CTSR was assessed using Cronbach's alpha coefficient, yielding values of 0.71, 0.68, and 0.75 for the *exhaustion*, *alienation*, and *helplessness* subscales, respectively, and 0.84 for the CTSR total score. Further analysis revealed that

Table 1. The CFA results for different CTSR models.

Indicator	Three-factor Ukrainian model	One-factor Ukrainian model	Three-factor Israeli model (Goral et al., 2021)	One-factor Israeli model	Two-factor Ukrainian model by Zasiiekina et al. (2024)
χ^2	72.84	110.73	143.58	152.99	143.57
df	24	27	41	44	43
p	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
χ^2/df	3.04	4.10	3.50	3.48	3.34
CFI	0.94	0.89	0.85	0.84	0.86
TLI	0.91	0.86	0.80	0.80	0.81
SRMR	0.04	0.06	0.06	0.06	0.06
RMSEA	0.08	0.10	0.09	0.09	0.09
AIC	5622	5672	7019	7022	7015
BIC	5699	5771	7152	7144	7140

removing any items from the subscales or the total score would decrease the homogeneity of the scale (Appendix D).

4. Convergent validity of the Ukrainian CTSR

Convergent validity was evaluated through correlations with the PHQ-9, GAD-7, PSS-4, BRS, and PCL-5 scales. All measures exhibited normal distributions based on skewness and kurtosis criteria (Kim, 2013), enabling the calculation of Pearson correlation coefficients. As hypothesized, reactions to CTS were negatively correlated with resilience, and positively correlated with depression, anxiety, and perceived stress, supporting the convergent validity of the Ukrainian CTSR (Table 2). Furthermore, positive correlations between CTSR and PCL-5 scores did not exceed 0.70, indicating that these instruments measure related but distinct psychological constructs.

5. Descriptive statistics for the Ukrainian CTSR

Given the described results, the Ukrainian CTSR demonstrated adequate levels of validity and reliability. Subsequently, we analyzed the distribution, mean scores, and prospective cut-off values for the scale. In the total sample, CTSR scores did not cover the full possible range, with scores distributed from 0 to 25; scores of 24 were missing, and the maximum of 26–27 were not observed. The score distribution graph revealed a slight right-skewness. However, according to skewness and kurtosis criteria the distribution was normal (Skewness = 0.85, Kurtosis = 0.51; Kim, 2013). The mean score was 7.69 (SD = 4.88), with the 75th percentile corresponding to a score of 10. The subscales of *exhaustion*, *alienation*, and *helplessness* also exhibited normal distributions, covering the entire possible range of scores from 0 to 9. The mean scores for these subscales were 2.70, 2.04, and 2.95, respectively. Cut-off values were determined based on the 75th percentile, with thresholds of 4 points for the *exhaustion* and *helplessness* subscales and 3 points for the *alienation* subscale.

Finally, ANCOVA models using sex as a predictor and age as a covariate, revealed no significant effects of sex or age on the total CTSR score or its subscales (p -values ranged from .34 to .90).

Table 2. Pearson correlation coefficients between CTSR, PHQ-9, GAD-7, PSS-4, BRS, and PCL-5 scores.

	PHQ-9	GAD-7	PSS-4	BRS	PCL-5
Exhaustion	0.55	0.49	0.58	−0.33	0.57
Alienation	0.44	0.47	0.46	−0.26	0.41
Helplessness	0.55	0.55	0.62	−0.38	0.55
CTSR_Total	0.62	0.61	0.67	−0.40	0.63

Note. All correlations are significant at $p < .001$.

4. Discussion

In the search for a factor structure that most accurately represents Ukrainians' reactions to CTS, a three-factor solution was identified. This structure accounted for 50.27% of the total variance and comprised the subscales of *exhaustion*, *alienation* and *helplessness*. The *exhaustion* subscale included three items from the *exhaustion-detachment* subscale of the original CTSR. The *alienation* subscale was composed of two items from the *exhaustion-detachment* subscale and one item from the *rage-betrayal* subscale of the original. Finally, the *helplessness* subscale shared only one item with the original Israeli *fear-helplessness* subscale of the CTSR. Although the three-factor solution exhibited suboptimal CFA fit indices, its fit statistics were superior to those of any alternative CTSR model, including the original Israeli model (Goral et al., 2021), and the Ukrainian model proposed by Zasiakina et al. (2024). The model by Zasiakina et al. (2024) included the same items as the final original version of the CTSR but did not replicate its three-factor structure, instead identifying a two-factor solution with poor discrimination between the factors. In contrast, the factors revealed in our model satisfied the discriminant validity criterion (≤ 0.85 ; Brown, 2015), indicating that they measure related but distinct psychological reactions to CTS.

