A Pre- and Post-Migrative Trauma Perspective on PTSD and Depression Among Mourning Ukrainian Refugees

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Abstract

As of now, numerous Ukrainians were forced to flee their homes on account of the conflict with Russia, substantially increasing their risk of trauma exposure and consequent psychiatric conditions. One of the most common traumas encountered by war refugees constitutes the unnatural loss of a beloved one. To better ascertain health demands of affected individuals, the experience of post-traumatic stress disorder (PTSD) was studied in the bounds of this online survey study employing a sample of 118 mourning Ukrainian refugees (M_{age} = 33.7, SD_{age} = 7.1). To this end, it was tested whether the type of relationship with the deceased predicted the existence of subgroups presenting with prototypical symptom profiles. Additionally, it was scrutinised how exposure to post-migrative stressors affected PTSD development and whether this relationship was mediated by depression. Thus, four self-report measures, the Post-traumatic Stress Disorder Checklist for DMS-5, the Patient Health Questionnaire-9, the Harvard Trauma Questionnaire, and the Post-migration Living Difficulties Checklist, were administered and interrelated. Results evinced that the depth of the attachment bound with the deceased, as opposed to the mere relativity status, positively predicted symptom profiles consolidating avoidance (p = .001) and intrusive symptoms (p = .007). The latter finding was related to the increased involvement of emotion-circuits during fear acquisition. Moreover, while post-migrative stressors were found to predict PTSD severity (p < .001), a relationship completely mediated by depression, the amount of exposure to pre-migration trauma emerged marginally insignificant (p = .051). Concludingly, this study stressed the potency of prevention-oriented PTSD rationales within the targeted population, while also pleading for the aetiological, rather than secondary, role of depression in the development of post-migrative PTSD.

Keywords: survey study, Ukrainian refugees, bereavement, PTSD, symptom profiles, pre-migrative trauma, post-migrative trauma, depression, mediation analysis

Contents

Introduction

The Ukraine-Russia conflict represents one of the most pressing crises faced by our current society, forcing numerous individuals to flee their homes in search of safety (Cai et al., 2022). Emergency reports of the World Health Organisation (2022) already promulgated the existence of 6.2 million Ukrainian refugees within six months after the Russian invasion in February 2022. Ensuing this immense influx of refugees, European countries now struggle to meet the sudden demands to provide culturally appropriate support, schooling, and healthcare resources to those in need (Kaufman et al., 2022).

The continuous strain and uncertainty refugees face during displacement, however, critically reflect how grave these demands are, as they frequently incarnate diagnosable and severe psychiatric conditions (Steel et al., 2009). Specifically, depression and anxiety disorders are more prevalent in refugee samples than non-refugee samples, often traced back to the heightened experience of traumatic incidents encountered by the former (Hajak et al., 2021). Recent studies confirm that war refugees, on average, experience 7 to 18 traumatic events in their home countries or during their getaway to safer areas, while 88.4% of refugees have at least experienced a single incident of comparable significance (Henkelmann et al., 2020; Vukcevic, 2016). These incidents range from witnessing violence, fear of life, and lack of shelter to forced separation from family members (Hajak et al., 2021). According to Vukcevic (2016), one of the most relevant traumatic events encountered by war refugees yet constitutes the unnatural loss of a beloved one. In this report, those who suffered such or a comparable loss and were forcefully displaced within or outside their country of origin will henceforth be defined as *mourning refugees*.

Research evinces that following the bereavement of a beloved person, refugees are at the uppermost risk to develop *post-traumatic stress disorder* (PTSD; Kaltman & Bonanno, 2003; Zisook et al., 1998). PTSD is thereby defined as “a set of persistent anxiety-based symptoms that occurs after experiencing or witnessing an extremely fear-evoking or life-threatening traumatic event” (Davey, 2014, p.186). The *diagnostic and statistical manual of mental disorders version 5* (DSM-5) subsequently specifies four sets of symptoms that portray the essence of PTSD, namely (a) *intrusive symptoms* such as flashbacks or intrusive thoughts, (b) *avoidance responding* such as active avoidance of thoughts or memories related to the trauma, (c) *negative changes in cognition and mood* such as the experience of persistent fear or negative beliefs about the self and the world, (d) *increased arousal and reactivity* as expressed in the form of hypervigilance and startle responses (Davey, 2014). Eventually,

Blackmore et al. (2020) illustrate the pertinence of this condition in refugee samples by emphasising a pooled prevalence rate of 31%, which dramatically exceeds the 3.9% prevalence rate observed by Koenen et al. (2017) in non-refugee samples.

Archetypical PTSD Symptom Profiles in Mourning Refugees

Incited by diagnostic manuals that presume PTSD to be a unitary syndrome, contemporary screening tools operate under the assumption that unified cut-off scores, which equally weigh the relevance of all symptom clusters, validly ascertain the disorder in diverse populations (e.g., *post-traumatic stress disorder checklist for DSM-5*; Weathers et al., 2022). However, records of clinical presentations, *profile analyses*, and *latent class analyses* increasingly challenge the former assumption by cumulatively demonstrating how different types of trauma model prototypical symptom presentations (Kelley et al., 2009; Lenferink et al., 2022). For instance, Kelly et al. (2009) emphasised significant violations in parallelism among PTSD symptom profiles in three different trauma groups, as assessed with *Multivariate analyses of Variance*. While avoidance symptoms surfaced in victims that suffered from sexual assault or the bereavement of a loved one, they were less commonly observed in car accident survivors. Yet, the latter group expressed more hypervigilance symptoms, which Kelly et al. (2009) eventually linked back to distinct fear-conditioning processes being triggered to different extents by various traumatic encounters.

For establishing sound screening instruments and allocating treatment resources in response to concurrent developments, it hence appears indispensable to precisely discriminate trauma types and their idiosyncratic psychiatric ramifications (Forbes et al., 2013). A study by Fan et al. (2021) during the COVID-19 crisis gives reason to assume that such sensitivity about symptom profiles is particularly crucial in the context of trauma associated with the death of a close one. This is since the latter study observed symptom presentations to seemingly depend on whether the ceased associate was a family or non-family member. While intrusive symptoms were more frequently reported than avoidance and hyperarousal symptoms in groups that lost a direct family member, the opposite applied to those who lost a close but unrelated acquaintance (e.g., friend or neighbour; Fan et al., 2021).

The above findings subsequently necessitate further investigations in the context of mourning Ukrainian refugees, as it could point to the underrepresentation and inappropriate treatment of PTSD cases. Thus, the first focal point of this study will regard whether the expression of PTSD symptoms is shaped by the fact who the refugee is mourning. For the sake of analysis, it will be distinguished between refugees who lost a direct relative,

henceforth defined as *proximal mourning refugees* (PMR), and those who lost a close but unrelated acquaintance, henceforth defined as *distal mourning refugees* (DMR). In line with the preliminary findings of Fan et al. (2021), it is hypothesised that the group affiliation of being a PMR or DMR significantly predicts differences among PTSD symptom profiles.

The Aetiological Role of Pre- and Post-Migrative Stressors in PTSD

Another intriguing characteristic of PTSD is that, unlike other psychiatric conditions, the former specifies the direct cause of the condition as a diagnostic criterion of itself (Davey, 2014). Accordingly, this primes relevant stakeholders to merely focus on pre-migrative trauma that precedes a diagnosis, a trend that reflects in contemporary practices. For instance, well-known PTSD screening tools such as the *Harvard trauma questionnaire* merely probe for the autobiographical presence of traumatic experiences in the refugee's country of origin (Mollica et al., 1992). Likewise, leading treatment approaches for PTSD include exposure therapies and cognitive restructuring approaches, which solely centre on the renovation of dysfunctional emotions and cognitions associated with the past traumatic event (Davey, 2014). Arguably, the diagnostic profile of PTSD leads researchers, policymakers, and clinicians to adopt a curative outlook, as typical in medicine (Suchman, 1966), wherein the emotional and cognitive repercussions of pathological experiences are treated rather than prevented in the first place.

Pioneering lines of research have, however, started to question this exclusively pre-migrative focus of trauma-related disorders by discussing the role of post-migration experiences in PTSD symptom development (Henkelmann et al., 2020; Kim et al., 2018). According to Henkelmann et al. (2020), such post-migration experiences encompass hazardous journeys, tedious asylum procedures, unemployment, discrimination, and continuous separation from family members. Considering post-migration experiences within research could therefore be pivotal for meeting the mental health demands of refugees due to the unique influence that policymakers can exert on post-migration experiences compared to pre-migration experiences. Accordingly, this might lead to a curative approach making way for a more prevention-oriented approach to PTSD development in refugee populations.

In an attempt to clarify the foregoing discussion and advise policies and research, this study will secondly analyse the influence of pre-migration experiences compared to post-migration experiences in the expression of PTSD symptomatology. Accordingly, the position of a curative approach, which comes at the disadvantage of foreclosing preventive approaches, will be reviewed. In line with the reasoning of Henkelmann et al. (2020) and Kim

et al. (2018), it is hypothesised that post-migration experiences will significantly predict PTSD symptom severity with a leastwise similar effect size as pre-migration experiences do.

Depression as a Mediator in Post-Migrative PTSD Development

Research moreover audits the role stressful post-migration experiences play in psychopathologies by shedding light on their dose-response relationship with depression (Heptinstall et al., 2004). Although depression and PTSD are listed as distinct disorders in the DMS-5, they should not be mistaken as independent from one another as these conditions are found to be highly comorbid with a rate of up to 50% (Flory & Yehuda, 2015). Evidently, pharmacotherapeutic approaches link these disorders, as they use the same drugs acting upon the serotonergic system to effectively treat both of them (Vaswani et al., 2003). Stressful and traumatic experiences accordingly might bring about alterations in neural circuits, which trigger depression as well as anxiety-based symptoms (Hammack et al., 2012).

Intriguingly, Lenferink et al. (2022) found that while PTSD symptoms in refugee samples often aggravate in synchrony with the exacerbation of depressive symptoms, this finding does not consistently hold bidirectionally. Accordingly, the role of depression as incarnated by post-migration stressors might bear an aetiological significance in the subsequent development of PTSD symptomatology. This topic requires further investigation as is sheds light on the importance of identifying and treating depression in PTSD prevention rationales following trauma, rather than presuming the role of depression to be secondary in the trajectory of PTSD cases (Lenferink et al., 2022).

To demystify this yet contentious aetiological debate (Stander et al., 2014), researchers substantially cite two schools of thought in relating depression to PTSD. Firstly, Breslau (1991) argues that the experience of depressive symptoms renders an individual less capable of coping with subsequent traumatic experiences. People who are depressed namely tend to respond to trauma in a more internalising and avoiding manner, which Sharkansky et al. (2000) yet linked back to an increased risk of PTSD development in succession to trauma exposure. A second line of reasoning associates depression and PTSD based on the concept of *mental defeat* (MD), which regards a negative appraisal bias wherein an individual feels incapable to effectively deal with hardship and adversity (Davey, 2014). While the helplessness associated with MD is a common symptom of depressive disorders (Hammack et al., 2012), it likewise is argued to operate as a risk factor for PTSD (Davey, 2014).

