

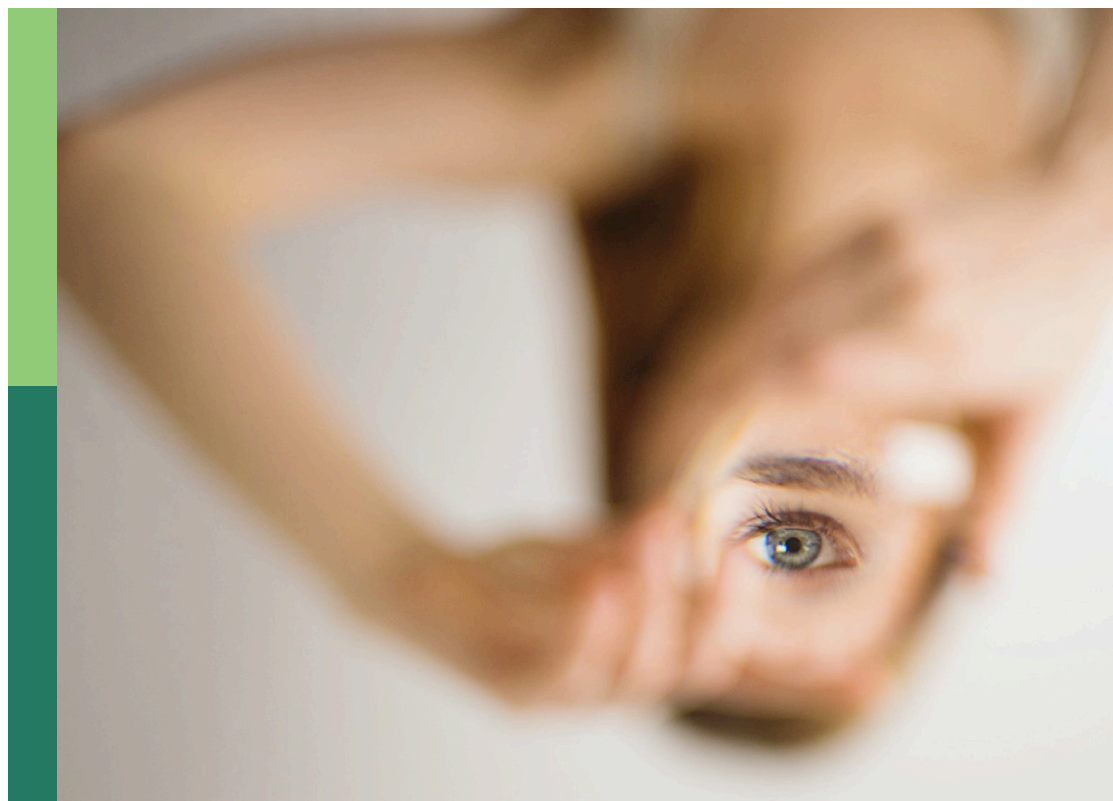
# Public mental health in trauma and war

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Man Cheung Chung

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# Public mental health in trauma and war

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# Psychological and environmental factors influencing resilience among Ukrainian refugees and internally displaced persons: a systematic review of coping strategies and risk and protective factors

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**Background:** There is much discussion in the literature about the link between traumatic events related to war and mental illness. However, in comparison, mental health has been more researched than protective factors such as coping methods, which are the primary factors to build resilience in these circumstances. This review examines the psychological and environmental elements that influence the resilience of Ukrainian refugees and IDPs by analyzing coping strategies and risk and protective factors.

**Methods:** A literature search was conducted on PsycINFO, Pubmed, Scopus, and Science Direct, with 259 articles screened and 13 determined as eligible for inclusion. Inclusion criteria were: (1) studies on adult Ukrainian refugees and/or IDPs; (2) original, peer-reviewed studies; and (3) studies written in English or Italian language. Single-case reports and qualitative studies were excluded, as well as those studies written in any other language, and any studies for which the full-text version could not be obtained (i.e., conference abstracts). Two reviewers independently reviewed titles and abstracts, reviewed relevant articles' full text, and extracted the data.

**Results:** A diverse range of individual and socio-environmental risk and protective factors were identified, influencing the resilience of Ukrainian refugees and IDPs, as well as five main categories of coping strategies: emotion-focused strategies, problem-focused strategies, avoidance, faith-based strategies, and the ones based on sense of belonging.

**Discussion:** War trauma and associated stressors can lead to distressing physical and psychological reactions, which persist even after leaving the war zone. Many individual and socio-environmental risk factors, such as mental disorders, financial security, having relatives wounded or displaced, and an unfamiliar environment could influence the risk and severity of psychological difficulties, emphasizing the importance of coping strategies, social connections, faith, and cultural resilience.

**Conclusion:** This systematic review underscores the complex range of coping strategies and factors influencing the resilience of Ukrainian refugees and IDPs. Social connections and inclusive community interventions play vital roles in improving their psychological well-being, while longitudinal studies and culturally sensitive support are needed to address their unique challenges and strengths. Implementing collaborative care models can provide comprehensive support by integrating mental health services with primary healthcare and community-based organizations.

#### KEYWORDS

war, Ukraine, mental health, risk factors, protective factors, coping strategies, refugees, IDPs

## 1. Introduction

### 1.1. Understanding war-related migration: impact on mental health

According to the definition of those who are either states or aspire to become states, “war should be understood as an actual, deliberate and widespread armed conflict between political communities” (Orend, 2008). Indeed, “War remains one of the most complicated and destructive human endeavors, whether viewed from a philosophical, sociological or legal standpoint” (Orend, 2008, p. 49).

The ongoing Russian invasion of Ukraine, which began on 24 February 2022, is causing the largest civilian refugee disaster in Europe since World War II and the first of its kind since the Yugoslav war in the 1990s. The war in Crimea and Eastern Ukraine goes back to 2014, and had already resulted in many deaths, large groups of internally displaced people, and significant psychosocial problems.

United Nations High Commissioner for Refugees estimates that in 2021 there were approximately 84 million displaced persons worldwide, of whom 26.6 million were refugees and 4.4 million were seeking asylum (United Nations High Commissioner for Refugees, 2022a). These numbers are the highest recorded in the last 20 years. In this regard, the conflict in Ukraine has led to both alarming numbers and a precarious scenario. As of 29 November 2022, more than 7.8 million people had left the country and 8 million were internally displaced (United Nations High Commissioner for Refugees, 2022b). According to the United Nations High Commissioner for Refugees (2022b), about 1.6 million Ukrainian refugees live in Poland, and many more are hosted in surrounding countries. Indeed, the war is having an impact not only on the Ukrainian population, but also on people in neighboring countries.

According to the literature on this topic, war-related trauma is a traumatic experience that not only directly exposes a person to violence and atrocities or poses a threat to life or health. As it is a negative life experience, one is not only directly exposed to war, but also indirectly, e.g., when seeing images of combat on television or social media (e.g., Miller and Rasmussen, 2010; Denov et al., 2019; Anjum et al., 2023). According to the concept of indirect exposure, people who are affected by war but do not live in an area of conflict can also experience negative mental health effects, such as the population of countries close to Ukraine as well as countries hosting

refugees (Essau and Trommsdorff, 1996; Chudzicka-Czupala et al., 2023a).

Among the most vulnerable demographic groups among refugees are children (more than half of all Ukrainian children have had to leave home), women, the elderly, and the sick, who are unable to participate in the military response (Dobson, 2022; Hodes, 2022). According to Charlson et al. (2019), Javanbakht (2022), and Elvevåg and DeLisi (2022), these people are at very high risk of developing a range of mental health conditions, including post-traumatic stress disorder (PTSD), severe anxiety and depressive symptoms, and suicidal thoughts or behavior. Johnson et al. (2022) found that internal migrants (IDPs) had a high incidence of PTSD symptoms across all socio-demographic categories due to their high level of direct exposure to conflict-related traumatic events (65%), even though the fighting was still confined to the Donbass and Kharkiv regions. Similar findings were reported by Roberts et al. (2019), who conducted a cross-sectional survey of IDPs in the early stages of the war and found that 32, 22, and 17% of IDPs suffered from PTSD, depression, and anxiety, respectively. According to Cheung et al. (2019), 55% of IDPs in Ukraine were at risk of somatic problems.

### 1.2. Coping strategies among refugees and internally displaced persons

There is much discussion in the literature about the link between traumatic events related to war and mental illness (Porter and Haslam, 2005; Steel et al., 2009). However, mental health research has come under criticism for adopting a limited, Western conception of trauma and mental disorders, particularly post-traumatic stress disorder (PTSD), which ignores the cultural roots of mental health and suffering and the different ways in which people and their communities deal with conflict (Kienzler, 2008; Miller and Rasmussen, 2010; Seguin and Roberts, 2015). In comparison, mental health has been more researched than protective factors such as coping methods, which are the primary factors to build resilience in these circumstances. Indeed, the main goals for mental health and primary care providers for families of refugees and IDPs can be seen in the promotion of resilience, post-traumatic growth and the strengthening of protective factors. Although researchers acknowledge the harmful effects of acute stress and mental health issues, in recent years they have begun to adopt a resilience approach.

Ungar (2008, p.225) describes resilience as: “*In the context of exposure to significant adversity, whether psychological, environmental, or both, resilience is both the ability of individuals to find their way to health-promoting resources, including the ability to experience feelings of well-being, and a condition of the individual’s family, community, and culture to provide these health resources and experiences in culturally meaningful ways.*”

According to Folkman and Lazarus (1980, p. 223), coping is defined as “*the cognitive and behavioral efforts made to manage, tolerate, or reduce external and internal demands and conflicts between them.*” The term “*coping strategies*” refers to cognitive and behavioral attempts to deal with specific external or internal demands (and conflicts between them) that are considered demanding or beyond a person’s resources (Lazarus, 1991, p. 112). An important area for the study of mental health and psychosocial support in conflict-affected communities is the exploration of protective factors, including coping (Tol et al., 2011).

To our knowledge, there is no systematic study examining the coping strategies of refugees and IDPs from the Ukrainian conflict. A variety of methods and paradigms can be used to understand coping (Lazarus and Folkman, 1984; Parker and Endler, 1992). Basic coping strategies in the literature include support seeking, positive cognitive restructuring, problem solving, distraction, and escape-avoidance (Seguin and Roberts, 2015).

Researchers and clinicians could shift the focus from an exclusive emphasis on pathology to the promotion of protective factors by adopting a strategy guided by the concept of resilience. Such a shift in focus would provide the elements necessary to improve each individual’s developmental trajectory, which would later serve as a protective factor in the face of new difficulties.

The aim of this study is therefore to examine the psychological and environmental elements that influence the resilience of Ukrainian refugees and IDPs by analyzing coping strategies and risk and protective factors. Health professionals pursuing a therapeutic strategy to support refugees and IDPs based on the concept of resilience may benefit from identifying protective variables that maintain normative development despite traumatic situations.

## 2. Methods

The quantitative study was analyzed using the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines (Moher et al., 2009). We outlined our research questions for the 2022–2023 literature search approach, screening phase, and final data extraction in line with our objectives.

First, the inclusion and exclusion criteria were merged with the screening questions (Aromataris and Pearson, 2014). Second, the Population, Intervention, Comparison, Outcome measures, and Study (PICOS) system was used to clarify the questions and establish criteria for the studies (Methley et al., 2014).

The outcomes of interest in this research are coping mechanisms and risk and protective factors used in the context of mental health as defined by World Health Organization (2015) to deal with difficulties arising from armed conflict and forced displacement. The war-affected adult civilian population aged 18 years or older formed the included population. Studies targeting only adolescents and children were not included, as their coping mechanisms are often very different from those of adults.

Studies that focused on internally displaced persons who were forced to leave conflict areas and remain within the borders of their country, as well as refugees who were forced to flee their country due to the conflict, were also included. Studies that focused exclusively on soldiers and war veterans were also not included, as they may have different resources and coping mechanisms than civilians affected by conflict. Both quantitative and qualitative English-language research was included in the review.

## 2.1. Data search, study screening, and analysis

PsycINFO, Pubmed, Scopus, and Science Direct as well as gray literature databases were also searched. The date of first publication was 24 February 2022 (date of the start of the conflict), and the final publication date had no restrictions. A preliminary assessment of relevant publications helped to select the search terms, which included terms for refugees and IDPs as well as typical terms for mental illness. The final keywords were: “*mental health*” AND “*refugee*” AND “*Ukraine*” OR “*IDPs*” on title and abstract for the articles.

English-language or Italian-language empirical research on adult populations was selected. The term “*coping*” was intentionally not included in the search. Because the concept of coping is so broad, some authors may not have clearly indicated how they would structure their research on coping, but they still included important components of coping that fit the definition and inclusion criteria of this systematic review. The methodological choice to include articles written in English and Italian was dictated by the urgency to have an overview of risk and protective factors and coping strategies to guide potential interventions. However, future works need to consider potential papers written in Ukrainian or Russian.

First, the retrieved papers were downloaded into Mendeley after searching the databases using the search terms. Second, the inclusion/exclusion criteria were checked against the titles and abstracts. Third, the full texts of the included articles were read. Articles that met the above inclusion criteria were included. Fourth, additional relevant publications were found by manually searching the reference lists of the included research papers. Fifth, a thorough analysis of the remaining research papers was conducted.

## 3. Results

Figure 1 shows the results of the five-stage screening process. There were a total of 259 studies (stage 1). After a review of titles and/or abstracts (stage 3), looking for core themes, 197 studies were excluded because they did not deal with coping mechanisms or dealt exclusively with children and adolescents, combatants, and war veterans, populations affected by conflicts that took place more than 10 years before the data collection.

In the next phase, 38 articles were excluded because they were review articles, editorials, or conference summaries. Phase 4 involved a more detailed assessment of the remaining 20 publications. In this phase, five research papers were excluded because they were written in languages other than English. Initially, 13 articles were selected for the final in-depth assessment. All articles were included in the final assessment.

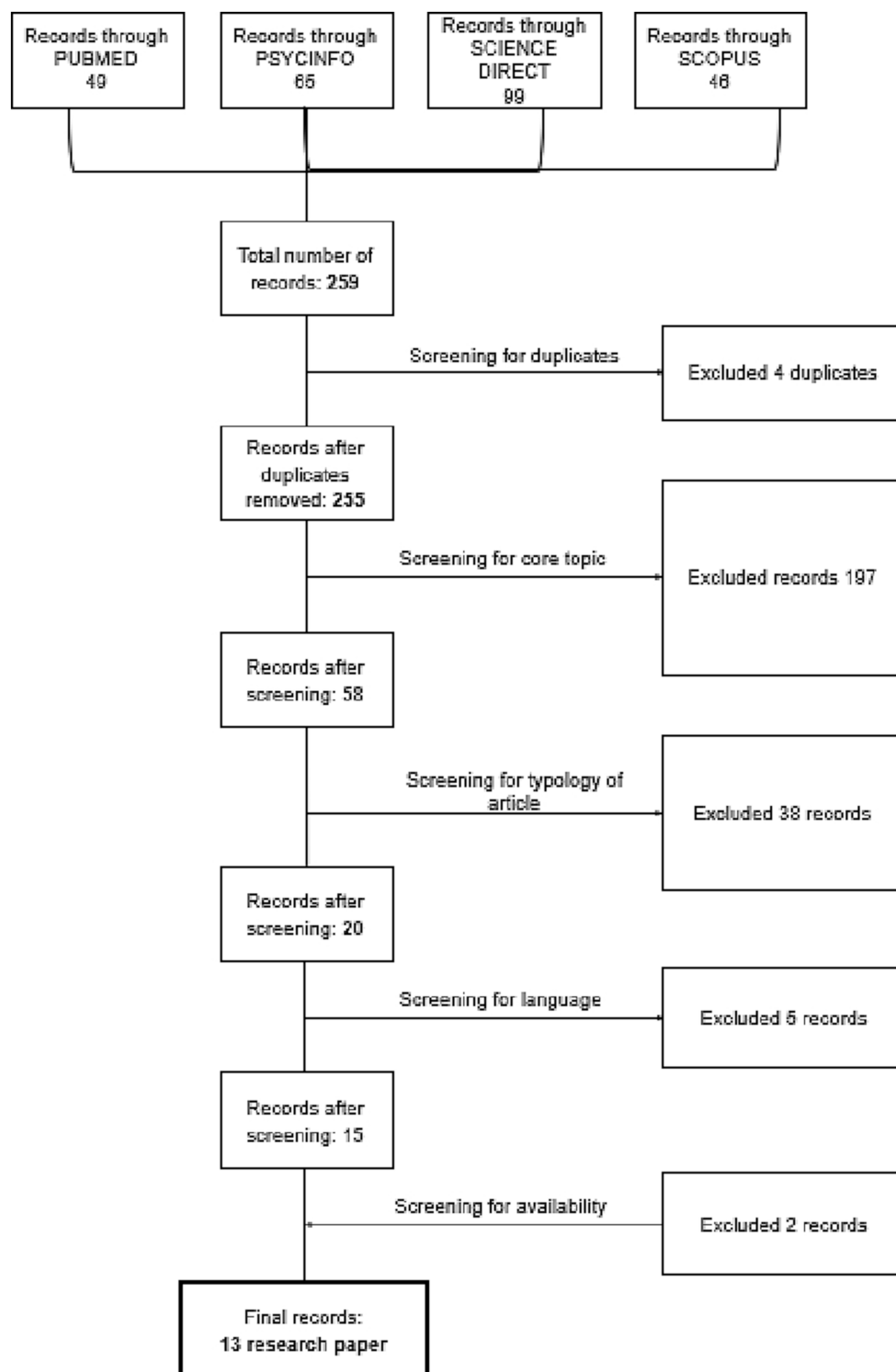


FIGURE 1  
Flow diagram.

### 3.1. The studies' characteristics

Thirteen studies were included in this systematic review. Features of the studies are summarized in Table 1.

Most of the studies ( $n=10$ ) were cross-sectional studies (Hamama-Raz et al., 2022; Kokun, 2022; Rizzi et al., 2022; Długosz,

2023; Karatzias et al., 2023; Kurapov et al., 2023; Miliutina et al., 2023; Xu et al., 2023; Chudzicka-Czupala et al., 2023a,b), two of them were qualitative studies (Khraban, 2022; Oviedo et al., 2022) and one had a descriptive survey research design (Talabi et al., 2022). Four of the included studies (Khraban, 2022; Xu et al., 2023; Chudzicka-Czupala et al., 2023a,b) investigated the first stages of the war, most of them

TABLE 1 Studies' features.

Study	Study design	Timeframe	Country where the study was conducted	Study population	Sample	Study objectives	Measures	Results
Karatzias et al. (2023)	Cross-sectional study	6 months after Russia's invasion	Ukraine	Ukrainian civilians	2,004 adult parents of children under 18	Assess the type and frequency of exposure to different war-related stressors, the prevalence rates of ICD-11 PTSD and CPTSD, and their relationship in a nationwide sample of parents living in Ukraine during the Russian war.	<i>War-related stressor</i> : a list of 34 events was used to assess various stressful experiences people may have had during the war; <i>The International Trauma Questionnaire (ITQ: 10)</i> : self-report measure to assess PTSD and CPTSD	All participants were exposed to at least one war-related stressor. Mean number of exposures = 9.07 (range = 1–26). 25.9% (95% CI = 23.9, 27.8%) met diagnostic requirements for PTSD and 14.6% (95% CI = 12.9, 16.0%) met requirements for CPTSD. Participants who had the highest exposure to war-related stressors were significantly more likely to meet the requirements for PTSD (OR = 4.20; 95% CI = 2.96–5.95) and CPTSD (OR = 8.12; 95% CI = 5.11–12.91) compared to the least exposed
Khraban (2022)	Qualitative study	first 15 days of war (24.02.2022 to 10.03.2022)	Northern Ukraine	Ukrainian civilians	Ukrainian sector of the social network Facebook on the pages of the groups “Boyarka and community news” (23.4 thousand participants) and “Boyarka. Boyarka community” (15.0 thousand participants). A total of 582 posts and comments to them were analyzed.	Identify topical coping strategies that were used by civilians of northern Ukraine during the first 15 days in the zone of military conflict.	Posts and comments to them, which contain linguistic markers of coping behavior (coping) and which have been posted during the period from 24.02.2022 to 10.03.2022 in the Ukrainian sector of the social network Facebook on the pages of the groups “Boyarka and community news.”	During the first five days non-adaptive emotionally focused coping strategies become in high demand. On days 6–10 of military conflict the civilians turn to problem-oriented, collective in nature coping strategies. On days 11–15 after the beginning of military conflict coping strategies aimed at creating a positive emotional state become predominant
Chudzicka-Czupala et al. (2023a)	Cross-sectional study	first stages of war (8 March and 26 April 2022)	Ukraine, Poland, Taiwan	Ukrainian, Polish, and Taiwanese civilians	1,598 participants (362 from Ukraine, 1,051 from Poland, and 185 from Taiwan)	Compare psychological distress and coping strategies among people living in Ukraine, Poland, and Taiwan and examine whether the associations between various coping strategies and psychological distress differed among people of various countries during the initial stage of the 2022 War in Ukraine.	<i>Hopelessness about the ongoing war</i> : one item ('I feel hopeless about the current war in Ukraine') to assess the current level of hopelessness of the respondents toward the 2022 War in Ukraine; <i>Brief Coping Orientation to Problems Experienced Inventory</i> : to measure how our participants behaved in response to the recent events related to the war; <i>21-Item Depression, Anxiety and Stress Scale</i> : to measure the three dimensions of emotional state in the preceding week; <i>Impact of Event Scale-Revised</i> : to measure the three dimensions of the psychological stress reactions (i.e., intrusion, avoidance, and hyperarousal) of the respondents to the war.	Psychological distress and adoption of coping strategies differed across people of various countries. Among Taiwanese and Polish respondents, avoidant coping strategies were most strongly associated with all categories of psychological distress compared with problem- and emotion-focused coping strategies. However, the associations of various coping strategies with psychological distress differed to a less extent among Ukrainian respondents. In addition, problem- and emotion-focused coping strategies had comparable associations with psychological distress among the people of Ukraine, Poland, and Taiwan.

(Continued)

TABLE 1 (Continued)

Study	Study design	Timeframe	Country where the study was conducted	Study population	Sample	Study objectives	Measures	Results
Oviedo et al. (2022)	Qualitative study	Started in February 2022. Refugees were interviewed between 1 and 3 months since they left Ukraine	Poland, Italy, and Spain	Ukrainian refugees	94 Ukrainian refugees	Identify: (1) what are the main stressors that are afflicting Ukrainian refugees; (2) what are the main coping strategies that they practice and advise for others; (3) what is the image they have of the hosts and other people they have met; (4) what are their current state and expectations; and finally, (5) what role does religion and religious prayer play in their stressing context	semi-structured interviews	The data obtained pointed to a plurality of coping and resilience strategies. Maintaining communication with separated loved ones as well as experiencing accompaniment by helpers and hosts emerged as principal elements for coping and resilience. It was found that a prior development of interior life or practice of prayer served as psychological “capital” that increased their resilience.
Chudzicka-Czupala et al. (2023b)	Cross-sectional study	First stages of war (8 March and 26 April 2022)	Ukraine, Poland, and Taiwan	Ukrainian, Polish, and Taiwanese civilians	1,626 participants (Poland: 1053; Ukraine: 385; Taiwan: 188)	Assess and compare mental health status, coping strategies, and views on the Russo-Ukrainian war in populations from Poland, Ukraine, and Taiwan, as well as identify demographic socio-and economic factors associated with depression, anxiety, stress, and post-traumatic stress levels	<i>Brief Coping Orientation to Problems Experienced Inventory</i> : to measure how our participants behaved in response to the recent events related to the war; <i>21-Item Depression, Anxiety and Stress Scale</i> : to measure the three dimensions of emotional state in the preceding week; <i>Impact of Event Scale-Revised</i> : to measure the three dimensions of the psychological stress reactions (i.e. intrusion, avoidance, and hyperarousal) of the respondents to the war	Ukrainian participants reported significantly higher DASS-21 ( $p < 0.001$ ) and IES-R ( $p < 0.01$ ) scores than Poles and Taiwanese. Taiwanese reported significantly higher avoidance scores ( $1.60 \pm 0.47$ ) than the Polish ( $0.87 \pm 0.53$ ) and Ukrainian ( $0.91 \pm 0.5$ ) participants ( $p < 0.001$ ). More than half of the Taiwanese (54.3%) and Polish (80.3%) participants were distressed by the war scenes in the media. More than half (52.5%) of the Ukrainian participants would not seek psychological help despite a significantly higher prevalence of psychological distress. Multivariate linear regression analyses found that female gender, Ukrainian and Polish citizenship, household size, self-rating health status, past psychiatric history, and avoidance coping were significantly associated with higher DASS-21 and IES-R scores after adjustment of other variables ( $p < 0.05$ )

(Continued)

TABLE 1 (Continued)

Study	Study design	Timeframe	Country where the study was conducted	Study population	Sample	Study objectives	Measures	Results
Xu et al. (2023)	Cross-sectional study	Initial period of the Russian invasion (March 19–31, 2022)	Ukraine	Ukrainian civilians	801 ukrainian civilians	Provide the prevalence rates of symptoms of psychological distress, anxiety, depression, and insomnia; and to link them with Ukrainians' productive coping strategies during the war	<i>Kessler Psychological Distress scale (K6)</i> : to assess psychological distress; <i>Generalized Anxiety Disorder-2</i> : to assess anxiety; <i>Patient Health Questionnaire-2</i> : to assess depression; <i>Insomnia Severity Index-4</i> : to assess insomnia; <i>Brief COPE</i> : to assess models of coping	Of 801 Ukrainian adults, 52.7% had symptoms of psychological distress (mean = 13.3 [SD = 4.9]); 54.1% of them reported symptoms of anxiety (mean = 2.9 [SD = 1.7]); 46.8% reported symptoms of depression (mean = 2.6 [SD = 1.6]). Symptom criteria for insomnia were met by 97 respondents (12.1%) (mean = 10.4 [SD = 4.2]). Demographic variables (including gender, living in an urban area, having children or elderly persons in the household, living in an area occupied by Russian forces) were associated with symptoms of distress, anxiety, depression, and insomnia. The productive coping strategies of using instrumental support, behavioral disengagement, self-distraction, and planning were significantly associated with mental health symptoms
Rizzi et al. (2022)	Cross-sectional study	Between March and June 2022	Ukraine and Poland	Ukrainian refugees and IDPs	352 Ukrainian refugees and 271 Ukrainian IDPs	Explore the mental health and well-being of Ukrainian refugees and IDPs who experienced transit conditions; examine the association of mental health and well-being with refugees' and IDPs' transit conditions and explore the protective role of family in building resilience by being open and (re)examining the idea of family	<i>A revised version of the DSM 5 TR Rated Level 1 Cross Cutting Symptoms</i> : to assess mental health. IDPs and refugees were asked to indicate the extent of their depression, anger, anxiety, and sleep disturbances on a Likert scale of 0–4 [none (0), mild (1), moderate (2), severe (3), or very severe (4)]. Two open-ended questions: what helps you feel better during this traumatic time and what worries you the most? to deepen the understanding of family resilience	Most of the samples (refugees and IDPs) reported high or very high levels of anxiety, depression, and sleep disturbances. Moreover, results highlighted how being close to families or being able to keep in touch with them work as a protective factor in enhancing resilience, as well as a support network

(Continued)

TABLE 1 (Continued)

Study	Study design	Timeframe	Country where the study was conducted	Study population	Sample	Study objectives	Measures	Results
Miliutina et al. (2023)	Cross-sectional study	Between February and April 2022	Ukraine	Ukrainian civilians	115 ukrainian families (45 in Kyiv, 12 Internally displaced, and 58 in evacuation in Europe countries)	Examine the influence of pets and relationships with them on maintaining the emotional state and the decision-making process of the Ukrainian residents during the war	In-depth interviews; the multidimensional psychological well-being model proposed by Ryff (the 42-item Psychological Wellbeing).	15% of adults experienced an improvement in their emotional state (residents who remained in Kyiv), 23% had a sense of shame (associated with inconvenience, that animals cause to other people), 42% have a feeling of anxiety (associated with concern for the life and health of an animal), 20% have a feeling of guilt in relation to abandoned and (or) dead animals. The migrants and refugees who took their pets with them showed an increase in the level of subjective well-being
Kokun (2022)	Exploratory cross-sectional study	Between June and July 2022	Ukraine	Ukrainian civilians	1,243 ukrainian civilians	Determine the possible differences in indicators of psychological and physical health in the Ukrainian population depending on the degree of employment, financial, and housing losses caused by the war	Ukrainian adapted versions of: <i>the Short Screening Scale for DSM-IV PTSD</i> : to assess PTSD; <i>the Connor-Davidson Resilience Scale, 10-Item Version</i> : to assess resilience; <i>the General Self-Efficacy Scale</i> : to evaluate individuals' perception of their competence in effectively manage stressful situations; <i>the Giessen Subjective Complaints List</i> : to quantify physical complaints	The sample showed significantly high levels of PTSD symptoms and physical complaints. Helplessness in the population caused by the war can be considered as an important mediating factor deteriorating the Ukrainian population's psychological and physical health as a result of employment and, especially, financial and housing losses. Secondly, such war-induced helplessness naturally reduces a person's ability to effectively search for work and earn money in new, unfavorable conditions, as well as his/her ability to minimize possible financial losses
Talabi et al. (2022)	Descriptive survey research design	Not specified	Nigeria	Ukrainian refugees	476 Nigerian refugees	Determine the utilization of social media storytelling for seeking and receiving help among Nigerian refugees who were displaced by the war between Russia and Ukraine	An online questionnaire was used to collect data for this study. The questionnaire sought both demographic and psychographic data. The response format was a five-point Likert scale that ranges from strongly agree to strongly disagree	The result of the study showed a significant positive correlation between social media storytelling and help-seeking and help-receiving among Nigerian refugees who were displaced by the war. The additional result showed that communication systems determined the promptness in receiving help. In particular, the macro-level was found to be more effective in promptness of help received than meso and micro levels

(Continued)

TABLE 1 (Continued)

Study	Study design	Timeframe	Country where the study was conducted	Study population	Sample	Study objectives	Measures	Results
Kurapov et al., 2023	Cross-sectional study	From May 5 to May 17, 2022	Ukraine	Ukrainian university students and personnel	589 university students (69.2%) and faculty/staff (personnel; 30.8%)	Investigate the impact of the war on the mental and emotional well-being of Ukrainian civilians—university students and personnel	<i>Modified version (FWS-Ukraine) of the Fear of War Scale</i> : to assess fear of war; <i>the Brief Resilience Scale</i> : to assess resilience; <i>the Short Burnout Measure</i> : to assess burnout; <i>the De Jong Gierveld 6-Item Loneliness Scale</i>	Most respondents (97.8%) reported deterioration of their psycho-emotional status including depression (84.3%), exhaustion (86.7%), loneliness (51.8%), nervousness (84.4%), and anger (76.9%)—students more than personnel, females more than males. The use of substances (i.e., tobacco, alcohol, pain relievers, and sedatives) has increased as well as loneliness associated with fear, burnout and lower resilience. However, despite these conditions, 12.7% of the respondents have reported the war has not affected them
Hamama-Raz et al. (2022)	Cross-sectional study	From April 7 to April 15, 2022	Ukraine	Ukrainian civilians	2,000 Ukrainian civilians	Explore predictors of patriotism attitudes among Ukrainians during wartime; and examine associations between patriotic attitudes and PTSD symptoms among Ukrainians during the conflict, alongside socio-demographic and war-related variables	Demographic information (sex, age, marital status, and having children under the age of 16 and region), with war related information assessed by three questions: “Do you have relatives that were wounded during the current war?”; “Do you have relatives that were killed in the current war?”; and “Do you have relatives that left Ukraine because of the current war?” (All rated Yes/No). Patriotic attitudes were measured with 20 items on a scale from 1 = Not true for me to 4 = Very true for me. (e.g., “I feel a sense of belonging to Ukraine no matter the challenges”; “It is necessary for me to serve my country”). the <i>International Trauma Questionnaire (ITQ)</i> : to measure PTSD symptoms	Hierarchical regressions found that having relatives that were wounded or that left Ukraine because of the war and those coming from a Ukrainian speaking region were associated with patriotic attitudes. Patriotic attitudes were positively associated with elevated risk for PTSD symptoms

(Continued)

TABLE 1 (Continued)

Study	Study design	Timeframe	Country were the study was conducted	Study population	Sample	Study objectives	Measures	Results
Długosz (2023)	Cross-sectional study	Between April 15, 2022 and May 10, 2022	Poland	Ukranian refugees	737 ukranian refugees in Poland	Diagnose mental health disorders with the use of the RHS-15 scale. Another aim of the study is the observation of strategies for coping with stress.	<i>The Refugee Health Screener-15 (RHS-15):</i> to assess mental distress	The analysis of responses on the RHS-15 scale has shown that depression, anxiety disorders and PTSD were observed among 73% of respondents, whereas 66% of the respondents display psychological distress. The analyses have shown that higher levels of mental health disorders were observed among women and refugees who do not speak Polish. Younger respondents experienced a higher psychological distress. The results of the study also indicate that the refugees more often implemented problem-focused strategies. The analysis has shown that the respondents who followed active strategies scored the lowest on RHS-15. The emotion-focused strategies, such as praying, diverting attention by becoming involved in different activities or taking sedatives were not effective. The highest levels of disorders were present among the refugees who indicated resignation

( $n=7$ ) were conducted between 1 and 5 months after Russian invasion (Hamama-Raz et al., 2022; Kokun, 2022; Oviedo et al., 2022; Rizzi et al., 2022; Długosz, 2023; Kurapov et al., 2023; Miliutina et al., 2023), only one study (Karatzias et al., 2023) was conducted 6 months after Russia's invasion and in one study (Talabi et al., 2022), the timeframe was not specified. Six countries were represented: Ukraine ( $n=10$ ; Hamama-Raz et al., 2022; Khraban, 2022; Kokun, 2022; Rizzi et al., 2022; Karatzias et al., 2023; Kurapov et al., 2023; Miliutina et al., 2023; Xu et al., 2023; Chudzicka-Czupała et al., 2023a,b), Poland ( $n=5$ ; Oviedo et al., 2022; Rizzi et al., 2022; Długosz, 2023; Chudzicka-Czupała et al., 2023a,b), Taiwan ( $n=2$ ; Chudzicka-Czupała et al., 2023a,b), Italy ( $n=1$ ; Oviedo et al., 2022), Spain ( $n=1$ ; Oviedo et al., 2022), and Nigeria ( $n=1$ ; Talabi et al., 2022). The majority of the studies ( $n=10$ ) included in their sample Ukrainian IDPs (Hamama-Raz et al., 2022; Khraban, 2022; Kokun, 2022; Rizzi et al., 2022; Karatzias et al., 2023; Kurapov et al., 2023; Miliutina et al., 2023; Xu et al., 2023; Chudzicka-Czupała et al., 2023a,b) while four studies included in their sample Ukrainian refugees (Oviedo et al., 2022; Rizzi et al., 2022; Talabi et al., 2022; Długosz, 2023). Among the studies examined, eight studies (Khraban, 2022; Oviedo et al., 2022; Rizzi et al., 2022; Długosz, 2023; Karatzias et al., 2023; Xu et al., 2023; Chudzicka-Czupała et al., 2023a,b) specifically included among their objectives that of investigating risk and/or protective factors and/or coping strategies. Among the instruments used to assess risk and/or protective factors there were: the War-related stressor (Karatzias et al., 2023), a list of 34 events was used to assess various stressful experiences people may have had during the war, interviews (Oviedo et al., 2022; Miliutina et al., 2023), two open-ended questions: "what helps you feel better during this traumatic time and what worries you the most?" (Rizzi et al., 2022), and the De Jong Gierveld 6-Item Loneliness Scale (Kurapov et al., 2023). The coping strategies were assessed using linguistic markers of coping behavior in posts and comments on social networks (Khraban, 2022), the Brief Coping Orientation to Problems Experienced Inventory (Xu et al., 2023; Chudzicka-Czupała et al., 2023a,b), and interviews (Oviedo et al., 2022; Miliutina et al., 2023); Two open-ended questions: "what helps you feel better during this traumatic time and what worries you the most?" (Rizzi et al., 2022), the Connor-Davidson Resilience Scale, 10-Item Version (Kokun, 2022), the General Self-Efficacy Scale (Kokun, 2022), and the Brief Resilience Scale (Kurapov et al., 2023).

## 3.2. Risk and protective factors

Table 2 shows risk and protective factors included in the studies examined.

Specifically, with respect of risk factors, individual risk factors are summarized in Figure 2.

Figure 3 summarizes the main socio-environmental risk factors.

From the studies reviewed, the individual risk factors that stand out the most were mental health disorders (Hamama-Raz et al., 2022; Chudzicka-Czupała et al., 2023a,b), female gender (Długosz, 2023; Kurapov et al., 2023; Chudzicka-Czupała et al., 2023b) and lack of sleep (Oviedo et al., 2022; Karatzias et al., 2023). On the other hand, the most frequently reported socio-environmental risk factors were direct exposure to war (Khraban, 2022; Oviedo et al., 2022; Karatzias et al., 2023), relatives wounded/displaced (Hamama-Raz et al., 2022; Rizzi et al., 2022; Karatzias et al., 2023), migration (Oviedo et al., 2022;

Rizzi et al., 2022; Karatzias et al., 2023), lack of primary needs (Khraban, 2022; Oviedo et al., 2022; Karatzias et al., 2023), and lack of normality/unfamiliar environment (Khraban, 2022; Oviedo et al., 2022; Karatzias et al., 2023).

With respect of protective factors, Figure 4 summarizes the main individual ones, while the main socio-environmental protective factors are summarized in Figure 5.

Faith and religion were the most reported individual protective factors (Khraban, 2022; Oviedo et al., 2022; Rizzi et al., 2022), followed by the feeling of safety (Khraban, 2022; Rizzi et al., 2022) and self-compassion/compassion (Khraban, 2022; Oviedo et al., 2022). Considering socio-environmental factors, the most cited one was the presence of a support network (Khraban, 2022; Oviedo et al., 2022; Rizzi et al., 2022; Talabi et al., 2022), that included friends and relatives as well as stuff in refugee camps, followed by communication (Rizzi et al., 2022; Talabi et al., 2022) and the presence of pets (Khraban, 2022; Miliutina et al., 2023).

## 3.3. Coping strategies

Table 3 summarizes the coping strategies reported in the studies examined.

Five main categories were identified: emotion-focused strategies, problem-focused strategies, avoidance, faith-based strategies, and the ones based on sense of belonging. The four studies that investigated the first stages of war identified the use of a variety of coping strategies among Ukrainian civilians. Khraban (2022) highlighted how, during the first 5 days, non-adaptive emotionally-focused coping strategies have been the most widely adopted, while on days 6–10 of military conflict the civilians turn to problem-oriented coping strategies. On days 11–15 after the beginning of military conflict, coping strategies aimed at creating a sense of belonging and based on a sense of hope and faith for the future become predominant. Similarly, Xu et al. (2023) emphasized a massive use of emotion-, problem focused strategies and avoidance. Moreover, they found that the productive coping strategies of using instrumental support, behavioral disengagement, self-distraction, and planning were significantly associated with mental health symptoms. Apparently, faith-based strategies were found not to be related to Ukrainian civilians' psychological symptoms. Furthermore, the works of Chudzicka-Czupała et al. (2023a,b) offer a cross-cultural comparison that highlighted how psychological distress and adoption of coping strategies differ across people of various countries. The associations of various coping strategies with psychological distress differed to a less extent among Ukrainian respondents compared to Taiwanese and Polish ones. However, problem- and emotion-focused coping strategies had comparable associations with psychological distress among the three samples. As the war progressed, Oviedo et al. (2022) found that, for refugees, strategies aimed at maintaining a solid social network and communication with loved ones were the most effective strategies. Faith-based strategies, in that stage of the war, was found to serve as psychological "capital" that increased their resilience.

Similarly, Rizzi et al. (2022) have identified how being close to families or being able to keep in touch with them, as well as having a support network worked as a protective factor in enhancing resilience. Even in this research, religion and hope for the future were found to be effective strategies. The work of Talabi et al. (2022) specifically

stressed how the use of social media storytelling was an effective strategy in help-seeking and help-receiving among refugees. Długosz (2023) found that the refugees more often implemented

problem-focused strategies. The respondents who followed active strategies scored the lowest on RHS-15. On the other hand, the strategies identified by the author as emotion-focused ones, such as

TABLE 2 Risk and protective factors.

Study	Risk factors	Protective factors
Karatzias et al. (2023)	Air raid sirens (99.0%), experiencing extreme financial hardship (74.6%), having to take shelter in an underground location (72.5%), seeing/hearing bombing and artillery fire (67.3%), and witnessing the destruction of local infrastructure (64.1%)	/
	Cultural difference in gender role	
	Financial security (e.g., experienced extreme financial hardship), and damage to their local environment (e.g., destruction of local infrastructure)	
	Mental health disorder	
	Lack of sleep	
	Relatives wounded	
	Loved ones displaced	
	Lack of essential care	
	Someone close was kidnapped	
	Move to another country	
	Torture/kidnapping	
	Experience sexual violence	
Khraban (2022)	Air raid sirens, alert music from loudspeakers, lack of primary needs (water and food), and lack of normality	Pets support
		Faith
		Strong sense of ethnic and national identity
		Communicational support
		Neighbor support
		Humor
		Sense of the belonging to the nation
		Self-compassion
Chudzicka-Czupala et al. (2023a)	Exposure to war information	/
	Mental health disorder	
Oviedo et al. (2022)	Shelter, leave home, and unfamiliar environment	Just 11.7% were being assisted by friends or relatives, although over 77% expected to find a better place to stay than the places they left behind, places often characterized by bombing and other great threats
	Being sometimes close to bombing zones or rail stations under attack for several days; not being able to sleep; being under very cold temperatures; and experiencing scarcity of food	Children
		Kindness and appreciation
		Gratitude and compassion
	Parental mental health	Faith to get back to Ukraine
		Religion
Chudzicka-Czupala et al. (2023b)	Mental health disorders	/
	Female gender	
	Self-rated health status	
Xu et al. (2023)	/	/

(Continued)

TABLE 2 (Continued)

Study	Risk factors	Protective factors
Hamama-Raz et al. (2022)	Wound relatives	/
	Mental health disorders	
	Relative left in Ukraine	
	Perceived threat	
	Patriotism	
Rizzi et al. (2022)	Duration of the trip	Have a support network
		Religion
		Planning the future
	Being IDPs	Feeling safe
	Lack of contact with relatives	Be able to engage in leisure activities
		Help other people
Miliutina et al. (2023)	Difficulties with pets' transportation prevent timely evacuation from dangerous areas	Talk about the war and give an explanation about it
Kokun (2022)	Helplessness and hopelessness	Pets helped maintain the normative emotional state of children
Talabi et al. (2022)	/	/
Kurapov et al. (2023)	Use of substances (i.e., tobacco, alcohol, pain relievers, and sedatives)	/
	Student status	
	Female gender	
Długosz (2023)	Female gender	/
	Resignation	

praying, diverting attention by becoming involved in different activities or taking sedatives were not effective. The highest levels of disorders were present among the refugees who indicated resignation. Miliutina et al. (2023) focused their work on pets and found that, in terms of problem-solving strategies, difficulties with pets' transportation prevent timely evacuation from dangerous areas, however, migrants and refugees who took their pets with them showed an increase in the level of subjective well-being. Among civilians, Kurapov et al. (2023) studied the effects of war in a population of Ukrainian university students and personnel and highlighted a massive use of avoidance that was found not to serve as an effective strategy in enhancing their resilience. Furthermore, Hamama-Raz et al. (2022) have focused their research on the study of patriotic attitudes that were found to be associated with having relatives that were wounded or that left Ukraine because of the war and coming from a Ukrainian speaking region. Patriotism was also found to be positively related to elevated risk for PTSD symptoms. Lastly, Kokun (2022) pointed out in his work how the progression of war and what this entails naturally diminishes problem-solving skills and therefore, civilians with a greater sense of self-efficacy are those who are more resilient.