The findings underscore the fact that each situation of CTS has its unique social, political, and economic characteristics, which shape individual perceptions (Senyk et al., 2022). Therefore, consistent with theoretical expectations, the cognitive representation of CTS may vary significantly across populations exposed to different CTS contexts (Eagle & Kaminer, 2013; Ford et al., 2015; Nuttman-Shwartz & Shoval-Zuckerman, 2016; Pat-Horenczyk & Schiff, 2019). For example, only one item from the *rage-betrayal* construct in the original CTSR ('I feel betrayed') was retained in final Ukrainian version of the scale. However, this item constituted to the *alienation* subscale, reflecting feelings of isolation from others rather than rage towards others. A possible explanation of the absence of the *rage* construct in the Ukrainian sample could be the elevated levels of depression and anxiety among Ukrainians exposed to ongoing trauma (Ministry of Health of Ukraine, 2022), which may deplete the energy required to express rage.

An analysis of homogeneity revealed that all items in the Ukrainian CTSR were sufficiently consistent with the scale and its other items. Cronbach's alpha coefficients for the CTSR total score, as well as the *exhaustion* and *helplessness* subscales, met the recommended threshold of 0.70 or higher. The *alienation* subscale showed a suboptimal alpha coefficient of 0.68. However, it is a known fact that Cronbach's alpha is sensitive to the number of items and tends to be

lower in scales like the three-item CTSR subscales (Cohen & Williamson, 1988).

Positive correlations between CTSR total, *exhaustion*, *alienation* and *helplessness* with depression, anxiety, perceived stress, and PTSD scores, and negative associations with psychological resilience, confirmed the scale's convergent validity. Unlike the alternative Ukrainian version of the CTSR proposed by Zasiakina et al. (2024), the correlation coefficients in our study did not exceed 0.7, demonstrating better construct discrimination. These findings support the theoretical proposition that psychological reactions to CTS overlap with those of PTSD symptoms but encompass a broader spectrum that may lead to comorbid diseases such as depression and anxiety disorders, as well as maladaptive coping strategies that diminish resilience (Greene et al., 2018; Potluri & R Patel, 2021). Continuous traumatic stress, such as from war or political violence elicits heightened neuroendocrine, neuronal, and immune responses without sufficient amount of rest, leading to dysregulation of adaptation systems and resulting in mental health issues, including anxiety and depression (Guidi et al., 2020; Itzhaky et al., 2017; Neria et al., 2010). Although these CTS symptoms resemble those of PTSD and CPTSD, they stem from ongoing rather than past and ceased traumatic events. Consequently, fear, distrust, and dysphoria from CTS may impair daily functioning and quality of life (Kaminer et al., 2018).

Finally, descriptive statistics revealed that all three subscales of *exhaustion*, *alienation*, and *helplessness* followed normal distributions, indicating that these constructs should be treated as continuous variables in analyses. Similarly, the CTSR total score exhibited a normal distribution and nearly spanned the full range, with a few exceptions at the highest scores (24, 26, and 27). A plausible explanation for the absence of individuals with the highest CTSR scores in the sample is the tendency of the most severely affected individuals to exhibit lower survey participation rates, as engaging in the studies may not be a priority for them (Senyk et al., 2023). Given that psychological responses to CTS do not represent a distinct nosological entity, but instead reflect standalone symptoms interconnected with other mental diseases (Greene et al., 2018; Itzhaky et al., 2017; Potluri & R Patel, 2021), we proposed prospective cut-off values for identifying warning symptoms that could precede more severe mental health conditions such as depression or anxiety disorders. These cut-off scores were determined based on the upper 25% of the score distribution: 10 for the CTSR total score, 4 for the *exhaustion* and *helplessness* subscales, and 3 for the *alienation* subscale.