Despite this, the existence of research that yields oppositional results, namely wherein PTSD crystalises as an antecedent of depression, needs to be acknowledged (Stander et al.,

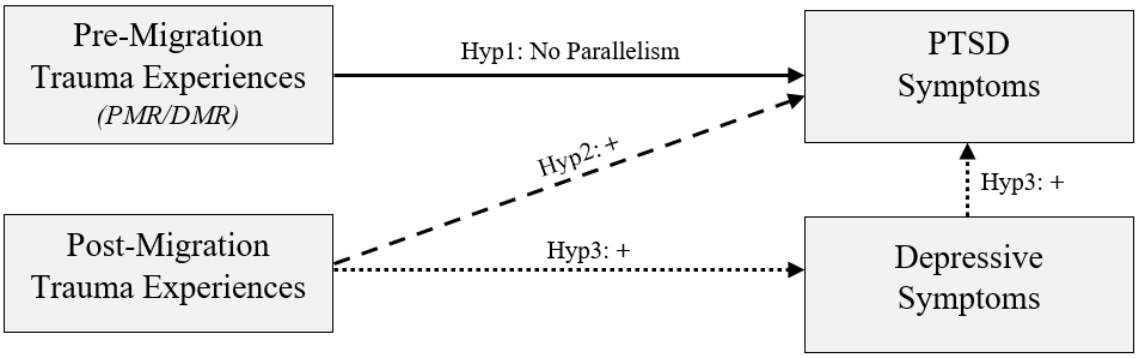
2014). Based on the above considerations, this study will hence build on the second research question by assessing whether the effect of post-migration experiences on PTSD severity is partly mediated by the associated development of depression. As inspired by forgoing research of Flory and Yehuda (2015), Hammack et al. (2012), as well as Heptinstall et al. (2004), a partial mediation within the above-specified variables is eventually predicted. Baron and Kenny (1986) thereby define a partial mediator as a variable explaining some, but not all, of the relationship between two variables, hence still allowing for a main effect between post-migration experiences and PTSD.

Present Study

This study strives to investigate three relational pathways that associate traumatic experiences with PTSD symptomatology in mourning Ukrainian refugees. While the first is concerned with pre-migration experiences and their relation to unique symptom profiles among PMR and DMR groups, the second path scrutinises the relationship between post-migration experiences and the severity of PTSD symptomatology. Ultimately, it is investigated whether the former relation is mediated by the development of depression. The corresponding predictions are displayed in Figure 1.

Figure 1

Relational Model of the Hypotheses Investigated in the Present Study



Note. In this table, the abbreviations PMR and DMR stand for proximal mourning refugees (i.e., those who lost a direct family member) and distal mourning refugees (i.e., those who lost an unrelated acquaintance), respectively. The corresponding hypothesis is that the former group membership predicts distinct and thus non-parallel PTSD symptom profiles.

Methods

The following study was conducted in the bounds of the large-scale research project *first aid for grief in Ukrainian refugees*, instituted by the cooperation of the University of Twente, Utrecht University, and the Fonds Slachtofferhulp Foundation. The eventual aims of this overarching research project were the inquiry into trauma-related grieving responses in Ukrainians and the direct provision of information and advice for afflicted individuals in the form of a self-help assessment tool. More details about this research project can be accessed via the website rouwbehandeling.nl.

Participants

In total, 421 participants voluntarily completed and consented to use their data in this online survey study. However, respondents with non-responses on central questionnaires or a non-displacement status were excluded from ensuing analyses, eventually leaving a sample comprising 118 participants (M_{age} = 33.7, SD_{age} = 7.1). Additional sample characteristics are specified in Table 1. Inclusion criteria for the study were: (1) being Ukrainian, (2) aged 18 years or older, and (3) having lost a loved one (e.g., family member or friend).

Table 1

Characteristics of the Collected Participant Sample

Variables	n	*%*
Gender		
Female	114	96.61
Male	4	3.39
Group Status		
PMR	97	82.20
DMR	21	17.80
Causes of Death (of the Deceased)		
Physical Illness	62	52.54
Accident	9	7.63
Suicide	6	5.08
Murder unrelated to the Russian war	2	1.69
Murder related to the Russian war	28	23.73
Disappearance	5	4.24
Other	6	5.08
Displaced		
Outside the Ukraine	38	32.20
Within the Ukraine	80[a]	67.80
Months passed since the loss [b]		
Median	10	N/A
SD	38.4	N/A

[a] Due to selective non-responses, only 77 of the initial 80 participants displaced outside the Ukraine could be used for analyses concerning the second and third research question.
[b] The time since the death of the beloved one was calculated by subtracting the start date of the data collection (i.e., March 2023) from the given date of death.

Because this study was part of a large-scale research project, diverse sampling methods were used to recruit participants. The author of the present paper contributed to this data collection process by instigating two non-probability sampling techniques. In fact, as the inclusion criteria for this study rendered the definition of a precise sampling frame unattainable, non-probability sampling methods had to be favoured over probabilistic methods (Babbie, 2019). Since the researcher does not affiliate with the targeted population and hence only has limited access to it, snowball sampling was deemed suitable as a primary technique (Harrison & Rentzelas, 2020). In line with a study employing snowball sampling in a refugee population, versatile entry points into the community were approached to reduce the susceptibility to selection biases (Sulaiman-Hill & Thompson, 2011). An overview of the characteristics of the used entry points is given in Appendix A.

Furthermore, in line with the meta-analysis of Enticott et al. (2017), online volunteer sampling was used as another technique qualified to access this target population. Posters that advertised participation in this study (see Appendix B) were thus published in Ukrainian Facebook support groups (see Appendix A). Although a drawback of this sampling technique is that it creates selection barriers due to the necessity of internet and social media access (Enticott et al., 2017), this issue was considered trivial as the present study already required online completion regardless of that.

The study was approved by the ethics committee of the Behavioural, Management and Social Sciences faculty of the University of Twente (No. 221111). Subsequently, the participant gathering was carried out throughout March and April 2023.

Procedure

Upon first accessing the link or QR code disseminated in the promoted poster materials, participants were directed to the online survey study published on the research tool *Qualtrics* (Serafin, 2023). Like all other materials participants encountered in the bounds of their participation in this study, the survey was translated and presented in Ukrainian.

Initially, participants were subjected to three demographic questions (i.e., sex, age, country of stay) and three questions probing for the nature of their loss (i.e., cause of death of the beloved one, date of death of the beloved one, relationship to the ceased beloved one).

Thereafter, participants had to complete the *traumatic grief inventory-self report plus* (TGI-SR+) as a self-help tool for assessing their grieving responses (Ashouri & Yousefi, 2023). Based on their total score, participants were classified into one of four categories (i.e., green, yellow, orange, or red), according to which they received some feedback on their severity and expression of grief. The TGI-SR+ merely operated as a self-assessment tool and was excluded from further analyses designated to test this study's hypotheses. Eventually, participants received a link to the research's website portal (www.Вимірюваннягоря.com) that provided means to more information about the topic of grief and grief management.

Participants were then invited to complete additional questionnaires for research purposes, which they accessed by continuing to navigate through the *Qualtrics* survey. Beforehand, participants were briefed about the intended use of the collected data and their rights as participants. Subsequently, participants had to provide informed consent and again had the option of continuing the study or discontinuing it at that time. In case of continuation, participants undertook the *post-traumatic stress disorder checklist for DMS-5* (PCL5), *patient health questionnaire-9* (PHQ9), *Harvard trauma questionnaire* (HTQ), *post-migration living difficulties checklist* (PMLDC), and several other measures. Eventually, participants were thanked for participating and asked if they would like to receive a summary of the research findings after publication.

The benefits of participation in this study were defined as an increased insight into one's trauma-related grieving response and corresponding advice on whether professional support could be of help for the participant. On the other hand, the defined risks of participation were a heightened experience of trauma-related distress. To preclude the latter as much as possible, participants were given the continuous option to drop out of the study and provided with the self-help materials mentioned above. Likewise, participants received access to request a grief management manual from the research's website portal.

Materials

A total of four trauma-related distress questionnaires were utilised in the scope of this study and are withal reported in Appendix C.

Post-traumatic Stress Disorder Checklist for DMS-5

The 20-item PCL5 was employed as a self-report tool assessing PTSD symptom severity according to the diagnostic criteria of the DSM-5 (Weathers et al., 2022). This questionnaire requires participants to indicate on a five-point Likert scale the degree to which they were bothered by symptomatic items over the past month (1= not at all, 5= extremely).

Item responses are condensed into a total score, whereby a high score tallies severe symptom-related distress (Weathers et al., 2022). Advocating its use in the present study, the PCL5 evinced good psychometric properties in diverse settings (Blevins et al., 2015; Bovin et al., 2016; Morrison et al., 2021) and was validated by Jungfer (2023) in a sample grieving the loss of a loved one. Analogous to Heeke et al. (2022), only six of the 20 items were eventually administered (see Appendix C), to approximate the operationalisation of PTSD advocated in the *international classification of diseases 11th revision* (ICD-11). For the sake of tailoring the questionnaire to the context of the present study, the wording of some items was adjusted to allude to the death of a loved one more explicitly (e.g., item 6: "Avoiding memories, thoughts, or feelings related to the death of your loved one").

Patient Health Questionnaire-9

Second, the PHQ-9 was used as a nine-item self-report designated to screen for major depression as specified in the DSM-4 (Kroenke et al., 2001). This questionnaire operates with a four-point Likert scale, whereon high scores indicate frequent symptom experiences within the previous two weeks (1= not at all, 4= nearly every day; Georgiadou et al., 2018). The PHQ-9 was chosen as an indicator for depression in this study, following Osokina et al. (2023), who modelled using this instrument for assessing individuals afflicted by the Ukraine-Russia conflict. Besides that, the PHQ-9 evinces good psychometric properties that warrant its status as one of the most common depression screeners available nowadays (Hall et al., 2020; Pranckeviciene et al., 2022). Due to its already comprehensive nature, no adjustments to the questionnaire were required in the bounds of this study. Exemplifying items of the PHQ-9 are "Feeling down, depressed, or hopeless" (item 2) and "Thoughts that you would be better off dead or of hurting yourself in some way" (item 9).