## 4. Discussion

This study systematically reviewed the current global literature on the psychological and environmental elements that influence the

resilience of Ukrainian refugees and IDPs by analyzing coping strategies and risk and protective factors. Studies identified by the search varied with regard to context, samples, study design, timeframe, measurements, and approach to data analysis. War trauma can elicit various physical and psychological responses as natural reactions to overwhelming and prolonged stress. However, these reactions can be distressing for individuals and their families. Moreover, it is important to recognize that the impact of war trauma and associated stressors persists even after individuals have left the war zone, as the challenges of resettling in a new host country and finding a new home can intensify these concerns. Following experiences like war, individuals exhibit diverse reactions based on their personal attributes and the nature of the stressful events. Certain personal factors can heighten the risk of more pronounced or prolonged psychological and psychosocial challenges following wartrauma. These factors encompass, for example, being female, facing poverty and socioeconomic hardships, experiencing pre-existing or ongoing psychological issues or encountering family dysfunction (Opaas, 2022). Furthermore, as emerged in this review, the individual risk factors are related to feelings of uncertainty and insecurity due to an unresolved legal status. Consequently, refugees and IDPs often live in fear, poverty, and isolation, separated from their families (Hoffman, 2011). Moreover, they frequently express a sense of hopelessness and lack of control over their circumstances and over their future (Hoffman, 2011; Bjertrup et al., 2018). The absence of employment opportunities yields not just economic ramifications but also psychological effects since it deprives individuals of routine, stability,

social connections, and a sense of safety and security. Thus, the waiting process exacerbates their psychological decline by fostering uncertainty, insecurity, isolation, and a sense of hopelessness, thereby stalling their lives (Hoffman, 2011). Considering that unresolved status, in line with our findings, Seguin and Roberts (2015) in their review present evidence of a stronger association of poor mental health with being internally displaced compared to being a refugee, as revealed in the systematic review by Porter and Haslam (2005). Beside these factors, it is crucial to remember that, during times of war, mass conflicts, or instances of individual violence, the distress and anguish

experienced by individuals can be traced back to the deliberate actions and choices of fellow human beings. These acts are typically intentional and purposeful in nature. Some examples of intentional acts of violence include armed assaults, torture, sexual assault, domestic violence, and child abuse. Extensive research has demonstrated that individuals who endure violence intentionally inflicted by others tend to exhibit the most severe reactions to such experiences (Briere and Scott, 2014). Indeed, exposure to violence has been established as the most substantiated factor contributing to the risk of subsequent psychological disturbances. The level of direct exposure to threat

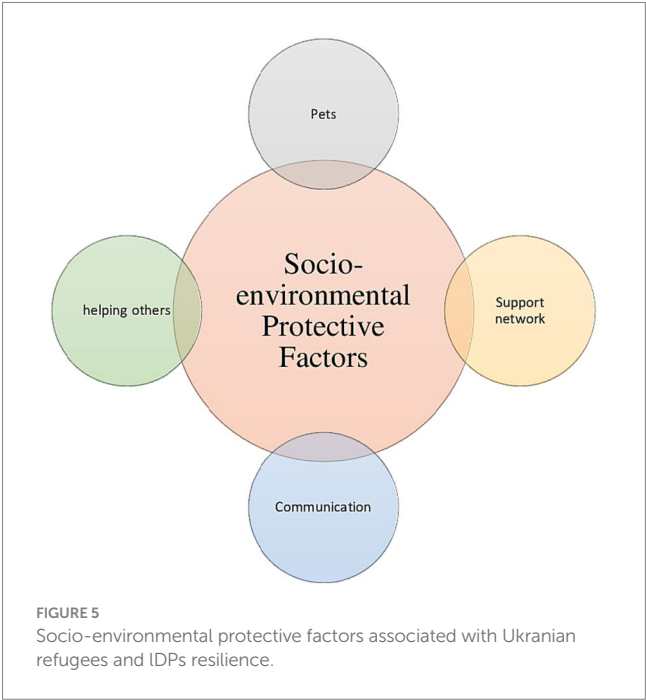
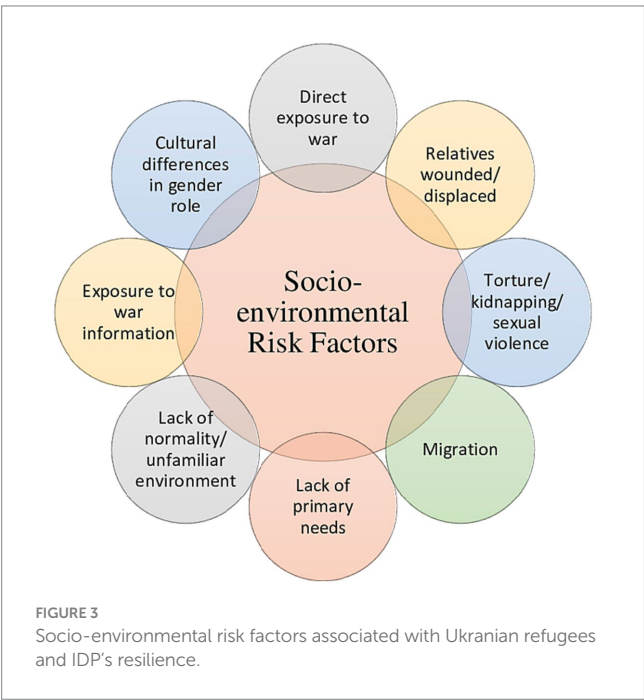
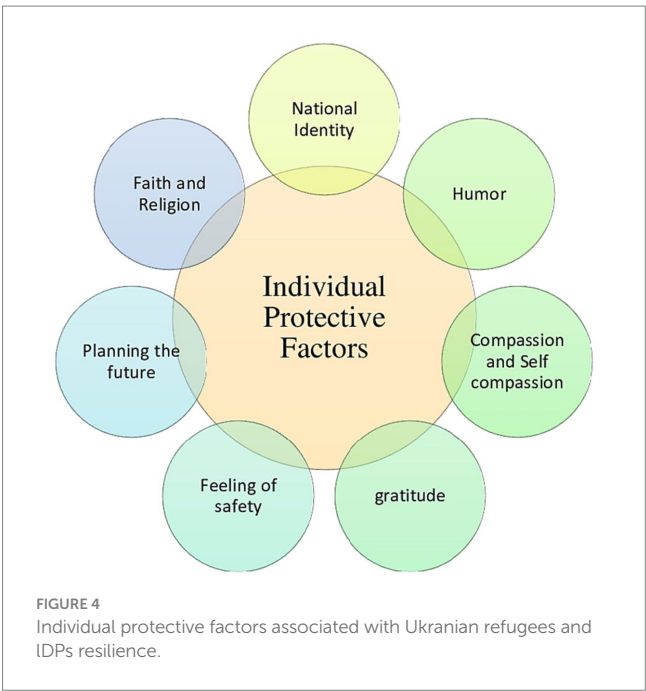


TABLE 3 Coping strategies.

Study	Coping strategies							Sense of belonging
	Emotion-focused		Problem-focused		Avoidance		Faith-based	
	Support (seeking)	Others	Positive cognitive restructuring	Problem solving	Distraction	Escape-avoidance		
Khraban (2022)	From the sixth day onward: pursuit of altruism, emotional and instrumental support provision	In the first 5 days: Emotional ventilation, blaming others, and catastrophizing; From the sixth day onward: emotional self-regulation	In the first 5 days: Challenging the negative beliefs and thoughts of others; From the sixth day onward: positive revaluation; and days 11–15 after the beginning of hostilities: humor	From the sixth day onward: active coping	Days 11–15 after the beginning of hostilities: indulging in the desires, distraction activities	/	In the first 5 days and days 11–15 after the beginning of hostilities: hope and focus on the future	From the sixth day onward: pursuit of unity; days 11–15 after the beginning of hostilities: creating a sense of belonging
Chudzicka-Czupala et al. (2023a)	Adopted mostly by Taiwanese respondents; adopted more by Polish respondents (compared to the Ukrainian respondents)		Adopted mostly by Taiwanese respondents; adopted more by Ukrainian respondents (compared to Polish respondents)		Adopted mostly by Taiwanese respondents (no difference between the Polish and Ukrainian respondents)		/	/
Oviedo et al., 2022	Relationships (including family, friends and others)	Therapy; positive experiences; feeling safe	Positive thinking	/	Activity (working, sport)	/	Interior life (including prayers, belief, confidence; hope); good expectations (hope; victory in the war)	/
Rizzi et al. (2022)	Being close to the family, support network (family, friends, and volunteers); helping/caring	Feeling safe	Meaning-making communication	/	Engaging in leisure activities	/	Religion and hope for the future	/
Hamama-Raz et al. (2022)	/	/	/	/	/	/	/	Patriotism
Chudzicka-Czupala et al. (2023b)	Adopted mostly by Taiwanese respondents; adopted more by Polish respondents (compared to the Ukrainian respondents)		Adopted mostly by Taiwanese respondents; adopted more by Ukrainian respondents (compared to Polish respondents)		Adopted mostly by Taiwanese respondents (no difference between the Polish and Ukrainian respondents)		/	/

(Continued)

TABLE 3 (Continued)

Study	Coping strategies							Sense of belonging
	Emotion-focused		Problem-focused		Avoidance		Faith-based	
	Support (seeking)	Others	Positive cognitive restructuring	Problem solving	Distraction	Escape-avoidance		
Xu et al. (2023)	Seeking instrumental support (negatively associated with psychological distress but positively associated with anxiety)	/	Positive reframing (not related to Ukrainians' mental health symptoms); humor (not related to Ukrainians' psychological symptoms)	Active coping (positively associated with anxiety) and planning (positively associated with insomnia)	Self-distraction (positively associated with symptoms of psychological distress but negatively associated with anxiety, depression, and insomnia) Behavioral disengagement (negatively associated with psychological distress)	/	Religion (not related to Ukrainians' psychological symptoms)	/
Miliutina et al. (2023)	/	/	/	Presence of pets reinforced ukrainian families decision-making process	/	/	/	/
Kokun (2022)	/	/	/	Self-efficacy	/	/	/	/
Talabi et al. (2022)	Use of social media storytelling	/	/	/	/	/	/	/
Kurapov et al. (2023)	/	/	/	/	/	Use of substances (i.e., tobacco, alcohol, pain relievers, and sedatives)	/	/
Karatzias et al. (2023)	/	/	/	/	/	/	/	/
Długosz (2023)	/	/	/	Those participants scored less at the RHS-15	Diverting attention by becoming involved in different activities (was found not to be an effective strategy)	Taking sedatives (was found not to be an effective strategy)	Praying (was found not to be an effective strategy)	/

(Goldstein et al., 1997; Allwood et al., 2002; Morgos et al., 2007), the cumulative number of adverse events (Mollica et al., 1997; Thabet et al., 2004; Morgos et al., 2007; Mels et al., 2010), and the duration of exposure (Ahmad et al., 2000) consistently heighten the likelihood of experiencing mental health symptoms. It is important to note that risks are not solely increased by actual or threatened violence toward an individual but also by witnessing violence inflicted upon others (Goldstein et al., 1997; Ahmad et al., 2000). The nature of the event itself also plays a significant role, with those events that directly endanger or disrupt the individual, family, or home having particularly profound consequences. Specific events such as house searches (McCallin, 1988), witnessing the death, injury, or torture of a family member (Goldstein et al., 1997), abduction, hiding for protection, rape, being coerced into harming relatives (Morgos et al., 2007), and the duration of captivity (Ahmad et al., 2000) are all factors associated with an elevated risk of psychological difficulties. Furthermore, as evidenced by this review, sustained physical distress resulting from sirens and bombings contributes to emotional distress and trauma, ultimately impacting physical health and overall well-being. Following exposure to highly threatening circumstances, individuals may experience immediate physical reactions such as sleep disturbances, nightmares, somatization (Balaban et al., 2005), restlessness, hyperarousal, heightened vigilance, feelings of weakness, and physical sensations of numbness (World Health Organization, 2015). Refugees and IDPs often encounter more intense traumatic experiences. This is not only due to the circumstances that forced them to flee but also because of the physical stressors endured in migrant and refugee camps, as well as during the resettlement process. Thus, they exhibit elevated rates of stress, depression, post-traumatic stress disorder (PTSD), and various other physical and psychiatric issues. The aftermath of war-related disasters often brings about broken homes, disrupted infrastructures, and the displacement of individuals, leading to a loss of their sense of place and a disruption of their identity (Anjum et al., 2023). Being compelled to reside in an unfamiliar environment could amplify these difficulties. Moreover, the increase in the number of refugees within the host community may result in a lack of hospitality, leading to additional exclusion and marginalization of the refugee population. Additionally, other risk factors that contribute to the decline in psychological well-being during the asylum-seeking process include the inability to meet social roles and expectations (Simich et al., 2010). Consequently, the asylum-seeking process, combined with the uncertainty of living in a state of limbo, could impede social integration within the host community. Given all of this, when it comes to protective factors and coping strategies, the use of faith, spirituality, and religious practices by refugees and internally displaced persons to navigate their circumstances is comprehensible (Kramer and Bala, 2004; Posselt et al., 2018). These practices provide a sense of normalcy and opportunities for social connections. Indeed, our findings highlighted that the strategies aimed at creating a sense of belonging, fostering hope, and maintaining faith in the future were identified as effective coping mechanisms that helped increasing refugees and IDPs' resilience (Oviedo et al., 2022; Rizzi et al., 2022). Moreover, they employ various behavioral strategies, such as engaging in physical activities, pursuing hobbies, and watching movies, as means of distraction from their current situation. In this review, avoidance strategies were frequently observed, however, in most cases they were not found to enhance resilience. Instead, they

were associated with increased psychological distress and lower levels of resilience (Długosz, 2023; Kurapov et al., 2023; Xu et al., 2023). However, Xu et al. (2023) still counted self-distraction as a functional strategy, despite the fact that it was associated with increased distress. They also employ cognitive strategies, including acceptance, positive thinking, and finding meaning in their suffering, to normalize and mitigate the severity of their predicament (Posselt et al., 2018). Throughout the lengthy asylum process, refugees actively seek strategies and practices that contribute to their mental well-being. Our findings have pointed out the prevalent use of emotion-focused strategies, such as seeking emotional support, in the early stages of war, while problem-focused strategies, such as taking action to address the challenges, became more prominent as the conflict continued (Khraban, 2022; Xu et al., 2023). Furthermore, in line with our results (Oviedo et al., 2022; Rizzi et al., 2022; Talabi et al., 2022), building friendships with peers and adults who share similar ethnic backgrounds, as well as fostering positive relationships with the host community, positively impact the mental health of refugee seekers (Arakelyan and Ager, 2020). Social connections and participation in social activities serve as outlets for distraction, sharing experiences, and providing emotional and practical support (Posselt et al., 2018). Hence, the support and inclusiveness of host communities significantly contribute to improved psychological outcomes for refugees during periods of uncertainty and despair. Moreover, when discussing these results, it is crucial to remember that most of the refugees and IDPs are women (United Nations High Commissioner for Refugees, 2019). Researchers have previously showed how men are more likely to adopt problem-focused strategies, while women are more inclined to concentrate on regulating their emotional reactions (emotion-focused coping) or to use avoidance (Billings and Moos, 1984; Stone and Neale, 1984; Endler and Parker, 1990). Specifically, our findings are consistent with coping research that suggest that support seeking is more common among women (Carver et al., 1989; Endler and Parker, 1990; Hobfoll et al., 1994). However, situations in which individuals have limited authority or where role expectations dictate behavior often offer little opportunity for exerting control and are more likely to be experienced by women. This suggests that gender differences in coping may be more a product of the specific settings than being primarily attributed to gender itself (Hobfoll et al., 1994). Further research is needed to investigate gender differences more in depth. Lastly, when analyzing protective factors and coping strategies, it is crucial to remember that culture plays a significant role in shaping coping strategies utilized by individuals in response to challenging situations, such as war and displacement.

Cultural factors, including beliefs, values, norms, and social support systems, influence how individuals perceive and interpret stressors and the available resources for coping. This was clearly demonstrated by the work of Chudzicka-Czupala et al. (2023a,b). Seguin and Roberts (2015) in their review described how cultural and religious beliefs shape the coping strategies of Eritrean refugees, as evidenced by Nordanger (2007). These strategies revolve around the belief that outward displays of grief can lead to physical illness and harm one's relationship with God. Consequently, coping strategies focus on diverting thoughts, seeking distractions, and investing in the future. Similarly, Afghan residents, as observed by Eggerman and Panter-Brick (2010), employ coping strategies deeply rooted in cultural values. These strategies encompass faith, morals, perseverance,

maintaining family unity, serving others and their country, and seeking social recognition and honor. The influence of cultural and religious beliefs on coping strategies was also evident among Iranian conflict-affected residents (Ebadi et al., 2009), female Darfuri students in Sudan (Badri et al., 2013), and Tibetan refugees (Ruwanpura et al., 2006; Sachs et al., 2008). These studies further underscore how cultural and religious beliefs shape the ways in which individuals cope with the challenges they face.

## 5. Conclusion

This systematic review highlighted the diverse range of coping strategies and risk and protective factors influencing the resilience of Ukrainian refugees and internally displaced persons (IDPs). Factors such as unresolved legal status, fear, poverty, and isolation contribute to the psychological decline of refugees and IDPs and hinder their social integration in host communities. Moreover, exposure to violence, both directly and indirectly, largely contribute to the risk of subsequent psychological disorders, as well as, witnessing violence and events that directly imperil individuals, families, or homes. On the other hand, strategies rooted in cultural values, faith, and maintaining a sense of belonging are commonly observed. The use of emotion-focused strategies, problem-focused strategies, and avoidance strategies varies in their effectiveness in enhancing resilience. Social connections, support networks, and inclusiveness significantly contribute to improved psychological outcomes for refugees and IDPs. As the war is still ongoing, longitudinal studies are warranted to examine the trajectory of coping strategies and resilience over time, particularly during different stages of displacement and resettlement. This can provide insights into the dynamic nature of coping and resilience and identify critical points for intervention and support. Furthermore, it is important to recognize the influence of culture in coping strategies. Further research is needed to explore the specific cultural and contextual factors that influence coping strategies and resilience of these populations. This can help develop a deeper understanding of their unique challenges and strengths and inform the development of culturally sensitive support and interventions that acknowledge individuals' cultural backgrounds that can enhance the effectiveness of coping strategies and promote overall well-being.

To sum up, tailoring interventions to consider cultural values, beliefs, and social support systems can facilitate a more comprehensive and meaningful approach to supporting individuals in times of crisis. In addition, our findings highlighted how community-based interventions that promote social connections, cultural integration, and empowerment should be prioritized. Creating spaces for social interaction, cultural activities, and support groups can foster a sense of belonging and provide opportunities for sharing experiences and coping strategies. Collaborative and multidisciplinary care models

should be implemented to address the complex needs of these populations. This may involve integrating mental health services with primary healthcare, social services, and community-based organizations to provide comprehensive support. According to World Economic Forum (2022), Ukraine has rapidly stepped up investment in and delivery of mental health services. Even before the war, Ukraine had embarked on an ambitious health reform process, including efforts to strengthen mental health services. This foundation has, by and large, enabled the wider mental health system to respond fairly quickly to the ongoing emergency. This is a noteworthy proof of Ukrainian population resilience that set an example for the entire WHO European Region facing similar challenges.

## Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## Author contributions

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# Impairments in psychological functioning in refugees and asylum seekers

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Refugees are at increased risk for developing psychological impairments due to stressors in the pre-, peri- and post-migration periods. There is limited knowledge on how everyday functioning is affected by migration experience. In a secondary analysis of a study in a sample of refugees and asylum seekers, it was examined how aspects of psychological functioning were differentially affected. 1,101 eligible refugees and asylum seekers in Europe and Türkiye were included in a cross-sectional analysis. Gender, age, education, number of relatives and children living nearby, as well as indicators for depressive and posttraumatic symptoms, quality of life, psychological well-being and functioning, and lifetime potentially traumatic events were assessed. Correlations and multiple regression models with World Health Organization Disability Assessment Schedule 2.0 (WHODAS 2.0) 12-item version's total and six subdomains' scores ('mobility', 'life activities', 'cognition', 'participation', 'self-care', 'getting along') as dependent variables were calculated. Tests for multicollinearity and Bonferroni correction were applied. Participants reported highest levels of impairment in 'mobility' and 'participation', followed by 'life activities' and 'cognition'. Depression and posttraumatic symptoms were independently associated with overall psychological functioning and all subdomains. History of violence and abuse seemed to predict higher impairment in 'participation', while past events of being close to death were associated with fewer issues with 'self-care'. Impairment in psychological functioning in asylum seekers and refugees was related to current psychological symptoms. Mobility

and participation issues may explain difficulties arising after resettlement in integration and exchange with host communities in new contexts.

#### KEYWORDS

psychological functioning, refugee mental health, post-migration stressors, trauma, WHODAS 2.0, participation

## 1 Introduction

Everyday functioning is an essential part of one's identity and is closely linked to quality of life and general well-being (Doré and Caron, 2017). Contrary to earlier conceptualisations of physical and mental health as the absence of illness, modern frameworks try to consider an individual's abilities in light of its challenges and resources (Sleijpen et al., 2013). The World Health Organization (WHO) developed the International Classification of Functioning, Disability and Health (ICF) as a tool to describe information on functioning and to measure impairments in functioning in consideration of environmental and societal factors (World Health Organization, 2001). In accordance with the functioning levels of ICF, the WHO distributed the WHO Disability Assessment Schedule (WHODAS) version 2.0 to efficiently assess psychological functioning in general and clinical populations across the globe (Üstün et al., 2010). Psychological functioning is an umbrella term for the ability to interact with one's surroundings and in different contexts.

Refugees and asylum seekers (RAS) face various pre-, peri- and post-migratory challenges (Laban et al., 2005; Priebe et al., 2016). RAS are often subjected to persecution for political, ethnic, religious or other reasons in their home countries, some witness death, combat, torture, abuse of relatives, or economic hardship and lack of water, food, and other basic needs (Nosè et al., 2020). On hazardous flight routes RAS are frequently exposed to physical harm, sexual violence and life-threatening conditions (Li et al., 2016). Even after resettlement in their host countries continuous stressors remain, including uncertainty about legal status, risk of being detained and deported, and difficulties with social integration, social exclusion, discrimination and economic disadvantages (Laban et al., 2008; Morgan et al., 2017). In a qualitative study, Salvo and de C Williams (2017) investigated how learning the host country's language affected the lives of RAS. While the impact of learning the language was associated with achievement, aspirations and autonomy, barriers to learning, and a sense of shame due to reduced skills were important mitigators of individual well-being (Salvo and de C Williams, 2017). Furthermore, traumatic life events are associated with common mental disorders such as posttraumatic stress disorder (PTSD), and with reduced functioning, with a more pronounced relationship in women than in men (Robertson et al., 2016). Recent studies confirm the risk of psychological distress, and occurrence of depression and anxiety symptoms in RAS individuals from Ukraine (Buchcik et al., 2023), while identifying several coping and resilience strategies in the context of war as well as risk and protective factors (Oviedo et al., 2022; Rizzi et al., 2023).

However, outcomes may also be very dependent on the different modes of migration, reasons for flight, levels of openness or hostility

of the host country society, as well as the legal, socioeconomic and healthcare provisions available in the host countries (Tay et al., 2019).

The aim of this cross-sectional analysis is to contribute to the existing knowledge base relating to risk factors associated with reduced psychological functioning overall and in the six domains of cognition, mobility, self-care, getting along, life activities and participation according to WHODAS 2.0 12-item version in a vulnerable, but clinically healthy population of RAS in high- and middle-income countries. To the best of our knowledge, no studies have yet examined influence factors on the different domains of functioning among RAS. Of particular interest will be which domains of functioning are typically impaired in these populations, whether specific effects of migration- and flight-associated stressors can be identified, and the specific role of traumatic events. Initial expectations were that, even in the absence of overt mental disorders, reduced psychological functioning would still play an important role in refugee mental health.

## 2 Method

### 2.1 Study design

We performed a secondary analysis of the RE-DEFINE dataset (Purgato et al., 2019, 2021; Acarturk et al., 2022), specifically of baseline data from an intervention study which had been gathered in the period between September 2018 and March 2020.

### 2.2 Participants and procedures

Recruitments took place in Austria, Finland, Germany, Italy, Türkiye and the United Kingdom. The study population had been highly selected, with inclusion and exclusion criteria rigorously applied in order to test the preventive effects of a psychosocial intervention in a sample of RAS who were in psychological distress, but without diagnosis of a psychiatric disorder. Inclusion criteria were (1) age 18 or above, (2) able to speak and understand Arabic, Dari, or English, (3) being asylum seeker, refugee or person under temporary protection, (4) presence of psychological distress with a score of 3 or more (binary scoring) on the 12-item General Health Questionnaire (GHQ-12), and (5) giving oral and written consent; exclusion criteria were (1) any mental disorder as shown by a positive Mini International Neuropsychiatric Interview (M.I.N.I., Sheehan et al., 1997), (2) acute medical conditions contraindicating participation, (3) clinical evidence of imminent suicide risk or 'moderate or high' suicide risk on the M.I.N.I., and (4) clinical evidence of impaired decision-making, and are given also in the RE-DEFINE study protocols

(Purgato et al., 2019). Interviews were performed with the help of cultural mediators and involved translators where necessary. Psychological distress, PTSD symptoms, depressive symptoms, psychological well-being and potentially traumatic life events were assessed by using standardized, widely used and feasible measures (see '2.3. Measures'). Furthermore, sociodemographic variables (age, gender, years and level of education, number of relatives and children living in the same country) and migration-associated factors (detention, post-migration living difficulties) were gathered during the interviews.

## 2.3 Measures

### 2.3.1 WHODAS 2.0 12-item version

The World Health Organization Disability Assessment Schedule (WHODAS) 2.0 12-item version (short form) is a measurement for deficits in everyday functioning due to health conditions across six domains (Üstün et al., 2010). It is linked to the concepts of the International Classification of Functioning (World Health Organization, 2001) and assesses a time period of 30 days before the interview. The schedule, which was used in translated and validated versions, has shown excellent internal consistency with Cronbach's alpha up to 0.96, and has been used across different countries and cultures with good discriminative ability and test-retest reliability (Saltychev et al., 2021). Two items each are grouped into the six domains 'cognition' (learning a new task, concentrating on doing something for 10 min), 'mobility' (standing for long periods, walking a long distance), 'self-care' (washing whole body, getting dressed), 'getting along' (dealing with people you do not know, maintaining friendships), 'life activities' (household responsibilities, day-to-day work), and 'participation' (joining community activities, emotionally affected by health problems). In our sample, Cronbach's alpha for the WHODAS 2.0 was 0.84, and ranging from 0.41 ('participation') to 0.90 ('self-care') for the subdomains.

### 2.3.2 PCL-5

The Posttraumatic Symptom Checklist (PCL-5) is based on the Diagnostic and Statistical Manual of Mental Disorders 5th edition (DSM-5)'s criteria for PTSD (American Psychiatric Association, 2013; Blevins et al., 2015). PCL-5 comprises 20 items out of the diagnostic criteria domains 'reexperiencing', 'avoidance', 'negative alterations in cognitions and mood' and 'hyperarousal', and rates them on a scale from zero ('not at all') to four ('extremely'). Recommended cut-offs for probable PTSD diagnosis and indication for treatment range from scores of 31–33 points (Bovin et al., 2016). Internal consistency was measured with a Cronbach's alpha = 0.91 in this study.

### 2.3.3 PHQ-9

The Patient Health Questionnaire 9-item version (PHQ-9) is a short screening tool for depressive symptoms in adult populations (Kroenke et al., 2001). It rates the nine Diagnostic and Statistical Manual of Mental Disorders 4th edition (DSM-IV)'s criteria for depression from zero ('not at all') to three ('nearly every day') (American Psychiatric Association, 1994). The PHQ-9 is a useful tool for measuring depression, with a recommended cut-off of 10 points, and depression severity, with scores of 5, 10, 15, and 20 indicating mild, moderate, moderately severe, and severe depressive symptoms,

respectively (Kroenke et al., 2001). Cronbach's alpha was 0.83 in this study.

### 2.3.4 GHQ-12

The General Health Questionnaire 12-item version (GHQ-12) is a short reliable measurement for psychological distress and signs of depression and anxiety (Goldberg et al., 1997). It includes a four-point Likert scale on each of the 12 items, and is most commonly rated either in a 0–0–1–1 or 0–1–2–3 mode. In order to better assess for severity of distress the second mode was used, with a Cronbach's alpha of 0.69.

### 2.3.5 PMLD

Stressors due to current living conditions in the host country were assessed through 17 items of the Post-Migration Living Difficulties (PMLD) scale, which rates if people were affected by problems in various domains from zero ('not a problem') to four ('a very serious problem') in the past 12 months (Silove et al., 1997). Cronbach's alpha in our sample was 0.85.

### 2.3.6 WHO-5

The 5-item World Health Organization Well-Being Index (WHO-5) is a commonly used short assessment of psychological wellbeing (World Health Organization, Regional Office, 1998). Five positively framed questions on subjective well-being are scored from zero ('at no time') to five ('all of the time'), and generated scores from zero to 25 are elsewhere usually multiplied by four (0–100 final score). It has been applied in many languages and across different settings, and has shown adequate validity as an outcome measure (Cronbach's alpha in this sample 0.88), with scores of 50 or below indicating poor well-being (12.5 in this study), and as a screening tool for depression (cut-off 28; or 7 in our study) (Topp et al., 2015).

### 2.3.7 HTQ part I

The Harvard Trauma Questionnaire (HTQ) assesses posttraumatic symptoms and life-time traumatic events in refugees (Mollica et al., 1992). Its first part focuses on 16 specific traumatic events and one item 'other (e.g., domestic violence)', and had been assessed in a binary yes or no question in this study. In a principal component analysis including a larger sample of refugees and asylum seekers HTQ items had been pooled in three thematic domains 'lack of basic needs' (three items, 'factor 1'), 'violence and abuse' (eight items, 'factor 2') and 'being close to death' (six items, 'factor 3') (Barbui et al., 2023). Internal consistency was high with Cronbach's alpha of 0.87 (subscores' alphas 0.75–0.80).

## 2.4 Data analysis

Sociodemographic, migration-related factors and results of WHODAS 2.0, GHQ-12, HTQ-I, PCL-5, PHQ-9, PMLD and WHO-5 were analyzed by using descriptive statistics, in absolute numbers and percentages for the categorical variables, and with means and standard deviations for continuous parameters. All parameters are given in gender-disaggregated form in order to take into account gender differences in descriptive statistics. Cross-tabulation for the WHODAS 2.0 subdomains was used to describe the level of functioning in the sample, with mean and standard deviation (SD) at the domain level to

sense differences in impairment. Overall WHODAS 2.0 scores were also reported, to see if values are evenly distributed in our sample.

Spearman rank-order correlations between WHODAS 2.0 total scores (0–48) and each domain score separately (0–8) were calculated for all potential factors, in order to detect strong positive or negative relationships. Strengths of correlations were measured with Spearman correlation coefficients  $r_s$ .

Finally, multivariable linear regression models were performed for WHODAS 2.0 scores and sub-scores separately, with all other variables acting simultaneously as independent variables (SPSS ‘Enter’ command). Non-standardized regression coefficients were calculated, and variance inflation factor (VIF) as a test for multi-collinearity was applied. In order to account for multiple testing, Bonferroni correction ( $\times 7$ ) was used, and the significance level of  $p < 0.05$  was adjusted accordingly ( $p < 0.007$ ).

### 3 Results

Sociodemographic characteristics are summarized in [Table 1](#). A total of 1,101 RAS (48.9% female) with a mean age of 31.8 years (SD 9.5; range 18–71 years) were included in the analysis, the majority of which were of Syrian nationality ( $n = 758$ ; 68.8%) and resettled to Türkiye ( $n = 642$ ; 58.3%). Male RAS reported considerably more often having been held in detention than female RAS (24.2% vs. 6.3%), were less likely to be living in a marriage or partnership (57.0% vs. 77.7%), and had on average fewer children and relatives living in the close proximity or the same household. Otherwise, men and women were roughly comparable in other sociodemographic variables.

Presence of psychiatric disorder as assessed by the M.I.N.I. was one of the exclusion criteria, but, based on a GHQ score of 3 or above, those assessed as experiencing clinically significant distress were eligible, and data on a range of depressive symptoms and PTSD symptoms was collected (see [Table 2](#)). Men suffered on average more post-migration living difficulties, and reported more lifetime potentially traumatic events, especially those associated with violence and close-to-death experiences. Participants in general showed high psychological distress and reduced quality of life. Accordingly, as shown in [Table 3](#), everyday functioning was mild to moderately impaired in the cohort. The most strongly affected domains of functioning were ‘mobility’ and ‘participation’, followed by ‘life activities’ and ‘cognition’.

Spearman rank-order correlations revealed that reduced overall psychological functioning was moderately to strongly associated with PHQ-9 depressive ( $r_s = 0.49$ ) and PCL-5 PTSD ( $r_s = 0.55$ ) symptom scores. Moderate correlations with depressive (PHQ-9) and PTSD (PCL-5) symptoms were also seen for the WHODAS 2.0 domains ‘life activities’ ( $r_s = 0.37$  and  $0.41$ ), ‘cognition’ ( $r_s = 0.40$  and  $0.46$ ), ‘participation’ ( $r_s = 0.45$  and  $0.46$ ), and ‘getting along’ ( $r_s = 0.31$  and  $0.34$ ). PHQ-9 and PCL-5 scores correlated strongly with each other ( $r_s = 0.68$ ), and both had an inverse relationship to quality of life ( $r_s = 0.41$  and  $0.34$ ). All bivariate correlations are shown in a table in the appendix ([Supplementary Table S1](#)).

The fitted regression models for WHODAS 2.0 total score and domain scores are shown in [Table 4](#). Overall regressions were statistically significant (all  $p < 0.001$ ), with a variance explained by all predictors simultaneously of around one-third (Nagelkerke’s  $R^2 = 0.368$ ). It was found that older age was significantly associated

TABLE 1 Sociodemographics of total sample ( $n = 1,101$ ).

Sociodemographic variable	Male ( $n = 563$ )	Female ( $n = 538$ )
Age in years, mean (SD)	31.6 ( $\pm 9.2$ )	32.0 ( $\pm 9.9$ )
Education in years, mean (SD)	9.8 ( $\pm 4.5$ )	9.3 ( $\pm 4.3$ )
Education level, n (%)		
- Illiterate	31 (5.5%)	43 (8.0%)
- Primary school	300 (53.3%)	291 (54.1%)
- High school	126 (22.4%)	117 (21.7%)
- University	98 (17.4%)	87 (16.2%)
Country of origin, n (%)		
- Afghanistan	39 (6.9%)	27 (5.0%)
- Iraq	66 (11.7%)	28 (5.2%)
- Nigeria	92 (16.3%)	22 (4.1%)
- Pakistan	41 (7.3%)	0 (0.0%)
- Syria	311 (55.2%)	447 (83.1%)
- Other/unknown	14 (2.5%)	14 (2.6%)
Host country, n (%)		
- Austria	39 (6.9%)	27 (5.0%)
- Finland	74 (13.1%)	26 (4.8%)
- Germany	27 (4.8%)	15 (2.8%)
- Italy	137 (24.3%)	22 (4.1%)
- Türkiye	238 (42.3%)	404 (75.1%)
- United Kingdom	48 (8.5%)	44 (8.2%)
Relationship status, n (%)		
- Single	229 (40.7%)	77 (14.3%)
- married-partnership	321 (57.0%)	418 (77.7%)
- divorced	10 (1.8%)	27 (5.0%)
- widowed	1 (0.1%)	15 (2.8%)
Number of relatives, mean (SD)	2.5 ( $\pm 2.7$ )	4.6 ( $\pm 3.4$ )
Number of children, mean (SD)	1.7 ( $\pm 2.2$ )	2.6 ( $\pm 2.0$ )
Unemployed, n (%)	272 (48.3%)	147 (27.3%)
Detention during migration, n (%)	136 (24.2%)	34 (6.3%)

SD, standard deviation.

with more pronounced disability overall ( $p < 0.001$ ) as well as in the specific domains ‘mobility’ ( $p < 0.001$ ) and ‘participation’ ( $p = 0.001$ ).

**TABLE 2** Depressive and PTSD symptoms, traumatic events, post-migration living difficulties, quality of life and psychological problems in the sample.

Psychometric measure	Male ( <i>n</i> = 563)	Female ( <i>n</i> = 538)
PHQ-9 total score (0–27), mean (SD)	7.1 (± 5.2)	7.3 (± 5.2)
PCL-5 total score (0–80), mean (SD)	20.9 (± 15.4)	22.6 (± 15.3)
HTQ part I (0–17), mean (SD)	6.9 (± 4.4)	4.7 (± 4.0)
• factor 1: lack of basic needs (0–3), mean (SD)	1.5 (± 1.2)	1.1 (± 1.1)
• factor 2: violence and abuse (0–8), mean (SD)	2.3 (± 2.2)	1.2 (± 1.8)
• factor 3: being close to death (0–6), mean (SD)	3.1 (± 1.9)	2.4 (± 1.9)
PMLD (0–68), mean (SD)	22.9 (± 13.0)	18.3 (± 11.8)
WHO-5 total (0–25), mean (SD)	11.7 (± 6.1)	10.6 (± 6.0)
GHQ-12 (0–36), mean (SD)	16.6 (± 4.4)	17.4 (± 4.4)

DSM-5, Diagnostic and Statistical Manual of Mental Disorders 5th edition; GHQ-12, General Health Questionnaire 12-item version; HTQ, Harvard Trauma Questionnaire; PCL-5, PTSD Checklist for DSM-5; PHQ-9, Patient Health Questionnaire 9-item version; PMLD, post migration living difficulties form; PTSD, Post-traumatic Stress Disorder; SD, standard deviation; WHO-5, 5-item World Health Organization Well-Being Index.

**TABLE 3** 12-item WHODAS 2.0 total and domain scores in the sample.

WHODAS 2.0 score	Male ( <i>n</i> = 563)	Female ( <i>n</i> = 538)
WHODAS 2.0 total score (0–48), mean (SD)	6.1 (± 6.5)	7.1 (± 7.5)
WHODAS 2.0 domain mobility (0–8), mean (SD)	1.2 (± 1.9)	1.8 (± 2.3)
WHODAS 2.0 domain life activities (0–8), mean (SD)	1.3 (± 1.7)	1.4 (± 1.8)
WHODAS 2.0 domain cognition (0–8), mean (SD)	1.2 (± 1.6)	1.3 (± 1.8)
WHODAS 2.0 domain participation (0–8), mean (SD)	1.5 (± 1.6)	1.4 (± 1.8)
WHODAS 2.0 domain selfcare (0–8), mean (SD)	0.2 (± 1.0)	0.3 (± 1.1)
WHODAS 2.0 domain getting along (0–8), mean (SD)	0.7 (± 1.4)	0.8 (± 1.6)

SD, standard deviation; WHODAS 2.0, World Health Organization Disability Assessment Schedule 2.0.

Higher PCL-5 and PHQ-9 scores were associated with worse psychological functioning overall (both  $p < 0.001$ ) and in every subdomain (all  $p < 0.001$ , except PHQ-9 with ‘mobility’ ( $p = 0.004$ )). Post-migration living difficulties was associated with worse

functioning in ‘cognition’ ( $p = 0.003$ ). Traumatic life events seemed to have heterogeneous effects on psychological functioning. While ‘violence and abuse’ (HTQ I factor 2) was significantly associated with impairment in ‘participation’ ( $p = 0.007$ ), ‘being close to death’ (HTQ I factor 3) was non-significantly associated to lower disability overall ( $p = 0.042$ ), and better ‘self-care’ significantly ( $p < 0.001$ ). Worse ‘self-care’, on the other hand, was significantly associated with a higher number of children ( $p < 0.001$ ). The highest VIF was tolerable (VIF = 2.177), hence supporting the assumption of non-multicollinearity of parameters.

## 4 Discussion

This study describes deficits in psychological functioning among a large sample of RAS in high- and middle-income countries in Europe and Türkiye. Functioning is more commonly investigated as a secondary or control variable, but rarely considered as an important primary outcome. It adds value to scientific knowledge in the sense of a differential analysis of psychological functioning in a predominantly Arabic-speaking sample of RAS in European countries including Türkiye. Syria is currently the main origin of RAS worldwide, who are experiencing a high prevalence of mental disorders (Sá et al., 2022), and together with RAS from Ukraine and Afghanistan account for 52% of refugees and persons needing protection worldwide in 2022 (UNHCR, 2023).

### 4.1 Impairments in psychological functioning

An individual’s everyday functioning - i.e. coping with everyday stressors and mastering challenges - is a multi-faceted ability, and there are calls for assessing different domains of functioning rather than an overall functioning as a summative score (Saltychev et al., 2021). These findings support our initial expectation that the various domains of functioning are differentially influenced by pre-, peri- and post-migration parameters. Our sample of RAS exhibits notable impairments in functioning, as the mean overall WHODAS 2.0 scores in the sample lie between the 80<sup>th</sup> and 90<sup>th</sup> percentile of population percentiles of the 12-item version (Ustun et al., 2012). Consistent with findings from other studies of RAS, older age is associated with disability, which might be due to the effects of physical aging (Mollica, 1999).