A major strength of this study is its adherence to the original questionnaire's methodological framework, resulting in a scale structure that accurately represents a unique context-related response to CTS in

Ukraine. The Ukrainian CTSR demonstrated robust convergent validity, confirming that while the scale captures constructs related to PTSD, it measures a distinct psychological response to CTS. Before concluding, we would like to consider some limitations of the present study. First, a larger and more regionally balanced sample would enhance the research's credibility and the instrument's construct validity. The underrepresentation of participants residing in the regions most affected by the war prevented an analysis of the impact of residence (and its proximity to the frontline) on the CTSR scores. Future research should employ a more personalized approach to data collection, including consideration of participants' displacement histories. While such an approach may demand additional time and resources, it is associated with higher response rates and a reduction in the underrepresentation of the most severely affected individuals, particularly in studies conducted under challenging living conditions (Senyk et al., 2023). Future studies should also assess participants' exposure to various traumatic events to distinguish continuous traumatic stress responses from other types of complex traumas and single traumatic episodes. Second, the predominance of women in the sample may have influenced the results. Although sex effects on CTSR scores were insignificant, a more balanced male-to-female ratio could provide different insights, given the varied experiences of men and women under continuous war-related stress. Many men were summoned to serve in the army, and women took over tasks previously managed by men, which could have differently impacted levels of exhaustion, alienation, and helplessness. Third, the reliability of the scale would benefit from assessing the reproducibility of the identified subscales over time. Longitudinal studies could provide valuable insights into the stability of the scale and the progression of CTS responses. Finally, future studies with more balanced samples are recommended for redefining cut-off scores, particularly for the ED subscale. Despite these limitations, the Ukrainian CTSR's robust psychometric properties support its use in future research and diagnostics.

5. Conclusions

The Ukrainian version of the CTSR scale provides a valuable and contextually sensitive tool for assessing reactions to CTS amid the ongoing war in Ukraine. Following standard validation procedures, the revised three-factor scale demonstrated strong validity and acceptable reliability. It effectively measures exhaustion, alienation, helplessness, and overall reaction to continuous traumatic stress. The findings of this study confirm the suitability of this scale structure for capturing Ukrainians' unique psychological

responses to continuous traumatic stress in the context of prolonged war.

The findings support the potential for CTSR to be integrated into mental health programmes in Ukraine, facilitating more effective triage and personalized support for individuals most affected by the continuous exposure to war. Including the CTSR scale into the training programmes for psychologists and social workers would enable systematic and quick assessment and monitoring of individuals under continuous stress, informing the development or adaptation of appropriate support resources in order to prevent development of a more serious clinical symptomatology.

In summary, when addressing populations exposed to continuous trauma, like refugee trauma or victims of prolonged natural disasters, it is crucial to recognize that the evolving nature of traumatic events directly shapes psychological responses. Therapeutic approaches should be flexible and adapted to the specific needs and symptoms of affected groups and individuals. Rather than fitting observed reactions into pre-existing diagnostic categories, a focus should be placed on the symptomatic reactions to continuous traumatic stress to provide more effective and individualized care.

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Author contributions

Conceptualization, I.F., O.S., O.A., I.L., A.R., A.G.; methodology, I.F., O.S., O.A., I.L., A.R., A.K., A.G.; formal analysis, I.F., O.S., A.K.; investigation, I.F., I.L., A.R.; data curation, I.F., O.S., I.L., A.R.; writing – original draft preparation, O.S., I.F., O.A.; writing – review and editing, O.S., I.F., O.A., A.G.; supervision, O.S., I.F., O.A.;

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Disclosure statement

No potential conflict of interest was reported by the author(s).

Data availability statement

The data that support the findings of this study are available from the corresponding author, Oksana Senyk, upon request.

ORCID

Iryna Frankova <http://orcid.org/0000-0001-9371-6849>
 Oksana Senyk <http://orcid.org/0000-0003-1657-4490>
 Oleksandr Avramchuk <http://orcid.org/0000-0001-8512-7817>
 Iryna Leshchuk <http://orcid.org/0000-0002-8353-6710>
 Anton Kurapov <http://orcid.org/0000-0002-1286-9788>

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Appendices

Appendix A. Ukrainian version of the Continuous Traumatic Stress Response scale-revised

Наступні твердження описують симптоми, які можуть з'являтися після важких чи стресових переживань.

Будь ласка, уважно прочитайте кожне твердження і позначте відповіді, які найкраще описують ваші переживання за останній місяць.