Harvard Trauma Questionnaire

Third, the HTQ contains two sections that probe pre-migration trauma experiences and subsequent trauma-related symptoms (Mollica et al., 1992). Generally, validity and reliability scores of this scale are reported as being acceptable (de Fouchier et. al, 2012; Renner et al., 2006). The aptitude of the questionnaire for this study was emphasised by Vindbjerg et al. (2020), who claim the HTQ to be the most prevalent instrument in the assessment of refugee populations. However, since this study merely sought to use the HTQ to indicate pre-migration trauma, only its first scale was eventually adopted. Additionally, two of its original 17 items were omitted because they queried experiences already predefined as inclusion criteria of this study. Example items of the HTQ are "Lack of food or water" (item 1) and

"Abduction or kidnapping of loved ones" (item 15), which only had a dichotomous answer as either having or not having experienced it.

Post-migration Living Difficulties Checklist

Finally, the PMLDC is a 23-item self-report that uses a five-point Likert scale to indicate the extent to which the participant struggled with certain post-migration challenges over the last six months (1= not a problem, 5= a very serious problem; Hocking et al., 2018). A high cumulative score accordingly reflects a high strain level on the refugee or immigrant (Schweitzer et al., 2006). Example items are "Poor access to emergency medical care" (item 2), "Discrimination" (item 9), and "Fears of being sent home" (item 23). The idea of internal consistency is not applicable to this scale because each item is regarded as a distinct and independent stressor (Schweitzer et al., 2011).

Data Analysis

All data were analysed using the software *R* version 4.2.0 (RStudio Team, 2022). After excluding non-eligible data entries, responses of individual participants were condensed into total scores for each questionnaire respectively, while scale scores were calculated for the PCL5 in addition to that. The parametric assumptions were tested and upon violation, non-parametric tests were preferred in subsequent analyses. Accordingly, the first hypothesis was tested with a *permutational multivariate analysis of variance* (PerMANOVA; Anderson, 2017). This analysis specified group affiliation of being a PMR or DMR as independent variable (IV) and each subscale of the PCL5 as separate dependent variable (DV).

A *generalised linear model* (GLM) analysis was subsequently performed to test the second hypothesis that specified pre-migration stressors (i.e., HTQ total score) and post-migration stressors (i.e., PMLDC total score) as IVs. PTSD symptom severity (i.e., PCL5 total score) was treated as DV, whereupon main effects were assessed and compared.

Testing the third hypothesis, a mediation analysis according to the method of Baron and Kenny (1986) was carried out. To this end, three GLM analyses were run with the following parameters and prerequisites to affirm the mediating role of depression: (1) there is a significant main effect of PMLDC scores as IV and PHQ-9 scores as DV, (2) there is a significant main effect of PMLDC scores as IV and PCL5 scores as DV, and (3) when taking PMLDC scores as well as PHQ-9 scores as IVs and PCL5 scores as DV, the main effect of the first IV on the DV is reduced in comparison to the results of the second regression, while the second IV predicts the DV. Finally, a *Sobel test* assessed the indirect effect of post-migration trauma on PTSD via depression as a mediator for significance.

Type I Error Threshold

As inspired by recent discussions on the crisis of confidence and replication in the area of psychological research (Benjamin et al., 2018; Hartgerink et al., 2016; Pashler & Wagenmakers, 2012), the present paper accords with modern practices favouring more critical cut-off scores for type I errors. A traditional α-level of .05 was therefore argued to be overly lenient and irresponsible considering the importance of obtaining credible findings that can advise an appropriate allocation of governmental resources. Accordingly, all analyses in this paper work with a more rigid and precautious α-level of .01.

Results

In the following, non-parametric tests had to be favoured over more conventional means of analysis, due to violations in the normality assumption of the employed variables (see Appendix D). The applied *R-script* can be found in Appendix E.

Psychometric Analyses

Relevant questionnaires were controlled on their *Cronbach's alpha* to thus substantiate the internal consistency and therewith eligibility of the utilised materials (see Table 2). As the HTQ and PMLDC merely probe the experience of independent items and abstain from inferring an underlying construct, internal consistency measures did not apply to these questionnaires (Silove et al., 1998).

Table 2

Internal Consistency Analysis of the PCL5 and PHQ9 Using Cronbach's Alpha

Measure	*Number of Items*	*α*	*Interpretation*
PCL5	6	.83	Satisfactory
PHQ9	9	.88	Satisfactory

Note. The indicated score interpretations follow the results of Bland and Altman (1997).

Furthermore, as this study strived to inter alia scrutinise the relationship between PTSD and depression, a *Pearson correlation* was computed for the PCL5 and PHQ9. Accordingly, a moderate positive relationship was found between both questionnaires, $r(112) = .53$, $p < .001$.

Subgroup Analyses of PTSD Symptom Profiles

Addressing the first research question, between-group differences on symptom scales were investigated among those who lost a relative (i.e., PMR) and those who lost a non-relative (i.e., DMR). To this end, a PerMANOVA obeying a *Manhattan distance metric*, particularly suitable for non-normally distributed data (McArtor et al., 2016), was run on the foregoing parameters. The merely insignificant results, $F(1, 116) = 4.99$, $p = .029$, yielded that the mean scores on each PTSD symptom scale were statistically equal among the PMR and DMR group. This accordingly refutes the initial hypothesis assuming the prediction of divergent symptom profiles dependent on the relativity status of the deceased one.

Additional data-driven analyses were then conducted, exploring between-group differences among other specifications of relationships with the deceased. Accordingly, *k*-

means clustering (KmC) established two subgroups exhibiting comparable symptom response patterns (i.e., Cluster 1 (n = 92): partner, child, parent, sibling; Cluster 2 (n = 49): grandparent, friend, other). Another PerMANOVA specifying the foregoing cluster distinction as IV subsequently predicted differences among leastwise one of the investigated PTSD symptom scales, $F(1, 114) = 6.72$, $p = .003$. To localise the exact source of these differences, three supplementary *Kruskal-Wallis tests* were conducted with each PTSD symptom scale representing an isolated DV. The results of these analyses and a visualisation of them can be found in Table 3 and Figure 2, respectively.

Table 3

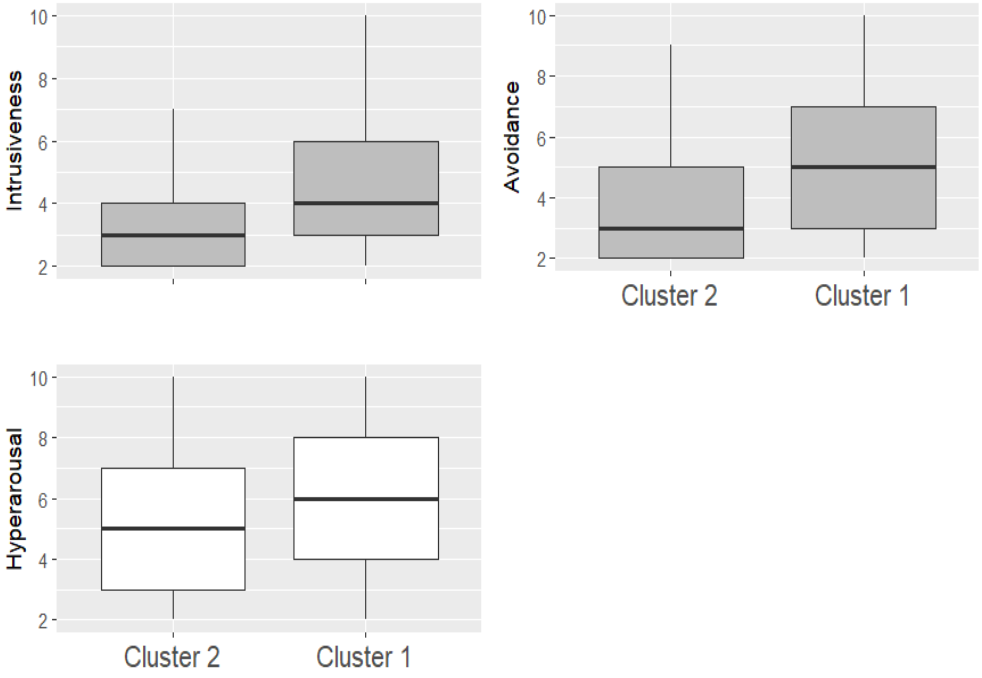
Separate Kruskal-Wallis Tests of PTSD Symptom Scales Based on the K-means Clusters

Outcome Variable	$\chi 2$	*df*	*p*
Intrusive Symptoms	10.25	1	**.001**
Avoidance Symptoms	7.28	1	**.007**
Hyperarousal Symptoms	2.24	1	.134

Note. In this table, the predictor comprises the group distinction suggested by *k-means clustering* (i.e., Cluster 1: partner, child, parent, sibling; Cluster 2: grandparent, friend, other).
* This table emphasises significant p-values in bold, according to an alpha of .01.

Figure 2

Boxplots on PTSD Symptom Differences as Based on the K-means Clusters



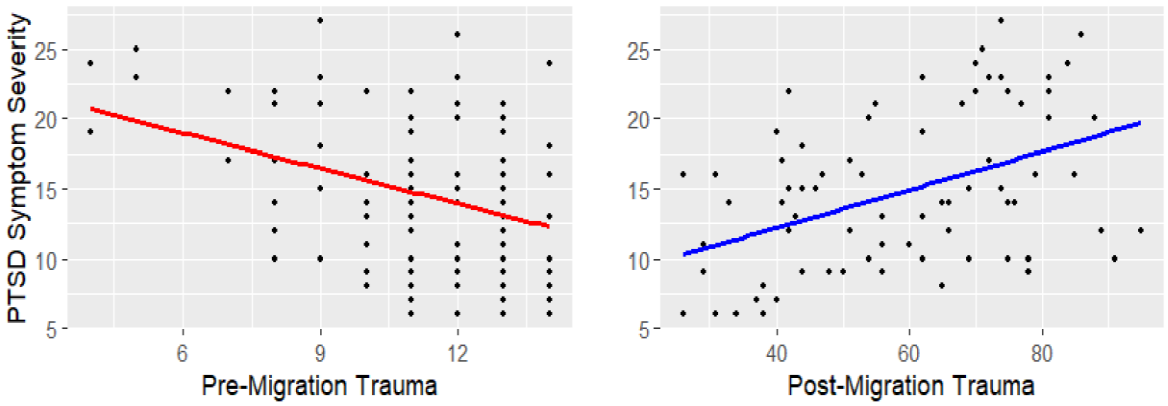
Note. In this figure, the predictor bases on the group distinction suggested by *k-means clustering* (i.e., Cluster 1: partner, child, parent, sibling; Cluster 2: grandparent, friend, other). * Significant differences among the IV are highlighted through grey-tinted boxplots.