In particular, symptoms of depression and PTSD were linked to worse day-to-day functioning overall and in all functioning subdomains in RAS with psychological distress. The influence of potentially traumatic life events, which correlated poorly with PTSD symptom scores, is more complex. In this study, experiences of deprivation and of violence and abuse were associated with lower functioning, especially when people were asked if they had trouble in joining community activities and if they were emotionally affected by their health problems. Counter-intuitively, experiences of ‘being close to death’, e.g., witnessing murder/combat, were associated with lower WHODAS 2.0 scores, and significantly predicted better functioning in ‘self-care’ (personal hygiene and dressing oneself). A similar result has been found in people who were victims of torture, but with a very small impact (Laban et al., 2008). In this population of non-hospitalized RAS individuals, these results might be explained by a higher level of

**TABLE 4** Multiple linear regression analyses with WHODAS 2.0 total score and subdomain scores as dependent variables, with non-standardized regression coefficients B for each independent variable, number of observations, R and F statistics and VIF.

VARIABLE	WHODAS 2.0 total score	WHODAS 2.0 mobility	WHODAS 2.0 life activities	WHODAS 2.0 cognition	WHODAS 2.0 participation	WHODAS 2.0 self-care	WHODAS 2.0 getting along
Constant	−2.618*	−1.196*	−0.441	−0.275	−0.481	−0.202	−0.022
Age	0.077*	0.037*	0.011	0.011	0.020*	−0.005	0.003
Female gender	−0.096	0.219	−0.123	−0.058	−0.141	−0.016	0.019
Education level	−0.071	−0.127	0.061	−0.160	0.038	0.029	0.087
Number of relatives	0.029	0.032	0.064	−0.005	−0.010	−0.027	−0.024
Number of children	0.236	0.118	0.013	0.018	−0.040	0.145*	−0.019
Detention	0.269	0.192	−0.054	0.168	0.037	0.118	−0.193
PCL-5	0.169*	0.038*	0.029*	0.039*	0.033*	0.010*	0.020*
PHQ-9	0.343*	0.053*	0.067*	0.064*	0.072*	0.029*	0.058*
PMLD	0.030	0.005	0.004	0.013*	0.007	0.002	−0.001
HTQ I 'lack of basic needs' (factor 1)	0.061	0.105	−0.044	0.025	−0.055	0.043	−0.013
HTQ I 'violence and abuse' (factor 2)	0.033	−0.063	<0.001	−0.021	0.094*	−0.005	0.029
HTQ I 'being close to death' (factor 3)	−0.253	−0.046	0.001	−0.051	−0.021	−0.069*	−0.068
Observations	770	770	770	770	770	769	770
R <sup>2</sup>	0.378	0.221	0.183	0.293	0.290	0.180	0.158
Adjusted R <sup>2</sup>	0.368	0.209	0.171	0.281	0.279	0.167	0.145
Residual standard error	5.36198	1.84901	1.58955	1.39729	1.42703	0.85536	1.31349
F statistics (df = 12)	38.315*	17.902*	14.176*	26.079*	25.768*	13.831*	11.841*
Highest VIF (HTQ I factor 2 in all regression models)	2.174	2.174	2.174	2.174	2.174	2.177	2.174

df, degrees of freedom; DSM-5, Diagnostic and Statistical Manual of Mental Disorders 5th edition; HTQ, Harvard Trauma Questionnaire; PCL-5, PTSD Checklist for DSM-5; PHQ-9, Patient Health Questionnaire 9-item version; PMLD, post migration living difficulties form; PTSD, Post-traumatic Stress Disorder; VIF, variance inflation factor; WHODAS 2.0, World Health Organization Disability Assessment Schedule 2.0.

\*  $p < 0.007$  (corresponds to 0.05, after Bonferroni correction).

resilience in those who have managed to cope with such difficulties. Similarly, front line workers in the COVID-19 pandemic who exhibited high trait resilience were tolerating stressors better (Fino et al., 2021). Another mechanism could be seen in accounts of post-traumatic growth (PTG) after traumatic events, where individuals were able to maintain or even exceed their functioning facing adversity (Tedeschi and Calhoun, 2004). For refugees, evidence of PTG was reported in several studies (Sultani et al., 2024).

Generally, it is acknowledged that trauma is a critical harmful agent in many aspects of everyday functioning, which is well documented for different populations of RAS (Khan and Haque, 2021). These findings underline the necessity of recognizing that trauma effects on individual functioning may be multifactorial, and of always considering multiple

influencing factors, such as symptoms of PTSD, family support and living conditions (Mollica, 1999). Disability in getting acquainted with living conditions and new people can maintain and even reinforce disadvantages, with consequences of prolonged suffering from mental health disorders (Friis Jørgensen et al., 2017).

Difficulties with living conditions post-migration were associated with worse functioning in concentrating and learning new tasks. Structuring one's daily routines and being resilient are important assets in organizing one's own day-to-day life, and difficult living arrangements, such as over-crowding, limited privacy and conflicts in large communal accommodations, may negatively interfere with these (Agbi, 2019). Another finding is that a higher number of children in the same household or living nearby was associated with worse

'self-care' and with worse functioning overall, which was previously described (Robertson et al., 2016). On the one hand, this could be explained by limited time resources when caring for under-aged children, and therefore having less time for fulfilling one's own needs, also considering that finding childcare options for RAS is difficult. On the other hand - with women reporting having more children than men in our sample - this could be a reflection of differences between genders, as the majority of RAS in Türkiye were female, whereas RAS in Western European countries were predominantly male. Another study reported a stronger negative relationship between trauma and functioning for females than for males, which might add to the gender differences (Robertson et al., 2016).

Lastly, the observed association between experiences of violence and abuse, and lower abilities in participating in community activities could stem from certain stressors or definitive life events. Past exposure to traumatic events may lead the individual to be less inclined to want to participate, potentially posing a further barrier toward inclusion into the host society, especially as expectations that RAS should integrate with the community in host countries may further amplify individual stress, potentially leading to social exclusion.

As one strategy to prevent social exclusion, proficiency courses in the host country's language could be combined with work training, day structure training and opportunities to mingle with local communities. Combined language and work training programs show promising results (Kuschel et al., 2023). Isolated language tandem programs have not been scientifically evaluated in RAS, gender differences must be taken into consideration in these populations. Female RAS's relationship status and childcare situations have an impact on their language skills, which was not found for male RAS (Bernhard and Bernhard, 2022). Having fewer opportunities to learn than men, female RAS were more efficient in learning (Bernhard and Bernhard, 2022).

## 4.2 Strengths and limitations

Strengths of this study are: firstly, a large sample size of RAS from many countries and settings; secondly, a methodologically exact screening procedure which rendered a comparably homogenous sample of RAS; thirdly, the nationalities included show that the sample was quite representative for current RAS populations in Europe and Türkiye until 2022. However, conclusions cannot be made for the general population of RAS in these regions, as we investigated a non-random sample under psychological distress and interested to receive an intervention. Limiting the study's findings is foremost that the study was ideated for another type of analysis; in this sample, psychological functioning was primarily assessed as a secondary outcome. Secondly, the cross-sectional methodology does not warrant causality assumptions, and some associations could be explained by reverse causality. Thirdly, we did not assess physical health, which might have been an important predictor of psychological functioning in our sample. Fourthly, questionnaires derived from different versions of the DSM were used, which might limit their comparability. Generated hypotheses have to be reviewed in a longitudinal follow-up study.

## 4.3 Conclusion

This study underlines the need for the consideration of sub-clinical forms of war and trauma-associated disabilities, as

patterns of functional impairment are even present in RAS without a clinical diagnosis of a mental health disorder. This finding might be taken into account in the organization of medical and psychosocial assistance to RAS. We hypothesize that reduced everyday functioning of individuals who had to leave their home country due to war, prosecution, and other hardships could hamper their ability to adapt successfully to new contexts, cope with new tasks and recover from their experiences.

## Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## Ethics statement

The studies involving humans were approved by WHO Research Ethics Review Committee and Ethics Committees of all participating sites. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

## Author contributions

JB: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Writing – original draft, Writing – review & editing. AR: Writing – review & editing, Visualization. TW-T: Writing – review & editing. PW: Writing – review & editing. CB: Conceptualization, Funding acquisition, Project administration, Supervision, Writing – review & editing. MP: Writing – review & editing. FT: Data curation, Formal analysis, Supervision, Writing – review & editing. LT: Writing – review & editing. VR: Writing – review & editing. CA: Writing – review & editing. EU: Writing – review & editing. MA: Writing – review & editing. TL: Writing – review & editing. MV: Writing – review & editing. RC: Writing – review & editing. LW: Writing – review & editing. MS: Writing – review & editing. PC: Writing – review & editing. MK: Writing – review & editing. TK: Writing – review & editing. RW: Writing – review & editing. MCA: Conceptualization, Supervision, Writing – review & editing, Methodology, Validation. JW: Writing – review & editing, Conceptualization, Project administration, Supervision.

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## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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## Supplementary material

The Supplementary material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsyg.2023.1295031/full#supplementary-material>

SUPPLEMENTARY TABLE S1  
Spearman correlations.

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# Reintegration of cyber veterans: challenges and strategies for post-war transition

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Battles in the cyber domain often lack visibility compared to the physical domain, which can lead to insufficient appreciation of its actors' achievements by the general public and society. Nonetheless, it has become a crucial area of modern warfare in which cyber professionals defend the nation's critical infrastructure, support other military operations and achieve military objectives that could not be attained in other domains. Although cyber combatants might not have as high a risk of injury or death as those on the front lines, they still can face traumatic events and suffer from the same types of issues after the war as any other veteran. Earlier studies on war veterans have shown they have elevated risks of mental health issues, substance use, social problems and financial difficulties which might push some individuals towards a path of crime. The cyber domain is also not limited by time or place, which has given rise to cyber volunteerism in which skilled individuals around the globe decide to assist their own country or friendly nations. This publication aims to identify the challenges cyber veterans might face when transitioning back to civilian life and develop appropriate strategies to facilitate their reintegration. It also raises the awareness of the hundreds of thousands of volunteers who can develop similar problems after the war. Without proper awareness, support and dialogue, some of these individuals can also drift towards harmful social implications such as cybercrime.

## KEYWORDS

cyberpsychology, veteran adjustment difficulty, mental health, cyber veteran, volunteer fighters, post-war (re)integration

## Introduction

Along with the development of new technologies, military activities have shifted into new environments, creating a hybrid format of warfare in multi-domain operations. In the 21st century, cyberspace has become a new battleground (Kremer and Müller, 2013; Lonergan and Lonergan, 2023), where cyber domain is recognized as a separate domain for conducting military operations (NATO, 2016; Ministry of Defence, 2023). The significance of the cyber domain cannot be overstated as its impact can occur at the operational, tactical and strategic levels. During wartime, both military and civilian experts from defense agencies conduct cyber operations aimed at achieving military objectives. The effects of cyber operations could even

surpass the results of actions on the battlefield, making the cyber domain a significant component in confrontations (Lee et al., 2016).

Measures in the cyber domain are also aimed at supporting information warfare and acting as a force multiplier for air, maritime, space and land operations (US FM 3-0 Operations, 2022). Given this, participants in cyber operations and cybersecurity experts are full-fledged contributors in combat operations and must be reintegrated into civilian life post-war like other veterans (D'Urso, 2015). Simultaneously, the high level of secrecy surrounding their activities and the lack of visibility of their achievements in the information space can elicit ambiguous attitudes toward their work among the civilian population and military personnel on the front line. At first glance, the risks of injury or death appear to be greater for soldiers on the battlefield, leading a significant portion of society to undervalue the efforts of cyber veterans compared to other veterans. However, many cybersecurity experts need to be positioned near the critical infrastructure they are defending which, despite international humanitarian law, can still be one of the main targets of enemy long-range strikes. Giving support to other combat operations might also require closer proximity to the front line exposing the cyber professionals to similar risks as other combatants on the battlefield.

Even without the hostilities of war, work-related stress can be high in cybersecurity professions (Nobles, 2022; Singh et al., 2023). When this is combined with the additional concerns of personal health and safety, atypical working conditions, high stakes in operations and possible exposure to traumatic events, they will endure considerable strain in their tasks. For their work, they might need to spend a considerable amount of time in the adversary's networks, immersing themselves in hostile information environments and propaganda for bits of valuable intelligence. The emotional distancing from this will also require considerable stress endurance. From this, it can be concluded that during and after the war, appropriate psychosocial support and reintegration assistance for cyber veterans is needed. The terms reintegration, transition, readjustment and community integration are commonly used to describe the process of exiting the military and returning to the civilian world (Elnitsky and Blevins, 2017). In this paper, we will not make a distinction between the nuances of these terms and use them all to refer to the transitioning process of an active cyber combatant role to a civilian non-combatant role.

A separate challenge may arise from the distinction between enlisted or mobilized cyber combatants in the military, paramilitary cyber professionals and civilian cyber volunteers; whether the individuals not part of the country's official armed forces can be called cyber veterans after a war. Nations can always prohibit paramilitary organizations outside the government or incorporate them under military command during a crisis when its members are considered part of the military forces. However, unlike military or paramilitary personnel under military command, individual cyber volunteers are much more difficult to identify and their personal contributions hard to evaluate. Without an official veteran status, they will probably fall through any psychosocial support programmes that might be provided. This question significantly deepens the problem of the reintegration of cyber warriors as there may be foreign cyber fighters, hacktivists, vigilantes, even minors and others that can be anywhere around the globe, where their actions would probably be considered as criminal activity by the regional authorities.

In this publication we review current literature on what type of reintegration challenges veterans face and consider whether similar and

novel types of challenges are expected for cyber veterans. In addition we explore some veteran support programmes and evaluate their fit for cyber veterans. The aim of this publication is threefold. First, to raise awareness of the global nature of cyber volunteers in modern conflicts and the potential social implications of these unseen cyber combatants. Second, to identify the challenges of reintegrating cyber veterans and third to explore appropriate strategies for the government to facilitate their return to civilian life.

## Methods

The intent of this study was not to conduct a systematic review as already preliminary searches indicated that research about cyber veterans, within the scope the authors had defined it, had not surfaced as a subject of robust academic research. This paper rather constitutes an explorative study of a potential new phenomenon. Providing an excursion and extrapolation from existing fields such as veteran studies and cyber warfare towards a related topic of cyber veterans.

The review proceeded roughly in two phases. Phase one focused on the regular veteran issues, reintegration challenges and transition support programmes from active service to civilian life providing the initial framework for the phenomenon. The second phase focused on the special characteristics of cyber warfare and the stressors cyber combatants face in their line of duty. Google Scholar served as search engine in a semi-systematic manner. Search terms were such as cyber, definition, package, reintegration, transition, veteran, warrior in various combinations. In overall, reachable, relevant articles in non-predatory publications with reasonable impact served as raw material for the present article. Several literature searches were conducted during the course of this study by each of the authors independently. These literature searches were periodically discussed during online meetings for their relevance and quality. The academic literature review was complemented with relevant legal and military doctrine documents and regular Google searches to deliver material for some illustrative case examples.

## Definition of a cyber veteran

According to the Oxford English Dictionary (2023), a veteran is a person who has had long experience in a particular field. However, many people associate the term with war veterans. A loose definition would therefore be everyone who serves in the military and survives will become a veteran (Kleykamp et al., 2021). Another way to define a veteran is when military personnel return from war and are discharged from military service they are assigned the label of veteran (Brown, 2011). However, nations differ in their requirements for achieving veteran status. This status is often further divided into war veterans, disabled veterans or overseas operations veterans, as their benefits may vary (38 USC, 2011; UK Public General Acts, 2021; UK Public General Act c48, 2023). In this paper, we define the term cyber veterans as individuals who have actively participated in the development, implementation and execution of national cyber capabilities to protect and secure the digital infrastructure and information assets during a time of war. This definition deliberately does not take a stand on the legislation and requirements of whether a person would receive a veteran status by their native country as this

research is intended to address the potential issues on reintegration of cyber combatants after the conflict.

## The special case of cyber volunteers

Our definition of cyber veterans does not exclude non-military personnel participants in the war such as cyber volunteers although to avoid ambiguity, cyber volunteers are not to be mixed with military volunteers who enlist for service freely and are then part of the military. These cyber volunteers are skilled individuals who have decided to assist their own country or friendly nations (Ottis, 2010). A topical example comes in the wake of the 24 Feb 2022 escalation of the Russo-Ukrainian war as Russia attacked Ukraine. Ordinary citizens from Ukraine and other countries have become cyber volunteers. Although this type of co-production of cyber security is not new (Chang et al., 2018), this cyber vigilantism phenomenon is on a scope and scale not seen before (Soesanto, 2022). Their voluntary assistance involves supporting the state sector in cybersecurity, including providing computational resources, technical and software support and consultancy. Some individuals have also attempted to attack the resources of the enemy, prompting the Ukrainian government to respond with legal clarifications regarding such actions. The government continues to coordinate support from cyber volunteers to avoid any violations of Ukrainian and international legislation. However, as these individuals are collaborating by their own volition and ways, there is always a risk of exaggerated actions conducted by overzealous cyber volunteers. Currently, a significant portion of cyber volunteers has found the opportunity to officially collaborate with the government and this trend is growing. Ukraine is considering the formation of a cyber reservist unit in the armed forces as an additional resource in the event of massive aggression in the cyber domain (Tkachuk, 2023).

Cyber volunteers can also create an increased element of uncertainty in the post-war period. Well-prepared and cohesive teams of cyber professionals not controlled by the government could pose a significant threat to national security as their actions could provoke further escalation of the conflict. Additionally, risks can be caused by individual specialists which could arise from financial motives or disagreements with government decisions. After the war, dissatisfaction may emerge if the cyber volunteers feel their contributions are not recognized and their previous roles are diminished. Thus, to foster constructive dialogue between the government and cyber volunteers and to minimize the risks posed by them, it is essential to focus on social policies that recognize their significance, acknowledge specific individuals for their significant contributions to cyber defense, involve them in conferences and participate in the development and discussion of regulatory documents for the advancement of cybersecurity. It is also important to raise awareness among citizens about their contributions and to foster trust in cyber volunteers in society.

## General stressors in the cybersecurity profession

Working in the field of cyber security has been compared to working in a warlike environment (Brody, 2015; Singh et al., 2023).

Cyberspace is contested at all times. Malign actors seek to degrade critical infrastructure, interfere with government services, extract intelligence, steal intellectual property and impede military activities (NATO, 2022). Cybersecurity professionals need to adapt to the fluctuating and rapidly evolving occupational requirements in an adversarial landscape. They provide a mission-critical service for ensuring operational security of armed forces and ensuring business continuity of private companies and government services (Paul and Dykstra, 2017). Offensive cyber operations can involve another set of demands where performance is highly dependent on speed and precision, not unlike the demands of fighter pilots or surgeons. Offensive cyber operators require a specialized set of skills and breadth of expertise from network fundamentals to adversarial thinking to strive in a high-risk high-reward environment (Dykstra and Paul, 2018).

Recent studies have indicated that work-related stress is high in the cybersecurity profession (Nobles, 2022; Singh et al., 2023). According to a 2021 CIISec State of Profession report, over half of cybersecurity professionals report having stress-related sleeping issues (Wilson, 2022). The VMware Global Incident Response Threat Report from 2022 confirms that this trend has not changed and 51% of cyber security professionals self-report having symptoms related to burnout and of that group, 65% have considered leaving the cybersecurity profession altogether (VMware, 2022). Some of these results can be explained by the global shortage of cybersecurity (CISA, 2020; De Zan and Di Franco, 2020; Coutinho et al., 2023). However, it seems that the working culture in cybersecurity tends to glorify working long hours as almost half of the CIISec report responders report working over 41 h a week and some even working up to 90 h a week (Wilson, 2022).

## Psychosocial issues related to potentially traumatic experiences

According to a recent meta-analysis of military personnel engaged in wars and conflicts between 1945 and 2022, 24% develop depression, 16% have anxiety-related issues and 21% suffer from Post-Traumatic Stress Disorder (PTSD) (Lim et al., 2022). Those who do not report experiencing such problems (25%) still sense difficulty in many essential areas of life such as difficulties in social and societal behavior, relationships, taking care of themselves, getting a job and feeling belonging, with injuries and suicidal thoughts (Elnitsky and Blevins, 2017). Potentially traumatic events often involve acute, high-strain situations which are not uncommon in combat situations or in a time of war. Encountering a direct attack or being in a combat situation has been associated with a significantly higher risk of PTSD and other psychological problems later in life (Hoge et al., 2004). PTSD can include symptoms such as hypervigilance, hyperarousal, intrusive images or thoughts, emotional numbing, difficulty trusting others, irritability or outburst of anger, heightened sense of vulnerability and trauma-related nightmares induced insomnia (WHO, 2021; APA, 2022). These symptoms can become crippling to the individual leading to withdrawal from social interactions and avoidance of everyday activities which could trigger symptoms and emotional distress.

From meta-analytic studies, demographic risk factors for the development of PTSD are the severity of the traumatic event, lack of social support, adverse childhood experiences and later life stress

(Brewin et al., 2000). A perceived threat to life, dissociative experiences and intensity of negative emotions during the traumatic event were also found to be additional risk factors for developing PTSD (Ozer et al., 2003). Cognitive vulnerabilities such as negative attributional style, rumination, looming cognitive style and anxiety sensitivity have also been suggested to explain some individual differences for the sensitivity in developing PTSD (Elwood et al., 2009).

Research on veterans from peacekeeping operations has indicated that 2 to 8% of them suffer from some degree of posttraumatic stress symptoms (PTSD) in 3 years of post-deployment (Pearn, 2000). Previous assumptions were that the time immediately following deployment is the hardest time for veterans. However, there are indications that problems increase with time (Vogt et al., 2022). For most, potential psychological symptoms will rise a year after their deployment (Kaikkonen and Laukkala, 2016). However, for some, the symptoms have a later onset where they might present even years later after the crisis management deployment (Bonanno, 2004; Gray et al., 2004). Overall, military personnel seem to present PTSD symptoms later compared to civilians experiencing traumatic events (Andrews et al., 2007).

## Challenges in adjusting to civilian life after a war

The process for military personnel returning home to civilian life from deployment and life immediately after deployment can be highly stressful. Difficulties related to this transition are common and more than half of veterans suffer from some kind of psychological symptoms (Romaniuk et al., 2020). This transition often entails exchanging social networks by leaving one group of relationships and being required to establish and develop relationships with another group (Hopewell and Horton, 2012). Exclusive interaction with only the previous military community may prove counterproductive to reintegration (Herman and Yarwood, 2014). It has also been noted that the stronger the military identity the veteran holds, the more difficult the transition to civilian life tends to be (Adeoti et al., 2022; Ben-Shalom et al., 2023).

While some symptomatic behaviors such as being hypervigilant could even be considered to be adaptive in the battlefield, they can be very maladaptive for typical civilian life (Grupe et al., 2016). Survivors of a traumatic event might also feel responsible for the death or injury of others, even if they had no real influence in that situation (Tangney, 2002; Murray et al., 2021). Feelings of guilt have been linked to substance abuse, PTSD and depression symptoms for war veterans (Davis et al., 2023).

Post-deployment adjustment difficulties also tend to co-occur or lead to other life problems such as relationship problems or financial difficulties. It is known that mental health issues can lead to adjustment difficulties such as social problems, unemployment and financial problems which can even further be bolstered by co-occurring substance abuse (Romaniuk et al., 2020). On the other hand, veterans' skills and experience might not be suitable for civilian professions causing financial difficulties, increasing life stress, and leading to adjustment difficulties while sensitizing the individuals towards mental health issues (Elbogen et al., 2012). Senior officers can expect to land a senior position in the civilian job market right away. However, while technical skills such as computing may transfer easily, non-technical skills like communication may need adaptation and

acclimatization to the civilian corporate culture. The business world can also be afraid of potential mental problems, inflexibility, inadaptability, regimented individuals and awkward reactions to stressful situations which can make veterans feel stigmatized (Davis and Minnis, 2017; Quirke et al., 2021). Relationship dysfunction is also a common challenge faced by individuals with PTSD. This dysfunction can present in a variety of ways from emotional numbing to domestic violence (Walker, 2020). Regardless of diagnosis, financial well-being has been linked to post-deployment adjustment where veterans having the means to cover basic needs were less likely to have issues with post-deployment adjustment such as criminal arrests, homelessness, substance abuse, aggression or suicidal behavior (Elbogen et al., 2012). Another protecting factor has been linked to gratitude. Being the recipient of thankfulness, recognition and obtaining personal benefits from the society may have salutary effects on everyday functioning of war veterans. Dispositional gratitude predicted greater daily positive affect, percentage of pleasant days over the assessment period, daily intrinsically motivating activity, and daily self-esteem over and above effects attributable to PTSD severity and dispositional negative and positive affect in the PTSD group but not the non-PTSD group (Kashdan et al., 2006).

## Challenges related to cyber veteran integration

With their unique skillset and experience, cyber veterans will probably be sought after workforce, where their experiences can help to better understand malicious actors' tactics, techniques and processes, improving organization's ability to defend themselves from cybercrime. Cyber volunteers from various backgrounds can even alleviate the global shortage of cybersecurity professionals (CISA, 2020; De Zan and Di Franco, 2020; Coutinho et al., 2023). However, these skills and knowhow can be used to do harm as well as to do good. The path of cybercrime can simply look attractive because it promises more immediate financial benefits. Especially if the cyber veterans lack social support while they suffer from debilitating mental health issues making it difficult for them to find or keep work. Some might see cybercrime as their only option just to make ends meet or acquire the financial security necessary to concentrate on overcoming their issues.

Challenge, curiosity and status are often linked to hacker motivations (Chng et al., 2022). By the Social Learning Theory, crime can be a behavior that is learned just like any other behavior (Bandura and Walters, 1977). If the cyber veterans were accustomed to breaking into systems during the war, this type of activity, accepted in the time of war, has become a deeply learned behavior where the hacker mentality could even be part of their identity. If these skilled individuals are not directed towards beneficial activities such as red teaming, penetration testing or bug bounty programmes, some might traverse to the black hat activities just to find challenges for their highly tuned skills.

The most sinister outlook for cyber veterans can even lead to radicalization. PTSD-related symptoms such as emotional numbness, feelings of vulnerability and alienation can lead to reduced empathy and indifference to others (Nietlisbach and Maercker, 2009a,b). Other PTSD symptoms such as a tendency to withdraw social contact, irritability and outbursts of anger can ostracize and marginalize them

from society even further (Nietlisbach and Maercker, 2009a,b). There is evidence that historical trauma can sensitize to conspiracy beliefs (Bilewicz, 2022). Research has shown that radicalization is driven by multiple causes. Wide-ranging grievances in everyday life can push individuals towards a more absolute way of thinking, while narrower political or religious pull factors attract certain types of ideology (Borum, 2011). These factors might start a vicious cycle where some cyber veteran individuals feel that society does not appreciate their war effort as much as others who fought with a rifle instead of a keyboard. These embittered individuals might drift towards extreme ideological groups where they could find a sense of community and comradeship. Doosje et al. (2016) has depicted the path to radicalization in three stages. Phase 1 is characterized by a sensitivity to a radical ideology. In Phase 2, the individual becomes a member of a radical group. Finally, in Phase 3, this person is ready to act on behalf of the group's ideology. The threshold for the final Phase 3 could be lowered in the cyber domain as it is easier to mentally distance oneself from the possible victims (Leukfeldt and Yar, 2016).

## Supporting the transition of cyber veterans to civilian life

Similar support programmes that have proven effective for veterans overall should also be beneficial for cyber veterans. Veteran support programmes should provide timely and appropriate support, start as soon as possible, be affordable and sustainable and have an approach that borrows and adapts from existing structures (NATO STO TR-HFM-263, 2021). In addition, preventive programmes such as Psychological First Aid could also mitigate further problems later on (Prykhodko et al., 2021). These veteran support programmes should at least include some interactive programmes, retreats or professional services that help those veterans with PTSD and other mental trauma (Pearn, 2000). Many of the support programmes also include assistance in finding education or employment to achieve financial security and facilitate social support for the veterans (Kranke et al., 2019; NATO STO TR-HFM-263, 2021; Adeoti et al., 2022). Often these programmes include activities that extend to include the veteran's family members and they can help in reconnecting and healing broken internal connections in the families (Tsybko, 2023). Younger veterans, would also benefit from support that offers interactive re-socialization and re-cultivation aid organized in educational institutions in connection with their studies (Pedersen and Wieser, 2021). Interventions which focus on strengthening personal resilience and available support before and after exit seem to protect against stress and depression and enable psychosocial functioning (Pietrzak et al., 2010).

To identify those most in need of support and optimally focus the limited resources, pre- and post-departure screening methods in the form of short but efficient survey batteries are recommended (Romaniuk et al., 2020; Markowitz et al., 2023). Although, not sufficient predictors on their own, background information and life situations might also provide some insight on who is in direst need of support. For example, research has indicated that overall financial well-being (Elbogen et al., 2012), higher education, rank, age and previous exposure to adversity can protect a person against excessive negative consequences of their transition (Adeoti et al., 2022; Markowitz et al., 2023). Another preventive measure comes from

voluntary or anticipated exit (Adeoti et al., 2022). In addition, the more in advance and concrete the planning for the next phase in life is, the better the chances for a successful transition (Kleykamp et al., 2021). Many veterans do not find satisfactory employment after service due to lack of a long-term plan (Kranke et al., 2019; Merritt, 2020; Adeoti et al., 2022). Thus, it is important that career planning support starts when soldiers enter service and that it helps them stay up-to-date on how military and civilian careers intertwine (Merritt, 2020).

Social support, defined as the perceived or tangible availability of social resources at one's disposal, is among the key factors for successful reintegration (Cohen et al., 2001). Peer support groups have been shown to improve veteran's reintegration and have beneficial mental health effects. Peer support groups often benefit from having members at various stages of their recovery, giving hope to those in their early stages and a feeling of accomplishment to those further on (Drebing et al., 2018). Special attention is required in assembling peer support groups for cyber veterans as the cyber domain and their experiences might be too technical for other war veterans to relate to.

Cyber veterans might have the skills and expertise to be a sought-after workforce. Their transitioning out of military service could also be expected to involve fewer challenges as their identities and professional profiles should be more aligned with civilian ones (Davis and Minnis, 2017). Veterans often report having a feeling of differentness where they feel separate from the civilians due to the perception that civilians do not understand veterans and what they have gone through, which is seen as a root cause for reintegration difficulties (Kranke et al., 2019). Clinging to veteran identity can also hinder reintegration (Adeoti et al., 2022; Ben-Shalom et al., 2023). Some individuals might therefore benefit from navigational support, aiding them in finding a route from their old identity to a new one (Herman and Yarwood, 2014). Veterans need to be encouraged to find new reference groups (Ben-Shalom et al., 2023) and focus on the many things they have in common with civilians (Kranke et al., 2019). While this process might appear easier for cyber veterans, as civilians working in cyber security should provide a relatable reference group for them, it is still crucial to provide enough navigational guidance for them, to nudge them towards more constructive reference groups. Some individuals might migrate towards undesirable reference groups such as hackers or even cyber-criminal groups.

Cyber volunteers will most likely not receive any legitimate veteran status which would make them eligible for state benefits and support programmes. It is, however, important to recognize that these individuals might also have similar difficulties in adapting back to their ordinary lives. In addition, the participating voluntary groups should acknowledge that they are responsible for their participants even after the conflict is over. These groups could seek discussions with Non-Governmental Organizations (NGOs) and professional practitioners who are already working with war victims and veterans for assistance. As an example, one framework could be taken from the National Psychological Association of Ukraine (NPA) for civilian wartime hotline support that currently works across 21 countries (Palii et al., 2023). While most of the volunteers are required to remain anonymous for their own safety, secure online peer support groups and information-sharing platforms could be developed. These could provide general information about education and working opportunities in cyber security, where to find professional help and act as a peer support forum, where former

cyber volunteers could discuss and share their thoughts and feelings anonymously.

## Discussion

This paper raised awareness of the social implications of cyber volunteers during and after conflicts, discussed what difficulties cyber veterans might face in their reintegration and explored the types of support programmes that should be developed to benefit their transition. As the cyber domain lacks similar visibility to the physical domain, it requires more effort from the media and societies to recognize the contribution of the cyber professionals, with and without uniform, as recognition and thankfulness have been shown to have salutary effects on the everyday functioning of veterans (Kashdan et al., 2006).

Especially for a mobilized army, most of the combatants will return to their civilian occupations after the war, while some might remain in the military. This transition requires adjusting and exchange of social groups (Hopewell and Horton, 2012). This process can lead to feelings of differentness, where veterans perceive their experiences in the war are not well understood by the civilians (Kranke et al., 2019). These feelings can be alleviated by peer support groups (Drebing et al., 2018). However, cyber veterans might be at a disadvantage as the cyber domain can be so technical that other war veterans might have difficulties relating to their experiences, while cyber volunteers are forced to remain anonymous for their own safety.

Reintegration difficulties tend also to co-occur or lead to other life problems such as relationship problems, financial difficulties, mental health issues and substance abuse. Financial well-being has been recognized as one of the key protecting factors for reintegration (Elbogen et al., 2012). With their unique skills and experience, cyber veterans will probably be a sought-after workforce. However, these skills and know-how can be used to do harm and to do good. The path of cybercrime can simply look attractive because it promises more immediate financial benefits. Especially in the global army of cyber volunteers, who already might have become accustomed to breaking the law in their native country for a cause they believe in, some individuals may drift towards criminal activity as implied by the Social Learning Theory (Bandura and Walters, 1977). To prevent this type of chain of events, more public discussion and dialogue with the cyber volunteers is needed. Many of them will be obliged to remain anonymous for their own safety and possible legal consequences by the regional authorities of their native country.

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The notable limitation of this study is the lack of systematic review process. Applying a more rigid review methodology, would have created a better stepping stone for further research. Several important aspects of veteran integration, such as gender issues were also omitted to keep the text somewhat clear and concise. Future research directions for exploring this novel phenomenon would be to approach military and paramilitary cyber professionals to better understand what difficulties they have had or are expecting to face with their transition to civilian life.

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# Emotional processing is not enough: relations among resilience, emotional approach coping, and posttraumatic stress symptoms among combat veterans

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Combat soldiers are exposed to various potentially traumatic events and face high risk of developing military-related psychopathology, such as depression, posttraumatic stress and grief (PTSS). However, a strong body of research shows that resilience is the default in the aftermath of trauma and indeed, many veterans do not develop high symptomatic levels. To explicate this inconsistency, the current study examined the associations among PTSS, resilience, and patterns of emotional-approach coping. A sample of 595 male combat veterans filled out questionnaires on trauma exposure, PTSS, depressive symptoms, resilience, and emotional-approach coping. Their data were analyzed using structural equation modeling path analysis. Participants reported high exposure to potentially traumatic events during service. Mean scores were high for resilience and relatively low for PTSS and depressive symptoms; 13% had a clinical level of posttraumatic stress disorder. Structural equation modeling revealed that emotional-approach coping strategies mediated the relationship between resilience and PTSS. However, emotional expression was associated with lower PTSS levels, whereas emotional processing was associated with higher PTSS levels. These results suggest that although emotional-approach coping was related to higher resilience, emotional expression (an intrapersonal coping strategy) might have a more positive effect than self-oriented emotional coping strategies. Providing veterans with supportive opportunities and a wider repertoire of emotional coping skills might enhance their well-being, reduce postservice emotional distress while not harming veterans' resilience levels.

## KEYWORDS

combat, coping, emotional approach coping, posttraumatic stress, resilience, veterans

## 1 Introduction

Exposure to potentially traumatic events (PTEs) and their aftermath is often an inevitable part of combat service for many soldiers and veterans around the world (Korte et al., 2020). Soldiers exposed to combat are at high risk of developing posttraumatic stress symptoms (PTSS) and presenting various levels of posttraumatic stress disorder (PTSD). Prevalence rates

of PTSD in veterans have been reported as varying from relatively low (1.09%) to very high (34.84%), depending on demographic, social, life experience, and exposure-related factors (Xue et al., 2015) and the veterans' homecoming conditions (Boscarino et al., 2018). Given this wide range, Fulton et al. (2015) performed a meta-analysis and found that 23% of American soldiers who participated in recent military campaigns experienced substantial PTSD levels. Although these estimations vary based on the choice of estimation tools and cohort (Hoge et al., 2014), they still reflect a major condition that affects a large part of the veteran population. Moreover, prior research reported that exposure to military trauma was associated with other emotional disorders, such as depression (Yancey et al., 2023), which affects an estimated 9–16% of American veterans (Karstoft et al., 2020; Inoue et al., 2023). Similar rates were reported among veterans of other countries, such as Australia (Carra et al., 2022), Canada (Thompson et al., 2019), and Israel (Shorer et al., 2023).

It is well established that the substantial presence of PTSS among military veterans has multiple causes related to precursor factors, the nature of the traumatic exposure, and its aftermath (Korte et al., 2020). Military-related PTEs are often characterized by unique and high-level exposure, such as facing ongoing danger or witnessing injuries and death of friends. Exposure to PTEs during military service is also unique due to postservice factors, such as confusion of self-identity between being a soldier and a citizen; dominance of masculine characteristics that demand repressing of emotions, most notably weakness and vulnerability (Mobbs and Bonanno, 2018); and experiences of loneliness, isolation, separation from loved ones, and living for long periods in uncertain and unpredictable conditions (Solomon, 2020). However, the inconsistency of this high risk of developing PTSS and the fact that most veterans do not develop military-related psychopathology (Porter et al., 2017) demand further study (Bonanno, 2021).

Aiming to fill this gap, the current research examined the relationships among the personal resource of resilience (Connor and Davidson, 2003), considered a pretraumatic factor; emotional-approach patterns (Stanton et al., 2000a), a peri- and posttraumatic factor; and PTSS and depression, being the consequences of the complex dynamics of these factors.

Resilience is considered to be a personal resource related to better psychological reactions to stressful life events (Bonanno, 2021). Although definitions of resilience as a psychological construct vary (Denckla et al., 2020), scholars generally agree that resilience is not a stable characteristic. Rather, it reflects the dynamics of different peritraumatic factors that comprise and shape the process of coping with the aftermath of traumatic exposure (Bonanno, 2021). It consists of a combination of psychological, physiological, and behavioral characteristics that enable individuals to resist, cope with, and recover in the face of adverse life experiences (Masten and Powell, 2003). Based on the accumulated body of research in this field, researchers have suggested that resilience can be taught and practiced. It is the product of an ongoing process of individual's evaluation of the situation they face, choosing resilience-enhancing coping strategies among those available, implementing them, and constantly evaluating their effect to make necessary adjustments to improve their coping (Bonanno et al., 2023). This approach considers resilience as a state of mind that can and should be constantly used. It can be evaluated at a specific point in time (Connor and Davidson, 2003), and research has shown high levels of resilience among

veterans associated with relatively low levels of PTSD (compared to the general population), despite experiencing multiple PTEs during military service (Galatzer-Levy et al., 2018). Studies have repeatedly examined this relationship, highlighting the notion that PTSS, resilience, and growth often coexist (Zerach et al., 2013). For example, research with a nationally representative sample of U.S. veterans found that most participants presented moderate to high levels of resilience, along with relatively low levels of PTSD (Fogle et al., 2020). This comprehensive study described various important relations among veterans' active coping methods, distress, and well-being. The study concluded that veterans who were more involved in therapy and social interactions, accepted their emotional and behavioral challenges, and engaged in efforts to solve them presented lower distress over time. Resilience, as a personal resource, was shown to be related to use of more efficient coping strategies in the face of stressors (Bonnano et al., 2023). Moreover, difficulty with emotional clarity (e.g., understanding one's emotions) and lack of emotional regulation strategies were found to be prominent in the development of PTSD and depression symptoms, two common emotional reactions following traumatic injury (Korte et al., 2020). Notably, lack of emotional clarity was associated with PTSD symptoms of hyperarousal and negative alterations in mood and cognition, overall PTSD symptom severity, and depression levels (Timmer-Murillo et al., 2023). PTSS and depression often co-occur and have been found to evolve in tandem (Armenta et al., 2019). The current study further explored these trajectories.

Theoretical models of coping with stressful situations define coping as the behavioral and cognitive means that individuals use to deal with stressors (Lazarus and Folkman, 1984), and it has been classified into different modes (e.g., problem-focused and emotion-focused coping). In recent years, leading stress and coping researchers have proposed the emotional-approach coping classification (Stanton and Low, 2012). The concept of emotional-approach coping was developed in response to Lazarus and Folkman's conceptualization of emotion-focused coping (Biggs et al., 2017). A major critique of their model is that it aggregates diverse strategies and does not distinguish between ineffective strategies of disengagement and avoidance, which usually increase emotional distress, and other efficient emotion-focused strategies, such as emotional processing and expression (Stanton et al., 2000a; Carver and Connor-Smith, 2010).

Emotional-approach coping involves processing and expressing emotions in response to stressful life experiences or exposure to adversities (Stanton et al., 2000a). This process is commonly divided into two strategies: emotional processing, which consists of attempts to acknowledge, explore, and understand emotions; and emotional expression, which involves verbal or nonverbal efforts to express or share emotional experiences. Previous studies reported that emotional-approach coping, combining emotional expression and processing, was associated with lower psychopathological symptoms and better adjustment to stressful situations (Stanton and Low, 2012; Juth et al., 2015; Hoyt et al., 2020). Nevertheless, studies also showed distinctive associations of emotional expression and processing with psychological factors. For example, emotional expression was associated with lower distress indexes, whereas diverse results were reported regarding the effect of emotional processing. Scholars suggested that whereas emotional expression helps relieve emotional load and is often related to other people, emotional processing may involve personal ruminations on negative cognitions and emotions

(Stanton et al., 2000a; Marroquin et al., 2016). However, the effect of emotional expression and processing may depend on time, gender, and situation (Stanton and Low, 2012; Juth et al., 2015; Hoyt et al., 2020).

Only a few studies have examined the effect of emotional-approach coping on PTSS and emotional distress among trauma-exposed individuals (Hassija et al., 2012; Fishbein et al., 2022). The current study aimed to fill this theoretical gap. In a study with cancer survivors, emotional-approach coping was associated with lower cancer-related trauma symptoms and mediated the effect of acceptance and commitment therapy on decreased symptoms (Fishbein et al., 2022). Another study, involving 209 trauma-exposed U.S. veterans, found that emotional expression was associated with lower PTSD and depression symptoms, whereas emotional processing was not (Hassija et al., 2012).

A study examining the complex relations between resilience and emotional-approach coping found that individuals who shared more of their experiences tended to express higher emotional resilience and have lower rates of PTSD symptoms and emotional distress (Yeung and Chow, 2019). Moreover, resilience was found to moderate the relations among combat exposure, intrusive ruminations, and PTSD levels at various levels of trauma exposure (Blackburn and Owens, 2016). Yet veterans may refrain from sharing their distress or seeking help for emotional issues. In other words, they tend to make partial use of their potential resilience resources (Lahad, 2017; Mobbs and Bonanno, 2018). This trend might be the consequence of shame regarding their combat experience and how they cope with its aftermath, because the military's masculine and stoic social norms discourage the expression of emotions perceived as weakness (Gaudet et al., 2015).