N твердження	Пункт	Зовсім ні	Трохи	Доволі сильно	Сильно
1	Я відчуваю невмотивованим_ою. <i>I feel unmotivated.</i>	0	1	2	3
2	Мені складно довіряти людям, які мене оточують. <i>I find it hard to trust the people around me.</i>	0	1	2	3
3	Я відчуваю, що не можу захистити тих, хто від мене залежить. <i>I feel that I cannot protect those who depend on me.</i>	0	1	2	3
4	Я відчуваю розумово виснаженим_ою. <i>I feel mentally exhausted.</i>	0	1	2	3
5	Я відчуваю, що мене ніхто не розуміє. <i>I feel that no one understands me.</i>	0	1	2	3
6	Я відчуваюся безпорадним_ою. <i>I feel helpless.</i>	0	1	2	3
7	Я відчуваю, що моє життя не має сенсу. <i>I feel that my life has no meaning.</i>	0	1	2	3
8	Я відчуваю себе зрадженим_ою. <i>I feel betrayed.</i>	0	1	2	3
9	Я відчуваю, що не маю контролю над майбутнім. <i>I feel that I have no control over the future.</i>	0	1	2	3

Субшкали (Subscales):

Виснаження (Exhaustion): 1, 4, 7

Відчуженість (Alienation): 2, 5, 8

Безпорадність (Helplessness): 3, 6, 9

Загальний бал: додайте усі твердження. (Total score: sum up all items.)

Appendix B

Table B1. Retained three-factor structure of the Ukrainian CTSR scale.

Item number	Item number (original)	Factor
		1 2 3
1	1. I feel unmotivated.	0.80
2	2. I feel mentally exhausted.	0.69
3	4. I feel that my life has no meaning.	0.44
4	6. I find it hard to trust the people around me.	0.82
5	7. I feel that no one understands me.	0.82
6	10. I feel betrayed.	0.49
7	11. I feel that I cannot protect those who depend on me.	0.90
8	17. I feel helpless.	0.40
9	25. I feel that I have no control over the future.	0.57

Table B2. Percentage of variance explained by factor.

Factor	SS Loadings	% of Variance	Cumulative %
1	1.69	18.81	18.81
2	1.53	16.97	35.78
3	1.30	14.49	50.27

Appendix C

Table C1. Factor loadings of the CFA.

Factor	Item	Estimate	SE	Z	p	Stand. Estimate
Exhaustion	1. I feel unmotivated.	0.49	0.05	10.00	< .001	0.62
	2. I feel mentally exhausted.	0.61	0.05	11.44	< .001	0.69
	4. I feel that my life has no meaning.	0.50	0.04	11.92	< .001	0.70
Alienation	6. I find it hard to trust the people around me.	0.42	0.05	8.03	< .001	0.53
	7. I feel that no one understands me.	0.45	0.05	9.70	< .001	0.63
	10. I feel betrayed.	0.47	0.05	9.77	< .001	0.62
Helplessness	11. I feel that I cannot protect those who depend on me.	0.51	0.05	10.56	< .001	0.61
	17. I feel helpless.	0.68	0.05	15.04	< .001	0.81
	25. I feel that I have no control over the future.	0.66	0.05	13.04	< .001	0.73

Appendix D

Table D1. Item reliability statistics for the exhaustion subscale.

Subscale Cronbach's α = 0.71	Item-rest correlation	If item dropped Cronbach's α
1. I feel unmotivated.	0.55	0.59
2. I feel mentally exhausted.	0.57	0.57
4. I feel that my life has no meaning.	0.48	0.68

Table D2. Item reliability statistics for the *alienation* subscale.

Subscale Cronbach's α = 0.68	Item-rest correlation	If item dropped Cronbach's α
6. I find it hard to trust the people around me.	0.51	0.56
7. I feel that no one understands me.	0.52	0.56
10. I feel betrayed.	0.45	0.64

Table D3. Item reliability statistics for the *helplessness* subscale.

Subscale Cronbach's α = 0.75	Item-rest correlation	If item dropped Cronbach's α
11. I feel that I cannot protect those who depend on me.	0.56	0.69
17. I feel helpless.	0.60	0.65
25. I feel that I have no control over the future.	0.59	0.66

Table D4. Item reliability statistics for the total CTSR score.

Subscale Cronbach's α = 0.84	Item-rest correlation	If item dropped Cronbach's α
1. I feel unmotivated.	0.48	0.83
2. I feel mentally exhausted.	0.58	0.82
4. I feel that my life has no meaning.	0.61	0.82
6. I find it hard to trust the people around me.	0.45	0.83
7. I feel that no one understands me.	0.55	0.82
10. I feel betrayed.	0.51	0.82
11. I feel that I cannot protect those who depend on me.	0.50	0.83
17. I feel helpless.	0.68	0.81
25. I feel that I have no control over the future.	0.59	0.82