Effect Comparison of Pre- and Post-Migration Trauma

In line with the second research question, a GLM analysis was run to examine the effects of pre-migration and post-migration trauma on reported PTSD symptom severity. Since the outcome variable exhibits a positive skew (see Appendix D), the GLM was designed fitting a *gamma distribution*. Moreover, as post-migration questionnaires were only given to those displaced afar the Ukraine (n = 77), following analyses had to omit those displaced within the country. The subsequent analysis revealed an insignificant effect of pre-migration trauma, assessed with the HTQ (β = -.04, *SE* = .02, $t(74) = -1.98$, $p = .051$), and a significant effect of post-migration trauma, assessed with the PMLDC (β = .01, *SE* = .01, $t(74) = 3.49$, $p < .001$). The second hypothesis that post-migration trauma predicts PTSD symptom severity to a leastwise similar extent as pre-migration trauma was thus affirmed (see Figure 3).

Figure 3

Scatterplots Depicting the Relation of Trauma Experiences and PTSD Symptom Severity



Further exploratory analyses examined whether the predictive value of pre- and post-migrative trauma varied in relation to PTSD severity when each symptom scale was modelled individually, rather than in a cumulative total score. Accordingly, due to a positive skew, three additional GLM analyses following a *gamma distribution* were run defining each PTSD symptom as isolated DV. Table 4 and Figure 4 show the results of these regression models.

Table 4

Generalised Linear Regressions on the Relation between Trauma and PTSD Symptom Scales

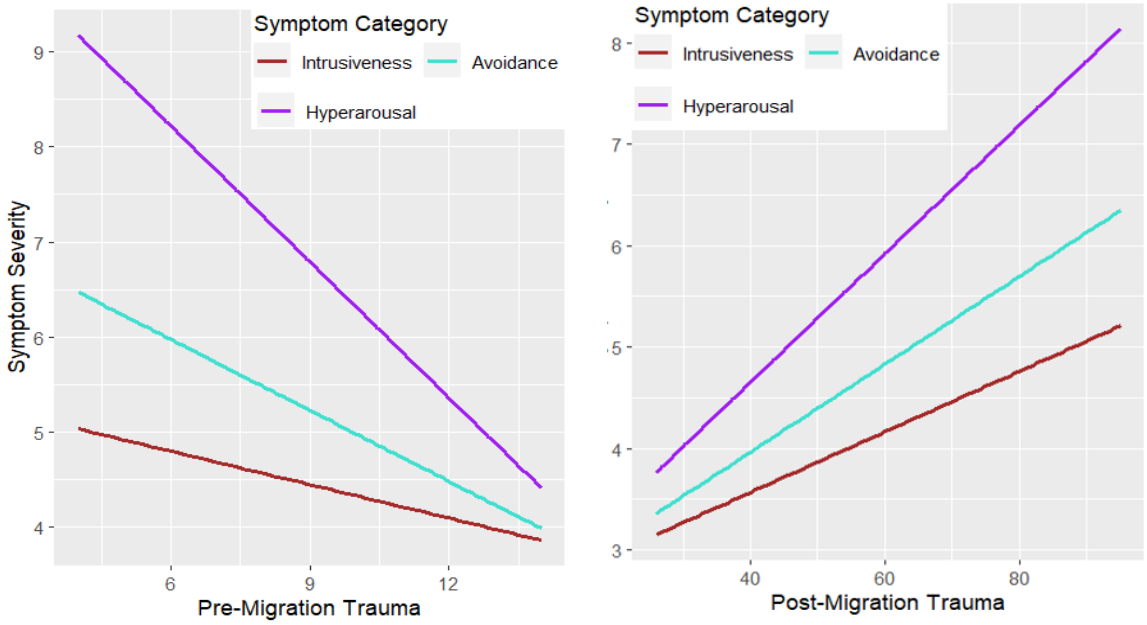
Outcome Variable	*Predictor*	B	*SE*	*t*	*p*
Intrusive Sym.	Pre-Migration Tr.	<.01	.02	-.14	.891
	Post-Migration Tr.	.01	<.01	2.55	.013
Avoidance Sym.	Pre-Migration Tr.	-.05	.03	-1.78	.079
	Post-Migration Tr.	.01	<.01	2.21	**.003**
Hyperarousal Sym.	Pre-Migration Tr.	-.05	.02	-2.54	.013
	Post-Migration Tr.	.01	.003	3.54	**<.001**

Note. The abbreviations Sym. and Tr. stand for the words symptom and trauma, respectively.

* Significant p-values are marked in bold, according to an alpha of .01.

Figure 4

Line Charts on the Relationship between Trauma Experiences and PTSD Symptom Scales



Note. In this figure, two line charts depict separate regression lines representing the perceived severity of individual PTSD symptoms (i.e., PCL5 symptom scales, specified through colour), modelled by the amount of exposure to pre-migration trauma (i.e., HTQ total score, left plot) and perceived severity of post-migration trauma (i.e., PMLDC total score, right plot).

Mediation Analysis

In order to test the third research question a set of three distinct GLM analyses had to be performed. The first accordingly typified post-migration trauma as IV (i.e., assessed with

the PMLDC) and depression as DV (i.e., assessed with the PHQ-9), and revealed a significant positive relationship between the variables, $\beta = .21$, $SE = .03$, $t(75) = 6.68$, $p < .001$.

While the normal distribution of the prior DV insisted a *gaussian fit* for the above GLM, the following regressions utilised a *gamma distribution* due to positive skew (see Appendix D). The second regression accordingly revealed a significant positive relationship between post-migration trauma as IV and PTSD symptom severity (i.e., assessed with the PCL5) as DV, $\beta = .01$, $SE < .01$, $t(75) = 4.58$, $p < .001$.

Eventually, the third GLM analysis established that the effect of post-migration trauma on PTSD symptom severity becomes insignificant when depression is also included in the model ($\beta = .01$, $SE < .01$, $t(74) = 1.97$, $p = .052$), while the latter variable still significantly predicts the DV ($\beta = .02$, $SE = .01$, $t(74) = 2.84$, $p = .006$). Similarly, a *Sobel test* investigating depression as a mediator for the relation between post-migration trauma and PTSD symptom severity turned out significant with Sobel's $z = 2.61$, $p = .009$.

In light of these results, the third hypothesis had to be rejected, as although depression emerged as a mediator of post-migration trauma and PTSD, this mediation was not merely partial, as was initially assumed, but even complete due to a missing main effect in the final regression analysis. Eventually, an exhaustive figural summary of the results observed in the bounds of this study can be found in Appendix F.

Discussion

The pursuit of the current study was to review the impact of distinct trauma experiences in relation to PTSD symptom presentations and comorbid depression among mourning Ukrainian refugees. Accordingly, this study aspired to build upon the contemporary research of Fan et al. (2021), Flory and Yehuda (2015), Hammack et al. (2012), Henkelmann et al. (2020), Heptinstall et al. (2004), Kelly et al. (2009), as well as Kim et al. (2018), to optimise support resources in response to the Ukraine-Russia conflict. Eventually, findings lead to the rejection of the first hypothesis (i.e., prediction of distinct PTSD symptom profiles based on the PMR/DMR status), affirmation of the second hypothesis (i.e., prediction of PTSD symptom severity based on post-migration trauma), and rejection of the third hypothesis (i.e., partial mediation of post-migration trauma and PTSD symptom severity by depression) as in fact a complete mediation through depression emerged.

Revision of PTSD Symptom Profiles

This study found evidence that casts doubt on the presumed relevance of the deceased's relativity status in relation to the unique expression of PTSD symptom profiles. Accordingly, this contradicts the findings of Fan et al. (2021) that initially gave rise to the prior assumption. Possibly, the settings of the two studies were too divergent, whereby the pandemic situation of the former incites psychological vulnerabilities and barriers in affected individuals, not analogous to those incited by warfare. For instance, Fan et al. (2021) pleaded for a mechanism of arousal due to a feared imminentness of viral infections, not perceived by war refugees. Nevertheless, caution is urged when interpreting this result, as findings were solely regarded insignificant in light of the critical, rather than traditional, α-level preferred in the bounds of this study. Therewith, this study does not seek to entirely disregard findings of Fan et al. (2021), but rather strives to emphasise rigid evidence that a different group distinction strikes to be more relevant in the symptom presentations of the regarded sample.

Namely, as uncovered by KmC, this grouping distinguishes between partners, children, parents, and siblings on the one hand, and grandparents, friends, and others (e.g., parents-in-law, uncles, aunts, ex-partners) on the other. The first cluster comprises people with whom one typically holds deeper attachment bounds (Trinke & Bartholomew, 1997), for what reason this clustering is labelled to distinguish between those close to the self and those more peripheral to it. Accordingly, this distinguishment also sheds light on the fact why marginally insignificant results were observed in prior comparisons based on relativity status, as the latter grouping fundamentally correlates to the one defined based on closeness. The

asynchronous symptom presentations observed amongst this grouping subsequently support the advocation of Kelly et al. (2009), regarding the existence of discrete symptom profiles as incited by various trauma groups. Similar to Kelly et al. (2009), who claim the operating mechanism of this phenomenon to constitute fear-conditioning processes being triggered to different extents, the current findings may likewise link to this rational.

In fact, this study uncovered that while avoidance and intrusive symptoms are more prominent among those mourning the death of a close one, hyperarousal symptoms are recounted equally among both refugee subgroups. Accordingly, this links with studies evincing that greater avoidance symptomatology associates with fear conditioning processes that tally a heightened activation of emotion-processing circuits (e.g., hippocampus, amygdala, insula, and medial prefrontal region; Sehlmeyer et al., 2009; Sripada et al., 2013). In the context of this study, this gives reason to expect that the attachment proximity to the deceased determines the emotional involvement in relevant fear conditioning processes. Subsequently, this might incline individuals to avoid situations that would lead to the re-experience of these intense emotions, which is not the case for individuals who have not associated the trauma with such intense emotions in the first place (Corr, 2013). This reasoning is hence expected to account for the differences in avoidance symptoms, as perceived by those who lost a close compared to a peripheral one.

In a similar vein, emotional involvement and personal meaningfulness of traumatic encounters are shown to be of the essence in dictating the profundity of information encoding in the perceptual memory (Brewin, 2014). Intrusive symptoms are thereby traced back to originate in the perceptual memory, while they relate to an impaired episodic memory (Brewin, 2014). Concludingly, the impact of varied emotional responses to trauma exposure might explain the observed differences in intrusive symptoms, as it emphasises the incitement of distinct encoding processes in those who lost a close compared to a peripheral person. This eventually pinpoints the relevance of considering emotional reactions, as determined by attachment proximity, in the acquisition and experience of PTSD. The treatment of patients suffering from avoidant and intrusive symptoms thus might likewise benefit from more emotion-oriented approaches (Boelen et al., 2003; Mlotek & Paivio, 2017).