Israeli citizens are obliged to complete army service of 2–3 years at age 18 (Knesset, 1986), and male Israeli veterans usually continue to serve in the reserve forces until age 40 (Knesset, 2008). Due to this state's ongoing struggle for security and its small size, Israeli veterans are at risk of multiple PTEs and retraumatization (Solomon, 2020). A recent report indicated about 5,700 of Israel's emotionally injured veterans were recognized by the Ministry of Defense's Rehabilitation Wing as dealing with PTSD (Yechimovitch-Cohen, 2022). However, this rate is expected to grow due to the state's recent violent conflicts (Ministry of Health, 2023). Because about 100,000 soldiers are recruited and discharged each year, this figure probably underestimates the number of Israeli veterans experiencing substantial levels of PTSS.

The current study examined the relationships among resilience, emotional-approach coping strategies, and PTSS and depressive symptoms among Israeli veterans. Specifically, we examined the associations between resilience and levels of PTSS and depression, along with the mediating role of emotional-approach coping strategies (emotional expression and processing) in the association of these factors. The cohort of this study was a unique nonclinical group of people with prior PTEs who were still at risk of exposure to additional PTEs (because most of them served as reservists); they were in touch with both their natural support systems and a military-related, assumedly supportive environment (peer combatants).

## 2 Materials and methods

The study was approved by the affiliated faculty's board of ethics (No. 266/21).

## 2.1 Participants and procedure

The current paper presents the results of the first wave of a longitudinal study on the impact of military service on Israeli combat veterans who participated in a nature-assisted group intervention for processing military-related PTEs called B'Shvil. B'Shvil is a nonprofit organization that aims to help Israeli veterans who served in military units of all forces to process their combat experience, address difficulties in the bidirectional transition between army and civilian life, and facilitate postservice psychological growth (Shorer et al., 2023). Teams of veterans (e.g., squads, companies, platoons) voluntarily participate in this intervention, usually around 5–10 years after their release from mandatory service (and the continuation of reserve service). The group intervention is usually operated as a 10-day retreat in nature settings (to learn more about this intervention, please refer to <https://www.bshvil.org/english>). Overall, including personal and group meetings before and after the retreat, participants are followed by B'Shvil facilitators for 6 months. A few main therapeutic components are highlighted in this recreational intervention: mind–body relations in the face of trauma; personal and group psychological resilience; and nature's healing power.

The full research project will examine participants' condition at three points: before the intervention, after the intervention, and at follow-up. Participants completed informed consent forms and self-reported questionnaires at the beginning of the group intervention.

The study sample consisted of 595 male veterans who served in various combat units and military forces (e.g., infantry, armory, navy, air force). Overall, 1,033 veterans participated in the intervention between February 2021 and October 2022 (when data were collected). In this sample, 640 (62%) participants filled out the study questionnaire; 17 participants were excluded because they did not complete the questionnaire. Although women comprise about 40% of Israeli military personnel and 19% of them serve as combatants (Shafraan Gittleman, 2020), only a dozen women participated in these groups and only six of them completed the questionnaire. Hence, their data were excluded from the current study. An *a priori* sample size calculation for SEM: Statistical Equation Modeling (Soper, 2024) indicated that a sample of 400 participants is needed to detect an effect size of 0.10 with desired power of 0.80, seven observed variables (including controlling for confounding variables), and one latent variable.

Table 1 shows the demographic characteristics of the participants. Their mean age was 32.9 ( $SD = 6.4$ ); 36% were single and the rest were either married or in a relationship; and 97% were engaged in either a full-time job or academic studies. Most participants (93%) reported exposure to PTEs, and 11% were injured during their army service.

## 2.2 Measures

Demographic data and army service details were collected, including what roles participants held during their army service (active combat, supporting active combat, etc.).

Trauma exposure was examined using Life Events Checklist for DSM-5 (Weathers et al., 2013), which was shortened to fit this study population. Six items were eliminated to avoid redundancy. These items related to occupational and recreational injuries, risk of toxification, nonspecific sexual abuse, captivity, exposure to general human suffering, and exposure to sudden death. The final list of events

TABLE 1 Participants' demographic data.

	<i>n</i> or <i>M</i>	% or SD	Range
Age	31.72	5.20	24–47
<b>Marital status<sup>a</sup></b>			
In relationship	198	33.7	
Single or divorced	389	66.3	
Education	14.58	2.06	10–22
<b>Employment</b>			
Work or study	579	97.30	
Not working or studying	16	2.70	
<b>Income<sup>a</sup></b>			
Below average	170	28.50	
Average	111	18.70	
Above average	193	52.80	
<b>Religiosity</b>			
Religious	193	32.40	
Secular	402	67.60	
Injury during service	44	11.80	
Exposure to PTE	551	92.60	

PTE, potentially traumatic events.  
<sup>a</sup>Percentage was calculated from the actual number of responses.

included exposure to combat, other military-related threats to their life or military-related physical injury, civil violence that included trauma, terror attack, car accident, life-threatening natural disaster, life-threatening illness, and other types of traumatic events.

PTSS was evaluated using the Hebrew version of the PTSD Checklist for DSM-5 (PCL-5; [Weathers et al., 2013](#); translated by the Israeli Ministry of Defense). This 20-item questionnaire features a 5-point Likert scale ranging from 0 (not at all) to 4 (extremely) regarding experiences of PTSD symptoms during the last month. For example: “In the past month, how much were you bothered by: Repeated, disturbing, and unwanted memories of the stressful experience?” Participants’ scores were calculated as a combination of their total score (range: 0–80) and whether they currently experienced symptoms in four PTSD clusters. This questionnaire was found to have high internal reliability ([Blevins et al., 2015](#)). Initial research suggested a cutoff score of 31–33 as indicative of probable PTSD across samples ([National Center for PTSD, n.d.](#)). Correlations between the subscales ranged from 0.71 to 0.93. In the current study, Cronbach’s alpha was 0.96.

Depressive symptoms were evaluated using the 6-item depression subscale of the Brief Symptom Inventory-18 ([Derogatis, 2001](#)). Participants were asked to rate certain feelings during the previous 7 days on a 5-point scale from 0 (*not at all*) to 4 (*extremely*). The inventory has been translated into Hebrew and is widely used. A mean score was calculated. In the current study, internal reliability (Cronbach’s alpha) for the 18-item questionnaire was 0.95; for the six depression items, it was also 0.95.

Resilience is a multidimensional, context-related, complex phenomenon. Hence, its assessment is complicated and context related ([Satapathy et al., 2022](#)). In the current research, resilience was evaluated using the Connor-Davidson Resilience Scale ([Campbell-Sills and Stein, 2007](#)), a widely validated and used self-report questionnaire

that evaluates perceptions of self-efficacy and adaptability in the face of stressful situations. This tool features 10 personal resilience statements evaluated on a 5-point Likert scale from 0 (*not at all*) to 4 (*strongly agree*) regarding the prior month. For example: “I am able to handle anything that happens in my life.” A sum score was calculated (range = 0–40). This tool was chosen because it examines the relevant resilience characteristics of adult participants, was previously used to evaluate veteran populations (e.g., [Green et al., 2014](#); [Hughes et al., 2018](#)), and was found to have good internal reliability of 0.86 ([Smith et al., 2019](#)). In the current study, Cronbach’s alpha was 0.89.

Emotional-approach coping, consisting of emotional processing and emotional expression subscales ([Stanton et al., 2000a,b](#)), was used to evaluate participants’ emotional coping mechanisms. We used a short version of this tool—five items from the emotional expression subscale (e.g., “I allow myself to express my feelings”) and eight items from the emotional processing subscale (e.g., “I take time to understand what I really feel”). Participants rated their answers on a 5-point Likert scale (1 = *not at all*, 5 = *very much*). A sum score was calculated for each subscale (range: 8–40). We used a Hebrew translation of this questionnaire ([Cohen and Numa, 2011](#)). This tool was found to have good internal reliability in previous studies (e.g., [Cohen and Numa, 2011](#); [Marroquin et al., 2016](#)). Internal reliability for emotional processing and emotional expression was 0.72 and 0.82, respectively ([Stanton et al., 2000b](#)). In the current study, Cronbach’s alpha was 0.94 for emotional processing and 0.93 for emotional expression.

### 2.3 Statistical analysis

Data were collected using the Qualtrics platform and later organized for statistical analysis using SPSS 27.0. Descriptive statistics and preliminary analyses were performed in SPSS. The research model was processed using a structural equation modeling path analysis with IBM AMOS 27.0, with the goal of assessing direct and indirect pathways from resilience to PTSS. The placement of the variables in the path analysis was based on the stress and coping model ([Lazarus and Folkman, 1984](#)), suggesting that the effect of resilience as a personal resource on psychological outcomes of stressful encounters is mediated via coping strategies. Six cases of missing education data were imputed using variable means. Model fit was assessed using the following indexes: chi-square and normed chi-square tests to assess the model’s overall fit and parsimony; comparative fit index (CFI), Tucker-Lewis Index (TLI), and normed fit index (NFI), which are incremental fit indexes; and root mean-square error of approximation (RMSEA) and its confidence interval (CI), which measures the discrepancy per degree of freedom and indicates the model’s absolute fit. To increase understanding of the mediation paths, the unstandardized indirect and total effects of the specific paths were evaluated using bootstrapping (5,000 bootstrap samples) via the user-defined estimands option.

### 3 Results

[Table 2](#) shows means, standard deviations, and correlations between the study variables. Mean levels of PTSS were low but ranged widely, from 0 to 70. In addition, 66% of the participants reported very low PTSD levels ( $PCL \leq 15$ ), 21% described low to subthreshold PTSD

TABLE 2 Means, standard deviations, and Pearson correlations of the study variables.

	<i>M</i> ( <i>SD</i> )	1	2	3	4
1. PTSS	14.19 (15.60)				
2. Depressive symptoms	3.57 (4.54)	0.84*			
3. Resilience	32.97 (6.66)	−0.44**	−0.43**	–	
4. Emotional processing	27.23 (7.53)	0.01	0.08	0.12*	
5. Emotional expression	15.10 (4.86)	−0.13*	−0.13*	0.29**	0.58*

PTSS, posttraumatic stress symptoms.

\* $p < 0.05$ , \*\* $p < 0.001$ .

levels ( $15 \leq PCL \leq 33$ ), and a small yet substantial minority (13%) described clinical PTSD levels ( $PCL > 33$ ). Levels of depressive symptoms were also low. Moreover, participants reported high levels of resilience, although scores varied from 0 to 40. Mean levels of emotional processing were high and substantially higher than levels of emotional expression. PTSS and depression were negatively associated with resilience. Emotional expression and emotional processing were positively associated with resilience. However, only emotional expression, which involves verbal or nonverbal efforts to express and share emotional experiences, was significantly and negatively associated with PTSS and depression. On the other hand, emotional processing, which consists of attempts to acknowledge, explore, and understand emotions, was not significantly associated with PTSS or depression.

Due to the high association between PTSS and depression and their similar associations with the other study variables, the consequent analysis was conducted only with PTSS. Prior to assessment of the direct and indirect associations among resilience, emotional-approach coping, and PTSS via path analysis, we examined what background variables should be controlled. Physical injury that occurred during army service, exposure to PTEs, and years of education were significantly associated with levels of PTSS. However, all injured participants also reported exposure to PTEs; therefore, exposure and education variables were added to the study model. The study model was examined with path analysis (Figure 1), in which emotional processing and expression were defined as mediators of resilience and PTSS, whereas injury and education were control variables. The fit indexes of the model were good:  $\chi^2(7) = 5.11$ ,  $p = 0.65$ ; NFI = 0.99, CFI = 1.00, TLI = 1.01, RMSEA = 0.00, 95% CI [0.00, 0.04]. The model showed that after controlling for exposure to PTEs and years of education (which were associated with PTSS), resilience was directly and negatively associated with PTSS (direct effect:  $b = -0.79$ ,  $SE = 0.09$ , 95% CI  $[-1.06, -0.54]$ ; total effect:  $b = -0.35$ ,  $SE = 0.04$ , 95% CI  $[-0.42, -0.26]$ ). Emotional expression and emotional processing were also directly associated with PTSS, showing a negative effect for emotional expression ( $b = -0.21$ ,  $SE = 0.16$ , 95% CI  $[-0.31, -0.12]$ ) and a positive effect for emotional processing ( $b = 0.25$ ,  $SE = 0.10$ , 95% CI  $[1.00, 0.37]$ ). Further analysis using bootstrapping indicated that the indirect and total effects for both paths between resilience and PTSS were significant (Table 3).

## 4 Discussion

The present study found low levels of PTSS and depression and high levels of resilience among veterans, along with strong negative

associations between resilience and symptoms. Moreover, these associations were mediated by emotional-approach coping. However, a distinct mediating role of each coping strategy emerged: Although both emotional expression and processing were associated with higher resilience, emotional expression mediated a positive association between resilience and PTSS, whereas emotional processing mediated a negative association with PTSS.

Like in previous studies (Fogle et al., 2020), veterans' resilience levels were found to be relatively high and their PTSS and depression levels were generally low. Because Israel constantly deals with security threats, health care experts have highlighted the importance of the ecological construct of Israeli resilience. Composed of four major systems (micro or individual, meso or family, exo or society, and macro or state), resilience in Israel exists during times of routine life and emergency—and equally importantly, in the periods between the two (Nuttman-Shwartz and Green, 2021). The relations among these resilience levels are apparently relatively strong and stable in Israel, as described by experts who have highlighted Israeli's "sense of mission" and "connectedness to others" as main resources that maintain their "inner strength, coping skills, and hope" (Corzine et al., 2017, p. 5). The findings of the current research are in line with this approach. Also, the strong association between PTSS and depression accords with previous studies (Armenta et al., 2019), suggesting that PTSD does not cover all manifestations of postservice distress and despite its centrality in the trauma discourse, represents only part of veterans' posttraumatic emotional burden. The relations between PTSD and posttraumatic depression are complex and deserve further longitudinal research.

The current study was the first to examine the role of emotional-approach coping in relation to resilience and veterans' PTSS. Structural equation modeling revealed that although both emotional-approach coping strategies were associated with higher resilience, they showed an inverse mediation effect. Emotional expression was negatively associated with PTSS, indicating that higher resilience was related to lower PTSS when connected with higher emotional expression (Van Voorhees et al., 2018; Fogle et al., 2020). This finding suggests that more use of emotional expression might enable emotions to be seen and shared with others, hence promoting relief (Stanton et al., 2000a). In line with Stanton et al.'s (2000a) findings, the analysis revealed that emotional processing was positively related to resilience but also higher PTSS. This finding suggests that higher involvement in emotional processing might increase PTSS among veterans, because it may represent a ruminative component.

Previous studies presented relations between the use of emotional-approach coping and lower levels of psychological symptoms regarding several stressful conditions, mostly concerning physical illness and physical pains (Austenfeld and Stanton, 2004;

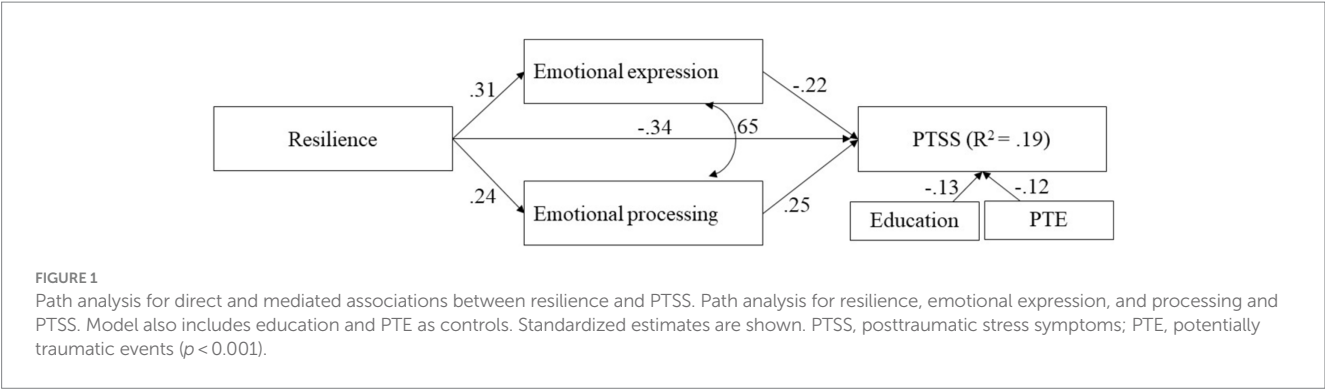


TABLE 3 Summary of total, direct, and indirect effects of resilience on PTSS.

	Effect					
	Total	Direct		Indirect		
	<i>b</i> (SE)	95% CI	<i>b</i> (SE)	95% CI	<i>b</i> (SE)	95% CI
Resilience	−0.81* (0.04)	−0.42, −0.26	−0.79** (0.09)	−1.06, −0.54		
Resilience → emotional expression → PTSS	−0.95 (0.13)	−1.21, −0.70			−1.92** (0.04)	−0.25, −0.08
Resilience → emotional processing → PTSS	−0.65 (0.15)	−0.95, −0.38			0.14** (0.04)	0.25, 0.08

CI, confidence interval; PTSS, posttraumatic stress symptoms. Unstandardized estimates are shown.  
\* $p < 0.01$ , \*\* $p < 0.001$ .

Jensen-Johansen et al., 2013; Batenburg and Das, 2014; Yeung and Chow, 2019). However, the clinical presentation of this trend seems to be more complex, with some research highlighting the fact that emotional processing’s effect may vary depending on the time since the traumatic or stressful event and how long this coping method is used (Stanton and Low, 2012; Juth et al., 2015). Similar to the present study’s findings, Hoyt et al. (2020) found that among older people, only emotional expression was related to better and more stable health outcomes over time, whereas emotional processing was related to increased depression in times of stress. Also, in support of the present study, only processing was found to be related to increased negative cognition and emotions (Watkins, 2004). These findings raise the questions of how, when, and for whom emotional-approach coping may be beneficial and whether it can be harmful in certain circumstances. A possible explanation for the sometimes-negative impact of intensive use of emotional processing is that it may foster rumination through the tendency to focus on negative emotions in a repeated manner, amplifying the consequences of those negative emotions. Rumination was found to be associated with increased symptoms of depression and anxiety and the onset of major depressive episodes (Nolen-Hoeksema and Davis, 1999; Vine et al., 2019). However, due to the correlational nature of the results, it may be that individuals with higher PTSS are more involved in emotional processing that encourages rumination.

Furthermore, veterans who presented high levels of emotional processing alongside high levels of resilience might experience resilience as a double-edged sword (Adler and Sowden, 2018). In other words, it seems that although these resilient veterans managed to process their emotions in a more thorough way alone, they were also

vulnerable. Paradoxically, the ability to process distress alone can impair the possibility of reducing that distress. This finding is an example of veterans’ radical implementation of the army’s values and culture, which encourage its members to embrace selflessness and personal courage (Adler and Sowden, 2018), which might be interpreted as contradictory to turning to others for help.

Our research contributes to the understanding of this complexity by shedding light on how these processes occur among veterans who deal with military-related traumatic stress, which is characterized by substantial avoidance of emotional sharing stemming from the nature of the trauma and the atmosphere of military service (Solomon, 2020). Because combat soldiers usually seek to live up to masculine codes of behavior and face negative stigma when these codes are not respected (O’Loughlin et al., 2020), sharing of emotions and emotional expressions of feelings seen as “soft” and “weak” is usually difficult. Understanding the nuances of this trend among veterans is of great importance, especially in light of the gap between different types of intimacy they represent. Although soldiers and veterans tend to maintain very intimate relationships with their fellow squad members, which is expressed in the ability to share significant and powerful emotional experiences related to combat and service, they often simultaneously have difficulty sharing personal feelings or moments of emotional weakness and hardship arising from these same experiences.

The fact that emotional expression mediated PTSS for veterans with high resilience levels in this study might indicate the need to encourage veterans to share their hardships via social interaction. It also supports the important role of family members and close others in such sharing initiatives, because they may foster this positive trend

and help break the loneliness cycle that sometimes traps trauma victims (Shorer et al., 2024).

## 4.1 Limitations

Our study has several methodological limitations. The research sample consisted of participants who applied to a program aiming to process combat experiences. It is reasonable to believe that they were more oriented toward emotional processing or expression of feelings than veterans who did not participate in such an intervention. Hence, our sample might be somewhat imbalanced. However, the large sample included full squads and companies from various army units. This means that people of varied backgrounds and many veterans who were not “emotionally oriented” participated in this intervention and study, and their standpoints might have balanced the sample.

Due to the cross-sectional design, the assessment of both resilience and PTSS levels should be interpreted cautiously, because the levels of these factors may change during post-trauma recovery and developmental stages (Masten, 2015). Moreover, as multilayered phenomena, both conditions should be further studied through the use of varied assessment tools and longitudinal research designs. Based on a limited cross-sectional design and only one resilience assessment tool, our study could not offer any causal interpretations or further explore distinct associations between specific resilience features and PTSS. Accordingly, this study does not permit causal inferences, and further studies using longitudinal design are encouraged. We recommend that future work on emotional-approach coping explore the relations between different emotional involvement and coping mechanisms among various trauma-exposed populations, along with studying the point at which emotional processing coping may become negative.

Despite the high rates of female soldiers in the Israeli military (Israel Defense Forces, 2013), few of them turn to military-experience processing programs, and units that use this psychological source are usually male dominated. One possible explanation for this is that female soldiers are expected to adopt “manly” trends during their service; hence, they learn to hide their emotions. Because emotional processing is the opposite of this, they might be confused by this ambiguous message (Harel-Shalev and Daphna-Tekoah, 2020). Because the current research dealt with male veterans only, its conclusions should not be generalized to female veteran populations.

## 4.2 Clinical applications

The results of the current study suggest that although resilience is a major factor in facing the effects of psychological trauma, its implementation and manifestations depend on individual coping skills. Common coping strategies should be examined in relation to the context in which they are implemented. Promoting resilience among veterans should encourage emotional expressions, and not limited to cognitive or emotional processing only. Interventions to promote the use of this strategy may include initiating social relationships, teaching stress management, and the restructuring of cognitive standpoints toward emotions (Van Voorhees et al., 2018). According to our findings, supporting emotional expression might reduce postservice emotional distress while not harming veterans' resilience levels.

## 5 Conclusion

This study explored associations among veterans' resilience levels, emotional coping mechanisms, and PTSS levels. The findings highlight the importance of emotional expressions of trauma-related reactions to enhance veterans' well-being. Further investigation of trauma survivors' specific emotional coping mechanisms is needed.

## Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, upon contacting the corresponding author.

## Ethics statement

The studies involving humans were approved by Board of Ethics, Faculty of Social Welfare and Health Sciences, University of Haifa, Israel. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

## Author contributions

SS: Conceptualization, Investigation, Project administration, Writing – original draft, Writing – review & editing. MW: Conceptualization, Data curation, Investigation, Methodology, Writing – review & editing. LC: Data curation, Investigation, Writing – review & editing. DM: Conceptualization, Writing – review & editing. MC: Conceptualization, Data curation, Investigation, Methodology, Supervision, Writing – original draft, Writing – review & editing.

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## Conflict of interest

DM serves as the clinical director of B'Shvil, a non-governmental organization which provides veterans with Nature-Assisted group interventions for processing post military-related stress.

The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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# Experiences of Afghan-Canadian language and cultural advisors who served with Canadian forces abroad: an interpretive phenomenological analysis

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Though much research has been conducted on the potential well-being effects of deployment on armed forces members, a significant gap seems to exist in the literature when it comes to its effect on conflict-zone interpreters. Drawing on the experiences of six former Afghan-Canadian Language and Cultural Advisors (LCAs), this paper aims to contribute to expanding the nascent literature on conflict-zone interpreters by exploring how former LCAs perceive their experiences before, during, and after their deployment and the resulting impacts on their well-being. Interested in an in-depth exploration of the experiences of former LCAs, this study employed an interpretive phenomenological analysis (IPA) approach. Through the analysis, four superordinate themes emerged in participants' narratives including: (1) the right opportunity, referring to the reasons for becoming an LCA; (2) overcoming challenges, when it comes to the work itself; (3) deserving better, relating to the experience returning to post-service life; and (4) moving forward, speaking to the current reality of participants. The results reveal key insights into the unique experiences and support needs of former Afghan-Canadian LCAs included in the study, offering an in-depth account of their experience before, during and after their service. The findings also offer important considerations regarding the support available not just to interpreters but to all contractors deployed in conflict-zones.

## KEYWORDS

Interpreters, veterans, conflict-zone, Afghanistan, language and cultural advisors, LCA

## 1 Introduction

As long as there has been human conflict, there has been a need for language brokering (Ruiz Rosendo and Persaud, 2016). Without a way to communicate, “conflict would still be possible, but not its resolution, because no one would know what the other is aiming at” (Tälpaş, 2016, pp. 242). Described by some as “oral translation of a spoken text” (Giles, 1998, p.40), interpretation can extend far beyond this definition when it comes to conflict-related

contexts where interpreters have always played a vital yet often overlooked role (Hoedemaekers and Soeters, 2009; Ruiz Rosendo and Persaud, 2016; Tälpaş, 2016). During conflicts, interpreters have been asked to hold many roles such cultural mediators providing advice on local culture and customs, intelligence-gatherers, and sometimes even soldiers (Guidère, 2008; Hoedemaekers and Soeters, 2009).

Frequently coming from unrelated jobs, many conflict-zone interpreters can be considered “accidental linguists” (Baigorri-Jalon, 2010, p.21); they became interpreters simply due to their functional knowledge of a relevant language, often times with minimal or no training (Baigorri-Jalon, 2010; Ruiz Rosendo and Persaud, 2016; Ruiz Rosendo and Todorova, 2022). Despite limited research on conflict-zone interpreters, various categories have emerged including military linguists, humanitarian interpreters, and contract interpreters (Allen, 2012). Military linguists, called military interpreters by others (Snellman, 2014, 2016; Méndez Sánchez, 2021), are trained military personnel who also act as interpreters (Ruiz Rosendo and Todorova, 2022). For these individuals, it is not uncommon for them to see themselves as soldiers first and interpreters second (Kelly and Baker, 2013; Snellman, 2014). Humanitarian interpreters, on the other hand, are those who work with news and international aid organizations (Allen, 2012). Lastly, contract interpreters provide most of the interpretation services in conflict-related contexts (Allen, 2012). Contract interpreters include two separate groups: locally recruited individuals who reside near the base - called local interpreters - and national interpreters who have been living in the country from which armed forces deployed but have a knowledge of the local language (Hoedemaekers and Soeters, 2009; Allen, 2012; Ruiz Rosendo and Persaud, 2016). While national interpreters is the term used by some countries such as the Netherlands (Hoedemaekers and Soeters, 2009), other countries have different titles to represent this same group – such as Language and Cultural Advisors (LCAs) in Canada (Lick, 2019).

A great deal of research has been conducted exploring the potential well-being impacts of deployment to conflict-zones for members of armed forces (Rebeira et al., 2017; Simkus et al., 2017; VanTil et al., 2018; Thompson et al., 2019), however literature on the impacts for interpreters remains scarce (Ruiz Rosendo and Todorova, 2022). Studies examining interpreters across different settings (such as in healthcare, legal, and humanitarian contexts) discuss the association between exposure to vicarious trauma – described by the British Medical Association (2022) as “a process of change resulting from empathetic engagement with trauma survivors” – and the potential effects on interpreter well-being (Geiling et al., 2021, 2022). Given that interpreters channel potentially traumatic content, this empathetic engagement with the content has been linked to consequences such as increased psychological strain, burnout, and compassion fatigue (Lai and Heydon, 2015; Daly and Chovaz, 2020; Geiling et al., 2021; Ruiz Rosendo and Todorova, 2022). In the case of war and conflict-zones, considered “the epitome of trauma” (Barnardi, 2022, p.199) by some scholars, the interpretation of potentially traumatizing content is merely one of the many possible sources of trauma (Tälpaş, 2016).

Through interviews with former interpreters who worked in either Croatia or Bosnia-Herzegovina, Barnardi (2022) categorized potential trauma-related sources of interpreting in a conflict zone into three categories: factors related to the context of the work, those related to the job itself, and those related with the content of the work. Further to the potential for vicarious trauma described above, factors

related to the content translated have been associated with long-term health effects such as posttraumatic stress disorder (PTSD) (Barnardi, 2022). Job-related trauma factors include the working conditions interpreters live through while carrying out their duties (e.g., weather, job security, available supports etc.) (Barnardi, 2022). Lastly, context-related trauma factors relate to the fact that interpreters are not solely translating the conflict but also experiencing it (Barnardi, 2022). It has been suggested that some context-related factors may be unique to interpreters, and especially traumatic, in situations where they are considered and/or consider themselves to be working for the “other” side (Bos and Soeters, 2006; Barnardi, 2022). In these cases, some researchers suggest that having ties to two separate groups while trying to balance both – the military they work with and the locals they are in contact with – leads to their group ties being “tortured” (Bos and Soeters, 2006; Hoedemaekers and Soeters, 2009). This has been mentioned, among others, in relation to contract Afghan interpreters during the mission in Afghanistan, (Bos and Soeters, 2006) in which Canada was involved.

In response to the events of September 11, 2001, Canadian Armed Forces (CAF) joined other countries in conducting operations in Afghanistan, sending around 40,000 members over more than 12 years in the country (Government of Canada, 2018). Although Canada’s combat role in Afghanistan ended in 2011, members of the CAF remained in the country training Afghanistan’s army and police force until March 2014 (Veterans Affairs Canada, 2019). During this time, the CAF relied on Afghan contract interpreters, including approximately sixty-five Afghan-Canadian citizens who deployed and accompanied soldiers outside the wire working as LCAs (Brewster, 2019) where they were exposed to potentially traumatic events (Lick, 2019). Considered civilian contractors, LCAs did not have the same access to supports and services upon their return as soldiers with whom they were deployed (Veterans Affairs Canada, 2015).

The literature on conflict zone interpreters is still nascent with only few studies exploring their experiences. There are even fewer publications exploring interpreters’ experiences transitioning back to civilian life after the conflict, and the lasting well-being impacts of their work. This is especially true of LCAs who worked with the CAF in Afghanistan. Drawing on the experiences of six former Afghan-Canadian LCAs, this paper aims to contribute to expanding this nascent literature by exploring how former LCAs perceive their experiences before, during, and after their deployment and the resulting impacts, using a qualitative research approach.

## 2 Materials and methods

### 2.1 Study design

Interested in an in-depth exploration of the experiences of former LCAs, this study employed an interpretive phenomenological analysis (IPA) approach (Smith, 1996; Smith and Shinebourne, 2012). With theoretical links to phenomenology, hermeneutics, and idiography, IPA as an analytical process is concerned with how individuals make sense of their individual experiences (Smith and Shinebourne, 2012; Pietkiewicz and Smith, 2014). With IPA, the researcher is attempting to interpret the participant’s experience while they themselves are making sense of it (Smith and Shinebourne, 2012); leading Smith and Osborn (2003) to describe the process as a “double hermeneutic”

(Smith and Osborn, 2003). Beyond the scope of this paper, further information on the origins and history of IPA is available in Smith (1996) and Smith and Shinebourne (2012).

The researchers assembled an advisory committee as part of the project, to provide insight and guidance on the study and its procedures. The advisory committee included individuals with lived and living experience related to the topic of this research. Advisory members were involved as partners across multiple aspects of the study including building the protocol, reviewing the interview guide, assisting with recruitment of participants, and informing dissemination of findings.

## 2.2 Participants and data collection

Participants in this study included a purposive sample of six former LCAs who worked with the CAF in Afghanistan. In-line with the IPA approach, the authors aimed to get accounts from enough former LCAs to be able to identify differences and similarities in experiences, while still being able to fully appreciate each account through an in-depth case-by-case analysis (Smith and Shinebourne, 2012; Pietkiewicz and Smith, 2014). Members of the study's advisory committee and others with existing connections to the LCA and Afghan community initially approached potential participants and invited them to connect with the researchers. Participants were eligible to participate if they were capable of conversing in English, were 18 years of age or older, and self-identified as having formerly worked as an LCA with the CAF in Afghanistan. Ethics approval was obtained from the Research Ethics Board at the University of Ottawa Institute for Mental Health Research (IMHR-REB #2021029). All participants provided informed consent.

Participants completed a brief online demographic survey with questions about themselves, their work as an LCA, and their self-rated health. Following the survey, participants were invited to participate in one-on-one, semi-structured interviews (interview guide available in Appendix A). Two of the authors (GD and JMM) conducted the interviews. Participants were asked about their life prior to working as LCAs, reasons for becoming LCAs, and their experiences during and after their work with the CAF in Afghanistan. Due to the context of the COVID-19 pandemic, interviews were conducted either through a professional Zoom account or over the phone, with participants having the flexibility to participate in the interview from an environment of their choosing. With participant consent, interviews were audio-recorded and transcribed for future analysis.

Interviews lasted between 26 and 62 min and were conducted between November 2021 and July 2022. Due to technical issues with audio, one interview had to be done a second time, which may have affected the experiences shared by this participant. In order to protect their identity, generic labels are used in this manuscript when referring to participants.

## 2.3 Data analysis

Analysis of the data, completed in NVivo analysis software, followed a similar process as that described by Smith and Osborn (2004). Immersing themselves in the data, two of the authors (JMM and VC) read and re-read the first transcript independently, making

notes of their observations and reflections (Smith and Osborn, 2004; Smith and Shinebourne, 2012; Pietkiewicz and Smith, 2014). Emergent themes were then identified, clustered, and discussed between the two authors. The themes from the first transcript were then used to help orient the analysis of the second transcript. The themes were updated as necessary, respecting the divergences and convergences in the data (Smith and Osborn, 2004). This process continued until all transcripts were analyzed, and a final table of superordinate themes was created (Smith and Osborn, 2004). One last analysis of each transcript was completed using the final table of themes (Smith and Osborn, 2004).

## 3 Results

The study procedures resulted in a total of six in-depth interviews with former LCAs. This sample size is consistent with the IPA approach and its aim to give a full appreciation to each individual participant's account (Smith and Shinebourne, 2012; Pietkiewicz and Smith, 2014). All participants were males who had immigrated to Canada before 2002.

Concerning their work as LCAs, participants started working for the CAF between 2006 and 2009 and left Afghanistan between 2010 and 2011. They worked an average of 6.2 deployments (range 3–9) over an average of 3.8 years (range 1–5). Further participant demographics are not presented to protect participant identity. Participants' self-rated mental health varied between Fair and Poor (Table 1).

Through the analysis, four superordinate themes emerged, corresponding to different phases of their experience: (1) the right opportunity, (2) overcoming challenges, (3) deserving better, and (4) moving forward (Table 2).

TABLE 1 Self-rated health, mental health, and transition difficulty.

Variable	Count
Self-rated general health	
Excellent	0
Very good	0
Good	1
Fair	1
Poor	3
Self-rated mental health	
Excellent	0
Very good	0
Good	0
Fair	2
Poor	4
Transition difficulty	
Very difficult	5
Moderately difficult	1
Neither difficult nor easy	0
Moderately easy	0
Very easy	0

TABLE 2 Superordinate and sub-themes.

Superordinate theme	Sub-theme
1. The right opportunity	i. For Canada and Afghanistan ii. Features of the job iii. Potential outcomes
2. Overcoming challenges	i. Lack of preparation ii. Working in a conflict-zone iii. Contractors in a military environment
3. Deserving better	i. Abandonment ii. Neglected, used, and betrayed iii. Not as before
4. Moving forward	i. Lasting impact ii. Making things better for others

3.1 The right opportunity

Participants were asked to share the reasons behind their decision to become an LCA. Their pre-LCA narratives tended to focus on their backgrounds as immigrants to Canada, motivations, and descriptions of the job itself, which together offered the right opportunity. Three distinct sub-themes emerged from these narratives: (i) for Canada and for Afghanistan, (ii) features of the job, and (iii) potential outcomes.

3.1.1 For Canada and for Afghanistan

Traversing all interviews was a shared sense of dual loyalty, both to Canada and to Afghanistan. Aply captured by Participant 11 in describing their decision to become an LCA: “one is my birthplace and one is the place who helped me to live.” This dual loyalty was an important factor, with many viewing the role as an opportunity “to go out and help both nations” (Participant 6). For example, Participant 10 expressed similar notions when explaining his decision:

*Think about it, I was born in Afghanistan and my family still lived in Afghanistan and then I was a citizen of Canada. My children were born in Canada. So, now, you know, we were against beating up on Afghan people, and they were beating us [...] for me it was brother killing brother, you know? And it was very important for me to be there and to do my part to save both sides. (Participant 10)*

For some, there was an added desire to ‘give back’ to Canada for bringing them into the country. Participant 11, for example, explained: “I left Afghanistan and I went to Pakistan, Iran, India and so many countries. And finally, I came to Canada and Canada accepted me as her citizen and I wanted to pay back.” Another participant detailed similar sentiments following community encouragement:

*We had, in our community, at that time we had like everyday announcement. It was announcing that Canadian, the Canadian government, the Canadian Armed Forces desperately needed help [...] community members were encouraging people to go and help out the Canadian Armed Forces in Afghanistan. And then, I decided that, okay, you know, that everything that Canada had done to me, this was the time to pay back. So, let's get up and go and do that. (Participant 4)*

3.1.2 Features of the job

Participants highlighted additional factors related to the job itself, which made becoming an LCA the ‘right opportunity’ for them. While there was diversity in their professional and educational backgrounds, none had worked as an interpreter prior to becoming an LCA. Their unique knowledge and backgrounds as Afghan-Canadians, however, made them feel qualified for the work and, for some, motivated them to apply. In describing their decision-making process, Participant 4 reflected on how “[...] not a lot of people were entitled or were able to go do that, you know, language skills, you know. Have the language skills, and go to the war zone [...].” Another participant highlighted their cultural knowledge of both nations and how this influenced their decision:

*Based on those, you know, experiences that we had, the knowledge we had, I totally understood that it was one of the most important things to do for both Afghans and Canadians...You know, we understood the language, we understood the culture and the political systems and the history [...] There's a language that anybody can learn to speak but there's a culture. You know, when you speak a sentence in English, there is a culture behind it. You speak a sentence in French, there is a whole culture behind it. So, that intricacies, cultural intricacies were very important for us. And that's really why I joined to go back to Afghanistan. (Participant 10)*

For others, like Participant 11, the primary motivator was that working as an LCA was “a job” and could help pay their bills. Although participants were not directly asked about their immigration experience, some highlighted struggles such as learning English and affording the cost of living. Participant 3, for instance, highlighted financial motivations for himself and others, speculating, “[...] everyone, when they went down there, there was no other [...] option or, they had made the decision because of the financial situation.”

3.1.3 Potential outcomes

When reflecting on their decision and the opportunity presented to them, a number of participants touched upon the broader outcomes and wider meaning of the work of an LCA. For them, the opportunity presented was one to make a difference in the lives of others. These outcomes included safety and security of CAF members, connection between the CAF and Afghan people, shared cultural awareness, and peace for Afghanistan.

Participant 11 captured some of these sentiments in recounting and reflecting upon their decision to “work side by side with the Canadian military soldier.” In particular, he described how he wanted “...To save [CAF members'] lives; to show—to tell them about the culture, [...] of Afghan; what they should do; what they should not do, and where is the danger and how they prevent that danger...” as well as “to bring some change to Afghanistan.” Another participant expressed similar sentiments:

*...when I heard that the Canadian Forces, they needed the support of some people, Canadians, Afghan-Canadians, who could help them with the communication with Afghans while they had the mission in Afghanistan. So for me, it was like a double-positive opportunity, like, to help Canadian Forces or Canada on the one side and also to help Afghanistan [...] to reach a point that there will be peace and prosperity over there. (Participant 2)*

## 3.2 Overcoming challenges

Participants were asked to describe their experiences of working as an LCA, including any positives or negatives from that experience. While describing the situation they experienced as LCAs for the Canadian Armed Forces in Afghanistan, three sub-themes emerged as they spoke about the challenges they overcame: (i) lack of preparation, (ii) working in a conflict-zone, (iii) civilian contractors in a military environment.

### 3.2.1 Lack of preparation

Among participants, there was a shared feeling that they had not been adequately prepared for what they had stepped into: “[...] *they put me in a vehicle and we went towards the front line. [...] I was kind of scared that day, you know. I thought we would go inside the base and stay there.*” (Participant 4).

From lack of training before deployment, to lack of understanding of what was going to be expected of them, participants felt more could have been done before being sent to Afghanistan with CAF members. Despite this lack of preparation, participants rose to the challenge and adapted to fulfill the many tasks expected of them. Participants described fulfilling many roles while deployed, some of which were outside of the scope of a traditional interpreter. These included advising on the mission, advising on local culture, being a voice of reason in heated and difficult situations, communicating with the local population, and also being an advocate for Canada. Participant 3 highlighted the importance of their presence explaining: “*We were their eyes; we were their ears; we were their tongue. Without us, they could not, you know, could not go one step forward.*”

### 3.2.2 Working in a conflict-zone

As their work required them to follow CAF members outside the wire – or outside of the base – participants were exposed to and witnessed many difficult situations associated with conflict-zones first hand. Seeing dead bodies, including some of their friends, living through suicide bombings, rocket attacks, ambushes and improvised explosive devices (IEDs), participants described many potentially traumatic situations usually only thought of when thinking of serving military members.

*And you are a witness. Witness somebody kill [in] front of you, your friend, your colleague is killed by a known enemy inside Afghan garrison, in the Afghan military base [...].* (Participant 11)

As difficult and potentially traumatic as the situation they were put in was, participants were still able to see the positive of their experience as they had found something that gave them purpose. When asked if there were any positives from their experience, most mentioned knowing that regardless of what they lived through, they felt like they had made a difference through their work. This sentiment is summarized aptly by Participant 10: “[...] *imagine if we were not there.*”

### 3.2.3 Civilian contractors in a military environment

The last sub-theme identified relating to overcoming challenges was the experience of being a civilian contractor, especially one who goes outside the wire in a military environment. All participants

described some unique situations they experienced because of being civilians, however, some had more positive outlooks on these experiences than others. While some felt respected and valued for their contributions, others like Participant 2 felt like they were never quite accepted: “*So, the major thing is that despite providing all the information and the intelligence and working with them, I never felt I had been trusted.*”

Although many comparisons can be made between the experiences of armed forces members and LCAs outside the wire, the uniqueness of the situation for conflict zone interpreters cannot be ignored. When describing being attacked and asking armed forces members for a weapon to defend himself, Participant 3 recounts his experience of having to sit and wait to find out what fate was awaiting him:

*Everybody had a weapon to defend themselves, but I didn't have anything. [...] [I said:] “I don't want to get captured by Taliban”. They didn't, they didn't give me that. They were not allowed to give me [a weapon]. They told me just, “you stay in this tent and lay down. We go fight. What happens, happens”. And you are waiting for when Taliban comes and gets you and torture you and kill you. So, what kind of experience is that going to be?*

## 3.3 Deserving better

While most participants took away some positives from their experience working as LCAs, the same cannot be said about their experience transitioning back into post-service life. When asked to speak about this period, three sub-themes emerged in the narratives speaking to the feeling of deserving better than what they experienced: (i) abandonment, (ii) neglected, used, and betrayed, and (iii) not as before.

### 3.3.1 Abandonment

Putting themselves in harm's way as LCAs, participants expected their country to be there for them upon their return, as it had been once before. Once they came back however, they were met with “*nothing, nothing, nothing. Not even a telephone call. Not one single telephone call*” (Participant 2). This led participants to experience a difficult transition back to post-service life, with a feeling of having nowhere to turn to for support:

*When I came back from Afghanistan after the deployment, it was very difficult to adjust to civilian life, plus the PTSD kicked in and there was absolutely nowhere for us to turn, nowhere to go and no how.* (Participant 10)

Having worked side-by-side with CAF members while in Afghanistan, participants considered they too served their country and could not help but to compare the situation they were faced with, and what they lived through, to their former colleagues. Knowing about the supports and services available to CAF members and CAF Veterans, participants failed to understand why these same services were not available to them.

*They had the facilities. They had safeties for the soldiers. For the soldiers and officers, but we were in the same situation, in the same*

*condition, but they didn't have those facilities. They didn't give us any advice. They didn't give us any, any, any kind of things. They just forgot about us when we came back. (Participant 3)*

While participants mentioned eventually consulting a healthcare professional, sometimes many years after their return, the results were mixed and in some cases, no follow up was provided.

*Despite they realized that I had PTSD, and despite they realized that I had depression and I was suffering from extreme anxiety, there is nothing. Like, nothing comes up. It's just about—it's all about talks. (Participant 2)*

They were faced with the reality that the devotion they had toward the country they were calling home was not reciprocated, leaving them feeling neglected, used, and betrayed.

### 3.3.2 Neglected, used, and betrayed

In some way, all participants shared a feeling of betrayal or abandonment. Reflecting on their overall experiences, the abandonment they experienced led to a perceived betrayal, which was more significant in terms of impact on participants than anything they experienced while working in the conflict-zone. This sentiment is illustrated by Participant 10: *"The hardest part was not so much the war but the neglect, the absolute neglect [...] That was really hurtful."*

Transition to post-service life and the repercussions of their experiences was uncharted territory for participants and they were once again faced with a situation for which they felt unprepared. As had occurred when they joined the Canadian Armed Forces as LCAs, participants had an expectation that they would, at least initially, be guided through this new situation by an authority who knew, or should have known, the potential repercussions of their experiences. As illustrated by Participant 2, part of the feeling of betrayal originates from a sense that those who sent them into a conflict-zone knew of the potential consequences and still chose to provide no support: *"And there was no help, no support, nothing, while they knew that I would have been affected by what I went through."*

Another part of the betrayal felt by participants is related to the lack of follow up or acknowledgement, even privately, for their contribution to the mission in Afghanistan. Most participants felt abandoned and used, with no one seeing how they were coping after their return:

*Forget about the other thing, even we were not deserve for a call, or a telephone call, "How are you?" It's very simple. [...] They didn't! They didn't. [...] We were dropped like a garbage. We were garbage, and garbage, and the garbage that cannot be recycled. (Participant 11)*

This experience led some participants to question how this betrayal was even possible: *"What is going on? Are we, are we human beings or not? Are we Canadian or not?" (Participant 3).* The combination of participants' experiences outside the wire and transitioning back to post-service life had repercussions on all aspects of their lives and well-being.

### 3.3.3 Not as before

Speaking to the impacts, participants linked the sum of their experiences described above to repercussions on many different

domains of their lives. If not explicitly, all participants expressed living with post-traumatic stress disorder (PTSD) or related symptoms such as sleep disturbances: *"It's always, I mean, for the past couple of years, like, I have almost no sleep at night. Maybe I have, like, a few hours, you know, at the beginning of the night and then I am up always until, like, 4 or 5 am" (Participant 4).* Other direct repercussions mentioned by participants included depression or anxiety, chronic pain, irritability, loss of life enjoyment, and financial issues due to inability to find and keep a job. For some participants, these impacts were exacerbated by the fact that their ties to their community and families had also been broken as a result of their work.

*I realized that, basically, the community that I was basically involved in actively before I went for the mission, before the deployment, they didn't take me in as a member because most of the people here, they believed that I betrayed the—basically, my country, helping the invaders. They are many who think like that. (Participant 2)*

*When I came home, I found out that, still, after two years, I don't feel I am part of this family, and part of this house. I'm in a small room, sitting alone. Cooking for myself. Going in, uh, just, just, go every, in the morning, even in the morning, I'm not going anywhere. [...] I think they turn against me. They think I turned against them. And, and this situation, they destroyed my life, destroyed my family life. (Participant 3)*

Even for participants whose ties were still intact, they spoke to how their experiences reverberated across their connections in some way. For some, this meant not being able to communicate with them anymore:

*[...] I didn't know like, what should I say it's not confidential, what should I say is confidential. [...] I couldn't say anything about my experiences up there, and I was just inside of me... I think that was the main cause of my problems. (Participant 6)*

For others, this was seeing their loved one living with the consequences of their experiences:

*The truth is that they are naturally affected when they see their father or their partner, you know, can't sleep or can't take a shower by himself [...] And I would have panic attacks so I would call my partner and say, "Leave your job. Come to me because I am dying." I mean, that affects my family, that affected everybody. (Participant 10)*

The combination of these impacts led some participants to feel as though everything they knew before working as LCAs, including themselves, had been broken.

## 3.4 Moving forward

Faced with the challenge of adjusting to a new reality while trying to manage their experiences as best they could, participants needed to pick up the pieces of what was their pre-service life and try to move forward. Speaking to their current reality, participants discussed how their experiences still affected them today and how things could be improved moving forward. While all participants were at a different

point in their journey to recovery, two sub-themes emerged from the narratives: (i) lasting impact and (ii) making things better for others.

### 3.4.1 Lasting impact

Most participants who were interviewed were still early in their recovery journey, living with the lasting impacts of their experiences, waiting for the support they feel they need and deserve. This ranged from being unable to work for some “unfortunately, I cannot work. I cannot do anything. It’s very, you know, a very bad situation” (Participant 4), to feeling like “there is a burden, like I carry on my shoulder. The life is a burden I carry on my shoulder” (Participant 3) for others.

Many years later, the fact that still, “there is no help facility available [...] there is no financial availability. There is nothing.” (Participant 11) has led to a lasting sense of resentment in most participants. On the other hand, those participants who seemed to be further along in their recovery felt that to get there, they had to take their recovery into their own hands. They could not, however, have done it without the support of those around them: “I have a good partner [...] she was the greatest asset to me” (Participant 10).

### 3.4.2 Making things better for others

When asked to provide recommendations based on their experiences, all participants indicated that one of the most important aspects would be to provide any sort of support or follow up, but specifically the same types of well-being supports received by the CAF members with whom they served and their families:

*Number one, it would have been very important, like, if they had a resource available or had access the same resources. Okay, look, let me give you an example. When a soldier is killed in Afghanistan or anywhere else in the world, his family has access to psychiatrists and psychologists in the army or in the Canadian Forces. [...] But to me, when we lost our comrades, our people who we served with day and night, and then we saw the same thing, we saw—we were shot at, we were blown up, we were suicide bombing and everything like that. We repatriated those people, but we come to Canada and there is absolutely nothing? (Participant 10)*

The importance of including families in the supports could not be understated by participants and for some, having someone talk to their families was mentioned as what would have been the most important thing upon their return. Expanding on the resources and supports that participants believed would have been helpful, they mentioned that access should be available immediately after their return, including support for financial and work-related impacts, and be provided by trained healthcare professionals with the proper clearance. The level of clearance was the only potential barrier to accessing supports mentioned by any of the participants, and especially important for Participant 6:

*The only thing was, all that was stopping me from anything, to come up is the level of secrets that go around that our job requires us to do, so. And, there was some medical officer who I could not even tell him anything, because he didn’t have the clearance level that we had.*

Despite the fact that all participants were former LCAs, they did not limit their recommendations to LCAs only. Rather, some made

recommendations that extended to all civilian contractors: “when somebody is sent to the battlefield and he work in the battlefield, does not matter—he’s LCA, language, cultural advisor or he has other job like intelligence and so and so, he must receive the same benefit as a soldier [...]” (Participant 11) Overall, the main sentiment included in all participants’ narratives was summarized by Participant 6 in that: “as a Canadian, as a human being that returned back, you are sending, if you are sending people away, when they come back, you should take care of them.”

## 4 Discussion

This study explored the experiences of former LCAs who served with the CAF in Afghanistan from their pre-service background to current day impacts. Hired as civilian contractors, these LCAs were not members of the CAF. In line with the available literature on conflict-zone interpreters, participants in this study had no previous experience with interpreting and became LCAs with limited training, due to their functional knowledge of Pashto and Dari languages (Baigorri-Jalon, 2010; Ruiz Rosendo and Persaud, 2016; Ruiz Rosendo and Todorova, 2022). Mostly shared when referencing pre-service reasons to become LCAs, many participants in the current study mentioned having ties to both Canada and Afghanistan. This situation has been discussed in the literature as having the potential to lead to especially traumatic situations over the course of interpreters’ work (Bos and Soeters, 2006; Barnardi, 2022). Contrary to what could be expected based on the limited literature, however, these multiple ties were not mentioned by participants as a cause for potentially traumatic experiences; only as a reason for agreeing to become an LCA.

As mentioned in a 2013 RAND Corporation report, although contractors are not supposed to engage in any offensive combat, this does not preclude them from being exposed to many of the same situations as serving military members (Dunigan et al., 2013). In terms of experiences while in the conflict zone, as previously mentioned, a recent study on interpreters categorized potentially traumatic experiences as relating to the context of the work, the content of the work, and the job itself (Barnardi, 2022). Experiences described by participants in this study while in Afghanistan can be considered using these same categories. Context-related factors mentioned in the literature, such as constantly fearing for their own lives and living in besieged cities, were also discussed by participants in the current study corroborating existing literature (Barnardi, 2022). Similarly, job-related factors mentioned by participants such as adverse temperature conditions, working long hours without pause, and traveling in hostile areas also align with experiences of conflict-zone interpreters in the literature (Barnardi, 2022). Of note, there are important divergences in terms of content-related factors for this present study compared to other literature.

Although much of the available literature on interpreters focuses on the potential for vicarious trauma through the content of what is interpreted and the resulting consequences (Lai and Heydon, 2015; Daly and Chovaz, 2020; Geiling et al., 2021; Ruiz Rosendo and Todorova, 2022), the actual interpretation of content was not mentioned by present study participants as being traumatic. Instead, the majority of described potentially traumatic situations related to more “traditional combat stressors” (Watkins, 2014, p.9). These traditional combat stressors, such as death and violence, have been

linked to mental health problems in CAF and other military members (Sareen et al., 2007; Bouchard et al., 2010; Thompson et al., 2019). Other potentially traumatic experiences shared by participants included feeling unprepared and uncertain, and feeling “othered” and isolated. Lack of unit cohesion and mission uncertainty has also been highlighted in studies on serving military members, including CAF members (Watkins, 2014). The uniqueness of the potentially traumatic experiences mentioned by the participants in this present study, which contains both similarities and differences to experiences of traditional interpreters, as well as experiences of serving military members, suggest that national conflict-zone interpreters, like LCAs, are in a unique situation where they cannot only be considered one or the other. Rather, future research is needed to develop tailored supports and services for this group.

A significant gap identified in the literature related to national interpreters' experiences upon their return. Few studies, if any, seem to exist on the transition period from service to post-service life for national interpreters – especially LCAs. Studied in military members, this transition period has been highlighted by scholars as a period where the need for services and support is the highest (Thompson et al., 2017). As highlighted by participants in the present study, very little support seemed to be available for LCAs during this crucial transition time. The absence of services and supports led to further consequences, creating feelings of abandonment and betrayal that was, and are still, felt by participants. Of note, this feeling of betrayal from an authority has been previously linked to the concept of moral injury (Shay, 1991; Shay, 2014). Described in the military and Veteran population as a “betrayal of what is right, by someone who holds legitimate authority, [...] in a high stakes situation” (Shay, 2014, p.183), the concept of moral injury may also be relevant to the LCA population upon their return from deployment. Based on participants' narratives, this feeling of betrayal may be even more impactful on their well-being than their experiences while deployed. Future research should specifically explore moral injury in former LCAs, to better understand this nuanced experience.

Further consequences mentioned by participants stemming from the entirety of their experiences as an LCA included PTSD, chronic pain, and depression. This supports other literature on the impacts of deployment on contractors, which indicate that deployments to combat theatres have implications for both physical and mental health (Dunigan et al., 2013). Further, the results of this study support the finding that many contractors are not getting the support they need to cope with their experiences (Dunigan et al., 2013). Although the referred literature did not include contract interpreters, the results of the current study suggest that the findings from that report could also reflect the LCAs who deployed with the CAF in Afghanistan.

The authors of this paper acknowledge several limitations. The first relates to the sample of participants. Individuals with existing connections to the Afghan-Canadian community recruited all participants for this study. The authors recognize that this method of recruitment may have led to a sampling bias based on the individuals who conducted the outreach however, the authors attempted to minimize this bias by connecting with as many different individuals possible for this recruitment strategy.

A second limitation is the language of the interviews. Although all participants worked as interpreters and could converse in English, English may not have been their first language. Potential language

barriers may have influenced the responses shared during the interview.

A final limitation of the study is the small sample size ( $n=6$ ). Nonetheless, the population of interest (Afghan-Canadian LCAs) includes approximately sixty-five individuals (Lick, 2019) in total, meaning that approximately 9% of the total population of interest was represented in this study. Even if the experiences reflected in this paper are limited to a small sample and cannot be considered representative of all former LCAs, they still raise important implications for the availability of supports available for Canadian LCAs, and all Canadian civilian contractors moving forward. Further research with larger samples may be necessary to access the full perspectives of former LCAs, especially to guide future program or policy development, which may lead to other themes and perspectives.

## 5 Conclusion

This paper expands on the nascent literature on national contract interpreters by presenting an analysis of the experiences of six former Afghan-Canadian LCAs. The results reveal key insights into the experiences and support needs of former Afghan-Canadian LCAs included in the study, offering an in-depth account of their experience before, during and after their service. The results also suggest that the experience of working as an LCA with the Canadian Forces had a considerable impact on participants.

Although the findings may not be representative of all former LCAs, the findings offer important considerations regarding the support available not just to interpreters but to all contractors deployed in conflict-zones more broadly. Given the inevitability of future conflicts and the unique experiences shared by participants, further research is needed on national interpreters from all conflict zones, especially LCAs, in order to identify the optimal resources required to support them throughout their work and their transition back to post-service life.

## Data availability statement

The raw data from this study will not be made available as this is a qualitative study based on interviews. The full interview transcripts contain identifiable information and sharing the transcripts would threaten participants' anonymity.

## Ethics statement

The studies involving humans were approved by the Research Ethics Board at the University of Ottawa Institute for Mental Health Research. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

## Author contributions

J-MM: Conceptualization, Formal analysis, Investigation, Methodology, Writing – original draft. VC: Formal analysis, Writing – original draft. GD: Conceptualization, Investigation, Methodology, Writing – review & editing. SM: Conceptualization, Writing – review & editing. YF: Conceptualization, Writing – review & editing. TL: Conceptualization, Writing – review & editing. FH: Conceptualization, Methodology, Writing – review & editing.

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## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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## Supplementary material

The Supplementary material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fcomm.2024.1279906/full#supplementary-material>

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# Posttraumatic stress disorder and its associated factors among people living in Dabat district, northwest Ethiopia

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**Background:** The conflict between the Ethiopian government and the Tigray People's Liberation Front (TPLF) in the Dabat district of Ethiopia has led to significant civilian casualties, instances of rape, sexual abuse, and property theft. These traumatic events contribute to the development of post-traumatic stress disorder (PTSD) among local residents. However, there is currently no available data on the prevalence of PTSD and its associated factors in this region. This study seeks to fill this gap by assessing PTSD prevalence and identifying related factors among residents of the war-affected Dabat district in northwest Ethiopia.

**Method:** A community-based correctional study was conducted in the Woken and China kebeles of Dabat district, northwest Ethiopia, spanning from July 13 to September 19, 2023. A total of 410 participants were selected using systematic random sampling, making a 100% response rate. The study utilized an interviewer-administered questionnaire, which included the Post-Traumatic Stress Disorder Checklist (PCL-5) to assess PTSD. The research investigated the association between PTSD and various demographic and psychosocial characteristics using both bivariate and multivariable binary logistic regression analyses. Statistical significance was set at a P-value of 0.05.

**Results:** The majority of participants in the study were male (62%) with a mean age of 33 (± 1.67) years. The overall prevalence of PTSD was 30.7% (95% CI: 26.6–35.10). Multivariable logistic regression analysis identified several factors significantly associated with PTSD: symptoms of depression (AOR=3.5; 95% CI: 1.13–6.89), age between 45 and 67 years (AOR=1.68; 95% CI: 1.04–5.78), experiencing stressful life events (AOR=1.63; 95% CI: 1.05–7.86), experiencing sexual abuse or rape (AOR=1.53; 95% CI: 1.07–6.75), chewing khat (AOR=1.48; 95% CI: 1.08–4.56), being female (AOR=1.43; 95% CI: 1.13–3.67), and having an income of 34.6 USD (AOR=1.28; 95% CI: 1.07–4.67).

**Conclusion and recommendation:** This study reported that the prevalence of PTSD was high. As a result, the study suggested that governments and other stakeholders should be involved in implementing efficient interventions and quick measures to mitigate the effects of war on mental health following the

**Abbreviations:** AOR, Adjusted Odds Ratio; CI, Confidence interval; COR, Crude odds ratio; HTQ, Harvard Trauma Questionnaire; OSSS, Oslo Social Support Scale; PCL-C, posttraumatic stress disorder civilian version; PHQ-9, Patient Health Questionnaire; PTSD, posttraumatic stress disorder; SD, standard deviation.

conflict. The government and nongovernmental organizations were also advised by these studies to continue providing humanitarian assistance, which should include access to food, clean water, clothing, shelter, and education. This study also suggested that people living in conflict zones should be legally protected from rape, sexual abuse, arson, detention without cause, and kidnapping.

#### KEYWORDS

stress related disorders, trauma, war, Ethiopia, prevalence

## Introduction

The Tigray conflict in Ethiopia lasted from November 2020 to November 2022 and was mainly concentrated in the Tigray region (1). It involved the Ethiopian federal government and the Tigray People Liberation Front. The Ethiopian government declared war following accusations of Tigray forces attacking its northern command base (2). The conflict, which initially started in Tigray, later extended to neighbouring regions like Afar and Amhara, impacting over 20 million people, predominantly women and children. Approximately 5.5 million individuals were displaced, fleeing to other parts of Ethiopia (3). The situation, particularly in Dabat District in northwest Ethiopia, worsened displacement, exposing many to homelessness and various criminal acts, including murder, sexual abuse, rape, and abduction. This significantly increased the risk of posttraumatic stress disorder among those affected.

Posttraumatic stress disorder is a highly prevalent mental disorder in war-affected areas or natural disasters (4–6). Posttraumatic stress disorder can result from experiencing or witnessing distressing events such as murder, threats, kidnapping, loss of loved ones, displacement from one's home, and deprivation of basic needs such as food (7). It manifests symptoms such as nightmares and flashbacks, avoiding triggers connected to trauma, elevated alertness, and detrimental cognitive alterations (8). Post-war settings are frequently characterized by instability, peril, and a scarcity of humanitarian aid, factors that may contribute to the onset of posttraumatic symptoms (9, 10). In the absence of effective management, Posttraumatic stress disorder can lead to a deterioration in quality of life, disruptions in daily functioning, and, in severe cases, even mortality (11).

Posttraumatic stress disorder is more prevalent in low- and middle-income countries where mental health services are often less accessible (12). Worldwide, the documented prevalence of Posttraumatic stress disorder among global populations affected by war is 12.9% (13). There is significant regional variation in Posttraumatic stress disorder prevalence, ranging from 0.3% to 8.7% (14, 15). A systematic review across 40 nations found that 30.6% of internally displaced individuals affected by war experienced Posttraumatic stress disorder (16). War-affected regions of sub-Saharan Africa also show high rates, with reported prevalence reaching up to 30% (17). In Uganda, Posttraumatic stress disorder

prevalence is identified at 11.8% In Uganda (18), whereas in Kenya, it notably rises to 62.1% (18), South Sudan has reported a prevalence of 28% (19). Within Ethiopia, there is significant variation in Posttraumatic stress disorder rates: Addis Ababa reports a lower rate of 3.7% (20), while Dessie reports a higher prevalence of 34.5% (5).

Several factors contribute to the development of posttraumatic stress disorder following exposure to wartime trauma. These factors include age, gender, experiences of potentially traumatic events during and after the war, unemployment, lower educational levels, and the presence of chronic diseases (19, 21–23).

Limited information exists regarding the prevalence of mental disorders, particularly posttraumatic stress disorder, among individuals directly involved in armed conflicts in low- and middle-income countries such as Ethiopia. However, a substantial number of individuals in such contexts are vulnerable to various mental health challenges due to their exposure to conflict-related trauma (24, 25). In the Dabat district of Ethiopia, a substantial conflict involving the Ethiopian government and the TPLF erupted, leading to numerous civilian casualties, incidents of rape and sexual abuse, cessation of hostilities, and property theft. These traumatic events may have contributed to the development of posttraumatic stress disorder among the affected population. However, available data on the prevalence of posttraumatic stress disorder and its associated risk factors among individuals residing in conflict-affected areas post-war are lacking. Therefore, this study aimed to investigate the extent of posttraumatic stress disorder and identify factors associated with it. The findings from this research have the potential to inform the government and other stakeholders, guiding them in implementing interventions and appropriate actions to address the lingering issues following the war.

## Methods

### Study area and period

This study was conducted in Woken and China Kebeles, which are located in the Dabat district of the Amhara regional state in Northwest Ethiopia, spanning from July 13 to September 19, 2023. The Dabat district is located approximately 775 kilometres away from

Addis Ababa. These two kebeles comprise 2000 households with a total population of 8,000. Unfortunately, during the study period, China and Woken Kebeles became battlegrounds between the Tigray People's Liberation Front and Ethiopian government forces. The Amhara Media Corporation documented that China and Woken Kebeles witnessed the tragic loss of hundreds of civilians, either through massacres or shelling. Furthermore, many residents endured severe hardships, including instances of sexual abuse and rape.

## Study design and population

A community-based cross-sectional study was carried out within war-affected regions of the Dabat district, specifically in China and Woken Kebeles. The source population consisted of adult residents aged 18 and above living in China and Woken Kebeles, who had been residing in the two kebeles for at least six months. However, the target population or study population included all adult individuals aged 18 years and above who presented themselves during the data collection period.

## Sample size calculation

By applying a single proportion population formula, the sample size was determined using the estimated prevalence rate of PTSD, which was 58.4%, as identified in a study conducted in southern Ethiopia (26).

$$n_i = \frac{(Z\alpha/2)^2 * p(1-p)}{d^2} = \frac{(1.96)^2 * 0.584(1-0.584)}{(0.05)^2} = 374$$

With the 10% nonresponse rate added, the total sample size was 412 with a 5% margin of error, a 95% confidence level, and a 10% nonresponse rate.

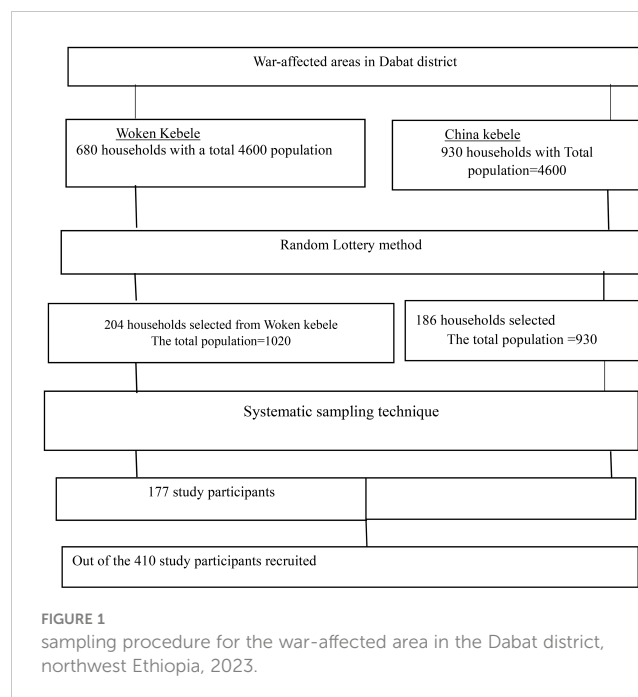
## Sampling technique and procedure

Participants for the study in both China and Woken Kebeles were recruited using a systematic random sampling technique. Initially, the number of households and the total population were determined for both kebeles. Then, 30% of households were selected from each kebele. Proportional allocation was applied to the selected households. Finally, the sampled population was chosen through a systematic random sampling technique after proportional allocation (refer to Figure 1).

## Eligibility criteria and study variables

The inclusion criteria for this study included all adult individuals aged 18 years or older, residing in China and Woken Kebele for a minimum duration of 6 months.

Individuals who reported being severely ill and unable to participate in interviews for data collectors, those who provided a medical certificate or related document indicating their current



illness, and those with observable verbal communication problems were excluded from the study.

**Posttraumatic stress disorder:** A 20-item post-traumatic checklist (PCL-5) was used to assess PTSD. A cumulative score was derived by summing the 20 items, with scores ranging from 0 to 80 on a five-point Likert scale (0 = not at all, 1 = a little bit, 2 = moderately, 3 = quite a bit, and 4 = extremely), Which means adults who score < 50 have no PTSD and ≥ 50 have PTSD (27).

## Depression

Participants exhibiting depression were identified through their scores on the Patient Health Questionnaire (PHQ), specifically those individuals who scored 10 or more on the nine items (28).

**Stressful life event.** It was determined by the presence of one or more life-threatening events within the last six months, as indicated by the relevant questions (29).

## Social support

Social support was assessed using the Social Support Scale (OSS-3), which consists of three items with scores ranging from 3 to 14. A score within the range of 3–8 indicates poor social support, while a score between 9–11 suggests intermediate social support. A score of 12–14 on the OSS-3 reflects strong social support (30).

Substance abuse was defined as the consumption of cigarettes, alcohol, or khat by individuals who met the criteria of (31, 32).

## Data collection tools

Data collection was conducted by psychiatric professionals with Bachelor of Science (BSc) degrees, trained in data collection techniques and ethical principles. The questionnaire was initially

developed in English and translated into Amharic, with a back-translation into English to ensure accuracy. Training was provided to study participants about the study's objectives, handling ambiguous questions, and adhering to ethical standards, including informed consent, confidentiality, anonymity, and data management. PTSD was assessed using the 20-item self-report Post-Traumatic Stress Disorder Checklist (PCL-5), which measures the 20 DSM-5 PTSD symptoms. We validated this assessment tool internally, achieving a Cronbach's alpha reliability coefficient of 0.78. It has been previously utilized in Ethiopia (5, 20). The Validity and reliability of the PCL-5 had been tested and proven in a different country, for example, Zimbabwe (Cronbach's alpha = 0.92) with sensitivity and specificity of 74.5% and 70.6% respectively (33), (5). We validated this assessment tool, achieving a Cronbach's alpha reliability coefficient of 0.78. Depression was measured using the Patient Health Questionnaire-9 (PHQ-9), where a person is considered depressed if their score is 10 or higher on the nine items. The PHQ-9 has 4 items with corresponding scores: not at all (0), several days (34), more than half a day (15), nearly every day (35), and over the last week (28).

## Data processing and statistical analysis

The collected data was coded and entered into Epi-Data version 4.6, followed by analysis using IBM SPSS Statistics version 25.0 software. Summary statistics, including proportions and frequencies, were utilized to summarize the results in tables. Bivariable and multivariable logistic regression models were fitted to identify factors associated with the outcome variable. In the bivariable logistic regression, variables with a  $p$  value  $\leq 0.2$  were considered candidates for inclusion in the multivariable logistic regression. Binary logistic regression was employed. Adjusted odds ratios (ORs) were used to determine the relationships between PTSD and associated variables at a significance level of  $p \leq 0.05$ . The normality of continuous data was assessed using the Shapiro–Wilk test, and the model's fitness was checked using the Hosmer–Lemeshow goodness-of-fit test.

## Ethics approval and consent to participate

We obtained ethical approval from the Institutional Review Board of the University of Gondar, School of Medicine, College of Medicine, and Health Sciences Ethical Review Committee, with reference number IRB/373/2023, subsequent to the review of our research proposal. After adequately briefing the educated study participants about the study, written informed consent was obtained from each individual. Conversely, during data collection from illiterate study participants, the data collectors began by reading aloud the consent form, providing a thorough explanation of the study's objectives and procedures. Upon participants' voluntary agreement to participate, the data collectors marked "Yes" on the consent form. Subsequently, participants confirmed their consent by providing their signature using a "thumbprint" as acknowledgment. This approach was approved by the Institutional Review Board (IRB) of the University of Gondar. To

uphold confidentiality and privacy, participants' names and other personal identifiers were excluded from the documentation. To maintain confidentiality, potential identifiers were omitted from the questionnaire, and all collected data were securely stored. Our procedures adhered to the relevant rules and guidelines outlined in the Helsinki Declaration (36).

## Results

### Background characteristics of the study participants

In this study, a total of 410 study participants were included, making 100% response rate. The majority of participants were male (62%). The mean age of the study participants was 33 years ( $\pm 1.67$ ). Approximately 45% of the participants were married, and 43% had completed elementary school. Nearly 63% of participants resided in rural areas, and approximately 45% were employed as farmers. Majority the participants reported a monthly income ranging from 34.6 USD (see Table 1).

### Clinical and behavioural characteristics of the study participants

In the present study, 17% of all participants reported a family history of mental illness. Approximately one-third of the participants (32%) had a known diagnosis of a chronic medical condition, 43% of whom were specifically diagnosed with diabetes. Symptoms of depression and morbidity were exhibited by approximately thirty percent of the research participants. More than thirty percent of the participants had engaged in khat chewing at some point in their lifetime. Additionally, one-third of the study participants reported experiencing sexual abuse or rape during the war (refer to Table 2).

### Prevalence of posttraumatic stress disorder

In this study, 30.7% of the participants (126 out of 410) had posttraumatic stress disorder (95% CI 26.6–35.1).

### Factors associated with posttraumatic stress disorder

Bivariable and multivariable logistic regression analyses of PTSD were conducted, as detailed in Table 3. In the bivariable analysis, sex, age, marital status, monthly income, educational status, khat chewing status, alcohol consumption status, family history of mental illness, depression symptoms, sexual abuse or rape status, and stressful life events were considered candidate variables for the multivariable analysis ( $p \leq 0.2$ ). Multivariable logistic regression analysis revealed several statistically significant factors associated with PTSD: having symptoms of depression (AOR=3.5; 95% CI: 1.13–6.89), age 45–67

TABLE 1 background characteristics of study participants who reside in the ware affected area in the Dabat district, northwest Ethiopia, 2023.

Study variables	Category	Frequency	Percentage
Gender	Male	254	62
	Female	156	38
Age (years)	18-25	139	33.9
	26-35	95	23.2
	36-45	93	22.7
	45-67	83	20.2
Marital status	Single	166	40.5
	Married	178	43.4
	Divorced or windowed	66	16.1
Educational status	Illiterate	58	14.1
	Primary schooling (Garde1-8)	174	42.4
	Secondary schooling (Grade 9-12)	104	25.4
	Diploma and above	74	18
Occupational status	Waged employed	59	14.4
	Farmer	183	44.6
	Unemployed	94	22.9
	Self employed	74	18.1
Income	>2000 ETB (34.6 USD)	253	61.7
	2001-3500ETB (34.6-60.6 USD)	61	14.9
	>3500 ETB (>60.7 USD)	97	23.4
Place of residence	Urban	134	32.7
	Rural	276	63.3

years (AOR=1.68; 95% CI: 1.04-5.78), experiencing stressful life events (AOR=1.63; 95% CI: 1.05-7.86), experiencing sexual abuse or rape (AOR=1.53; 95% CI: 1.07-6.75), chewing khat (AOR=1.48; 95% CI: 1.08-4.56), being female (AOR=1.43; 95% CI: 1.13-3.67),an d having an income 34.6 USD (AOR=1.28; 95% C: (1.07-4.67). Symptoms of depression were the strongest predictor (AOR=3.5; 95% CI: 1.13-6.89), indicating that individuals with depression symptoms were 3.5 times more likely to develop PTSD compared to those without. Age 45-67 years (AOR=1.68; 95% CI: 1.04-5.78), showing that participants in this age group were 1.68 times more likely to develop PTSD compared to those aged 18 to 25 years. Stressful life events (AOR=1.63; 95% CI: 1.05-7.86), indicating a 1.63 times higher likelihood of PTSD among those who experienced such events. Sexual abuse or rape (AOR=1.56;

TABLE 2 Clinical and behavioural factors among study participants who reside in the ware-affected area in the Dabat district, northwest Ethiopia, in 2023.

Variables	Category	Frequency	%
Clinical factors			
Known family history of diagnosed with mental illness	Yes	71	17.3
	No	339	82.6
Known diagnosed chronic medical condition	Yes	131	32
	No	279	68
Type of medical condition	Diabetic Mellitus	56	43.1
	Hypertension	41	31.6
	Cancer	18	13.8
	Heart disease	15	11.5
Depressive Symptoms	Yes	126	30.7
	No	284	69.3
Morbidity (incidence of health issues or conditions associated with PTSD).	Yes	123	30
	No	287	70
Behavioural factors			
Ever khat used in lifetime	Yes	121	29.5
	No	289	70.5
Current khat used in the last 3 months	Yes	96	23.4
	No	314	76.6
Ever used alcohol drinks in life	Yes	219	53.4
	No	191	46.6
Current used alcohol drinks in last 3 months	Yes	201	49
	No	209	51
Current tobacco products used in the last 3 months	Yes	67	16.3
	No	343	83.7
Sexually abused or raped	Yes	142	34.6
	No	268	65.4
Had ill health without medical care	Yes	166	40.5
	No	244	59.5
Experienced forced separation from family	Yes	185	45.1
	No	225	54.9
Experienced trauma/ raped in childhood	Yes	176	42.9
	No	234	57.1
Stressful Life Event	Yes	62	15.1
	No	348	84.9
Social Support	Poor social support	135	32.9
		165	40.2

(Continued)

TABLE 2 Continued

Variables	Category	Frequency	%
Behavioural factors			
	Intermediate social support		
	Strong social support	110	26.8

95% CI: 1.07-6.75), showing a 1.56 times greater odds of PTSD among individuals who experienced these incidents. Khat chewing (AOR=1.47; 95% CI: 1.08-4.56), indicating a 1.47 times higher likelihood of PTSD among khat chewers compared to non-chewers. Female gender (AOR=1.43; 95% CI: 1.13-3.67), with females having a 1.43 times greater likelihood of PTSD compared to males. Compared to study participants with incomes with of >60.7 USD, those with less than 34.6 USD had a higher likelihood of developing PTSD (AOR=1.28; 95% CI: 1.07-4.67).

Discussion

The observed prevalence of PTSD among people living in war-affected areas in Dabat district, was determined to be 30.7% (95% CI 26.6–35.1). These finding suggest a higher prevalence of PTSD among residents of war-affected regions in the study settings, this result is similar to findings from studies conducted in Dessie, Ethiopia (34.5%) (5), Israel (27%) (37), Servia (32.3%) (38) and South Sudan (28%) (19). However, this result is lower than those of studies conducted in Kenya, which reported a prevalence of 62.1% (39); in South Sudan Juba, which reported a prevalence of 37.6% (40); and in Croatia, which reported a prevalence of 56.7% (41). On the other hand, this prevalence is higher than that reported in studies conducted in Uganda, 18% (21), and in Libya 25.23% (42). In the Dabat district of Ethiopia, cultural beliefs profoundly influence responses to war-related atrocities such as rape, torture, murder, and abduction. Stigma often prevents victims from seeking justice or support services due to fears of social ostracization and

TABLE 3 factors associated with PTSD among study participants who reside in the ware-affected area in the Dabat district, northwest Ethiopia, 2023.

Variables	Category	PTSD		COR (95%CI)	AOR (95%CI)	P value
		Yes	No			
		N (%)	N (%)			
Gender	Female	37 (23.7)	119 (76.3)	1.75 (1.10-2.71)	1.43 (1.13-3.67) *	0.03
	Male	89 (35)	165 (65)	1	1	1
Age (years)	18-25	25 (18)	114 (82)	1	1	1
	26-35	38 (45.8)	45 (54.2)	0.55 (0.29-1.02)	0.23 (0.13-0.78)	0.67
	36-45	36 (60.2)	57 (39.8)	0.04 (0.24-0.098)	0.57 (0.72-0.89)	0.59
	46-67	27 (28.4)	68 (71.6)	3.18 (1.25-8.08)	1.68 (1.04-5.78) *	0.02
Marital status	Single	74 (44.6)	92 (55.4)	1	1	
	Married	30 (16.9)	148 (83.1)	3.96 (2.41-6.52)	1.45 (0.12-5.63)	
	Widowed or divorced	22 (33.8)	43 (66.2)	1.57 (1.09-2.89)	1.17 (0.76-3.87)	
Monthly income (ETB)	<2000 ETB (34.6 USD)	33 (26.4)	92 (73.6)	2.86 (1.14-6.84)	1.28 (1.07-4.67) *	0.045
	2001-3500ETB (34.7-60.6 USD)	66 (36.8)	113 (63.2)	1.957 (1.15-3.32)	1.2 (0.16-5.45)*	0.45
	>3500 ETB (>60.7 USD)	27 (25.5)	79 (74.5)	1.32 (1.60-3.67)	1	1
Educational status	Illiterate	17 (29.3)	41 (70.7)	12.56 (10.54-22.55)	3.4 (0.67-6.98)	0.53
	Primary schooling	47 (27)	127 (73)	7.89 (5.45-12.34)	0.98 (0.45-578)	0.32
	Secondary schooling	35 (33.7)	69 (66.3)	2.56 (1.89-5.68)	1.22 (0.34-4.67)	0.065
	Diploma and above	27 (36.5)	47 (73.5)	1	1	1
Khat chewing	Chewer	33 (42.9)	44 (57.1)	1.94 (1.16-3.24)	1.47 (1.08-4.56) *	0.02
	No-chewer	93 (31.1)	239 (68.9)	1	1	1
Alcohol drinking	Drunker	82 (37.4)	137 (62.6)	2.00 (1.29-3.08)	3.3 (0.16-4.76)	0.12

(Continued)

TABLE 3 Continued

Variables	Category	PTSD		COR (95%CI)	AOR (95%CI)	P value
		Yes	No			
		N (%)	N (%)			
	Non drinker	44 (23)	147 (77)	1	1	1
Family history of mental illness	Yes	44 (34.9)	88 (65.1)	5.08 (2.96-8.72)	1.3 (0.78-7.86)	0.71
	No	27 (9.5)	256 (90.5)	1	1	1
Depression symptoms	Yes	68 (54)	58 (46)	4.56 (2.90-7.19)	3.5 (1.13-6.89) **	0.001
	No	58 (20.4)	226 (79.6)	1	1	1
Sexual abused or raped	Yes	32 (25.4)	94 (74.6)	1.85 (1.16-2.96)	1.56 (1.07-6.75) *	0.001
	No	110 (38.7)	174 (61.3)	1	1	
Stressful life event	Yes	12 (9.5)	114 (90.5)	2.03 (1.04-3.96)	1.63 (1.05-7.86) *	0.1001
	No	50 (17.6)	234 (82.4)	1	1	1

1= reference category, Hosmer–Lemshow = 0.24, \*p ≤ 0.05, \*\*p ≤ 0.001.

reputation damage, potentially exacerbating PTSD development. Societal pressures and familial honor heavily influence whether victims disclose their experiences and the type of community support they receive. Additionally, religious and spiritual beliefs shape interpretations of trauma, affecting coping mechanisms and attitudes toward seeking professional help versus traditional healing practices (26, 43–45).

This study revealed that PTSD was positively associated with having symptoms of depression, ages 45-67, experiencing stressful life events, enduring sexual abuse or rape, chewing khat, being female, and having an income of less than 34.60 USD.

Symptoms of depression were the strongest predictor, showing that individuals with depression symptoms were more likely to develop PTSD compared to those without. This study is supported by a study performed in Nigeria (46), northeaster Ethiopia (5), the Maikadra massacre in Ethiopia (47). This is because people with depression may have heightened sensitivity to stress and trauma, impaired coping mechanisms, and neurobiological changes that increase their vulnerability to developing PTSD (48). Elderly study participants were more prone to developing PTSD than their male counterparts were. This result is in line with research conducted in Netherland (49). This could be attributed to the greater prevalence of chronic health conditions such as heart disease, hypertension, and diabetes among elderly people, coupled with challenges such as sleep disturbances, insomnia, physical and mental fatigue, changes in appetite, muscle tension, pain, chest discomfort, an upset stomach, and other issues more commonly experienced in the elderly population. All these factors may contribute to the development of posttraumatic stress disorder (50, 51).

According to the results of this study, women were more likely to develop PTSD than men were. These findings align with research conducted in northeast Ethiopia (5) and Uganda (52). This could be attributed to the greater vulnerability of females to sexual abuse or rape during times of war, making them more susceptible to developing PTSD than men are (53).

A potential explanation could be the influence of sex hormones and neuro-steroids on emotional learning and memory formation, coupled with disparities in brain anatomy and activation in response to traumatic stress (54). Contrary to current findings, research conducted in the US found no significant difference in PTSD rates between men and women, even after adjusting for demographic factors and lifetime trauma exposure (55). Hence, it is reasonable to deduce that when males and females experience similar types and levels of traumatic stressors, disparities in PTSD rates between the genders may not be as pronounced (53). Individuals with lower incomes were more likely to develop PTSD than their higher-income counterparts were. This study aligns with the study conducted in low-income countries (56). This can be attributed to the vulnerability of individuals with low incomes, who are more prone to experiencing depression, anxiety, and increased levels of the hormone cortisol. These factors collectively contribute to heightened stress levels (57). Compared with no chewers, study participants who chewed khat had greater odds of developing PTSD. This study is supported by a study performed in Somali (58). A possible explanation is that chewing khat can result in side effects such as headaches, vertigo, decreased cognitive function, fine tremors, sleeplessness, heightened alertness, dependence, tolerance, and anxiety. All these effects could contribute to the development of posttraumatic stress disorder (59).