Furthermore, screeners focusing on the whole spectrum of PTSD symptoms might not be as representative and accurate for refugees that mourn a peripheral attachment loss. Namely, these individuals seem to externalise their traumatic experiences rather in form of hyperarousal symptoms, than in other typical PTSD symptoms which are more closely tight to affective responses. Therefore, practitioners managing health issues during the current refugee

crisis are advised to be mindful of the sort of loss suffered by the refugee and the distinct ramifications this may bear on symptom presentations. An understanding of the latter should subsequently advise appropriate treatment preferences.

Revision of Pre- and Post-Migration Trauma in PTSD

Next, the current study found compelling evidence that whereas the extent of pre-migrative trauma did not predict the severity of PTSD, post-migrative trauma did so in the form of a positive relationship. This goes in line with research of Henkelmann et al. (2020), Kim et al. (2018), and Lenferink et al. (2022), all of which emphasising the aetiological function that post-migrative stressors exhibit concerning trauma-related psychopathologies.

In the sample at hand, it is expected that the observed results underly patriotic values that are culturally engrained in the Ukrainian population (Hamama-Raz et al., 2022). These values illustrate in the Ukrainian language, whereby the word *khata* symbolises a sense of cultural identity and belonginess to the homeland, beyond its mere literal translation to *house* (Cherednyk et al., 2018). Considering how patriotism shapes psychopathologies, yet no uniform effects surface in literature. According to Hamama-Raz et al. (2022), patriotism is antagonistic in those fleeing their homes, as war damaged idealisations of a progressive country and the therewith established affective attachment bond. On the contrary, a study on war veterans found the protective value of patriotism by uncovering its incremental effects on the resilience towards stressors (Whitesell & Owens, 2012). Comparing the different settings of the forgoing studies, it is hence expected that the displacement status moderates the relationship between patriotism and PTSD. Thus, pre-migrative stressors might be met with a heightened resilience in patriotic communities, while displacement eventually grows these values to become associated with heighten levels of grief, broken ideals, and psychopathologies. Under the precondition that future studies validate the moderating role of patriotism in this target group, the above reasoning accounts for the observed results.

Moreover, the means of operationalisation used to appraise trauma experiences in this study might have further induced the observed results, by contextualising them in the debate over the predictive usefulness of trauma intensity as contrasted with trauma quantity (Branchey et al., 1990). Although the HTQ probed the experience of diverse pre-migrative traumata, it in fact neglected the personal significance and hardship attributed to them. In comparison, the PMLDC precisely coded this experienced hardship in regard to post-migration stressors and evinced highly significant results. Accordingly, this may emphasise that psychological torment is less determined by the sheer experience of trauma, then by the

cognitive and emotional appraisals associated with it. This deliberation finds support in paradigms mapped out in the *cognitive model of PTSD*, as defined by Ehlers and Clark (2000). Nevertheless, future research is required to confirm whether attributions of personal significance in relation to pre-migration trauma are indeed more predictive of PTSD, than the sheer quantity of such traumata as assessed within this study. Ultimately, the interplay of trauma-related attributions and patriotic attitudes in provoking PTSD mark a promising direction for future research.

Revision of the Aetiological Role of Depression in PTSD Development

Lastly, it was uncovered that depression acted as a complete mediator of the relationship between post-migration trauma and PTSD. This concords with literature accenting the sound link between the two conditions (Flory & Yehuda, 2015; Hammack et al., 2012), and further stresses the aetiological role of depression in the post-migrative development of PTSD among mourning Ukrainian refugees. Prompt depression treatment in arriving refugees is thus urged to be employed as a prevention strategy for comorbid PTSD.

Additional analyses moreover yielded insights into the potential mechanisms transpiring the aforementioned mediation. Namely, PTSD symptoms were found not to unitarily accelerate in synchrony with increments in post-migrative stressors, but particularly avoidance and hyperarousal clusters emerged as the most reactive to these stressors. Even though avoidance behaviour does thereby not emerge as a diagnostic criterion for depressive disorders in itself, it oftentimes reflects a coping strategy for dealing with negative emotions employed by affected individuals (Grant et al., 2013). As previously suggested by Breslau (1991) and Sharkansky et al. (2000), this supports the notion that avoidance coping emerges as the agent for linking depressive diagnoses with the emergence of future psychopathologies. Appropriately addressing dysfunctional coping strategies, for instance by means of *cognitive-behavioural therapy* (Bourdon et al., 2019), is hence advised as rational to reduce PTSD prevalence rates in refugee populations.

Despite that, given that the *tripartite model* employs physiological hyperarousal as criterion to discriminate depression and anxiety disorders (Clark & Watson, 1991), the above discovery contextualising these factors appears surprising on first examination. However, current reviews have casted more and more doubt on this obsolete model and the clear-cut differentiation suggested therein (Greaves-Lord et al., 2007). In fact, hyperarousal symptoms are shown to characterise dysregulations in stress hormones, which are regularly observed in depression cases (Holsen et al., 2012). As suggested by concepts like *allostatic load* and

decreased dendritic branching, a chronic dysregulation in stress hormones can subsequently contribute to a physiological vulnerability to comorbid psychopathologies, such as anxiety disorders (McEwen, 2003). In conclusion, next to a cognitive pathway, this study also points to a physiological pathway underlying depression as a mediator of PTSD. Particularly in light of the contrary assumptions advocated in the *tripartite model*, the latter pathway yet requires further verification by longitudinal research.

Limitations and Strengths

While this study provides valuable insights into trauma-reactions of mourning Ukrainian refugees, it is also subject to some limitations. First, a moderate correlation was observed between the instruments operationalising depression and PTSD, which relates to ongoing debates regarding whether those conditions might underly a single disorder spectrum (O'Donnell et al., 2004). Potentially, this weakens the explanatory power of the administered mediation analysis, by overrepresenting main effects unrelated to causality but to the measurement of the same latent construct. Confirmatory studies are thus required to discriminate between the two conditions more carefully to validate the discussed results.

The second limitation regards the sample scrutinised in this study, which constituted to 96% of female participants. In accordance with research that cites differences in trauma responses between sexes (Olff, 2017), this undermines the generalisability of the results to mixed-sex populations. On a positive note, this gives repetition studies that contain male refugee samples the chance of between-sex comparisons in relation to this study's subject.

In order to approximate PTSD operationalisations as defined in the ICD-11, this study moreover reduced the item batteries of the employed questionnaires. Subsequently, this lead to the exclusion of the PCL5 symptom cluster regarding negative changes in cognition and mood, as it is listed in the DSM-5. The results of this study thus have to be considered incomplete in light of the latter classification manual and hence urge for repetition studies that approximate DSM-5 operationalisations. Notwithstanding that, the tight relationship between the omitted symptom cluster and the diagnostic criteria of depression (e.g., feelings of guilt, loss of interest, negative thoughts about oneself or the world) propounds that mediation analyses including this symptom cluster will likely evince comparable results.

On the contrary, this study embodies evident strengths in its culturally robust operationalisation of pertinent concepts, employing well-suited instruments for the targeted population. Accordingly, this was secured by adhering to research standards advised in contemporary literature and thereafter demonstrated in psychometric investigations evincing

sound consistency values in the scrutinised sample. In a similar vein, the critical α-level adhered to in the bounds of this study attests the validity of significant results reported, as it reduced the likelihood of engaging in type I errors. In conclusion, this study's design and meticulous analysis plan enhanced the robustness and cultural fit of the observed results, hence marking its relevance and potency for advising mental health policies during the current refugee crisis.

Practical Implications

First and foremost, this study stresses that a mindfulness of distinct trauma experiences and concordant psychopathological ramifications is of the essence in efficiently treating PTSD cases among mourning Ukrainian refugees. In that regard, it is urged to direct resources towards the minimisation of refugees' exposure to post-migrative stressors, as they were vigorously demonstrated to relate to depression and comorbid PTSD. Similarly, the wide-spread screening and prompt treatment initiation for refugees at-risk of depression is informed as a promising PTSD prevention technique. Lastly, curative resources for PTSD are advised to better emphasise the proper processing of emotional trauma responses in those refugees who bereave a close attachment loss. Thus, notwithstanding aforementioned limitations, this study concludingly points to a subversive shift in current treatment trajectories of mourning Ukrainian refugees.

Conclusion

This study addressed compelling evidence stressing the significant role of post-migrative trauma in the development of depression and PTSD, over and above effect sizes of trauma preceding displacement. This finding was related to patriotic values that are culturally relevant in Ukrainian populations, which are expected to grow aversive in individuals having to flee their homes. For the first time, this subsequently encourages prevention-oriented treatment rationales for combating PTSD during the ongoing refugee crisis. The latter should thereby constitute a potent alternative to curative approaches in the country of arrival, which are overly emphasised by relevant stakeholders owing to the diagnostic profile of PTSD.

Furthermore, the profound impact of emotions and attributions of meaning during and ensuing traumatic fear acquisition were discussed. As a result, it was emphasised that refugees mourning the loss of a close rather than peripheral attachment bound are more prone to exhibit intrusive and avoidant symptom profiles. This finding was related to a facilitated perceptual memory and tendencies to avoid situations that incline re-experiences, as incited by the involvement of intense and unbearable emotions involved in the trauma.

In a similar vein, this study stressed the aetiological, rather than secondary, role of depression in the development of post-migrative PTSD. Operating mechanisms were suggested to be dysfunctional avoidance coping and continuous dysregulations in stress hormones. Thus, this paves the way for embracing depression-centred therapies in PTSD prevention campaigns for arriving refugees.

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Appendix A:

Specification of the Applied Sampling Techniques

Table A1

Characteristics of the Used Entry Points for the Snowball Sample

Nr.	*Age*	*Gender*	*Country of Stay*
1	42	Female	Germany
2	22	Female	Germany
3	33	Male	Netherlands
4	21	Female	Netherlands
5	49	Female	Poland
6	29	Female	Ireland

Table A2

Facebook Support Groups the Study was Advertised in

Nr.	*Name*	*Group Size*	*Link*
1	Українці у США/ Ukrainian refugees in the USA	18,349	https://www.facebook.com/groups/usaforukrainians
2	Ukrainian refugees in Denmark. Українські біженці в Данії.	2,882	https://www.facebook.com/groups/235125798746715
3	Ukrainian Refugees in Romania	7,382	https://www.facebook.com/groups/631172467976319
4	Ukrainian refugees in London / Українські біженці в Лондоні	2,528	https://www.facebook.com/groups/348887983687658
5	Ukrainian refugees in Paris - Help & Accommodation	1,023	https://www.facebook.com/groups/650676696258446
6	Mental Health of Ukrainians	243	https://www.facebook.com/groups/mentalhealthofukrainians
7	Українці біженці в Німеччині Ukrainian refugees arrive in Germany's	178	https://www.facebook.com/groups/343023531116775
8	Ukrainian Mental Health Platform	418	https://www.facebook.com/groups/334425010454774/
9	Ukrainian Florida (Українська Флорида)	7,001	https://www.facebook.com/groups/500597197516230/
10	Ukrainian newcomers Manitoba support group.	4,122	https://www.facebook.com/groups/535982471520162/

Appendix B:

Advertisement Materials Used for the Participant Recruitment

Figure B1

Participant Recruitment Poster in Ukrainian

Figure B2

Participant Recruitment Poster in English

Appendix C:

Item Overview of the Questionnaires Employed in this Study

Table C1

Utilised Items and Scale Definitions of the Post-traumatic Stress Disorder Checklist 5

Item Nr.	*Item in English*	*Item in Ukrainian*	*Scale*
2	Repeated, disturbing dreams of the death of your loved one?	Повторювальні, тривожні сни про смерть близької людини?	Intrusive Symptoms
3	Suddenly feeling or acting as if the the death of your loved one was actually happening again (as if you were actually back there reliving it)?	Ви раптом відчували себе або діяли так, ніби смерть близької людини відбувається з Вами знову (начебто Ви «знову там» і переживаєте все наяву)?	Intrusive Symptoms
6	Avoiding memories, thoughts, or feelings related to the death of your loved one?	Ви намагалися уникати спогадів, думок чи почуттів, пов'язаних зі смертю вашої близької людини?	Avoidance Symptoms
7	Avoiding external reminders of death of your loved one (for example, people, places, conversations, activities, objects, or situations)?	Ви уникали зовнішніх нагадувань про смерть близької людини (напр., людей, місць, розмов, дій, предметів, ситуацій)?	Avoidance Symptoms
17	Being “superalert” or watchful or on guard?	Перебували у стані «надмірної настороженості», пильності, напруженого очікування?	Hyperarousal Symptoms
18	Feeling jumpy or easily startled	Нервово реагували, легко лякалися?	Hyperarousal Symptoms

Table C2

Utilised Items of the Patient Health Questionnaire-9

Item Nr.	*Item in English*	*Item in Ukrainian*
1	Little interest or pleasure in doing things	Дуже низька зацікавленість або задоволення від звичайних справ
2	Feeling down, depressed, or hopeless	Поганий настрій, пригніченість або відчуття безпорадності
3	Trouble falling or staying asleep, or sleeping too much	Труднощі із засинанням, переривчастий або занадто тривалий сон
4	Feeling tired or having little energy	Почуття втоми або знесилення (занепад сил)
5	Poor appetite or overeating	Поганий апетит чи навпаки – переїдання
6	Feeling bad about yourself — or that you are a failure or have let yourself or your family down	Погані (негативні) думки про себе. Ви вважали себе невдахою або розчаровані в собі, або вважали, що не виправдали

		сподівань своєї родини
7	Trouble concentrating on things, such as reading the newspaper or watching television	Труднощі концентрації уваги (наприклад, зосередитися на читанні газети чи перегляді телепередач)
8	Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual	Ваші рухи або мова були настільки повільними, що оточуючі могли це помітити. Або навпаки, Ви були настільки метушливі або збуджені, що рухалися більше, ніж зазвичай
9	Thoughts that you would be better off dead or of hurting yourself in some way	Думки про те, що Вам краще було б померти або про те, щоб заподіяти собі шкоду будь-яким чином

Table C3

Utilised Items of the Harvard Trauma Questionnaire

Item Nr.	*Item in English*	*Item in Ukrainian*
1	Lack of food or water	Нестача води або їжі
2	Ill health without access to medical care	Проблеми зі здоров'ям без доступу до медичної допомоги
3	Lack of shelter	Відсутність укриття
4	Imprisonment	Позбавлення волі
5	Serious injury	Серйозна травма
6	Being in an immediate war situation - shelling, occupation, missile strikes (either as a soldier or as a civilian in a conflict zone)	Перебування у безпосередній воєнній ситуації - обстріли, окупація, ракетні удари (або як солдат, або як цивільна особа в зоні конфлікту)
7	Brain washing	Промивання мізків (пропаганда)
8	Rape or sexual abuse	Зґвалтування або сексуальне насильство
9	Forced isolation from others	Вимушена ізоляція від інших
10	Being close to death	Бути на межі смерті
11	Forced separation from family members	Вимушена розлука з членами сім'ї
14	Murder of stranger or strangers	Вбивство незнайомця чи незнайомців
15	Abduction or kidnapping of loved ones	Викрадення або викрадення близьких
16	Torture	Тортури

Table C4

Utilised Items of the Post-migration Living Difficulties Checklist

Item Nr.	*Item in English*	*Item in Ukrainian*
1	Worries about not getting treatment for health problems	Занепокоєння через відсутність лікування проблеми зі здоров’ям
2	Poor access to emergency medical care	Поганий доступ до невідкладної медичної допомоги
3	Poor access to long-term medical care	Поганий доступ до тривалого медичного обслуговування

4	Poor access to counselling services	Поганий доступ до консультаційних послуг
5	Little government help with welfare	Невелика державна допомога з соціальним забезпеченням
6	Little help with welfare from charities	Невелика допомога від благодійних організацій
7	Delays in processing refugee applications	Затримки в розгляді заяви про надання статусу біженця
8	Communication difficulties	Труднощі в спілкуванні
9	Discrimination	Дискримінація
10	Bad working conditions	Погані умови праці
11	Poverty	Бідність
12	Poor access to dental care	Поганий доступ до стоматологічної допомоги
13	Being unable to find work	Неможливість знайти роботу
14	No permission to work	Немає дозволу на роботу
15	Separation from family	Розлука з родиною
16	Worries about family back at home	Хвилювання про родину вдома
17	Unable to return home in an emergency	Неможливість повернутися додому в екстреному випадку
18	Loneliness and boredom	Самотність і нудьга
19	Isolation	Ізоляція
20	Poor access to traditional foods	Поганий доступ до традиційних продуктів харчування
21	Interviews by immigration	Інтерв'ю з імміграційною службою
22	Conflict with immigration officials	Конфлікт з імміграційною службою
23	Fears of being sent home	Страх бути відправленим додому

Appendix D:

Violations of the Normality Assumption in the Used Variables

Table D1

Shapiro-Wilk Normality Test for the Variables of Analysis

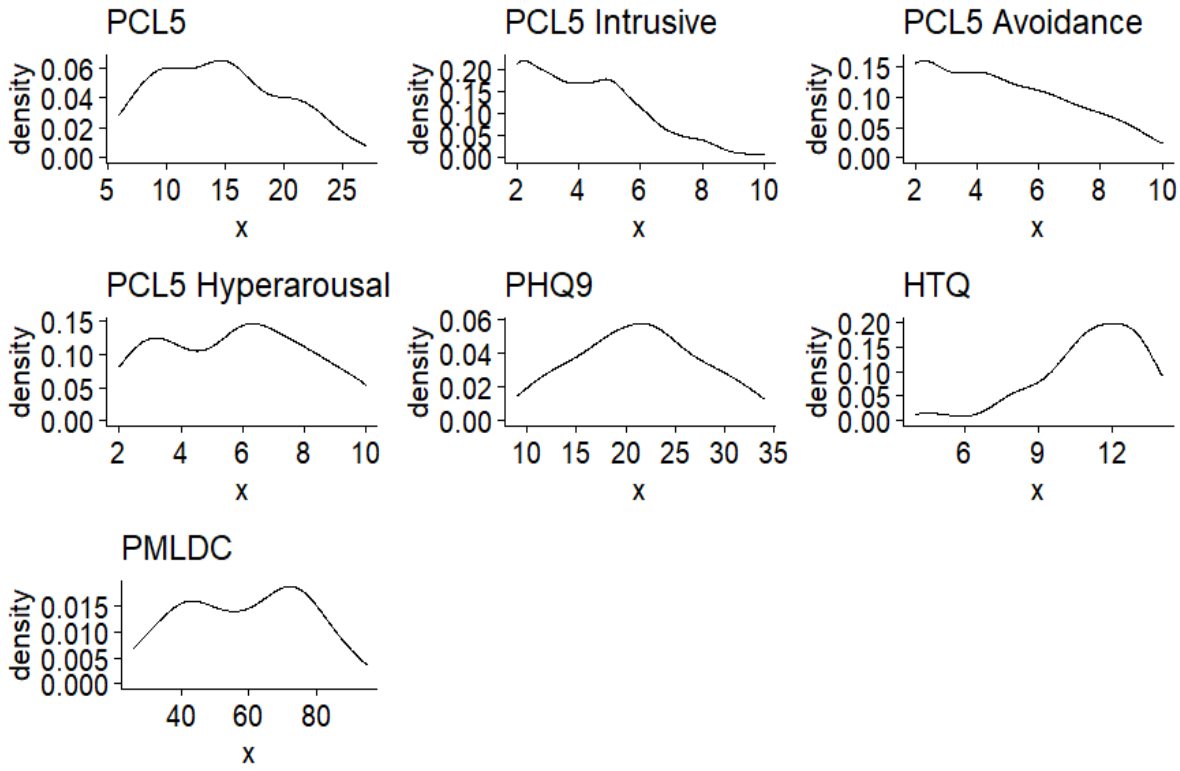
Outcome Variable	W	*p*
Scale_Score_HTQ	.90	**<.001**
Scale_Score_PCL5	.97	**.004**
Scale_Score_PHQ9	.98	.112
Scale_Score_PMLDC	.96	.021
Scale_Score_PCL5_Intrusive	.91	**<.001**
Scale_Score_PCL5_Avoidance	.91	**<.001**
Scale_Score_PCL5_Hyperarousal	.94	**<.001**

Note. Significant values on the Shapiro-Wilk normality test are indicative of violations in the null hypothesis that the data is normally distributed.

* This table marks significant p-values in bold, according to an alpha of .01.