Compared to study participants who were not sexually abused or raped, those who suffered these events had a greater chance of developing PTSD. This study is in line with previous findings in the Balkans (4). This correlation may be attributed to the impact of depression, which influences susceptibility to trauma and contributes to the development of posttraumatic stress disorder by elevating steroid hormones such as cortisol (60). Finally, participants who experienced stressful life events exhibited a greater likelihood of developing posttraumatic stress disorder (PTSD) than did those who had not experienced such events. This study consistent with findings from a prior investigation conducted in southern Sudan (40) and northeast Ethiopia (5). This can be explained by the fact that

stressful life events, such as problems with work, relationships, or finances, can exacerbate PTSD (61).

## Strengths and limitations of the study

The strength of this study was its use of primary or original data, which increased its relevance. This study and this study had certain limitations, including social desirability bias, as participants might be hesitant to provide socially acceptable responses to sensitive questions concerning sexual abuse and substance use. Additionally, there was a recall bias due to the limitations of the study design.

## Conclusion and recommendation

The results of this study showed that a significant proportion of people living in war-affected areas had PTSD. As a result, the study suggested that governments and other stakeholders should be involved in implementing efficient interventions and quick measures to mitigate the effects of war on mental health following the conflict. The government and nongovernmental organizations were also advised by these studies to continue providing humanitarian assistance, which should include access to food, clean water, clothing, shelter, and education. This study also suggested that people living in conflict zones should be legally protected from rape, sexual abuse, arson, detention without cause, and kidnapping. This study recommends that scholars employ a combination of qualitative and quantitative approaches to gain a comprehensive understanding of PTSD in war-affected areas. Furthermore, it highlights the critical role of cohort studies in establishing causal relationships between exposure to war and the development of PTSD.

## Data availability statement

The datasets presented in this study can be found in online repositories. The names of the repository/repository and accession number(s) can be found in the article/Supplementary Material.

## Ethics statement

The studies involving humans were approved by the institutional review board of the University of Gondar's School of Medicine,

College of Medicine, and Health Sciences ethical review committee, with the reference number (IRB/373/2023). Upon explaining the study's significance to participants, both verbal and written informed consent were obtained. To maintain confidentiality, potential identifiers were omitted in the questionnaire, and the collected data was securely stored. All procedures adhered to the relevant rules and guidelines of the Helsinki Declaration. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

## Author contributions

MM: Writing – original draft, Writing – review & editing. LM: Data curation, Conceptualization, Writing – original draft, Writing – review & editing. DE: Conceptualization, Writing – original draft, Writing – review & editing.

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## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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# War, emotions, mental health, and artificial intelligence

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During the war time dysregulation of negative emotions such as fear, anger, hatred, frustration, sadness, humiliation, and hopelessness can overrule normal societal values, culture, and endanger global peace and security, and mental health in affected societies. Therefore, it is understandable that the range and power of negative emotions may play important roles in consideration of human behavior in any armed conflict. The estimation and assessment of dominant negative emotions during war time are crucial but are challenged by the complexity of emotions' neuro-psycho-physiology. Currently available natural language processing (NLP) tools have comprehensive computational methods to analyze and understand the emotional content of related textual data in war-inflicted societies. Innovative AI-driven technologies incorporating machine learning, neuro-linguistic programming, cloud infrastructure, and novel digital therapeutic tools and applications present an immense potential to enhance mental health care worldwide. This advancement could make mental health services more cost-effective and readily accessible. Due to the inadequate number of psychiatrists and limited psychiatric resources in coping with mental health consequences of war and traumas, new digital therapeutic wearable devices supported by AI tools and means might be promising approach in psychiatry of future. Transformation of negative dominant emotional maps might be undertaken by the simultaneous combination of online cognitive behavioral therapy (CBT) on individual level, as well as usage of emotionally based strategic communications (EBSC) on a public level. The proposed positive emotional transformation by means of CBT and EBSC may provide important leverage in efforts to protect mental health of civil population in war-inflicted societies. AI-based tools that can be applied in design of EBSC stimuli, like Open AI Chat GPT or Google Gemini may have great potential to significantly enhance emotionally based strategic communications by more comprehensive understanding of semantic and linguistic analysis of available text datasets of war-traumatized society. Human in the loop enhanced by Chat GPT and Gemini can aid in design and development of emotionally annotated messages that resonate among targeted population, amplifying the impact of strategic communications in shaping human dominant emotional maps into a more positive by CBT and EBSC.

## KEYWORDS

war, negative emotions, mental health and artificial intelligence, digital therapeutic devices, cognitive behavioral therapy, emotionally based strategic communications, ChatGPT and Gemini

## 1 Introduction

The impact of war and trauma on mental health is devastating, particularly for civilians who are living in a state of constant fear, hopelessness, misery, horror, sadness, and humiliation. Individuals in war-inflicted societies are subjected to profoundly traumatic and stressful events that can have detrimental effects on their mental health, leading to anxiety, depression, post-traumatic stress disorder (PTSD), and suicidal tendencies (Kleber, 2019; Rozanov et al., 2019; Jain et al., 2022). Prevalence rates of mental health disorders are strongly correlated with the number of traumatic events people have experienced during war time, as well as their individual stress resilience and vulnerability (Lim et al., 2022). A continuous flow of armed conflicts, global crises, natural disasters, and pandemics has resulted in an unprecedented number of individuals feeling stressed, anxious, depressed, and emotionally fragile (Jakovljevic et al., 2020; Ćosić et al., 2020a; Kopilaš et al., 2021; Lass-Hennemann et al., 2023; Mejia et al., 2023; Prazeres et al., 2023). Globally, yet unrecognized demand for high on-time effective preventive and treatment resources has contributed to a significant mental disease burden. This gap between what is needed and what is available has continued to grow due to the lack of mental health professionals and unmet need for early preventive treatment. Mental health disorders induced by war and trauma may lead to disorganization of key human emotional, cognitive and behavioral functions, like dysregulation of thoughts, emotions, feelings, compromised physiology, immune-inflammatory dysfunction, cognitive distortions and maladaptive coping mechanisms (Rozanov et al., 2019). The impact of war on the overall mental health and well-being might be catastrophic, surpassing the toll inflicted by any major disease in terms of mortality and disability. It can devastate entire nations, communities, families and individuals, frequently disrupting their socio-economic development and prosperity (Betancourt et al., 2018; Kleber, 2019; Rozanov et al., 2019; Trujillo et al., 2021; Lim et al., 2022).

The war-related death toll represents only the visible wounds of war, while numerous other consequences, such as the invisible wounds of war, like PTSD and suicides, are not yet efficiently and adequately addressed and treated. Potential of new mental health artificial intelligence (AI) tools and means might be effectively used in early recognition and treatment of mental health challenges. Therefore, this paper aims to address the capacity of a more comprehensive approach based on AI state-of-the-art tools and means to provide effective utility in coping with this global health challenge, particularly in societies affected by wars and traumas. Consequences of war, including forced displacement, exposure to violence, supplies' deficiencies, damages to essential infrastructure, and disruption of vital services, can exert significant adverse effects on the psychological well-being and overall health of the Ukrainian population during and after the war (Hamama-Raz et al., 2022; Ellis et al., 2024). Measures of standard of living, psychological well-being, depressive symptoms, substance misuse, and consumption of unhealthy foods are commonly linked to the conflict regardless of sex, age, religion, or marital status (Konstantinov et al., 2023a,b). Our research highlights the importance of emotions as a motivating factor for engaging in voluntary service as well, since the majority of volunteers emphasized that feelings of compassion, anger, and a willingness influenced their decision to engage (Domaradzki et al., 2022).

## 2 The importance of emotion analysis

Global security challenges and wars might be expressed by different negative emotions, particularly those of fear, anger, despair, hatred, resentment, rage, and frustration (Milevski, 2020; Cricenti et al., 2022). These emotions may escalate into behavior of aggression, war, resistance, terrorism, insurgent action. Emotions may play a very important role in understanding human behavior and have a significant impact on the politico-security analysis. It is almost impossible to fully understand the complexity of global military tension, insecurity and armed conflicts without trying to understand the range and power of emotions in a theater of war. During the war, unlimited production and distribution of negative emotions makes multidimensional emotional space uncontrollable (Ćosić et al., 2012b). Therefore, the emotional dimension of any conflict or problem should not be underestimated. War tragedies and the negative emotion of humiliation generates irrational, harmful, devastating and hateful feelings. If emotions are not integrated and embedded into a global multidisciplinary politico-security analysis, the world will be in danger due to ignoring a fundamental aspect of human emotional behavior. Hence, strength and diversity of negative emotions remain a crucial factor in understanding the complexity of the global political and security landscape (Ćosić et al., 2018).

The explosion of negative emotions and their impact on relationship between nations, cultures, and religions is a crucial important topic which deserves much more attention. Without understanding the pivotal influence of emotions, which have greater control over individuals than they exert on them, it is fundamentally impossible to grasp the political and security realities of war trauma (Ćosić et al., 2012b; Webster and Albertson, 2022). For example, fear as absence of confidence can lead to obsessive worries about the present and the future and become more dangerous for overall security and individuals' mental health. At the same time, fear is a force for survival in a dangerous environment and a natural protective response. Anger involves appraisals of relative strength and coping potential, while hatred is the strongest, extreme emotion which is characterized by willingness to harm and even annihilate the hated individual or hated group. However, war traumatic events can challenge and uproot related attachments, making their emotional nature exposed in a very visible manner (Bleiker and Hutchison, 2008).

In order to understand such complex societal situations, analysis of emotional contexts is extremely important and necessary (Ćosić et al., 2012b). Each emotion is related to a specific response tendency and action readiness (Frijda, 1987). This means that negative dominant emotional maps have corresponding action tendencies and behaviors, closely related to group willingness and energy to create some kind of change in the society.

An approach to use emotions as a mechanism to explain irrational behavior of war actors might be an innovative way to add value in searching for a solution for the most complex, unpredictable and uncertain war conflicts in the modern world. In order to reconcile people with diverse emotional landscapes, it is necessary to understand the main drivers of their behaviors and actions. Behavioral characteristics of people cannot be understood without deeper and complex analysis of their dominant emotional maps and their socio-cultural and security conditions and interactions. Different dominant emotions of the population must reflect in different policy ramifications (Mercer, 2005). This indicates that different societal and

cultural values and norms cannot be easily changed by excessive use of military power. Finally, the effects of military dominance, like airstrikes or drone attacks, may produce strong negative emotions and effects in the battle for hearts and minds of a war-inflicted population, making the use of military power a less effective (Dixon, 2009). Potential military failure might be a consequence of unrealistic expectations that serious security problems in war-inflicted societies can be resolved by the military while ignoring the fact that the post-conflict developmental and recovery programs are the most crucial (Galula, 1964).

### 3 Dominant emotional maps representation and mental health

The estimation and assessment of dominant emotions during and after war is extremely important, but at the same time a very challenging and complex task. In politico-security analyses the aggregation of dominant emotional maps, and their potential transformation into group actionable scenarios, actions, reactions, behavior, and riots, deserves more attention (Lofland, 1985). Participants in the same social situation often share a common awareness and a common emotional reaction to it (Barbalet, 1998; Pizarro et al., 2022). Aggregation and unification of these individuals' emotional characteristics may lead to strongly unified emotional groups which may become powerful strategic agents in conflict management. Dominant emotional maps determine the ability of a society to cope with its own social and security challenges. Identifying the dominant emotions within populations in war-affected societies should be considered one of the foundational tasks. This endeavor aims to ameliorate negative emotions wherever they exist and capitalize on positive ones.

Group dominant emotional maps arise from the aggregation of emotional maps of individual members within a population (Ćosić et al., 2012a), and serve as representations of "dominant emotions," which are publicly expressed feelings of collective behavior (Lofland, 1985). Additionally, they can be understood as depictions of "emotional atmospheres," which encompass collective moods, or as "emotional climates," which encompass collections of significant emotions or feelings that contribute to the formation and maintenance of political and social identities, as well as collective behavior (Barbalet, 1998; De Rivera et al., 2007). The synchronous alteration of dominant emotions among substantial portions of the population can potentially act as a driving force or leverage for broader societal transformations. The nuanced, but simultaneous modification of individuals' feelings at the micro-level could lead to far-reaching transformations at the macro-level. Consequently, changes in dominant emotions entail shifts in the action tendencies of numerous individuals, thereby providing a basis for cohesive collective action on a societal scale.

Analyses of these dominant emotional maps in combination with other relevant efforts are the basis for a comprehensive approach to conflict resolution, and corresponding peaceful policy. Dominant negative emotions, particularly on the global and strategic political scene, are the main driving force of war and global insecurity (Webster and Albertson, 2022). Therefore, estimation and assessment of dominant negative emotion in times of war and trauma are extremely important. Figure 1 illustrates the hypothetical normalized negative

emotional map during the war time. From the illustrated contour plots it is easy to notice that centers of gravity of dominant emotional maps are situated in the upper-left quadrant of the valence/arousal space, due to the presence of negative and mostly arousing emotions, like fear, anger, hatred, frustration etc.

Emotions affect attention, beliefs, and actions, focusing and guiding memory and influencing our cognitive processes (Tyng et al., 2017). They shape and strengthen our beliefs, help us rearrange our priorities and revise our goal hierarchies, influence our preferences, and act as a nexus among our beliefs, value systems and thereby strengthening our commitments (Gonzalez et al., 2020; Furman, 2024; Kisley et al., 2024).

The estimation of dominant emotional states may encompass various elements such as aggregated emotional feelings, beliefs, and a behavioral component characterized by impulsive or expressive gestures. Moreover, it incorporates a cognitive element associated with the evaluation of the scenario, as well as a drive component linked to the preparedness for activity (Scherer, 1984). As a result, when estimating dominant negative emotional maps, one must consider not only the collective emotional experience of a group, but also the corresponding behavioral and cognitive components (Ćosić et al., 2012a).

Dominant emotional maps can display data or signals from different sources, like linguistic textual records related to emotion from social media which are increasingly popular. Individuals experiencing mental health issues frequently express their psychological difficulties through various platforms and forums, such as Facebook, Instagram, Twitter, Reddit, and other online forums, by sharing text messages, comments, photos, videos, and other related information (Naslund et al., 2020; Zhang et al., 2022, 2023). A differentiating characteristic of Reddit, when compared to other sources of data, is the classification of posts into distinct subreddits based on specific subjects, such as anxiety, depression, post-traumatic stress disorder (PTSD), and even suicide (Zhang et al., 2022). In addition, electronic health records (EHR) function as a valuable source of secondary healthcare data, providing comprehensive documentation of individuals' historical medical records. Another viable approach involves identifying mental illness by conducting user interviews and subsequently analyzing the linguistic information obtained from transcribed clinical interviews (Morales and Levitan, 2016; Spruit et al., 2022). Finally, the application of standardized questionnaires for individual's diagnosis and self-assessment is also considered fitting in this circumstance (Ćosić et al., 2021).

Regarding mental health diagnostic analysis of keywords and statistical representations of words dominates, but involvement of state-of-the-art NLP methods, like large language models (LLM) can significantly improve word representations with better and deeper understanding of mental health context and semantics (Bartal et al., 2024). The interpretation of keyword-based features is much easier, while clarification of context and meaning of words is more abstract. Analyses of dominant emotional maps in war-inflicted societies reveal dominant emotions which people express in online posts or forums, such as fear, sadness and anger. Uncovering the overall emotional tone and how people describe their emotions in the war environment is the right approach to prediction and prevention of potential massive mental health diseases in a reliable and accurate way. Available NLP tools have a variety of computational methods to analyze and understand the emotional content of relevant textual data in

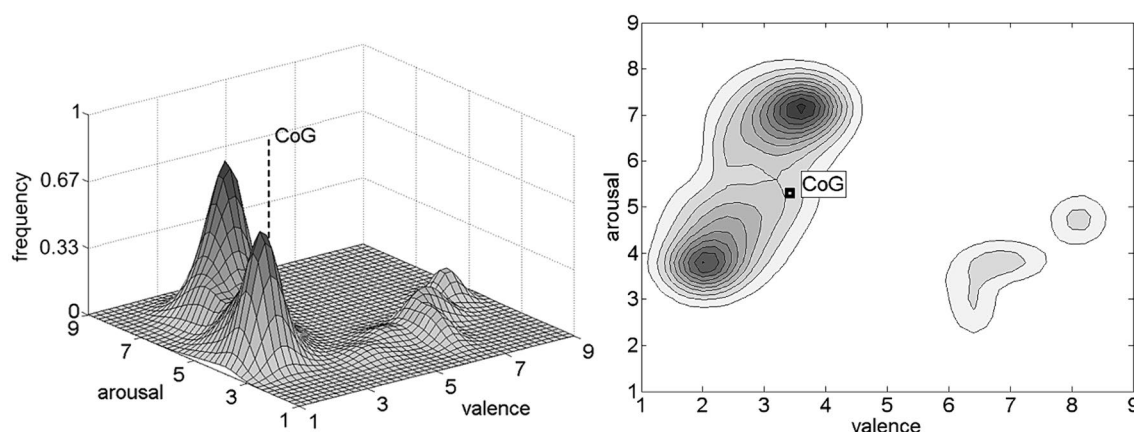


FIGURE 1

Hypothetical normalized emotional map of a war-inflicted population and the associated center of gravity (CoG): surface plot (left), contour plot (right).

war-inflicted societies, enabling better and deeper insights into their emotional states. From the utilization of NLP methodologies and illustrative large-scale data collections, we are able to observe intricate patterns of emotions and sentiments that are manifested in language and associated emotional and semantic characteristics that exhibit dynamic changes over time (Sawalha et al., 2022). Through the examination of posts, we can analyze linguistic features such as word frequencies, lexical diversity, narrative coherence, emotional content, and sentiment content to effectively detect and forecast significant mental health disorders (Ćosić et al., 2021). The most commonly used features in mental illness detection are linguistic patterns such as Bag-of-Words, Linguistic Inquiry and Word Count (LIWC), sentence and passage length, N-gram language models, emotional thesauri like WordNet-affect, and normative databases like the Affective Norm for English Words. Domain specific ontologies, dictionaries, and social attributes in social networks have the potential to improve accuracy. However, LIWC is the most widely used software tool in mental health research projects which is composed of more than 6,000 words, word stems and selected emotions and calculates approximately 90 output variables (Pennebaker et al., 2015).

## 4 Mental health challenges and potential of artificial intelligence

Disruptive AI-based technologies using machine learning (ML), deep learning (DL), neuro linguistic programming (NLP), cloud infrastructure, and new digital therapeutic apps offer a significant promise for enhancing mental health care on a worldwide scale, rendering these approaches more cost-effective and readily implementable, specifically targeting nations and individuals lacking sufficient access to health care (Schwalbe and Wahl, 2020; Lekkas and Jacobson, 2021; Koutsouleris et al., 2022; Tutun et al., 2023). Due to an inadequate number of psychiatrists and limited psychiatric resources to cope with war-related disasters, traumas and tragedies, new digital therapeutic wearable devices supported by advanced statistical methods and machine learning algorithms might represent a positive shift in the psychiatry of the future (Ćosić et al., 2021). The

predictive AI-based methods which can recognize potential chronic psychopathology early enough compared to traditional reactive psychiatry is example of more proactive and preventive type of medicine (Ćosić et al., 2020a,b, 2021; Bertl et al., 2022). The major advantage of predictive AI is its ability to identify specific non-obvious patterns which are beyond human observation capabilities and may be essential for early detection of individuals at high risk of mental health deterioration (Ćosić et al., 2021). These AI-based tools and means are leading to a new era of mental health global management offering new opportunities and a more holistic approach to patients by early intervention with novel therapeutic methods (Schwalbe and Wahl, 2020; Garriga et al., 2022; Koutsouleris et al., 2022). These changes can be objectively assessed by state-of-the-art wearable devices which can capture clusters of different multimodal and multidisciplinary features focusing on early prediction and prevention of potential chronic mental health disorders using new AI-based therapeutic strategies, like computerized cognitive behavioral therapy (Wilhelm et al., 2020; Grodniewicz and Hohol, 2023; Khawaja and Bélisle-Pipon, 2023). Early prediction and prevention of mental health disorders, particularly for populations in war zones, based on the objective measurement and computation of relevant neuro-psycho-physiological and linguistic features and a machine learning model development of highly heterogeneous data sets, may enhance traditional face-to-face therapy. Such approach is particularly important for all of those who are exposed to high levels of stress during war time and need assistance more quickly and accurately.

Machine learning (ML) models have been developed to detect mental illness based on a combination of various multimodal physiological sensors (Chen et al., 2022; Garriga et al., 2022; Sabry et al., 2022). The computation of corresponding features, selection and labeling training datasets, and selection of validation and verification datasets using a supervised learning model, can be developed for classification or prediction of different mental health issues. Traditional and most common machine learning methods include: support vector machine (SVM), k-Nearest Neighbors (KNN), Adaptive Boosting (AdaBoost), Decision Tree (DT), Random Forest (RF), Naive Bayes (NB), and Logistic Regression (LR; Sarker, 2021). To develop a robust ML model, it is crucial to identify the primary

multimodal features that serve as key predictors of severe mental health conditions (Zhang et al., 2022). The main advantage of supervised learning lies in the model's ability to learn patterns from labeled datasets, therefore leading to better model performance. However, labeling the large amount of data with high quality is a time consuming and challenging job, therefore the methods that can help reduce the human annotation burden are of special interest. Methods which do not rely on labeled data or need only a small amount of data to train a classifier, are based on unsupervised learning methods which can discover patterns from unlabeled data, such as clustering data.

Currently, deep machine learning (DL) methods receive more attention and perform better than traditional machine learning methods, while the interpretable models, like XAI, deserve particular attention. DL methods can capture valuable features automatically without feature engineering and may be preferred for tasks of mental illness detection from text. DL methods consist of multiple layers, including an embedding layer and a classification layer (Zhang et al., 2022). The embedding layer has the ability to retain both semantic and syntactic information, thereby enhancing the training of deep learning models. Various embedding techniques exist, such as ELMo, GloVe word embedding, word2vec, and contextual language encoder representations like bidirectional encoder representations transformers (BERT). Depending on the structure of the classification layer, DL methods might be divided into convolutional neural networks (CNN), recurrent neural networks (RNN), transformer-based methods, and hybrid-based methods (Zhang et al., 2022). DL models have shown high accuracy in predicting mental health disorder diagnosis and severity (Garriga et al., 2022; Allesøe et al., 2023).

The utilization of NLP and the analysis of free-form online posts can provide significant advantages in accurately predicting potential psychiatric disorders (Le Glaz et al., 2021; Arowosegbe and Oyelade, 2023). In particular, distinguishing between individuals who are vulnerable to mental stress and those who are resilient to mental stress can greatly contribute to the reliability of such predictions (Ćosić et al., 2021). NLP-based semantic analysis and recognition of specific keywords to track individual emotions and moods illustrates promising improvements to empower mental health management (Zhang et al., 2022). Such linguistic features and information and related unstructured data may be valuable tool in identification of relevant keywords for early detection of various mental health problems (Ćosić et al., 2021). Early warning text-based indicators of potential mental illness deserve particular attention since they enable early intervention and prevention of serious mental health diseases, like PTSD. NLP methodologies possess the capability to apprehend irrational or distorted conversations that are related with some psychopathological patterns, such as the patient's cognitive distortions, biases, core beliefs and negative wording. By employing NLP techniques, medical practitioners can unveil the configurations that exemplify how specific psychopathological conditions are manifested in language, as well as the corresponding semantic and acoustic qualities over a period of time (Ćosić et al., 2021). All individual posts, their contents, and comments on related, continuously monitored, social networks may serve as a source of relevant linguistic features such as word frequencies, lexical diversity, narrative coherence, sentiment of speech content and others, using them to classify major mental health disorders. These features might be calculated, for

example by Linguistic Inquiry and Word Count (LIWC), Bag-of-Words model, word2vec and BERT.

Digital therapeutic devices and apps based on cognitive behavioral therapy and explainable artificial intelligence (XAI) might be an additional transformative and powerful approach in psychiatry of the 21st century leading toward highly efficient diagnosis and treatment as complementary assistance to traditional face-to-face therapy (Tong et al., 2022; Górriz et al., 2023). A virtual digital therapist might be as good as a human therapist based on the enormous potential of AI-based tools and means. Such applications offer great promise since they only require smart wearables sensors and smartphones. Cognitive behavioral therapy (CBT) is a type of evidence-based psychotherapy that is often recognized by the Institute of Medicine as the first-line approach to provide behavioral, cognitive, and emotional change and adaption to a range of common psychological and psychiatric problems (David et al., 2018). Finally, to the personalization of online CBT and XAI treatments using minimal human resources is an important research topic which deserves much more attention, particularly regarding the issues of optimal adaptive treatments, selection of best treatments, minimization of dropouts etc.

Explainable AI within the field of psychiatry could potentially serve as a self-explanatory digital aid to psychiatrists, enabling them to meticulously analyze vast amounts of data and identify intricate patterns and concealed indicators that may elude the perception of a psychotherapist. The goal of XAI in mental health diagnostics is to understand explanatory factors of mental illness in order to improve diagnostic performance and empower therapeutic decision-making (Kerz et al., 2023). The interpretability of diagnostics and treatments is extremely important for guiding psychiatrists to understand not only what has been extracted from big multimodal datasets, but also to enhance treatment and prediction (Koppe et al., 2021). Machine and deep learning-based methods achieve good performance by utilizing a large number of features, their extraction and computation, but they still fail to explain some complex decisions (Zhang et al., 2022). As a result, the explainability or interpretability of the machine and deep learning decision making process will become an important research direction in the future. This is an issue when both patients and doctors need to understand why an outcome has been produced for a given specific set of multimodal inputs. This allows physicians to check if the reasoning of the trained model aligns with their own understanding and general medical domain principles. Understanding the mechanisms and rationales behind a particular machine learning algorithm is crucial in establishing confidence and trust among domain experts. These factors can lead human experts to either reject or embrace these diagnostic approaches. Therefore, the need for transparency in psychiatry due to probabilistic variations relating to the complexity of neuro-psycho-physiological factors of mental health disorders is extremely important. As increasingly complex models are developed and their replacements for human expert decision making, it is necessary to ensure that the "black box" nature of these models have not learned undesirable patterns (Ali et al., 2023).

## 5 Mental health monitoring by wearable devices

Wearable and wireless sensors and sensing technology using a variety of AI algorithms can be applied in the prediction of different

mental health disorders by monitoring human physiology, emotion, cognition, and behavior (Lee et al., 2021; Kalisperakis et al., 2023; Sigcha et al., 2023; Zheng et al., 2023). Majority of applications are deployed on smartphones or configured with a chatbot interface via a web application for providing access to a larger population offering a unique opportunity for ubiquitous mental health screening. Connected and embedded into people's personal lives, smartphones provide considerable insight into individual routines, habits, activities, and human way of living. The convergence of sensor networks, fusion of sensors, processing of signals, and human interaction with these devices result in a vast amount of data, which serves as a valuable source for extracting intricate characteristics utilized by machine learning algorithms (Sabry et al., 2022). These algorithms are then able to identify and acquire meaningful patterns that aid in the prediction of potential mental health disorders. Wearable devices have the capacity to incorporate a range of sensor types, enabling the continuous monitoring of various bodily signals. Consequently, these devices can gather an extensive amount of data, potentially reaching millions of data points per person per day. Such information can be utilized by a range of machine learning techniques, like deep neural networks, for the purposes of training, learning, and predictive modeling (Ćosić et al., 2024). Smart wearables supported by AI can be very helpful in digital psychiatry to provide care to millions of potential patients simultaneously and can be used for clinical purposes to track patients with greater care and accuracy (Chen et al., 2022; Shajari et al., 2023). A large amount of the biometric data can be analyzed on edge computing devices enabling developers to secure sensitive data and enhance security and privacy. Based on innovation in new sensors technology and sophisticated algorithms, wearables can be used as diagnostic devices using machine learning models built on data streaming from each individual. It might be also very helpful to enhance traditional conventional face-to-face therapies which currently represent a serious barrier to care. These devices can resolve many problems regarding potential massive mental health problems induced by war traumas, natural disasters or pandemics.

Today, each part of human biology can be captured by more than a thousand sensors collecting a few thousand physiological, emotional, cognitive and behavioral features (Dang et al., 2023). Wearable physiological sensors may include measurements of heart rate variability, body temperature, breathing dynamics, oculometric features, electrodermal activity, respiration rate, blood volume, blood oxygen saturation, blood pressure, acoustic recordings, movement sensors, such as tri-axis accelerometers, tri-axis gyroscopes, inertial platforms, magnetometers, and many others (Ates et al., 2022; Scataglini et al., 2023). From all these neuro-psycho-physiological variables, more complex physiological states can be computed (i.e., respiratory sinus arrhythmia). Daily tracking of activity and movement by GPS, their mutual interactions, and physiology or even metabolic functions, including variations of glucose, microbiome analysis, genomics sequencing, offers a new dimension in monitoring and tracking human behavior, and offers valuable tools and means in prevention of serious mental health disorders in war-inflicted societies.

Model development based on extracted features and sophisticated and complex innovative machine learning algorithms can be used for classification of certain mental disorders. For example, activity monitoring and recognition by text messages, location, movement, touch screen typing patterns, and voice recordings can assist in mental health monitoring and diagnostics. However, the interpretation of the

impact of certain statistical features on classification or other outcome variables can often be challenging. Furthermore, the precision of a model can be adversely impacted by the incorporation of irrelevant characteristics (Sabry et al., 2022). It is important to note that the notion of "more is better" does not always hold true, as the inclusion of domain-specific features that possess expressive qualities tends to yield superior performance. For instance, features such as heart rate, breathing rate, changes in acceleration, motion jerk, and transient alterations in skin resistance can be considered as domain-specific features for seizure detection (Sabry et al., 2022). In certain applications, the focus lies on changes occurring over extended periods, while in others, attention is directed toward transient changes resulting from specific events like fall detection and emotion recognition. The growing array of wearable devices can lead to big changes in the prevention of chronic mental health diseases by continuous measurements to identify which patterns are normal and which are abnormal. Continuous measurements make it possible to establish which patterns are normal for a specific individual, such as respiration or heart rate, and can assist in recognizing important deviations before disease develops.

Acoustic characteristics of speech, like prosody have commonly been utilized as indicators of sentiments, emotions and underlying physiological states (Huang et al., 2021). Slight alterations in physiological and cognitive states can result in perceptible acoustic alterations in speech perception, particularly during distressing incidents (Scherer, 1984). Certain descriptions can be readily elucidated by individual characteristics such as reduced fundamental frequency of speech, decreased number of voiced frames in an utterance, and pauses between words. Additional set of acoustic features that delineate such phenomena contributes to more information in the emotional analysis of speech (Ćosić et al., 2021).

Challenges for machine learning applications on wearable devices are related to the accuracy of machine learning models. Cross-validation techniques increase accuracy by testing the model on unseen data that have not been used in training (Sabry et al., 2022). Model interpretability is crucial, especially in wearable device applications in healthcare, where users need understandable results. Model size also matters for wearable devices due to memory constraints, as does computational complexity for inference and online training. Past obstacles in model development include data collection, feature selection, and model evaluation, highlighting the need for caution in relying on machine learning decisions. Healthcare models must generalize well, handle unseen examples, consider personal attributes, offer interpretable results, and communicate outcomes carefully (Sabry et al., 2022).

## 6 Transformation of dominant emotional maps

Transformation of dominant emotional maps might be undertaken by simultaneous combination of computerized CBT (CCBT) on an individual level, as well as usage of emotionally based strategic communications (EBSC) on a public level. Strategic communications, aimed at shaping perceptions and behavior, can be enhanced by leveraging emotions, as proposed in EBSC (Ćosić et al., 2012a,b). This aligns with J. A. Treadwell's statement: "If you want to influence someone, you have to touch their emotions" (Merle, 2005). Emotionally infused strategies, whether in individual

therapy like CCBT or in strategic communications like EBSC, are essential for effective intervention. Integrating emotional strategies into strategic communications can be pivotal in conflict and post-conflict management within diverse social and cultural contexts. Hence, the proposed positive emotional transformation by means of CBT and EBSC may provide important leverage in efforts to protect mental health of local populations in war-inflicted societies. The transformation of negative dominant emotional maps into more positive emotions delivered by EBSC messages to targeted audiences is focused on mental health protection and support. This type of psychological operation can be defined as “planned psychological activities using methods of communications and other means directed to selected audiences in order to shape their perceptions, attitudes and behavior to achieve specific political and military objectives” (Reding et al., 2010). Strategic communication can be defined as “a systematic series of sustained and coherent activities, conducted across strategic, operational and tactical levels to promote and sustain particular types of ideas, opinions and behavior” (Tatham, 2008).

The idea of EBSC originates from our research focused on new technologies in digital psychiatry, like Virtual Reality (VR) adaptive stimulation (Ćosić et al., 2010). The similarity between individual psychotherapy, such as Virtual Reality Exposure Therapy (VRET) and their generalization to psychological operations on a strategic level, based on EBSC, is based on their common neurobiological background in “emotional brain” (Wiederhold and Wiederhold, 2008; LeDoux, 2012; Ćosić et al., 2012a). The best information contents, context, and emotional properties delivered by EBSC are related to ideas and emotions that quickly resonate among targeted audiences and cause a small incremental positive emotional step toward desirable dominant emotional maps (Ćosić et al., 2018). In other words, EBSC must be delivered as a comprehensive communication strategy through which individual and group emotions are reshaped in a more positive manner, producing and shaping “soft power” important for reaching the desired emotional end state (Ćosić et al., 2012a). Figure 2 illustrates the transformation of a negative dominant emotional map of a war-inflicted society to a desirable more positive dominant emotional map, which could be facilitated by EBSC. Redirection of attention of more vulnerable individuals or selected groups from dominant negative emotions to more positive emotions may change how people appraise their current war situation, stimulating incremental emotional transformation toward more positive emotional and mental states.

AI-based tools that can be applied in the creation of EBSC stimuli, like Chat GPT or Google Gemini (Alford, 2024), may have great potential to significantly enhance EBSC by deeper understanding of the dominant emotional maps in targeted populations by more comprehensive semantic and linguistic analyses of available text datasets (Elyoseph et al., 2023). Chat GPT and Gemini can aid in crafting emotional messages that resonate among the targeted populations, amplifying the impact of strategic communications and reshaping dominant emotional maps over time into more positive ones, simultaneously protecting human mental health in war torn societies. It is important to stress that Gemini has an advantage over Chat GPT in EBSC providing high-quality information extracted in real-time, having been trained from Gmail, Google Docs, Google Maps, and Google Drive accounts instead of books and articles to ensure more up-to-date information. However, before one can fully rely on these AI tools, the applied LLM must provide high accuracy, transparency, and trust. Off-the-shelf models such as ChatGPT 4 or

Gemini can produce wrong answers which is unacceptable in any kind of public campaigning, therefore human experts must be permanently embedded in the EBSC closed loop. To be applicable, understandable, and explainable within a specific war zone or region, LLM should be trained on a relevant dataset, for example, using Ukraine or Gaza posts related to current security environment and war disasters.

Training Chat GPT for such a specific strategic communication issue requires fine-tuning the model on a dataset relevant for the selected use cases. The collection of war domain-specific datasets from different local data sources should reflect the emotional and mental states covering a wide range of scenarios and questions that users might encounter within the selected use case domain. After cleaning and preprocessing the collected data to remove noise and tokenization, the preprocessed dataset is used to fine-tune a pre-trained ChatGPT model. Techniques like transfer learning might be used to leverage the knowledge already encoded in the pre-trained model. Training the fine-tuned model on the selected use case specific dataset is monitored by tracking metrics such as loss and validation performance. Once training is completed, evaluation of the performance of the fine-tuned model using validation data, or by manually testing it with sample inputs from related domain. Once the model has satisfied required performance metrics, it can be deployed in an EBSC campaigning process. Continuous monitoring of its performance in production requires its fine-tuning based on user feedback and real-world usage. Real time monitoring and tracking of emotional dynamics based on different data sources with a variety of NLP tools and methods within specific war zone and consequently mental health states deteriorations is extremely important. Early detection and prevention of serious mental health disorders just in time and online comprehensive state of the art therapy is prerequisite for meaningful success.

## 7 Conclusion

The power of simultaneous usage of CCBT and EBSC supported by tools and means of AI may provide a breakthrough in global mental health recovery in war-inflicted societies after the enormous psychological distress caused by war brutality and tragedies. The synergy between individual psycho-therapeutic techniques, such as Virtual Reality Exposure Therapy (VRET), and psychological operations on a strategic level, based on EBSC can be understood by their common neurobiological underpinnings (Wiederhold and Wiederhold, 2008; Ćosić et al., 2012a,b). The potential of AI-based tools and means, such as machine learning, deep learning, neuro-linguistic programming, cloud infrastructure, and new wearable therapeutic devices and apps offer an immense prospect to enhance mental health care on a global scale, rendering them more economically viable and readily implementable. Specifically, when considering the insufficiency of psychiatrists and the limited availability of psychiatric resources in addressing war traumas, disasters, and tragedies, the suggested approach may prove to be a transformative force in the field of psychiatry in the years to come.

Emotionally based strategic communications supported by ChatGPT and Gemini have the potential to revolutionize digital psychiatry in combination with previously described tools and means based on multimodal physiological features, wearable and wireless devices, machine learning and edge and cloud computing. Sustainability of any long-term solution in war zones will depend on

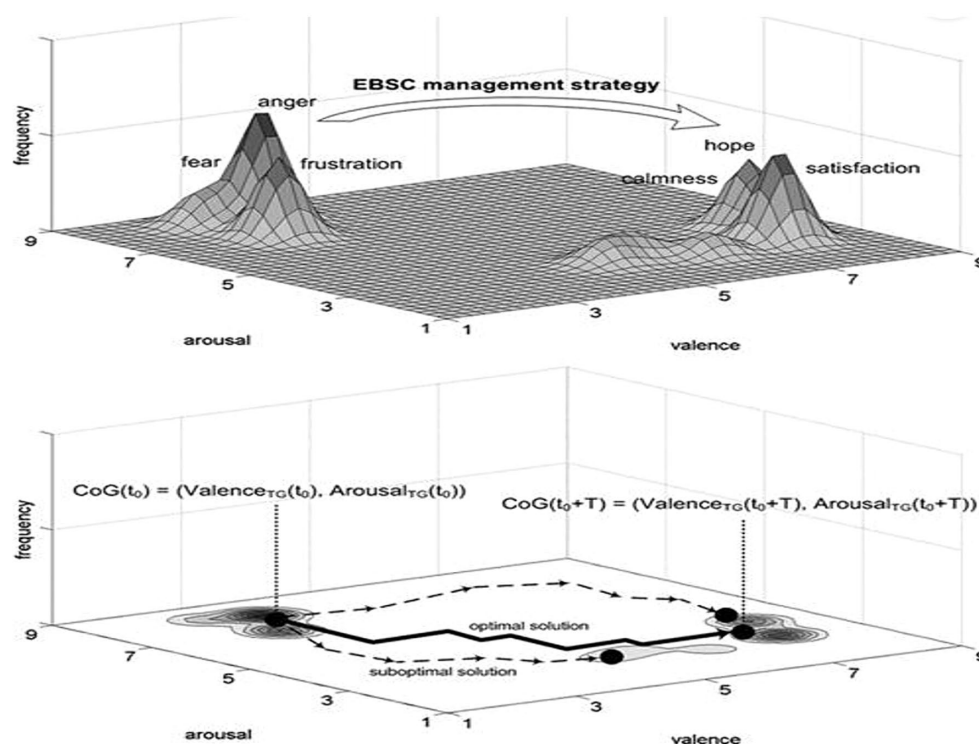


FIGURE 2

Transformation of a negative dominant emotional map of a war-inflicted society to a more positive dominant emotional map by EBSC.

the proposed approach, bringing the new vision on how to cope with and overcome the invisible wounds of war trauma.

## Author contributions

KC: Writing – review & editing, Funding acquisition, Resources, Supervision, Writing – original draft. VK: Writing – review & editing, Resources. TJ: Supervision, Writing – review & editing.

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## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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# Strengthening the military stoic tradition: enhancing resilience in military service members and public safety personnel through functional disconnection and reconnection

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This paper addresses operational stress injuries (OSIs) among military service members (SM) and public safety personnel (PSP) resulting from prolonged exposure to potentially psychologically traumatic events (PPTes). While psychotherapeutic interventions for post-traumatic stress injuries (PTSI) are well established, there is a significant gap in evidence-based mental health training programs addressing proactive mitigation of negative outcomes from PPTes. Building on the Functional Disconnection/Functional Reconnection (FD/FR) model, we introduce FD/FR 2, emphasizing early identification and management of psychological risks. FD/FR 2 discusses the practice of emotional suppression, or “pseudo-stoicism,” and its potential negative impact on mental health. By integrating authentic Stoic principles, FD/FR 2 offers practical exercises to enhance resilience and well-being, addressing a critical need in current training approaches for military SM and PSP.

## KEYWORDS

functional disconnection, functional reconnection, military service members, public safety personnel, first responders, mental health, operational stress injuries, stoicism

## 1 Introduction

Operational stress injuries (OSIs) frequently manifest in military service members (SM) and public safety personnel (PSP), arising from persistent exposure to potentially psychologically traumatic events (PPTes; Carleton et al., 2019). The PPTes experienced by military SM and PSP are associated with higher risk of compromised mental well-being, including various post-traumatic stress injuries (PTSI; Carleton et al., 2018; Inoue et al., 2021). Encouragingly, the effectiveness of individual psychotherapeutic interventions for PPTe and PTSIs are well established for military SM (Straud et al., 2019) and PSP (Bahji et al., 2022). While these PPTe and PTSIs interventions can serve to support the mental health of military SM and PSP, there are very few evidence-based mental health training programs specifically designed to proactively mitigate the negative mental health outcomes associated with PPTes (Anderson et al., 2020; Di Nota et al., 2021).

Given the high psychological risks faced by military SM and PSP, we believe that programming should orient and train these communities to identify and address these risks at the beginning of their careers. A review of existing literature found that many military SM and PSP training programs in North America focus on exposing recruits to scenarios that mimic high-stress environments experienced in the workplace (Atkins and Norris, 2012); however, these current training programs often leave members feeling insufficiently prepared to deal with work-related mental health problems (Lentz et al., 2022).

Evidence evaluating the effectiveness of upstream mental health training is building. The “Road to Mental Readiness” is one program that has been provided to SM and PSP since 2006. This program focuses on the provision of psychoeducation and skill building for participants and has demonstrated some effectiveness in reducing stigma for SM and PSP participants (Carleton et al., 2018). Findings from the Before Operational Stress program (which will be described in greater detail in a later section) was developed to address a gap in early career training for SM and PSP. It focuses on education regarding Stoicism and pseudo-stoicism, with the objective of operationalizing mental health skills participants can use to enhance resiliency in active ways throughout their careers (Stelnicki et al., 2021; Ioachim et al., 2024).

McElheran and Stelnicki (2021) assert that military SM and PSP are often encouraged to “harden” their reactions in stressful situations, engaging in pseudo-stoicism (Bassue, 2023). The influence of pseudo-stoicism may lead to over-reliance on ineffective emotional coping mechanisms detrimental to mental health (McElheran and Stelnicki, 2021). In response, they proposed the Functional Disconnection/Functional Reconnection (FD/FR) Model, integrating Stoic philosophy to emphasize functional reconnection during transitions from work to personal contexts. Incorporating Stoicism into intervention programs offers a promising shift toward training approaches that acknowledge the challenges in military and PSP occupations, providing effective coping strategies early in a career. Unlike other resiliency approaches, Stoic philosophy is deeply tied to the Western profession of arms, with many Stoic-influenced military works, such as Marcus Aurelius’s *The Meditations*, supporting self-directed learning and motivation to use Stoic practices among the military community (Annis, 2023).

This paper presents an updated FD/FR model that incorporates Stoic principles into a series of exercises for military SM and PSP to proactively enhance mental resilience and well-being. Each aspect of Stoic philosophy, as interpreted through the FD/FR model, provides valuable insights for the unique challenges faced by military SM and PSP in both professional and personal contexts. Additionally, the application of the FD/FR model within an evidence-informed resiliency-based training program, Before Operational Stress [BOS], will be examined.

## 2 Stoic philosophy

Stoic philosophy resonates with the challenges faced by contemporary military SM and PSP, emphasizing the transformative power of adversity over material wealth or societal status (Sellars, 2006). This alignment is evident when comparing ancient Stoic teachings with modern conceptualizations of posttraumatic growth, often cited by military SM and PSP exposed to PPTs (Tedeschi et al., 1998). However, we argue that the over-reliance on emotional coping mechanisms, such as suppression and minimization, reflects a misunderstanding of Stoic principles.

In 2021, McElheran and Stelnicki (2021) introduced the Functional Disconnection and Functional Reconnection (FD/FR) model to improve mental health outcomes for military SM and PSP, drawing from Stoic philosophy. They argue that the current application of Stoicism in military and public safety organizations, which emphasizes emotional suppression, deviates from the original intentions of ancient Stoic philosophers. The following section will outline key features of ancient Stoicism and explore the rise of pseudo-stoicism in military and PSP contexts.

### 2.1 Ancient Stoicism

There is no philosophy more deeply connected to the Western military and public safety tradition than Stoicism. Its adoption within PSP cultures is logical (given the paramilitary structures to which PSP sectors adhere). The ancient Stoics collected battlefield-proven approaches to hardening the body and mind from Spartan culture and military veterans (Annis, 2023). Stoicism held virtue as the paramount good. It was the goal in life to live according to reason, seen as a connection to the divine, in harmony with nature. The key features of Stoicism include *the Dichotomy of Control*, *Amori Fati* and *Avoidance of Luxuries* (Sellars, 2006; Sherman, 2007).

#### 2.1.1 Dichotomy of Control

*Dichotomy of Control* focuses individuals on the things in life that exist within their control. Stoics become focused on controlling their judgments, thoughts, and actions while learning to disregard outside factors, including wealth and social positions (Sellars, 2006). Stoics recognized their first impressions and related emotional responses were likely to be wrong. Reflection was required to determine if the correct opinion was held (Enfield, 1792). However, this practice is more of an attitude than a strict direction, as Stoic reflection did not call for the evaluation of every variable within a given scenario. Additionally, the practice of dichotomy of control requires deliberate reflection and would not be possible in emergency situations where cognitive resources are consumed on tasks related to survival, but it could occur when individuals return to situations of relative safety.

#### 2.1.2 Amori Fati

The concept of *Amori Fati* instructs Stoics to “love their fate” and adopt a worldview that interprets even terrible events and hardships in an accepting light. Burdens in life, such as loss or suffering, within this worldview, are ultimately needed and are a means of evolving personal growth and ultimate personal excellence (Sherman, 2007). Both the *Dichotomy of Control* and *Amori Fati* help instill optimism and self-reliance in military and public service contexts.

#### 2.1.3 Avoidance of luxuries

The Stoics were indifferent toward material possessions, instructing individuals to keep their desires small to live well (Sellars, 2006; Sherman, 2007). The desire to live simply offers significant benefits for military SM and PSP, including the reduction of logistical demands and the preservation of available energy reserves (calories) during occupational operations. The lighter a member can learn to live, the quicker they can maneuver on the battlefield and in response to emergency situations while maintaining their ability to think and engage in moral judgment.

## 2.2 Rise of pseudo-stoicism

Pseudo-stoicism, in contrast to authentic Stoic philosophy, leads individuals to actively suppress their emotions (Bassue, 2023). Pseudo-stoicism contends that actions such as crying and other displays of emotion or empathy are commonly deemed as “inappropriate” signals of weakness, fragility, or even incompetence (Bassue, 2023). We contend that the emergence of pseudo-stoicism in the military and public service sectors is likely attributed to changes in education. Recruits and trainees, lacking formal instruction in Stoic philosophy, may seek to emulate the emotional composure of veterans by suppressing their emotions. This effort to reject natural emotions can result in psychological injury and the development of toxic leadership traits. Within the Functional Disconnection/Functional Reconnection framework, we posit that the adoption of pseudo-stoic behaviors is implicitly linked to the prevalence of operational stress injuries among military SM and PSP.

## 3 Functional disconnection/functional reconnection re-visited

In 2021, McElheran and Stelnicki (2021) introduced the Functional Disconnection and Functional Reconnection (FD/FR) model as an alternative to pseudo-stoicism. This framework builds on Whitehead's (2012) concept of “functional disconnect,” initially applied to physicians delivering terminal diagnoses. McElheran and Stelnicki (2021) noted that similar coping strategies are used by military SM and PSP during critical incidents, requiring emotional and personal detachment to perform their duties effectively.

McElheran and Stelnicki (2021) extended Whitehead's framework to include “functional reconnection,” addressing the need for military SM and PSP to re-engage with personal experiences post-shift. This reconnection involves reflecting on the impact of exposure to PPTE's and employing active strategies for processing these experiences. The FD/FR model thus facilitates the transition between occupational and personal contexts, promoting positive coping strategies across various life domains. The model recognizes the necessity of disconnection for professional duties while emphasizing the importance of reconnection for personal well-being (McElheran and Stelnicki, 2021).

## 4 Discussion

### 4.1 FD/FR 2: an updated practical model

Recognizing the need for emotional distance in the work of military SM and PSP, the original FD/FR model emphasizes the importance of functional reconnection for experiential processing. However, the original framework lacked specific application steps. Therefore, we propose an updated FD/FR model that integrates Stoic principles more comprehensively and includes practical exercises to proactively improve mental resilience and well-being. This updated model interprets Stoic philosophy to offer valuable insights tailored to the unique challenges encountered by military SM and PSP in both professional and personal contexts.

Acknowledging that personal excellence is achieved through exposure to loss and suffering, Stoic philosophy is ideal for contemporary military SM and PSP. Rather than pursuing wealth and status, Stoics embraced virtue and recognized that adversity drives personal excellence. This aligns with modern conceptualizations of posttraumatic growth (Tedeschi et al., 1998), often cited by military SM and PSP in understanding chronic PPTE exposure. We propose aligning posttraumatic growth principles (e.g., Tedeschi and Moore, 2016) with FD/FR strategies to challenge pseudo-stoicism and promote true Stoic practices in military and public safety cultures in the following practical ways:

#### 4.1.1 Take the view from above

This Stoic exercise is suitable for both functional disconnection and reconnection. The Stoics advise mindfulness of the transitory nature and recognizing our part in any moment as fleeting. For disconnection, SM and PSP should reflect on their degree of responsibility, particularly in war or critical incidents. It may be that by the time it comes to individual deployment of duty, the outcome of any given situation may already be determined. By practicing the ability to take the view from above, individual distress may be dampened by recognizing the small part any one person has to play in a given situation. For reconnection, Stoics remind us that life is short, encouraging us to focus on activities that align with our values. Practically, this means SM and PSP should actively determine their values and routinely reflect on whether they are living in accordance with these values, particularly in personal relationships and circumstances.

#### 4.1.2 Voluntary discomfort

The Stoics guided how voluntary engagement in difficult or uncomfortable situations could serve to prepare us for future adversities. In modern psychotherapeutic terms, voluntary discomfort can be equated to exposure paradigms used in addressing phobic anxiety (Maund et al., 2019). Such exercises expose oneself to potentially distressing circumstances to enhance tolerance and new learning. In the FD/FR model, we propose engagement in voluntary discomfort practices as a way of life, recognizing that increased tolerance for discomfort can be valuable to the military SM and PSP in both occupational and personal contexts. The physical hardships often faced by these communities during their occupational duties (e.g., long periods without rest, exposure to the elements), and difficult emotional or relational challenges at home (e.g., rebellious children, arguments with a spouse) can benefit from regular practice of voluntary discomfort.

Similarly, we recommend the routine practice of saying “no,” to indulgences to enhance gratitude for what one already has. By intentionally denying cravings, individuals can increase their awareness and appreciation of existing comforts and resources. Existing literature strongly correlates gratitude with happiness (Witvliet et al., 2019), so we advise military SM and PSP to practice this strategy in both occupational and home environments to foster a deeper connection with their current resources.

#### 4.1.3 Focus on what you can control

Military SM and PSP tend to assume undue responsibility for circumstances beyond their control, believing they could have altered

adverse outcomes. This misplaced responsibility can negatively impact the outlook and psychological health of military SM and PSP, often because the assumed responsibility is objectively inaccurate. The FD/FR model encourages military SM and PSP to actively assess what variables are within their control, whether on the battlefield, at critical incidents, within their organizations, or in personal contexts. Practicing this assessment diligently can help military SM and PSP more accurately evaluate events and their roles in the outcomes.

#### 4.1.4 Negative visualization

The ancient Stoics engaged in a negative visualization practice known as *futuorum malorum praemediation*. We understand that military SMs and PSP are often familiar with anticipating worst-case scenarios, as this is often required in battlefield and critical incident scenarios. From the perspective of mental wellness, a regular practice of visualizing the worst potential outcome of a scenario (e.g., an argument with a spouse leading to the dissolution of marriage) may enhance these communities' recognition of the agency they have at their disposal to interrupt the worst-case outcome from coming to fruition. We posit in the FD/FR model that when military SM and PSP believe they can adopt an active approach to coping, their mental health will likely improve.

#### 4.1.5 Summary

In summation, the updated FD/FR model highlights the compatibility of Stoic philosophy with the challenges faced by contemporary military SM and PSP in dealing with potentially traumatic events. The updated model emphasizes that personal excellence, according to Stoicism, arises from exposure to loss and suffering rather than the pursuit of wealth and status. The recommended strategies include taking a broader perspective on one's role in situations, embracing voluntary discomfort for personal growth, focusing on what can be controlled, practicing routine self-denial for enhanced gratitude, and employing negative visualization to anticipate and interrupt potential negative outcomes.

## 5 Incorporation of the FD/FR model into the before operational stress (BOS) program

The BOS program, developed by Canadian mental health experts, addresses the lack of adequate mental health training for military SM and PSP in North America (Stelnicki et al., 2021). BOS aims to proactively strengthen psychological resilience and provide evidence-informed coping strategies for managing operational stressors. Since 2018, BOS has reached over 70,000 Canadian's in high-risk professions, including frontline public safety personnel and military members (Stelnicki et al., 2021; Ioachim et al., 2024).

The FD/FR framework is thoughtfully embedded into the BOS program, offering proactive coping strategies during transitions between work and personal life. BOS integrates the FD/FR model and Stoic principles, aligning with the original Stoic philosophy. The BOS program employs evidence-based proactive strategies to address adverse outcomes from potentially traumatic events and operational stressors. Emerging evidence suggests BOS improves mental health outcomes in PSP (Stelnicki et al., 2021; Ioachim et al., 2024). A revised version of BOS for military SM was launched in December 2023, with future evaluations to include military SM data.

To integrate the newly developed methods into the BOS program or clinical practice, we recommend incorporating the updated FD/FR model and Stoic exercises into the existing curriculum. This involves creating new training modules focused on practical Stoic principles. Workshops and training sessions for trainers and mental health professionals will ensure they are well-prepared to teach and implement these methods. Pilot programs in select military and PSP units can test the effectiveness and feasibility of the updated methods, with data and feedback refining the approach before broader implementation. Encouraging mental health professionals to integrate these exercises into therapy sessions and equipping clients with practical tools will further enhance resilience and well-being. By following these steps, the newly developed methods can be seamlessly integrated into the BOS program and clinical practice, enhancing the psychological resilience of military SM and PSP.

## 6 Conclusion

The updated FD/FR model, integrating Stoic principles, offers a promising approach to enhancing the mental resilience and well-being of military SM and PSP. By embedding Stoic exercises into existing programs and clinical practice, we provide practical tools to proactively mitigate the negative mental health outcomes associated with operational stress. A key strength of the updated FD/FR model is its alignment with the historical and cultural context of military and public safety professions, which have long valued Stoic philosophy. This alignment can facilitate greater acceptance and motivation among military SM and PSP. Additionally, the proactive nature of the FD/FR model addresses a significant gap in early career mental health training, equipping individuals with skills to manage stress and enhance mental resilience. While the updated FD/FR model provides a framework for assessing controllable variables, the line between controllable and uncontrollable factors can often be blurred in high-stress environments, highlighting the need for continuous refinement based on real-world feedback.

We encourage military and PSP organizations to adopt the updated FD/FR model into existing early career training programs while identifying psychological stressors their personnel may potentially face. Stoic-based education that can train military SM and PSP in active approaches to monitor and intervene on mental wellness, disrupting the potentially deleterious effects of chronic exposure to psychologically traumatic events. Pilot programs and workshops can serve as valuable platforms for testing and refining the model. Initial implementation may face resistance from individuals accustomed to traditional training methods, and the effectiveness of the model may vary across different units and contexts. However, if military SM and PSP can learn proactive mechanisms to attend to mental wellness throughout their careers, this may impact the pervasive psychological difficulties currently identified in these populations.

Future research should focus on further validating and refining the updated FD/FR model. Longitudinal studies assessing the long-term impact of the model on mental health outcomes in military SM and PSP are essential. Exploring the integration of the model with other therapeutic approaches could enhance its effectiveness and applicability. By addressing these areas, we can continue to improve the FD/FR model, ensuring it remains a valuable tool for enhancing

the mental resilience and well-being of those who serve in high-risk professions.

## Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

## Author contributions

MM: Conceptualization, Writing – original draft, Writing – review & editing. FA: Conceptualization, Writing – original draft, Writing – review & editing. HD: Writing – original draft, Writing – review & editing. TC: Writing – original draft, Writing – review & editing.

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# Psychological status of general population 1 year after the outbreak of COVID-19: a cross-sectional study based on SCL-90

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**Introduction:** The mental health of populations is usually affected after a disaster event. However, it is not known what the level of mental health of Chinese population 1 year after COVID-19, nor what factors influence it.

**Aim:** This study aimed to examine the mental health status of general population in Chengdu 1 year after COVID-19, and then analyse influencing factors.

**Method:** This study is a cross-sectional survey based on the SCL-90 questionnaire. Continuous data were described as M and SD, and counting data were described as frequencies(n) and percentages (%). Chi-square test or Fisher's exact test were used for statistical inference, and significance variables were included in the binary logistic regression equation for multivariate analysis.

**Results:** There were 172 participants with positive screening results. Age, marital status, number of kids, self-perceived health and the presence of chronic disease had an effect on screening results. Logistic regression analysis showed that age and self-perceived health were the main influencing factors.

**Discussion:** Young people aged 18–19 and those who consider themselves not very healthy were at higher risk of poor mental health 1 year after the COVID-19 outbreak.

**Impact statement:** Community institutions and community workers should focus on the mental health status of people 1 year after COVID-19, with a focus on people with poor self-perceived health and younger age groups, and take early preventive measures.

## KEYWORDS

COVID-19, epidemic, general population, mental health, SCL-90

# 1 Introduction

Disaster events (such as earthquakes, hurricanes, outbreaks of epidemics, etc.) take a significant toll on human physical and mental health, and individuals affected by disasters are at risk of developing adverse mental health sequelae (Hu et al., 2021). COVID-19 has also been a disaster. On December 31, 2019, a new strain of coronavirus was isolated from patients with pneumonia of unknown etiology in Wuhan city, China, and named as severe acute respiratory syndrome coronavirus 2 (SARS-Cov-2) by the International Committee on Taxonomy of Viruses (ICTV) (Habas et al., 2020). On January 30, 2020, the World Health Organization declared that the COVID-19 outbreak is an international public health emergency, calling on all countries to take immediate action (World Health Organization, 2020). On March 11, 2020, WHO declared COVID-19 is a new pandemic (Anka et al., 2021).

The global excess mortality associated with COVID-19 was 14.91 million in the 24-months between 1 January 2020 and 31 December 2021, representing 9.49 million more deaths than those globally reported as directly attributable to COVID-19 (World Health Organization, 2022). The novel coronavirus has the characteristics of strong infectivity, multiple routes of infection, and wide spread. Since its full outbreak in December 2019, COVID-19 has become a global pandemic, causing a global public health crisis (He et al., 2020). COVID-19 is not only a threat to an individual's physical health, it can also trigger mental health issues such as insecurity, fear and depression (Lindert et al., 2021).

With the progression of the outbreak, respiratory mucus droplets and direct contact have been identified as the main modes of human-to-human transmission. The basic strategies for the control of ongoing pandemic are dependent on the control policies and human behaviors, such as home isolation, contact tracing, social distancing, frequent handwashing (Habas et al., 2020). The implementation of these epidemic prevention measures may cause negative psychological reactions of general population, including adjustment disorders, anxiety disorders and depression, and then the psychological symptoms related to epidemics arise.

Researchers have found that after epidemics, such as SARS and MERS, the mental health of the population remained poor after one, two or even 3 years (Vindegaard and Benros, 2020). Moreover, a study has shown that the psychological symptoms of individuals were more severe 6 months after the epidemic than within 6 months (Yuan et al., 2021). This phenomenon is known as epidemic psychology. It is a unique field of research and applied science, suggests that the outbreak of an epidemic can have a significant impact on mental health (Taylor, 2022).

During COVID-19 pandemic a significant increase on COVID-19 Anxiety Syndrome (Alhakami et al., 2023; Mansueto et al., 2022), fatigue, loneliness (Mansueto et al., 2021) and a decrease in psychological flexibility and well-being has been observed across different countries (Mansueto et al., 2024; Carrozzino et al., 2021; Landi et al., 2020). A systematic review also showed that the general population experienced relatively high rates of symptoms of anxiety (6.33 to 50.9%), depression (14.6 to 48.3%), post-traumatic stress disorder (7 to 53.8%), psychological distress (34.43 to 38%) and stress (8.1 to 81.9%). Therefore, mitigating the adverse effects of COVID-19 on mental health has been recognized as a global public health priority (Xiong et al., 2020). But since the outbreak of COVID-19, researchers have paid much attention to

understanding the epidemiology, clinical features, modes of transmission, resistance to virus transmission, and global health challenges, with limited attention to mental health of general population (Mukhtar, 2020).

Although previous studies have explored mental health status and related influencing factors of general population during the COVID-19 emergency response phase. They found that more than 70% of people had moderate or high level of psychological symptoms during this phase (Tian et al., 2020), but it remains unclear what the psychological status of general population 1 year after the outbreak of COVID-19. Based on a large number of studies on respiratory infectious diseases such as SARS and MERS, we hypothesized that general population will show a similar psychological trajectory after the outbreak of COVID-19 (Lung et al., 2009; Lee et al., 2007). That is to say, for a long period of time after the outbreak of COVID-19, the mental health of individuals may be poor, which will seriously affect the normal life of individuals. However, there is very little research to support our conjecture. Therefore, this study aims to investigate the psychological status of the general population 1 year after COVID-19 and to analyse the influencing factors. The results of this survey can provide professionals with a reference for early intervention, and provide support for the further development of epidemiological psychology.

## 2 Methods

### 2.1 Study design

This was an observational study and had been registered at the Clinical Trials Center. This study was in line with the Declaration of Helsinki revised in 2013 and received approval from the Medical Ethics Committee of Chengdu Women's and Children's Central Hospital (approval number: 2021(16)). Before participants start filling out the questionnaire, the researcher introduced the purpose and significance of the survey to them, and all participants were agreed to participate in the study.

### 2.2 Population and sample

Convenience sampling method was used to recruit subjects. The inclusion criteria were as follows: ① participants were  $\geq 18$  years old; ② ability to complete the survey using smartphones; ③ were informed about the purpose of the study; ④ volunteered to participate. The exclusion criteria were as follows: ① illiterate; ② cannot understand the content of the questionnaire; ③ cannot complete the questionnaire independently. In the end, a total of 2,235 people were recruited in the survey.

### 2.3 Data collection

This was an online survey, and all participants used Wenjuanxing, a professional Chinese questionnaire survey platform, to complete the questionnaire. The first part of the questionnaire was informed consent form. Participants would first read the informed consent of the study, tick "agree" and then enter the questionnaire filling interface; otherwise, the survey would be finished.

## 2.4 Instrument

### 2.4.1 Demographic and health related questionnaire

A self-designed questionnaire was used to collect demographic and health related information of the participants, including items for gender, age, marital status, number of kids, occupation, education background, any chronic illness, and perceived health status.

### 2.4.2 Symptom Checklist 90 (SCL-90)

The 90-item symptom list (SCL-90), also known as the symptom self-rating scale, is the most widely used outpatient examination scale for mental disorders and mental illnesses. It was compiled by L.R. Derogatis in 1975 and suitable for adults over 16 years old. This scale can assess whether an individual has a certain psychological symptom and its severity from multiple perspectives (Tang et al., 1999). The SCL-90 scale has been translated into multiple languages and used in several countries around the world. It was introduced into mainland China in 1984 to study psychiatric symptoms. Then Chinese national norms was subsequently established for the first time. From then on, it has been widely used in general population surveys and large-scale psychological status screening research in China (Tan et al., 2015; Tsai et al., 2003; Dang et al., 2021). Data were collected using SCL-90 Chinese version, which demonstrated high reliability (Cronbach's  $\alpha$  of this scale was 0.98, Cronbach's  $\alpha$  of each factor score ranged from 0.80 to 0.91) (Yu et al., 2019), and the validity of the scale was 0.963, indicating that the scale had good reliability and validity, and could accurately reflect the mental health status of residents (Shi et al., 2013).

The SCL-90 includes nine subscales involving nine symptom dimensions, which are somatization (SOM), obsessive-compulsive disorder (OC), interpersonal sensitivity (IS), depression (DEP), anxiety disorder (ANX), hostility (HOS), phobic anxiety disorder (PHOB), paranoid perception (PAR), and psychosis (PSY), and the remaining seven items reflecting sleep and diet were listed as other dimensions. Nine subscales provided symptom descriptions, and participants assessed the symptoms described by the scale, with 1 for no symptoms, 2 for mild symptoms, 3 for moderate symptoms, 4 for severe symptoms and 5 for very serious symptoms. Participants was required to make an independent self-assessment based on their actual feelings of “now” or “the last week”. The main scoring indicators include the total score of 90 items; GSI (Global Severity Index) score: actual total score of the scale/90; factor score: total factor score/number of factor items; PST (Positive Symptom Total): the number of items with a single score  $\geq 2$ ; PSDI (Positive Symptom Distress Index): the total score of positive items/number of positive items (Gomez et al., 2021).

## 2.5 Data analysis

Data were analyzed by Statistical Package for the Social Sciences (IBM SPSS 26.0). Frequencies (n) and percentages (%) were used to describe general information include gender, age distribution, vaccination, marital status, number of kids, educational background,

occupation, perceived health status, any chronic diseases. Shapiro-Wilktest was used to test the normality of the data. Continuous data were described as mean (M) and standard deviation (SD). To identify the differences in positive and negative SCL-90 screening groups according to demographic characteristics, Chi-square test and Fisher's

TABLE 1 General information of the sample population of this study.

Variables		N	%
Gender	Male	906	40.50%
	Female	1,329	59.50%
Age distribution (year)	18–19	29	1.30%
	20–29	378	16.90%
	30–39	622	27.80%
	40–49	552	24.70%
	$\geq 50$	654	29.30%
Vaccination	Once	1,131	50.60%
	Twice	1,104	49.40%
Marital status	Unmarried	355	15.90%
	Married	1,723	77.10%
	Divorced	136	6.10%
	Widowed	21	0.90%
Number of kids	0	427	19.10%
	1	1,299	58.10%
	2 or more	509	22.80%
Educational background	Junior middle school and below	611	27.30%
	High school	575	25.70%
	College degree or Bachelor	1,001	44.80%
	Master's degree or above	48	2.10%
Occupation	Government organs and institutions	354	15.80%
	Professional skill worker	348	15.60%
	Business service industry	590	26.40%
	Agriculture, forestry, fishery and animal husbandry	85	3.80%
	Production and transportation	62	2.80%
	Soldier	9	0.40%
	Unemployed	368	16.50%
	Other	419	18.70%
Perceived health status	Healthy	1,899	85.00%
	Not very healthy	336	15.00%
Any chronic diseases	No	1,944	87.00%
	Yes	291	13.00%

exact test were performed. Significant variables were incorporated into the binary logistic regression equation for multivariate analysis.

## 3 Results

### 3.1 General information

As shown in Table 1, a total of 2,235 people completed the survey, of which 906 (40.50%) were male, 1,329 (59.50%) were female; 1,131 (50.60%) got one vaccination, and 1,104 (49.40%) got two vaccinations. Most of the respondents were over 30 years old (1,828, 81.79%), married (1,723, 77.10%), had one child (1,299, 58.10%), and had a college or university degree (1,001, 44.80%), engaged in business services (590, 26.40%), and considered themselves healthy (1,899, 85%), and with no chronic disease (1,944, 87.00%).

The scores of each factor and total score of SCL-90 are shown in Table 2. DEP symptoms was the highest ( $14.54 \pm 3.556$ ), followed by SOM symptoms ( $13.22 \pm 2.282$ ), and PAR symptoms was the lowest ( $6.41 \pm 1.223$ ).

Table 3 shows the symptom severity of each factor score and total score of the study population. From the GSI score, 33.96% of the population were asymptomatic, 65.10% had mild symptoms, 0.94% had moderate symptoms, and no one had severe symptoms or very serious symptoms. In the distribution of symptom severity of each factor, the number of population with OC symptoms (1,061 people, 47.47%), SOM symptoms (930 people, 41.61%) and other symptoms (926 people, 41.43%) ranked the top three. Among the population with OC symptoms, 92.65% (983 people) had mild symptoms, 6.60% had moderate symptoms, and 0.75% had severe symptoms. Among population with SOM symptoms, 98.71% (918 people) had mild symptoms, 1.18% had moderate symptoms, and 0.11% had severe symptoms. Among the population with other symptoms, 93.74% (868 people) had mild symptoms, 5.40% had moderate symptoms, and 0.86% had severe symptoms. Figure 1 shows the distribution of SCL-90 scores of

symptomatic and asymptomatic people in the sample of this study. Figure 2 shows the proportion of the population with SCL-90 score symptom severity in this study sample.

### 3.2 Univariate analysis of negative and positive groups of participants

If the total SCL-90 score exceeds 160 points, or the number of positive items exceeds 43, or any factor score exceeds 2 points, we consider the screening result to be positive for psychological status. In this study, 172 participants (7.70%) were positive. As shown in Table 4, there was a significant difference in the psychological status of gender ( $p = 0.027$ ), age ( $p < 0.001$ ), marital status ( $p < 0.001$ ), number of kids ( $p < 0.001$ ), perceived health status ( $p < 0.001$ ), and whether have chronic diseases ( $p = 0.012$ ).

### 3.3 Influencing factors analysis of negative and positive groups of participants

The significant variables of univariate analysis were included in the binary logistic regression model, and the forward stepwise regression method was used for analysis.  $p < 0.05$  in The Omnibus Tests of Model Coefficients test, indicating that the model established in this study has statistical significance ( $\chi^2 = 90.392$ ,  $p < 0.001$ ).  $p = 0.901 > 0.05$  in the Hosmer and Lemeshow Test, indicating that the model fits well. Nagelkerke  $R^2$  can be used to evaluate the fit of the regression equation,  $R^2$  takes a value between 0 to 1, the larger its value, the better the fit of the regression model. The value of  $R^2$  is affected by the number of independent variables, and an increase in the number of independent variables increases the value of  $R^2$ . The Nagelkerke  $R^2$  of this model is 0.095, the lower  $R^2$  may be related to the smaller number of independent variables in the model. In conclusion, this model has a good judgment effect. The risk of mental health problems of young people aged 18–19 years was 3.861 times that of individuals aged 30–39 years ( $OR = 0.259$ , 95%  $CI: 0.103 \sim 0.656$ ;  $p = 0.004$ ); 7.407 times that of 40–49 year old individuals ( $OR = 0.135$ , 95%  $CI: 0.051 \sim 0.358$ ;  $P < 0.001$ ); and 5.814 times than that of residents aged 50 or older ( $OR = 0.172$ , 95%  $CI: 0.067 \sim 0.439$ ;  $P < 0.001$ ). Individuals who consider themselves not very healthy are 4.182 times more likely to have psychological symptoms than those who consider themselves healthy ( $OR = 4.182$ , 95%  $CI: 2.957 \sim 5.913$ ;  $P < 0.001$ ) (Table 5).

## 4 Discussion

The COVID-19 pandemic has brought unprecedented psychological stress to people around the world (Carlos et al., 2020; Levkovich and Shinan-Altman, 2021). This study examined the mental health status of general population in Chengdu, China. We found that 1 year after the outbreak, most people screened for SCL-90 have mild symptoms. Most importantly, we found that perceived health status and age were important influences on mental health. Poor subjective health status and younger age (18–19 years old) were independent risk factors for poorer mental health status.

TABLE 2 SCL-90 scores for each factor in this study.

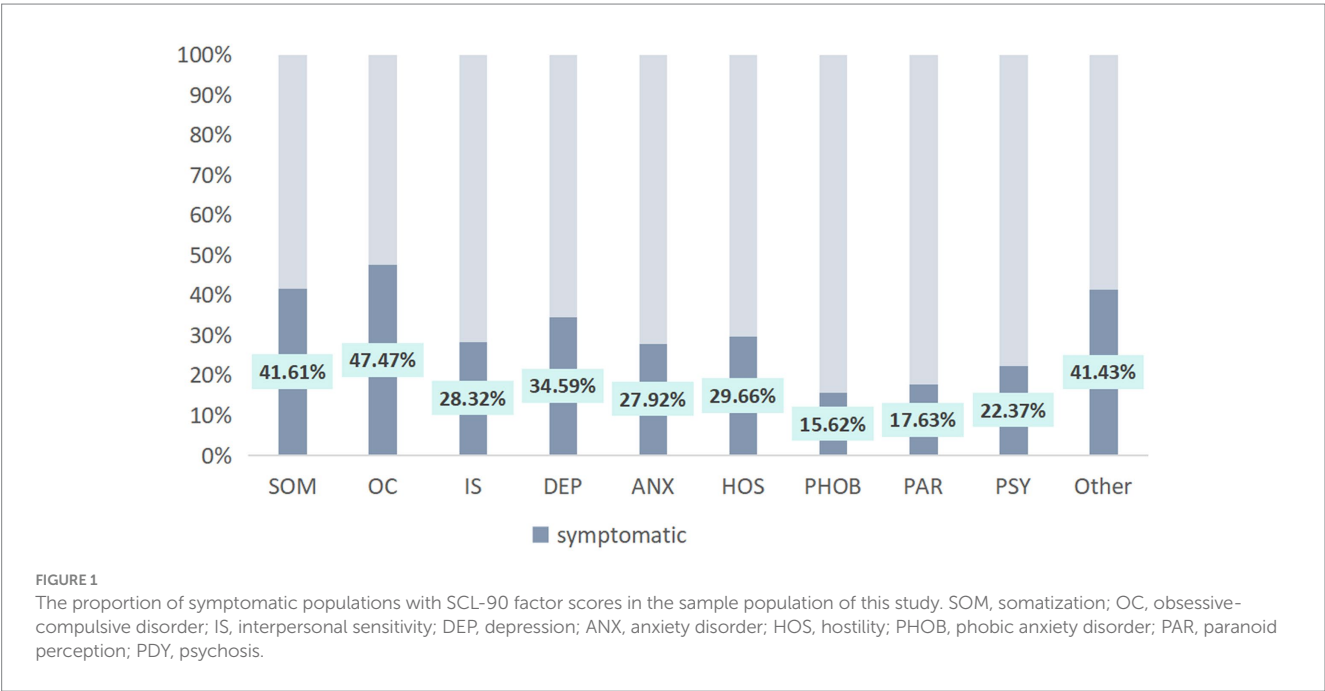
Factor	Minimum (point)	Maximum (point)	Mean score	SD
SOM	12	41	13.22	2.282
OC	10	35	11.94	3.357
IS	9	31	9.95	2.319
DEP	13	43	14.54	3.556
ANX	10	37	10.81	2.098
HOS	6	24	6.69	1.584
PHOB	7	23	7.37	1.209
PAR	6	21	6.41	1.223
PSY	10	32	10.73	2.057
Other	7	24	8.32	2.296
Total	90	268	100.00	18.792

SOM, somatization; OC, obsessive-compulsive disorder; IS, interpersonal sensitivity; DEP, depression; ANX, anxiety disorder; HOS, hostility; PHOB, phobic anxiety disorder; PAR, paranoid perception; PDY, psychosis.

TABLE 3 Severity distribution of SCL-90 factor scores and GSI scores in the sample population of this study.

Factor	Asymptomatic		Symptomatic		1 < i ≤ 2 mild		2 < i ≤ 3 moderate		3 < i ≤ 4 severe		4 < i ≤ 5 very serious	
SOM	1,305	58.39%	930	41.61%	918	41.07%	11	0.49%	1	0.04%	0	0.00%
OC	1,174	52.53%	1,061	47.47%	983	43.98%	70	3.13%	8	0.36%	0	0.00%
IS	1,602	71.68%	633	28.32%	592	26.49%	39	1.74%	2	0.09%	0	0.00%
DEP	1,462	65.41%	773	34.59%	729	32.62%	40	1.79%	4	0.18%	0	0.00%
ANX	1,611	72.08%	624	27.92%	604	27.02%	17	0.76%	3	0.13%	0	0.00%
HOS	1,572	70.34%	663	29.66%	625	27.96%	33	1.48%	5	0.22%	0	0.00%
PHOB	1886	84.38%	349	15.62%	339	15.17%	8	0.36%	2	0.09%	0	0.00%
PAR	1841	82.37%	394	17.63%	377	16.87%	15	0.67%	2	0.09%	0	0.00%
PSY	1735	77.63%	500	22.37%	478	21.39%	20	0.89%	2	0.09%	0	0.00%
Other	1,309	58.57%	926	41.43%	868	38.84%	50	2.24%	8	0.36%	0	0.00%
GSI	759	33.96%	1,476	66.04%	1,455	65.10%	21	0.94%	0	0.00%	0	0.00%

i refers to the dimension score.



**Self-perceived health (SPH)** is a subjective expression of health, which is widely used in population health research (Gumà, 2021). Perceived health status, also known as subjective health perception, represents the self-evaluation of an individual's general health status. It refers to people's overall perception of their own health status, including physical and psychological factors (Denche-Zamorano et al., 2022; Kwak et al., 2022). In this study, SPH was measured by 'How do you usually view your health?', and the responses were categorized as "healthy" or "not very healthy." We found that the SPH status was the main influencing factor of community residents' mental health, and community residents who self-perceived as unhealthy were more likely to have mental health problems. The results obtained are consistent with that reported by Inbar and Shinan-Altman (2021) and Buneviciene

et al. (2022), suggesting that poorer perceived health is associated with increased risk of mental health problems. This phenomenon also may be explained by the concept of positive psychology. SPH is a positive emotion, it can improve the psychological state and make people's psychology tend to be in a healthy state (Seligman et al., 2005). de-Mateo-Silleras et al. (2019) conducted a cross-sectional survey of 214 university students in Spain, the aim of the study was to assess their perception of health based on their lifestyle. The results of this study found that for the university population, a healthy lifestyle had a significant impact on health perception (de-Mateo-Silleras et al., 2019). The results of Cau et al. (2016) and Szwarcwald et al. (2015) also found that health behaviors, such as not smoking, consuming enough recommended amounts of fruits and vegetables, and engaging in physical exercise,

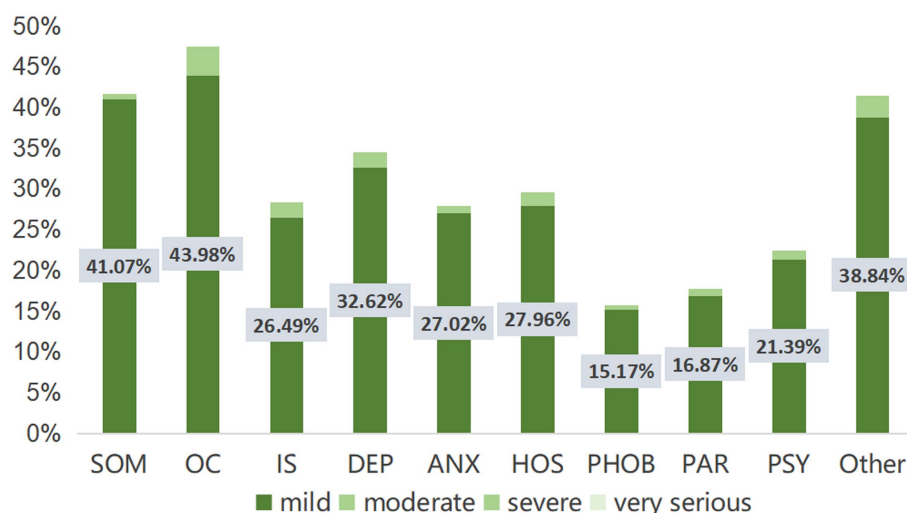


FIGURE 2

The severity distribution of SCL-90 factor scores in the sample population of this study. SOM, somatization; OC, obsessive-compulsive disorder; IS, interpersonal sensitivity; DEP, depression; ANX, anxiety disorder; HOS, hostility; PHOB, phobic anxiety disorder; PAR, paranoid perception; PSY, psychosis.

can help to improve health perception, which in turn improves psychological status. So we believe that community residents can be encouraged to adopt a healthy lifestyle and do more exercise to improve their health perception and regulate their mental health level. Studies by D'Oliveira et al. (2022) and da Cruz et al. (2022) have concluded that physical activity improves the mental health of the population. D'Oliveira et al. (2022) conducted a study on a physical exercise protocol for older adults, applied remotely during the pandemic, this study offers a home-based exercise protocol for older adults. In line with the findings of D'Oliveira et al. (2022), our study also highlights the importance of adapted physical exercise protocols for vulnerable populations during periods of social isolation. Moreover, community agency organizations can use digital interventions to raise awareness of healthy lifestyles among general population. For example, mass media can be used to publicise the importance of a healthy lifestyle for the body and mind, what a healthy lifestyle is and how to choose a healthy lifestyle.

**Age** is an influential factor for mental health during COVID-19, which is consistent with the findings by Huang and Zhao (2020) and Chew et al. (2020), but differ in Inbar and Shinan-Altman (2021). Huang and Zhao (2020) collected data from 7,236 volunteers, found that the incidence of mental health problems in younger people was significantly higher than in older adults. But in another study conducted in Israel by Inbar and Shinan-Altman (2021) explored the relationship between emotional reactions and subjective health status during the COVID-19 pandemic, showing a high prevalence of emotional reactions among older adults. Despite inconsistent findings, most research now agrees that young people are more likely to have mental health problems.

The results of a recently published meta-analysis showed that mental health problems were most prominent among young people during COVID-19 (Dragiotti et al., 2022). In another

review, researchers also found that psychiatric symptom problems were prominent among young people (university students), which is consistent with our findings (Manchia et al., 2022). In our study, age is a protective factor, the older the age, the less likely the mental health problems are. On the contrary, the more likely the mental health problems are. Our study found that young people aged 18 to 19 years were more likely to have mental health problems 1 year after the outbreak of the epidemic. Possible explanations for this result are as follows: (a) young people have less life experience, less mental resilience, and are unable to recover in time after experiencing stressful events (Manchia et al., 2022); (b) residents aged 18–19 years are at the peak period for mental health problems. Exposure to the COVID-19 pandemic during this fragile developmental period may leave young people more vulnerable to the negative psychological effects of such events, and at high risk of negative psychological experiences followed by mental health problems (O'Reilly et al., 2021). Furthermore, researchers have shown that family support has an important impact on mental health (El Haj et al., 2020; Bethell et al., 2021). In China, most 18- and 19-year-olds are leaving their families and going to university alone, with limited family support in their daily lives, which can make them vulnerable to mental health problems. During the COVID-19 pandemic, due to the adoption of epidemic prevention measures such as home isolation and social reduction, the loneliness of young people was particularly prominent, while the increase of loneliness was an important reason for the emergence of mental health problems (Lee et al., 2020). So we believe that for young people aged 18–19, schools or communities should give them more support, such as holding group activities, reading salons, family days to enrich their daily lives. Furthermore, more attention needs to be paid to them, with the aim of early detection of mental health problems in young people and early intervention.

TABLE 4 The sample population of this study SCL-90 screening negative and positive groups chi-square test.