Figure D2

Density Plots for the Variables of Analysis



Appendix E:

R-Script for the Data Analysis

(1) Data Preparation

Import Data Set

```
# Set Working Directory
setwd("C:/Users/janre/Desktop/M12/Results/Original Data Files")
# Load Data Sets
library(haven)
DS.1 <- read_sav("First_DataSet.sav")
DS.2 <- read_sav("Second_DataSet.sav")
```

Filtering/Cleaning the Data Sets

```
# Remove Non-Consents from DS.1
DS.1.1 <- subset(DS.1, !is.na(Consent))
DS.2.1 <- subset(DS.2, Consent != 2 & !is.na(Consent))
DS.1.1$FilterCriterion <- rowSums(DS.1.1[, c("PCL_5_1","PCL_5_2", "PCL_5_3", "PCL_5_4", "PC
L_5_5", "PCL_5_6")])
filtered_data <- DS.1.1[complete.cases(DS.1.1$FilterCriterion), ]
DS.2.1$FilterCriterion <- rowSums(DS.2.1[, c("PCL_5_1","PCL_5_2", "PCL_5_3", "PCL_5_4", "PC
L_5_5", "PCL_5_6")])
filtered_data2 <- DS.2.1[complete.cases(DS.2.1$FilterCriterion), ]
```

Merging the Filtered Data Sets

```
M.D.1 <- merge(filtered_data, filtered_data2, all = TRUE)
```

Create Scale Scores

```
## Scale Scores PCL5
# Total Scale Score PCL5
M.D.1$Scale_Score_PCL5 <- rowSums(M.D.1[, c("PCL_5_1","PCL_5_2", "PCL_5_3", "PCL_5_4", "PCL
_5_5", "PCL_5_6")])
# Scale: Re-experiencing/Intrusive Symptoms (1&2)
M.D.1$Scale_Score_PCL5_Intrusive <- rowSums(M.D.1[, c("PCL_5_1","PCL_5_2")])
# Scale: Avoidance Symptoms (3&4)
M.D.1$Scale_Score_PCL5_Avoidance <- rowSums(M.D.1[, c("PCL_5_3","PCL_5_4")])
# Scale: Hyperarousal (5&6)
M.D.1$Scale_Score_PCL5_Hyperarousal <- rowSums(M.D.1[, c("PCL_5_5","PCL_5_6")])

## Scale Scores PHQ9
# Total Scale Score PHQ9
M.D.1$Scale_Score_PHQ9 <- rowSums(M.D.1[, c("PHQ9_1", "PHQ9_2", "PHQ9_3", "PHQ9_4", "PHQ9_5
", "PHQ9_6", "PHQ9_7", "PHQ9_8", "PHQ9_9")])

## Scale Scores HTQ
# Reformulate Responses on HTQ (2=yes=1; 1=no=0)
M.D.1$HTQ_1_recoded <- ifelse(M.D.1$HTQ_1 == 2, 1, 0)
M.D.1$HTQ_2_recoded <- ifelse(M.D.1$HTQ_2 == 2, 1, 0)
M.D.1$HTQ_3_recoded <- ifelse(M.D.1$HTQ_3 == 2, 1, 0)
M.D.1$HTQ_4_recoded <- ifelse(M.D.1$HTQ_4 == 2, 1, 0)
M.D.1$HTQ_5_recoded <- ifelse(M.D.1$HTQ_5 == 2, 1, 0)
M.D.1$HTQ_6_recoded <- ifelse(M.D.1$HTQ_6 == 2, 1, 0)
M.D.1$HTQ_7_recoded <- ifelse(M.D.1$HTQ_7 == 2, 1, 0)
M.D.1$HTQ_8_recoded <- ifelse(M.D.1$HTQ_8 == 2, 1, 0)
M.D.1$HTQ_9_recoded <- ifelse(M.D.1$HTQ_9 == 2, 1, 0)
M.D.1$HTQ_10_recoded <- ifelse(M.D.1$HTQ_10 == 2, 1, 0)
M.D.1$HTQ_11_recoded <- ifelse(M.D.1$HTQ_11 == 2, 1, 0)
M.D.1$HTQ_12_recoded <- ifelse(M.D.1$HTQ_12 == 2, 1, 0)
M.D.1$HTQ_13_recoded <- ifelse(M.D.1$HTQ_13 == 2, 1, 0)
M.D.1$HTQ_14_recoded <- ifelse(M.D.1$HTQ_14 == 2, 1, 0)


# Total Scale Score HTQ
M.D.1$Scale_Score_HTQ <- rowSums(M.D.1[, c("HTQ_1_recoded","HTQ_2_recoded", "HTQ_3_recoded"
```

```
, "HTQ_4_recoded","HTQ_5_recoded", "HTQ_6_recoded", "HTQ_7_recoded", "HTQ_8_recoded", "HTQ_
9_recoded", "HTQ_10_recoded", "HTQ_11_recoded", "HTQ_12_recoded", "HTQ_13_recoded", "HTQ_14
_recoded")])

## Scale Score PLDQ
# Total Scale Score PLDQ
M.D.1$Scale_Score_PLDQ <- rowSums(M.D.1[, c("Postmigration_list_1", "Postmigration_list_2",
"Postmigration_list_3", "Postmigration_list_4", "Postmigration_list_5", "Postmigration_list
_6", "Postmigration_list_7", "Postmigration_list_8", "Postmigration_list_10", "Postmigratio
n_list_11", "Postmigration_list_12", "Postmigration_list_13", "Postmigration_list_14", "Pos
tmigration_list_15", "Postmigration_list_16", "Postmigration_list_17", "Postmigration_list_
18", "Postmigration_list_19", "Postmigration_list_20", "Postmigration_list_21", "Postmigrat
ion_list_22", "Postmigration_list_23")])
```

PMR/DMR Group

```
M.D.1$PMR <- ifelse(M.D.1$Kinship <= 6, 1, 0)
# Discriminate the "Other" (8) responses into family or non-family
# Family: 335, 39, 56, 234, 306, 266, 34, 85, 196, 175, 239, 151
# Non-family: 16, 273, 40, 247, 31, 128, 36, 205, 14, 126, 167, 191, 90, 191, 90, 277, 236,
109
# Code the Family cases which are yet coded as 0 as 1
M.D.1$id <- 1:nrow(M.D.1)
M.D.1$PMR_recode <- M.D.1$PMR
M.D.1$PMR_recode[M.D.1$id %in% c(335, 39, 56, 234, 306, 266, 34, 85, 196, 175, 239, 151)] <
- 1
```

Create Group of Analysis with only Relocated Ukrainians

```
Relocated.D1 <- subset(M.D.1, Flee >= 2)
```

(2) Demographics

```
Relocated.D1$PMR_recode_cat <- factor(Relocated.D1$PMR_recode)
Relocated.D1$Gender_cat <- factor(Relocated.D1$Gender)
Relocated.D1$Age_num <- as.numeric(Relocated.D1$Age)
Relocated.D1$Flee_cat <- factor(Relocated.D1$Flee)
Relocated.D1$Kinship_cat <- factor(Relocated.D1$Kinship)
Relocated.D1$Cause_cat <- factor(Relocated.D1$Cause_of_death)
summary(Relocated.D1[, c("Gender_cat", "PMR_recode_cat", "Age_num", "Flee_cat", "Kinship_ca
t", "Cause_cat")])
sd(Relocated.D1$Age_num)
Relocated.D1$date_of_death <- gsub("[-/]", ".", Relocated.D1$date_of_death)
Relocated.D1$date_of_death <- as.Date(Relocated.D1$date_of_death, format = "%d.%m.%Y")
sorted_dates <- sort(Relocated.D1$date_of_death)
median_date <- median(sorted_dates)
median_date_formatted <- format(median_date, "%d.%m.%Y")
median_date_formatted
```

(3) Psychometric Investigations

Internal Consistency PCL 5 & PHQ9

```
library(psych)
PCL5items <- Relocated.D1[, c("PCL_5_1", "PCL_5_2", "PCL_5_3", "PCL_5_4", "PCL_5_5", "PCL_5
_6")]
alpha_matrix <- psych::alpha(PCL5items)
cat("Cronbach's alpha for pcl5:", alpha_matrix$total$raw_alpha, "\n")

PHQ9items <- Relocated.D1[, c("PHQ9_1", "PHQ9_2", "PHQ9_3", "PHQ9_4", "PHQ9_5", "PHQ9_6", "
PHQ9_7", "PHQ9_8", "PHQ9_9")]
alpha_matrix2 <- psych::alpha(PHQ9items)
cat("Cronbach's alpha for pcl5:", alpha_matrix2$total$raw_alpha, "\n")
```

Relationships between the Questionnaires

```
# r: PCL5 & PHQ9
cor.D1 <- Relocated.D1[, c("Scale_Score_PCL5", "Scale_Score_PHQ9")]
cor.D1 <- na.omit(cor.D1)
cor.m <- cor(cor.D1$Scale_Score_PCL5, cor.D1$Scale_Score_PHQ9)
```

```
print(cor.m)

# p-value
cor_result <- cor.test(Relocated.D1$Scale_Score_PCL5, Relocated.D1$Scale_Score_PHQ9)
p_value <- cor_result$p.value
print(p_value)

# df
df <- cor_result$parameter
print(df)
```

(4) Parametric Tests

Assumption of Normality

```
shapiro.test(Relocated.D1$Scale_Score_HTQ)
shapiro.test(Relocated.D1$Scale_Score_PCL5)
shapiro.test(Relocated.D1$Scale_Score_PHQ9)
shapiro.test(Relocated.D1$Scale_Score_PLDQ)
shapiro.test(Relocated.D1$Scale_Score_PCL5_Intrusive)
shapiro.test(Relocated.D1$Scale_Score_PCL5_Avoidance)
shapiro.test(Relocated.D1$Scale_Score_PCL5_Hyperarousal)

library(ggpubr)
library(ggplot2)
library(gridExtra)
D1 <- ggdensity(Relocated.D1$Scale_Score_PCL5, main = "PCL5")
D2 <- ggdensity(Relocated.D1$Scale_Score_PCL5_Intrusive, main = "PCL5 Intrusive")
D3 <- ggdensity(Relocated.D1$Scale_Score_PCL5_Avoidance, main = "PCL5 Avoidance")
D4 <- ggdensity(Relocated.D1$Scale_Score_PCL5_Hyperarousal, main = "PCL5 Hyperarousal")
D5 <- ggdensity(Relocated.D1$Scale_Score_PHQ9, main = "PHQ9")
D6 <- ggdensity(Relocated.D1$Scale_Score_HTQ, main = "HTQ")
D7 <- ggdensity(Relocated.D1$Scale_Score_PLDQ, main = "PMLDC")
grid.arrange(D1, D2, D3, D4, D5, D6, D7, nrow = 3, ncol = 3, widths = c(1, 1, 1), heights =
c(1, 1, 1))
```

(5) Non-parametric Main Analysis

PERMANOVA Analysis ~ RQ1

```
library(vegan)

# Distance metric: Manhattan distance (particularly suitable for non-normally distributed d
ata)
distmatrix <- vegdist((Relocated.D1[, c("Scale_Score_PCL5_Intrusive", "Scale_Score_PCL5_Avo
idance", "Scale_Score_PCL5_Hyperarousal")]), method = "manhattan")
PERMANOVA1 <- adonis2(distmatrix ~ PMR_recode, data = Relocated.D1)
PERMANOVA1
```

Additional (Mentioned) Analysis ~ RQ 1

```
# Kmeans Analysis to identify other Grouping Clusters
library(cluster)

subset1 <- Relocated.D1[, c("Scale_Score_PCL5_Intrusive", "Kinship")]
subset1 <- na.omit(subset1)
cluster_model <- kmeans(subset1$Kinship, centers = 2)
cluster_labels <- cluster_model$cluster
subset1$cluster_labels <- cluster_labels
boxplot(Scale_Score_PCL5_Intrusive ~ cluster_labels, data = subset1)

subset2 <- Relocated.D1[, c("Scale_Score_PCL5_Avoidance", "Kinship")]
subset2 <- na.omit(subset2)
cluster_model2 <- kmeans(subset2$Kinship, centers = 2)
cluster_labels2 <- cluster_model2$cluster
subset2$cluster_labels2 <- cluster_labels2
boxplot(Scale_Score_PCL5_Avoidance ~ cluster_labels2, data = subset2)
```

```
subset3 <- Relocated.D1[, c("Scale_Score_PCL5_Hyperarousal", "Kinship")]
subset3 <- na.omit(subset3)
cluster_model3 <- kmeans(subset3$Kinship, centers = 2)
cluster_labels3 <- cluster_model3$cluster
subset3$cluster_labels3 <- cluster_labels3
boxplot(Scale_Score_PCL5_Hyperarousal ~ cluster_labels3, data = subset3)

# Suggested Group:
# Cluster 1: 1-4 (partner, child, parent, sibling),
# Cluster 2: 5-8 (grandparent, friend, other (6=grandchild is not in the data))
# Non-parametric Test
Relocated.D1$Close <- ifelse(Relocated.D1$Kinship <= 4, 1, 0)

# Discriminate the "Other" (8) responses into close or non-close
# Close: 266
Relocated.D1$Close_recode <- Relocated.D1$Close
Relocated.D1$Close_recode[Relocated.D1$id %in% c(266)] <- 1

# Summary of the New Groups
Relocated.D1$Close_cat <- factor(Relocated.D1$Close_recode)
summary(Relocated.D1[, c("Close_cat")])

# Distance metric: Manhattan distance (particularly suitable for non-normally distributed d
ata)
distmatrix2 <- vegdist(na.omit(Relocated.D1[, c("Scale_Score_PCL5_Intrusive", "Scale_Score_
PCL5_Avoidance", "Scale_Score_PCL5_Hyperarousal")]), method = "manhattan")
PERMANOVA2 <- adonis2(distmatrix2 ~ Close_recode, data = Relocated.D1)
PERMANOVA2

# Separate Kruskal-Wallis test for each DV
kruskal.test(Scale_Score_PCL5_Hyperarousal ~ Close_recode, data = Relocated.D1)
kruskal.test(Scale_Score_PCL5_Intrusive ~ Close_recode, data = Relocated.D1)
kruskal.test(Scale_Score_PCL5_Avoidance ~ Close_recode, data = Relocated.D1)

# Plots for each DV
library(ggplot2)
Plot_1 <- ggplot(Relocated.D1, aes(x = Close_cat, y = Scale_Score_PCL5_Intrusive)) +
  geom_boxplot(fill = "grey") +
  xlab("") +
  ylab("Intrusiveness") +
  scale_x_discrete(labels = c("", "")) +
  theme_gray()
Plot_2 <- ggplot(Relocated.D1, aes(x = Close_cat, y = Scale_Score_PCL5_Avoidance)) +
  geom_boxplot(fill = "grey") +
  ylab("Avoidance") +
  xlab("") +
  theme_gray() +
  scale_x_discrete(labels = c("Cluster 2", "Cluster 1")) +
  theme(axis.text.x = element_text(size = 13))
Plot_3 <- ggplot(Relocated.D1, aes(x = Close_cat, y = Scale_Score_PCL5_Hyperarousal)) +
  geom_boxplot() +
  xlab("") +
  ylab("Hyperarousal") +
  theme_gray() +
  scale_x_discrete(labels = c("Cluster 2", "Cluster 1")) +
  theme(axis.text.x = element_text(size = 13))
library(gridExtra)
grid.arrange(Plot_1, Plot_2, Plot_3, nrow = 2, ncol = 2, widths = c(2, 2), heights = c(2, 2
))
```

Additional (Unmentioned) Analyses ~ RQ1

```
## Cause of Death - Marginally Insignificant
distmatrix3 <- vegdist(na.omit(Relocated.D1[, c("Scale_Score_PCL5_Intrusive", "Scale_Score_
PCL5_Avoidance", "Scale_Score_PCL5_Hyperarousal")]), method = "manhattan")
PERMANOVA3 <- adonis2(distmatrix3 ~ Cause_of_death, data = Relocated.D1)
```

```
PERMANOVA3

## Year of Death and PTSD Symptom Profiles ~ Insignificant
Relocated.D1$year_of_death <- substr(Relocated.D1$date_of_death, start = nchar(Relocated.D1
$date_of_death) - 3, stop = nchar(Relocated.D1$date_of_death))
Relocated.D1$year_of_death_cat <- factor(Relocated.D1$year_of_death)
distmatrix4 <- vegdist(na.omit(Relocated.D1[, c("Scale_Score_PCL5_Intrusive", "Scale_Score_
PCL5_Avoidance", "Scale_Score_PCL5_Hyperarousal")]), method = "manhattan")
PERMANOVA4 <- adonis2(distmatrix4 ~ year_of_death, data = Relocated.D1)
PERMANOVA4

## Flee within/without Country and PTSD Symptom Profiles ~ Insignificant
distmatrix5 <- vegdist(na.omit(Relocated.D1[, c("Scale_Score_PCL5_Intrusive", "Scale_Score_
PCL5_Avoidance", "Scale_Score_PCL5_Hyperarousal")]), method = "manhattan")
PERMANOVA5 <- adonis2(distmatrix5 ~ Flee_cat, data = Relocated.D1)
PERMANOVA5
```

Generalised Linear Model ~ RQ2

```
# As the foregoing analyses are on post-migration, the sample has to be restricted
Relocated.D2 <- subset(M.D.1, Flee >= 3)
Relocated.D2 <- Relocated.D2[complete.cases(Relocated.D2$Scale_Score_PLDQ), ]

# Generalised Linear Model Analysis
GLM1 <- glm(Scale_Score_PCL5 ~ Scale_Score_HTQ + Scale_Score_PLDQ, data = Relocated.D2, Gam
ma(link = "log"))
summary(GLM1)

# Plot
P1 <- ggplot(Relocated.D2, aes(x = Scale_Score_HTQ, y = Scale_Score_PCL5)) +
  geom_point(size = 0.8) +
  geom_smooth(method = "lm", se = FALSE, color = "red") +
  labs(x = "Pre-Migration Trauma", y = "PTSD Symptom Severity") +
  theme_replace()
P2 <- ggplot(Relocated.D2, aes(x = Scale_Score_PLDQ, y = Scale_Score_PCL5)) +
  geom_point(size = 0.8) +
  geom_smooth(method = "lm", se = FALSE, color = "blue") +
  labs(x = "Post-Migration Trauma", y = "") +
  theme_replace()
grid.arrange(P1, P2, nrow = 2, ncol = 2, widths = c(2, 2), heights = c(2, 2))
```

Additional Analyses ~ RQ2

```
# Gamma distributions due to the positive skew in all PCL5 Symptom Scales
GLM2 <- glm(Scale_Score_PCL5_Hyperarousal ~ Scale_Score_HTQ + Scale_Score_PLDQ, data = Relo
cated.D2, Gamma(link = "log"))
summary(GLM2)
GLM3 <- glm(Scale_Score_PCL5_Avoidance ~ Scale_Score_HTQ + Scale_Score_PLDQ, data = Relocat
ed.D2, Gamma(link = "log"))
summary(GLM3)
GLM4 <- glm(Scale_Score_PCL5_Intrusive ~ Scale_Score_HTQ + Scale_Score_PLDQ, data = Relocat
ed.D2, Gamma(link = "log"))
summary(GLM4)

# Plots
# For the Pre-Migration
ggplot(Relocated.D2, aes(x = Scale_Score_HTQ)) +
  geom_smooth(aes(y = Scale_Score_PCL5_Intrusive, color = "Intrusiveness"),
              method = "lm", se = FALSE, size = 1) +
  geom_smooth(aes(y = Scale_Score_PCL5_Avoidance, color = "Avoidance"),
              method = "lm", se = FALSE, size = 1) +
  geom_smooth(aes(y = Scale_Score_PCL5_Hyperarousal, color = "Hyperarousal"),
              method = "lm", se = FALSE, size = 1) +
  scale_color_manual(values = c("Intrusiveness" = "brown",
                                "Avoidance" = "turquoise",
                                "Hyperarousal" = "purple")) +
  labs(x = "Pre-Migration Trauma", y = "Symptom Severity",
```

```
       color = "Symptom Category") +
  theme_replace() +
  theme(plot.title = element_text(hjust = 0.5),
        legend.position = "top") +
  guides(color = guide_legend(nrow = 1, title.position = "top")) +
  theme_gray()

# For the Post-Migration
ggplot(Relocated.D2, aes(x = Scale_Score_PLDQ)) +
  geom_smooth(aes(y = Scale_Score_PCL5_Intrusive, color = "Intrusiveness"),
              method = "lm", se = FALSE, size = 1) +
  geom_smooth(aes(y = Scale_Score_PCL5_Avoidance, color = "Avoidance"),
              method = "lm", se = FALSE, size = 1) +
  geom_smooth(aes(y = Scale_Score_PCL5_Hyperarousal, color = "Hyperarousal"),
              method = "lm", se = FALSE, size = 1) +
  scale_color_manual(values = c("Intrusiveness" = "brown",
                                "Avoidance" = "turquoise",
                                "Hyperarousal" = "purple")) +
  labs(x = "Post-Migration Trauma", y = "Symptom Severity",
       color = "Symptom Category") +
  theme_replace() +
  theme(plot.title = element_text(hjust = 0.5),
        legend.position = "top") +
  guides(color = guide_legend(nrow = 1, title.position = "top")) +
  theme_gray()
```

Mediation Analysis ~ RQ3

```
# First Regression - Significant - Gaussian due to normal distribution of PHQ9
GLM5 <- glm(Scale_Score_PHQ9 ~ Scale_Score_PLDQ, data = Relocated.D2, family = gaussian)
summary(GLM5)

# Second Regression - Significant - Gamma due to positive skew in PCL5
GLM6 <- glm(Scale_Score_PCL5 ~ Scale_Score_PLDQ, data = Relocated.D2, Gamma(link = "log"))
summary(GLM6)

# Third Regression - Significant Depression; Significant Post-Migration Trauma
GLM7 <- glm(Scale_Score_PCL5 ~ Scale_Score_PLDQ + Scale_Score_PHQ9, data = Relocated.D2, Ga
mma(link = "log"))
summary(GLM7)

# Information for Sobel Test via https://quantpsy.org/sobel/sobel.htm; extracted from previ
ous analyses
# a = 0.20811
# SE of a = 0.03116
# b = 0.022277
# SE of b = 0.007858
# Results of Sobel Test with Relocated.D1: Sobel test statistic = 2.60958341, SE = 0.001776
55, p = 0.00906525
```

Appendix F:

Figural Summary of the Study's Results