Variables		Negative		Positive		Test value	P value
		N	%	N	%		
Gender	Male	850	93.80%	56	6.20%	4.921	0.027
	Female	1,213	91.30%	116	8.70%		
Age (year)	18–19	22	75.90%	7	24.10%	32.493	<0.001
	20–29	329	87.00%	49	13.00%		
	30–39	572	92.00%	50	8.00%		
	40–49	528	95.70%	24	4.30%		
	50–59	612	93.60%	42	6.40%		
Vaccination	Once	1,039	91.90%	92	8.10%	0.62	0.431
	Twice	1,024	92.80%	80	7.20%		
Marital status	Unmarried	304	85.60%	51	14.40%	24.863	<0.001
	Married	1,616	93.80%	107	6.20%		
	Divorced	124	91.20%	12	8.80%		
	Widowed	19	90.50%	2	9.50%		
Number of kids	0 child	369	86.40%	58	13.60%	26.081	<0.001
	1 child	1,220	93.90%	79	6.10%		
	2 or more	474	93.10%	35	6.90%		
Educational background	Junior middle school and below	571	93.50%	40	6.50%	3.834	0.272
	High school	536	93.20%	39	6.80%		
	College degree or Bachelor	912	91.10%	89	8.90%		
	Master's degree or above	44	91.70%	4	8.30%		
Occupation	Government organs and institutions	327	92.40%	27	7.60%	3.981	0.758
	Professional skill worker	321	92.20%	27	7.80%		
	Business service industry	547	92.70%	43	7.30%		
	Agriculture, forestry, fishery and animal husbandry	78	91.80%	7	8.20%		
	Production and transportation	59	95.20%	3	4.80%		
	Soldier	8	88.90%	1	11.10%		
	Unemployed	344	93.50%	24	6.50%		
	Other	379	90.50%	40	9.50%		
Perceived health status	Healthy	1,790	94.30%	109	5.70%	68.026	<0.001
	Not very healthy	273	81.20%	63	18.80%		
Have chronic diseases	No	1,805	92.80%	139	7.20%	6.256	0.012
	Yes	258	88.70%	33	11.30%		

4.1 Implications for mental health nursing practice and research

In recent years, there has been an increasing focus on mental health. Mental health, as a sustainable development goal, plays an

important role in achieving global development. The effects of poor mental health cover many areas of an individual's life. Nursing approach to intervention required due to the significant impact on mental health in COVID-19 (Moitra et al., 2023). This study found that SPH and age were significant influences on

TABLE 5 Analysis of influencing factors of SCL-90 screening negative and positive groups in the sample population of this study.

Variables		B	SE	Wald	p value	OR	95% CI
Perceived health status	Healthy	Reference					
	Not very healthy	1.431	0.177	60.644	<0.001	4.182	2.957 ~ 5.913
Age	18–19	Reference					
	20–29	−0.761	0.475	2.570	0.109	0.467	0.184 ~ 1.185
	30–39	−1.349	0.473	8.132	0.004	0.259	0.103 ~ 0.656
	40–49	−1.999	0.496	16.254	<0.001	0.135	0.051 ~ 0.358
	≥50	−1.762	0.479	13.535	<0.001	0.172	0.067 ~ 0.439
(Constant)		−1.395	0.450	9.630	0.002	0.248	–

mental health in general population following the COVID-19 epidemic. SPH is a modifiable factor. In the future, after a disaster event, the relevant personnel can intervene early in the mental health of the general population by adjusting their perceived state of illness, in order to prevent serious mental health problems. Age is an unmodifiable factor. Young people's mental health problems are prominent after a disaster event, and require focused attention from professionals. Therefore, schools and communities and other relevant authorities need to consider early intervention and sustained attention to young people after a disaster event. The findings of these results also provide some ideas for future post-pandemic psychological care: (i) community nurses may play an important role in a pandemic, so their latent capacity needs to be recognized and stimulated; and (ii) coordinated care approaches need to be proposed in order to deal with post-pandemic mental health conditions; (iii) Young people are a vulnerable group with mental health problems and need more attention and early intervention.

In terms of research implications, future research could continue to focus on the mental health of the general population after COVID-19. Long-term follow-up studies may help us to understand the trajectory of mental health development in the general population after a disaster event. In addition, large-scale research studies could be conducted in the future to increase the representativeness of the sample population.

## 4.2 Limitations

As far as we know, this is the first study in China to investigate the mental health status of the general population 1 year after COVID-19. This study contributes to the development of epidemiological psychology. However, it has several limitations. First, this research is a cross-sectional survey, the absence of long-term follow-up limits the ability to determine the persistence of the observed effects. This is an important area for improvement in future research. Second, no information was collected about currently or previous pharmacological (e.g., characteristic of BZD of SRRI) (Cosci et al., 2016) or psychological treatments (Swartz, 2020), although it may affect SCL-90 symptoms severity; Third, most of the study participants were community residents near a large tertiary hospital, with relatively few participants from other administration area,

it might be more persuasive if it covered residents of more administrative districts in the city of Chengdu.

## 5 Conclusion

Based on the results of this study, 1 year after COVID-19, 7.70% of the general population in Chengdu still had psychosomatic symptoms. Poor self-perceived health and younger age were the main influencing factors affecting their mental health. After the outbreak, community agency organizations can take some measures for preventive intervention and monitoring of this population.

## Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## Ethics statement

The studies involving humans were approved by Ethics Committee of Chengdu Women's and Children's Central Hospital. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

## Author contributions

XC: Software, Writing – original draft, Writing – review & editing. YH: Methodology, Supervision, Writing – original draft. YD: Conceptualization, Data curation, Writing – original draft. XW: Conceptualization, Data curation, Writing – review & editing. XY: Project administration, Resources, Writing – review & editing. YW: Data curation, Investigation, Writing – review & editing. YL: Investigation, Writing – review & editing. SW: Resources, Supervision, Writing – review & editing. XX: Investigation, Writing – review & editing. CL: Conceptualization, Writing – review & editing. FW: Conceptualization, Methodology, Writing – review &

editing, SC: Methodology, Writing – review & editing, HL: Conceptualization, Project administration, Resources, Writing – review & editing, Writing – original draft.

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## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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# Human rights violations are associated with forcibly displaced population's mental health—a systematic review and meta-analysis

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**Background:** Little is known about the mental health consequences of human rights violations in forcibly displaced populations. Objective: The objectives of this systematic review are to examine: (1) the prevalence of mental health conditions among forcibly displaced persons; (2) to investigate methodological factors contributing to mental health conditions; and (3) associations between mental health conditions and human rights violations.

**Methods:** We conducted a systematic review with meta-analyses on the prevalence of anxiety, depression, and posttraumatic stress disorder among forcibly displaced populations and factors contributing to it by searching in databases MEDLINE (Ovid), Embase, Web of Science Core Collection (Clarivate), PsycINFO (EBSCO), Sociological Abstracts (ProQuest), and PTSDpubs (ProQuest). Additionally, we assessed the Global Peace Index. Pooled associations were calculated using a random-effects meta-analysis model. Subgroup analyses were performed for the Global Peace Index, sampling methodology, also we assessed risk of bias.

**Results:** Of the 8,555 records screened, 55 with  $n = 31,573$  participants met the inclusion criteria ( $n = 15,714$  males, females,  $n = 15,859$  females). Most studies were cross-sectional ( $n = 49$ ). The pooled prevalence rates were 38.90% (95% CI: 29.63; 48.17) for anxiety, 38.16% (95% CI: 32.16; 44.15) for depression and 39.62% (95% CI: 32.87; 46.36) for posttraumatic stress disorder. Analyses by level of human rights violations show anxiety, and depression prevalence rates were higher in countries with very low Global Peace Index than countries with high, moderate and low Global Peace Index (39.84% vs. 16.09%; 41.07% vs. 26.67%). Analyses by risk of bias indicate that the prevalence rate of PTSD was higher in studies with a high risk of bias compared to those with a very high risk of bias (49.27% vs. 29.79%). For anxiety, the prevalence rate was greater with random sampling compared to convenience sampling (44.71% vs. 36.87%). Depression and PTSD prevalence rates were higher with convenience sampling than with random sampling (38.67% vs. 37.70%; 42.83% vs. 35.50%).

**Conclusion:** Our review suggests that systematic continuous human rights violations are associated with mental health conditions in forcibly displaced persons. To prevent mental health conditions, it is necessary to reduce exposure to human rights violations in the countries forcibly displaced persons come from.

**Systematic review registration:** [https://www.crd.york.ac.uk/prospero/display\\_record.php?ID=CRD42017076535](https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42017076535), PROSPERO registration: CRD42017076535.

#### KEYWORDS

forcibly displaced persons, depression, anxiety, PTSD, human rights violations, global peace index, systematic review, meta-analysis

## Introduction

Mental health conditions among forcibly displaced populations (FDPs) are a public mental health challenge given the prevalence of mental health conditions and the number of FDPs worldwide (1). Forcibly displaced persons include refugees as defined by the 1951 Refugee Convention (2). We use in this paper the term forcibly displaced persons as an umbrella term which includes refugees and asylum seekers. The number of FDPs was 89.3 million in 2021 (3) and is estimated to be more than 130 million by the end of 2024 (4). A broad range of factors contribute to mental health conditions among FDPs (5, 6). These factors are among other socioeconomic conditions including low household income and poverty (7), food insecurity (8), unemployment and job insecurity (9), financial difficulties (5), violence, conflicts and traumatic events including access to basic human rights such as secure housing and healthcare (10). However, studies suggest, heterogeneous prevalence rates of mental health conditions among FDPs between 1 and 77% for PTSD 4–74% for depression, and anxiety disorders between 2 and 50% (11). Yet, few studies investigated associations between human rights violations and mental health conditions of forcibly displaced persons. This could be because of human rights violations (e.g., restricting the freedom of movement and residence; freedom of thought, expression, religion; and rights to food, health, and livelihood, policies restricting the ability to marry, have children, or travel) have been assessed in few studies (12).

Human rights are fundamental entitlements inherent to every individual, irrespective of factors such as race, gender, nationality, ethnicity, language, or religion. These rights encompass essential freedoms, including the right to life, liberty, freedom from slavery and torture, freedom of expression, and access to education, work and health. They apply universally without any form of discrimination (13). To the best of our knowledge, no systematic review so far investigated the association of human rights violations with FDP's mental health.

The objectives of this systematic review are therefore to evaluate (1) the prevalence of mental health conditions among FDPs; (2) investigate methodological factors contributing to study results; and (3) evaluate associations between mental health conditions and human rights violations. This study represents a novel contribution to the literature on FDPs mental health. This systematic review is registered with PROSPERO, identifier CRD42017076535.

## Methods

### Search strategy

In this systematic review and meta-analysis, undertaken according to both MOOSE and PRISMA standards, a health-science librarian

(PB) developed the search strategy in consultation with the principal investigator (JL). The search included studies on forcibly displaced persons published until June 2022. We searched MEDLINE, Embase, PsycINFO, Scopus, and Web of Science for publications on FDPs and mental health conditions, as defined using a combination of keywords and controlled vocabulary terms applicable to each database in April 2017 and the search was updated in June 2022 (Supplementary Table 1), with no publication type or language restrictions at this stage. Articles with FDPs were identified using MeSH and text keywords for “FDPs,” while “mental health” content in articles was identified using MeSH and text keywords for “mental health” and specifically for “depression,” “anxiety,” and “PTSD.” These terms were adapted for each database. We supplemented the bibliographic database searches by checking the reference lists of identified relevant studies for additional relevant research. We managed the references using ENDNOTE 21.2 through which duplicates were removed. An additional search with a focus on individuals displaced by the war in Ukraine was performed in the database PubMed in October 2024, however no study provided data on individuals fleeing from the territories occupied by Russia.

### Inclusion and exclusion criteria

Firstly, we developed a study protocol. Based on the protocol, four reviewers (FS, PC, JL and HK) screened titles and abstracts of all potentially eligible publications. We excluded case reports, experimental studies, and studies with no prevalence information on mental health conditions, studies on internally displaced persons, study samples fewer than 100 participants, studies with clinical settings, studies on internally displaced populations as well as studies with populations aged below 18 years. All studies included at this stage were published in English, reported original research using an observational study design (cross-sectional or cohort) and with information on the mental health conditions (anxiety disorders; depressive disorders; trauma and stressor-related disorders). We chose this threshold to enable us to draw on the maximum amount of information in the current literature and to sample broadly to minimize bias. In the second step, following the above criteria, full-text articles were assessed for inclusion by the same reviewers and the same was followed for exclusion of studies. Disagreements between reviewers were solved by consensus (Supplementary Figure 1).

### Data extraction

A standardized data extraction sheet was developed. We extracted (1) study characteristics (e.g., author, year of publication), (2) participants' characteristics [e.g., age, gender, sample size(s)], (3) study

participant's country by origin and settlement, (4) study design, sampling method (5) measurements (e.g., exposure measure, adjustment/control of confounders, outcome measure for anxiety, depression and PTSD). Three reviewers (FS, PC, HK) extracted and cross-checked data independently for included full-text articles, including study information, participant characteristics, and information needed to calculate pooled estimates of prevalences for each co-occurring mental health condition.

## Assessment of human rights violations

Human rights violations can be assessed in a variety of ways. We used an external dataset, the Global Peace Index (GPI). The GPI uses 23 quantitative and qualitative indicators and measures the status of peace across three domains: the level of societal safety and security, the extent of ongoing domestic and international conflict, and the degree of militarization. These indicators were first selected with the assistance of an expert panel in 2007 and are evaluated by the expert panel on a yearly basis. The scores for each indicator are standardized on a scale of 1–5, whereby qualitative indicators are banded into five groups, while quantitative ones are scored from 1–5 (14). The GPI ranks 172 states and territories (collectively accounting for 99.7 per cent of the world's population) according to their levels of peacefulness. In the last years, the GPI showed an increase in violence and a decrease in peace (15).

## Data analyses

Prevalence estimates of mental health outcomes are calculated with 95% confidence intervals (CIs) in the pooled data. Random-effects meta-analyses were calculated using the DerSimonian and Laird estimator based on inverse variance weights (16). Heterogeneity was anticipated because of between-study variations in study, design, sampling methods, country of origin, type of exposure and country of settlement. Hence random-effects meta-analysis was used to aggregate the prevalence rates. The heterogeneity among studies was described by  $I^2$ -statistic.  $I^2$  is not affected by sample size and thus was considered useful for comparisons (17). Additionally, we evaluated potential sources of heterogeneity across studies in three subgroup analyses. First, we investigated the potential effects of human rights violations using the Global Peace Index ranking of countries. The indices of human rights violations were divided into three groups where low, moderate and high GPI countries were compared with very low GPI countries. Studies with samples from more than three countries were excluded from subgroup analysis by GPI in all three outcomes. Further, we analyzed the prevalence rates by risk of bias and sampling method (random and convenience sampling). All analyses were performed using Stata software version 18.5 [Stata Corp].

## Sensitivity analysis

Sensitivity analysis was conducted based on the study quality or risk of bias for 55 studies included. The risk of bias was assessed by two reviewers (FS and PC) using a modified version of quality assessment for quantitative genocide studies (18). This tool evaluates eight

domains: ethical approval, external validity and selection bias, misclassification bias, study design, confounders, data collection methods, withdrawals and dropouts, and data analysis. Each domain is rated as strong (1 point), moderate (2 points), or weak (3 points). Based on the cumulative score, studies are categorized into quality ratings: strong, moderate, weak, or very weak. Additionally, the risk of bias was determined based on these quality ratings, with strong-rated studies associated with very low to low risk, moderate-rated studies considered moderate risk, weak-rated studies indicating high risk, and very weak-rated studies reflecting very high risk of bias. We used this tool which is based on the Effective Public Health Practice Project Quality Assessment Tool for Quantitative Studies (EPHPP), as it allows to evaluate the potential risk of bias for populations affected by mass violence and human rights violations (19).

In the subgroup analysis, we considered the level of human rights violations by human rights violations by GPI score of the FDPs country of origin and study conducted year. We excluded studies that represented samples from more than three countries (20–27), and one study due to lack of GPI score (28). As a result, the number of studies in each subgroup was limited to the number of studies included in the meta-analysis. Therefore, subgroups in all three outcomes were merged when there were three or fewer studies in each category. Further, in anxiety subgroup analysis, study from Carta et al., 2018 (29) was not included due to negative lower bound confidence intervals in the prevalence rates for high, moderate and low GPI subgroups. This is likely because of the large prevalence within the studies in this category. After excluding this study, our analysis yielded a positive confidence interval and presented. In the subgroup analysis by sampling method, the study from Bogic et al., 2012 (28) was not included due to the mixed method sampling method.

## Results

The search yielded 8,555 articles, with 611 articles being added from other sources. After abstract title and abstract screening, 8,314 records were excluded. Another 186 studies were excluded after full-text screening. Overall, 55 studies were included, providing data for 31,573 adult FDPs (Table 1). The additional search on individuals displaced by the war in Ukraine yielded 470 studies. Of those no study fulfilled the inclusion criteria. Supplementary Figure 1 shows the search, inclusion and exclusion process in detail. Characteristics including gender and age distribution, country of origin, study design, sampling strategy, exposure and exposure measures, outcome and outcome measures, confounder and confounder measures as well as prevalence rates of anxiety, depression and PTSD of selected studies are shown in Table 1. 18 of the 55 studies investigated anxiety, 38 depression and 41 PTSD. 49 studies used a cross-sectional study design (20–26, 28–70), three studies a longitudinal study design (27, 71, 72) and one study cohort study design (73) was used.

Country of origin of FDPs varied: with FDPs from Africa [Congo (31, 44), Eritrea (35, 73), Mali (29), Rwanda (55), Somalia (45, 72)]; eight studies from Asia [Bhutan (68), Cambodia (36), China (69), North Korea (47, 50, 53, 58), Sri Lanka (34)]; 28 studies from Middle East [Iran (72), Iraq (41, 54, 59, 64, 66, 70), Syria (30, 32, 33, 37–43, 46, 48, 49, 52, 54, 56, 57, 60–62, 65, 67, 71, 74), Afghanistan (72)], and two studies from Europe (Bosnia (63), former Yugoslavia (28)). The age range of participants ranged from 18 years to 97 years. All studies

TABLE 1 Characteristics of included studies.

Author(s), year	Study participants (n, gender (%), age in years)	Refugee country		Study design, sampling methods	Exposure	Exposure measure	Outcomes	Outcome measure	Confounder	Confounder measure	Results: n (prevalence), M (SD)/95% CI
		Origin	Settlement								
Acarturk C et al., 2020 <sup>A</sup> (30); Fuhr DC et al., 2019 <sup>B</sup> (74)	n = 1,678 [n = 812 males (48%), n = 866 females (52%), 18–88]	Syria	Turkey	Cross-sectional, random sampling	War	Own scale	Anxiety, depression, PTSD,	PCL-5, HSCL-25	Age, gender, education, displacement time, living with a chronic disease or disability, lifetime history of mental health treatment	Own scale	Anxiety: n = 582* (34.7%), 95% CI: 32.4–37.0, depression: n = 606* (36.1%), 95% CI: 33.8–38.4, PTSD: n = 329* (19.6%), 95% CI: 17.7–21.5
Ahmad F et al., 2021 (71)	n = 1924 [n = 937 males (48.86%), n = 984 females (51.14%), ≥18]	Syria	Canada	Longitudinal, snowball sampling	Refugee resettlement process	MSPSS, perceived control scale	Depression	PHQ-9	Age, gender, marital status, education, employment status, religion, financial hardship	Own scale	Depression: n = 292* (15.2%), 95% CI: 0.137–0.169
Ainamani HE et al., 2020 (31)	n = 325 [n = 143, males (44%), n = 182 females (56%), 18–65]	Democratic Republic of Congo	Uganda	Cross-sectional, convenience sampling	War violence	War-related traumatic events Checklist-25	PTSD	DSM-IV	Gender	Own scale	PTSD: n = 285* (87.7%), males n = 118 (83.7%), females n = 167 (93.8%)
Alpak G et al., 2015 (32)	n = 352 [n = 179 males (50.9%), n = 173 females (49.1%), 18–65]	Syria	Turkey	Cross-sectional, random sampling	Traumatic incidents	Stressful life events screening questionnaire, adapted	PTSD	Diagnostic psychiatric interview, DSM-IV-TR	Age, gender, marital status, number of children, number of people who live together, education, employment status, duration of asylum, health behavior, personal history of medical disorder, family history of psychiatric disorder	Own scales	PTSD: n = 118 (33.5%), males: n = 38 (32.2%), females: n = 80 (67.8%)
Bapolisi AM et al., 2020 (20)	n = 387 [n = 168 males (43.44%), n = 219 females (56.56%), ≥18]	>3 countries <sup>1</sup>	Uganda	Cross-sectional, stratified quota random sampling	Traumatic events in the home country or during displacement	–	Anxiety, depression, PTSD	MINI 7	Perception of stress	Own scale	Anxiety: n = 283* (73%), depression: n = 224* (58%), PTSD: n = 259* (67%)

(Continued)

TABLE 1 (Continued)

Author(s), year	Study participants (n, gender (%), age in years)	Refugee country		Study design, sampling methods	Exposure	Exposure measure	Outcomes	Outcome measure	Confounder	Confounder measure	Results: n (prevalence), M (SD)/95% CI
		Origin	Settlement								
Basheti IA et al., 2019 (33)	n = 186 [n = 99 males (53.2%), n = 87 females (46.8%), ≥18]	Syria	Jordan	Cross-sectional, convenience sampling	War trauma	HTQ	PTSD	HTQ-16	Age, gender, marital status, education, residential status, smoking, watching TV	Own scale	PTSD: n = 72* (38.7%), males M = 2.42 (SD = 0.50), females M = 2.26 (SD = 0.57)
Beiser M et al., 2011 (34)	n = 1,603 [n = 866 males (54%), n = 737 females (46%), ≥18]	Sri Lanka	Canada	Cross-sectional, convenience sampling	Stresses of passage, post migration stress	Own scales	PTSD	WHO-CIDI	Age, gender, marital status, education, employment status, household income below the poverty line, duration of stay in host country	Own scales	PTSD: n = 192 (12%)
Berhe SM et al., 2021 (35)	n = 786 [n = 495 males (63%), n = 291 females (37%), 25–45]	Eritrea	Ethiopia	Cross-sectional, random sampling followed by systematic sampling	War trauma	HTQ	Depression	PHQ-9	Age, gender, education, employment status, social support, displacement history, personal history of psychiatric disorder, family history of psychiatric disorder, duration of stay in refugee camp, current presence of family	Own scale, OSSS-3	Depression: n = 297* (37.8%), 95% CI: 34.2–41.2
Berthold SM et al., 2014 (36)	n = 136 [n = 53 males (39%), n = 83 females, 32–85]	Cambodia	USA	Cross-sectional, snowball sampling	War	Own scale	Depression, PTSD	HTQ, HSCL	Age, gender, personal history of physical and mental disorders	Own scale	Depression: n = 5 (3.7%), PTSD: n = 7 (5.1%)
Bogic M et al., 2012 (28)	n = 854 [n = 416 (48.7%) males, n = 438 (51.3%) females, 18–65]	former Yugoslavia	Germany, Italy, UK	Cross-sectional, random/non-random sampling	Pre-war factors, war factors, post-war factors	LSC-R	Anxiety, depression, PTSD	MINI	Age, gender, marital status, education, employment status, number of pre-war, war traumatic events, time since the most traumatic event, host language fluency, residence status, country of residence	Own scales	Anxiety: n = 74* (8.7%, SE = 1.0), depression: n = 293* (34.3%, SE = 1.6), PTSD: n = 283* (33.1%, SE = 1.6)

(Continued)

TABLE 1 (Continued)

Author(s), year	Study participants (n, gender (%), age in years)	Refugee country		Study design, sampling methods	Exposure	Exposure measure	Outcomes	Outcome measure	Confounder	Confounder measure	Results: n (prevalence), M (SD)/95% CI
		Origin	Settlement								
Carta MG et al., 2018 (29)	n = 409 [n = 179 males (44%), n = 230 females (56%), ≥18]	Mali	Burkina Faso	Cross-sectional, random sampling	War	–	Anxiety and mood disorders, PTSD	SSS-PTSD, K6 scale	Age, gender, death of a family member, severe problems with food, injury or physical damage to self or acquaintances, difficulties related to housing	Own scale	Anxiety and mood disorders: n = 306 (75.0%), males: n = 142 (79.8%), females: n = 164 (71.3%), PTSD: n = 350 (85.6%), males: n = 152 (85.4%), females: n = 198 (86.1%)
Cengiz I et al., 2019 (37)	n = 310 [n = 164 males (52.9%), n = 146 females (47.1%), ≥18]	Syria	Turkey	Cross-sectional, convenience sampling	War	HTQ	PTSD	IES-R	Age, gender, marital status, education, employment status, having children, family size, monthly income, length of stay in host country, smoking history, alcohol history, wishing to return to home country	Own scale	PTSD: n = 248* (80%), M = 18.80 (±7.66), males n = 130 (79.3%), females n = 118 (80.8%)
Chernet A et al., 2021 (73)	n = 107 [n = 95 males (89%), n = 13 females (11%), ≥16]	Eritrea	Switzerland	Cohort, convenience sampling	Traumatic events	Baseline screening for mental health, resilience	Anxiety, depression, PTSD	PHQ-SADS, PTSD-CL-S	NA	NA	Anxiety: n = 11* (10.3%), depression: n = 16* (15.0%), PTSD: n = 52* (48.6%)
Chung MC & Shakra M, 2022 (38)	n = 475 [n = 265 males (56%), n = 210 females (44%), 18–82]	Syria	Sweden	Cross-sectional, convenience sampling, snowball sampling	Traumatic events	HTQ	PTSD	HTQ	Age, gender, marital status, education, time since leaving home country, duration of stay in host country	Own scale	PTSD: n = 123 (26%), M = 50.13 (SD = 8.10), males: M = 34.81 (SD = 12.41), females: M = 34.42 (SD = 2.15)

(Continued)

TABLE 1 (Continued)

Author(s), year	Study participants (n, gender (%), age in years)	Refugee country		Study design, sampling methods	Exposure	Exposure measure	Outcomes	Outcome measure	Confounder	Confounder measure	Results: n (prevalence), M (SD)/95% CI
		Origin	Settlement								
Cheung MC et al., 2018 (39)	n = 1,197 [n = 715 males (60%), n = 482 females (40%), ≥18]	Syria	Sweden, Turkey	Cross-sectional, convenience sampling	Traumatic events	HTQ	PTSD	HTQ	Education, country lived in, residence location	Own scale	PTSD: n = 515* (43%)
Chung MC et al., 2018 (40)	n = 564 [n = 381 males (67.55%), n = 183 females (32.44%), ≥18]	Syria	Sweden	Cross-sectional, convenience sampling	War traumatic events	CES, HTQ	PTSD	HTQ	Age, gender, marital status education	Own scale	PTSD: n = 169* (30%), M = 15.59 (SD = 5.56)
Dietrich H et al., 2019 (41)	n = 175 [n = 153 males (87%), n = 12 females (13%), 18–24.9]	Syria, Iraq	Germany	Cross-sectional, cluster-based total population sampling	Civil war	Own scale	PTSD	ETI, SSS-PSD, SCL-10	Gender, education, social origin, living conditions	Own scale	PTSD: n = 14 (8%), 95% CI: 3.9–12.1 (with ETI: 9.5%, with SSS-PSD: 6.1%)
Eiset AH et al., 2022 (42)	n = 712: n = 113 Denmark, n = 599 Lebanon [n = 222 males (27%), n = 490 females (73%), ≥18]	Syria	Lebanon, Denmark	Cross-sectional, one-stage cluster random sampling	Long distance migration	Adapted from Spolaore and Warczarg distance estimates	PTSD	HTQ	Age, gender, exposure to violence during migration, socioeconomic status, general mental well-being	WHO-5	PTSD: Denmark n = 68* (60.2%), Lebanon n = 330* (55.1%)
Ersahin Z, 2020 (43)	n = 805 [n = 329, males (41%), n = 383 females (59%), 19–77]	Syria	Turkey	Cross-sectional, convenience sampling	Civil war	HTQ-14	PTSD	IES-R	Age, gender, marital status, duration of stay in host country	Own scale	PTSD: n = 668* (83%), M = 41.25 (SD = 18.04)
Familiar I et al., 2021 (44)	n = 580 Women, (≥18)	Democratic Republic of Congo	Uganda	Cross-sectional, respondent-driven sampling	Sexual, non-sexual violence	HTQ	Depression, PTSD	PHQ-2, HTQ-Part 1	Age, marital status education, level of social support	Own scale	Depression: n = 330* (57%), 95% CI: 51–63, PTSD: n = 423* (73%), 95% CI: 67–78

(Continued)

TABLE 1 (Continued)

Author(s), year	Study participants (n, gender (%), age in years)	Refugee country		Study design, sampling methods	Exposure	Exposure measure	Outcomes	Outcome measure	Confounder	Confounder measure	Results: n (prevalence), M (SD)/95% CI
		Origin	Settlement								
Feyera F et al., 2015 (45)	n = 847 [n = 383 males (53.9%), n = 448 females (53.9%), ≥18]	Somalia	Ethiopia	Cross-sectional, multistage probability sampling	Trauma events, basic needs	HTQ	Depression	PHQ-9	Gender, marital status, housing status, witnessing the murder of a family/friend, cumulative traumatic events	Own scale	Depression: n = 324* (38.3%), 95% CI: 34.9–41.9, males: n = 101 (11.92%), females: n = 187 (22.08%)
Garoff F et al., 2021 (21)	n = 784 [n = 473 males (60%), n = 311 females (40%), ≥18]	>3 countries <sup>2</sup>	Finland	Cross-sectional, population-based sampling	PTEs	10 items adapted from HTQ	Anxiety, depression	HSCL-25	Age, gender	Own scale	Anxiety: n = 268* (34.2%), 95% CI: 32.1–36.2, Depression: n = 327* (41.7%), 95% CI: 39.6–43.9
Gottvall M et al., 2019** (46)	n = 1,215 [n = 763, males (62.8%), n = 452 females (37.2%), 18–64]	Syria	Sweden	Cross-sectional, random sampling	Torture	RTHC	PTSD	HTQ	Gender, social support	Own scale	PTSD: n = 372* (30.6%)
Jeon BH et al., 2009 (47)	n = 367 [n = 151 males (41%), n = 216 females (59%), >20]	North Korea	South Korea	Cross-sectional, convenience sampling	Trauma events	GHQ	Depression	CES-D	Age, gender, marital status, education, employment status, residence, religion, subjective health status, health behavior	Own scales	Depression: n = 88 (24%), males: n = 36 (23.8%), females: n = 52 (24.1%)
Kaya E et al., 2019 (48)	n = 420 [n = 183, males (43%), n = 237 females (57%), ≥18]	Syria	Turkey	Cross-sectional, convenience sampling	War	HTQ	Depression, PTSD	BDI, HTQ	Age, marital status, education, duration of asylum in Turkey, past psychiatric disorder	Own scale	Depression: n = 200 (47.7%) (HTQ: M = 2.18 (SD = 0.55), BDI: M = 20.49 (SD = 10.62)), PTSD: n = 153 (36.5%)
Kazour F et al., 2017 (49)	n = 452 [n = 200 males (44.2%), n = 252 females (55.8%), 18–65]	Syria	Lebanon	Cross-sectional, convenience sampling	Exposure to trauma	MINI (Arabic version)	PTSD	MINI (Arabic version)	Age, gender, marital status, education, employment status, duration of displacement	Own scales	PTSD: n = 123 (27.2%), 95% CI: 23.1–31.3, males: n = 55 (44.7%), females: n = 68 (55.3%)

(Continued)

TABLE 1 (Continued)

Author(s), year	Study participants (n, gender (%), age in years)	Refugee country		Study design, sampling methods	Exposure	Exposure measure	Outcomes	Outcome measure	Confounder	Confounder measure	Results: n (prevalence), M (SD)/95% CI
		Origin	Settlement								
Kim HH et al., 2011 (50)	n = 144 [n = 20 males (14%), n = 124 females (86%), 21–75]	North Korea	South Korea	Cross-sectional, convenience sampling	–	–	Anxiety, depression	SCL-90-R, CES-D	Age, gender, marital status, employment status, monthly income, history of physical illness, escape duration	Own scales	Anxiety: n = 49 (34.0%), males: n = 2 (10%), females: n = 47 (37.9%), depression n = 56 (38.9%), males: n = 5 (25%), females: n = 51 (41.1%)
Kim I, 2018 (51)	n = 184 [n = 77, males (42%), n = 107 females (58%), 18–87]	Burma	USA	Cross-sectional, convenience sampling	Torture, trauma, forced displacement	–	Anxiety, depression, PTSD	RHS-15, HSCL-10, 15 item	Age, gender, marital status, education, ethnicity, duration of stay in camp, duration of stay in host country, English proficiency	Own scale	Anxiety: n = 37* (20.3%), depression: n = 39* (21.2%), PTSD: n = 93* (50.4%)
Kira IA et al., 2017 (52)	n = 196 [n = 134 males (68.4%), n = 62 females (31.6%), 18–63]	Syria	Egypt	Cross-sectional, snowball sampling	War trauma, stress	CTS-S	PTSD	CAPS-2	NA	NA	PTSD: n = 66* (33.7%), M = 24.18 (SD = 19.25)
Lamkaddem M et al., 2014 (72)	n = 410 [n = 241 males (58.8%), n = 169 females (41.2%), ≥18]	Afghanistan, Iran, Somalia	Netherlands	Longitudinal, random sampling	Traumatic events	HTQ-part 1	PTSD	HTQ-part 4	Age, gender, mental health care utilization, PTSD score	NA	PTSD: n = 28 (16.3%), M = 1.81 (SD = 0.68)
Lee YJ et al., 2016 (53)	n = 177, [n = 48 males (27.12%), n = 129 females (72.88%)]	North Korea	South Korea	Cross-sectional, convenience sampling	Traumatic events in North Korea	Trauma Exposure Check List for North Korean FDPs	Depression, PTSD	CES-D, IES-R	Age, gender	Own scale	Depression: n = 82 (46.33%), PTSD: n = 71 (40.11%)

(Continued)

TABLE 1 (Continued)

Author(s), year	Study participants (n, gender (%), age in years)	Refugee country		Study design, sampling methods	Exposure	Exposure measure	Outcomes	Outcome measure	Confounder	Confounder measure	Results: n (prevalence), M (SD)/95% CI
		Origin	Settlement								
Lenferink L I.M et al., 2022 (27)	n = 613 [n = 326, males (53%), n = 287 females (47%), ≥18]	>3 countries <sup>3</sup>	Australia	Longitudinal, snowball sampling	PTE, PMLD	HTQ	Depression, PTSD	PDS-17, PHQ-9, PMLD-CL	Gender, age, trauma count, difficulties relating to housing, not enough money to buy food, pay the rent and bills, or buy necessary clothes, not being able to find work, separation from family, worry about family back home, difficulties accessing treatment for health or mental health problems	NA	Depression: n = 156 (25.4%), PTSD: n = 42 (7.2%)
Lin SL et al., 2020 (22)	n = 29,670 [n = 272 refugees: 145 males (53.3%), n = 127 females (46.7%), 45–85]	>3 countries <sup>4</sup>	Canada	Cross-sectional, random sampling	Refugee status	Self-reported information	Depression	CESD 10	Age, gender, marital status, education, employment status, household income, health status, social connections	Own scale	Depression: n = 60* (22.1%)
Maharaj V et al., 2017 (23)	n = 335 [n = 178 males (53.1%), n = 157 females (46.9%), 18–75]	>3 countries <sup>5</sup>	South Africa	Cross-sectional, convenience sampling	Food insecurity	12-Month Food Security Scale-SF	Anxiety, depression	HSCL-25	Age, gender, marital status, education, employment status, monthly income, migration status, social support, racism	Own scale	Anxiety: n = 165 (49.4%), depression n = 180 (54.6%)
Mahmood HN et al., 2019 (54)	n = 988 [n = 494 males (50%), n = 494 females (50%)]	Syria	Iraq	Cross-sectional, stratified random sampling	War	WAEK-created based on the existing trauma instruments- WES, LEC-5 for DSM-5	Depression, PTSD	DSM-5, PCL-5, Kurdish Kurmanji, Arabic version of D-HSCL-15	Age, gender, marital status, education, employment status, duration of stay in camp, area in which participants were grown up	Own scale	Depression: n = 586* (59.4%), M = 29.36 (SD = 8.52), PTSD: n = 606* (61.4%), M = 26.44 (SD = 15.3)

(Continued)

TABLE 1 (Continued)

Author(s), year	Study participants (n, gender (%), age in years)	Refugee country		Study design, sampling methods	Exposure	Exposure measure	Outcomes	Outcome measure	Confounder	Confounder measure	Results: n (prevalence), M (SD)/95% CI
		Origin	Settlement								
Mwanamwambwa V & Pillay BS, 2021 (55)	n = 267 [n = 128 males (47.94%), n = 139 females (52.06%), 18–65]	Rwanda	Zambia	Cross-sectional, purposive sampling, snowball sampling	Genocide	IES-R	PTSD	IES-R, GHQ-28	Gender, marital status, number of children, education, employment status, financial support	Own scale	Depression: n = 60* (22.8%), PTSD: n = 205* (76.8%)
Naal H et al., 2021 (56)	n = 3,255 [n = 1,071 males (33%), n = 2,184 females (67%), ≥18]	Syria	Lebanon	Cross-sectional, random sampling	Traumatic events	Baseline screening	Depression	PHQ-2, 9	Age, gender, marital status	Own scale	Depression: n = 1510* (46.4%)
Naja W et al., 2016 (57)	n = 310 [n = 120 males (38.7%), n = 190 females (61.3%), ≥18]	Syria	Lebanon	Cross-sectional, random sampling	Religiosity	Original Arabic religiosity scale	Depression	MINI	Age, gender, religiosity	Own scale	Depression: n = 136 (43.9%), 95% CI: 38.5–49.4
Nam B et al., 2016 (58)	n = 304 [n = 102 males (33.8%), n = 200 females (66.2%), ≥18]	North Korea	South Korea	Cross-sectional, snowball sampling	Family cohesion	FACES-III, Korean version	Depression	CES-D, Korean version	Age, gender, resilience, time spent in South Korea	Own scale, K-CD-RISC	Depression: n = 135 (44.4%)
Nesterko Y et al., 2019 (24)	n = 502 [n = 348 males (69%), n = 154 females (31%), ≥18]	>3 countries <sup>6</sup>	Germany	Cross-sectional, cluster-based total population sampling	Traumatic events, flight related experiences	DSM-5 LEC-5	Anxiety, depression, PTSD	PCL-5, PHQ-9, HSCL-25	NA	NA	Anxiety: 210* (41.8%), depression: n = 108* (21.6%), PTSD: n = 174* (34.7%)
Nickerson A. et al., 2009 (59)	n = 315 [n = 150 males (47.5%), n = 165 females (52.5%)]	Iraq	Australia	Cross-sectional, convenience sampling	Past traumatic experiences, current resettlement difficulties, human rights violations	PMLD, HTQ, HSCL-25, depression subscale	PTSD, depression	HTQ, HSCL-25, depression subscale	Life experiences, fear of extinction	Own scale	Depression: n = 107 (34%), PTSD: n = 72 (22.9%),

(Continued)

TABLE 1 (Continued)

Author(s), year	Study participants (n, gender (%), age in years)	Refugee country		Study design, sampling methods	Exposure	Exposure measure	Outcomes	Outcome measure	Confounder	Confounder measure	Results: n (prevalence), M (SD)/95% CI
		Origin	Settlement								
Nissen A et al., 2021 (60)	n = 902 [582 males (64.5%), 320 females (35.5%), 18–65]	Syria	Norway	Cross-sectional, random sampling	Potentially traumatic experiences (PTEs), length of flight	RTHC	Anxiety, depression, PTSD	HTQ, HSCL	Age, gender, marital status, education, refugee status, arrival with family/friends, prior family in Norway, length of flight, time in Norway	Own scale	Anxiety: n = 271* (30.1%), 95% CI: 25.7–34.9, depression: n = 46* (5.2%), 95% CI: 40.6–49.8, PTSD: n = 267* (29.7%), 95% CI: 25.4–34.4,
Poole DN et al., 2021 (61)	n = 135 [n = 80 males (59.26%), n = 55 females (40.74%), 18–61]	Syria	Greece	Cross-sectional, purposive sampling followed by systematic sampling	Asylum process	–	Depression	PHQ-8	Gender, marital status, number of children, length of asylum process	NA	Depression: n = 59* (44%)
Rasmussen A et al., 2012 (25)	n = 660 [n = 345 males (52.3%), n = 315 females (47.7%), 18–97]	>3 countries <sup>7</sup>	USA	Cross-sectional, multistage area probability sampling	Traumatic events, migration	NLAAS measures	Depression, PTSD	WMH-CIDI	Gender, country of origin, time in host country, use of mental health services	Own scale	Depression: n = 97 (14.74%, SE = 0.20), PTSD: n = 31 (4.75%, SE = 0.16)
Sagaltici E et al., 2019 (62)	n = 342 [n = 163 males (47.66%), n = 179 females (52.34%), 18–65]	Syria	Turkey	Cross-sectional, random sampling	War	Own scale (based on stressful life events screening questionnaire)	PTSD	DSM-IV-TR	Age, gender, number of traumatic events	Own scale	PTSD: n = 106* (31%)
Silove D et al., 2010 (63)	n = 126 [n = 49 males (31%), n = 77 females (61%), 18–88]	Bosnia	Australia	Cross-sectional, convenience sampling	War	Own scale	Depression, PTSD	CAPS, SCID, ASA-SI	Age (at the time of entering Australia), gender	Own scale	Depression: n = 58 (46%), PTSD: n = 79 (63%)
Taylor EM et al., 2014 (64)	n = 366 [n = 218 males (60%), n = 144 females (40%), 18–84]	Iraq	USA	Cross-sectional, random sampling	War trauma	–	Anxiety, depression, PTSD	HSCL 25, PC-PTSD	Age, marital status, employment status, duration of stay in host country, health behavior	Own scale	Anxiety: n = 182 (50%), depression: n = 177 (49%), PTSD: n = 112 (31%)

(Continued)

TABLE 1 (Continued)

Author(s), year	Study participants (n, gender (%), age in years)	Refugee country		Study design, sampling methods	Exposure	Exposure measure	Outcomes	Outcome measure	Confounder	Confounder measure	Results: n (prevalence), M (SD)/95% CI
		Origin	Settlement								
Tekeli-Yesil S et al., 2018 (65)	n = 285 [n = 144 males (51%), n = 141 females (49%), ≥18]	Syria	Turkey	Cross-sectional, convenience, snowball sampling	War experience	Own questionnaire adapted from HTQ, PMLD-CL	Anxiety, depression, PTSD	MINI (Arabic version)	Age, gender, marital status, employment status, economic status, family unity, size of the family during pre-and post-migration	Own scale	Anxiety: 151* (53.2%), depression: n = 151* (52.8%), PTSD: n = 152* (53.2%)
Tekin A et al., 2016 (66)	n = 238 [n = 105 males (44.1%), n = 133 females (55.9%), 18–65]	Iraq	Turkey	Cross-sectional, random sampling	Lifetime exposure to traumatic events	Stressful life events screening questionnaire	Depression, PTSD	SCID-I	Age, gender, marital status, education, employment status, duration of displacement, psychiatric or other medical history	Own scale	Depression: n = 94 (39.5%), PTSD: n = 102 (42.9%)
Tinghög P et al., 2017** (67)	n = 1,215 [n = 763 males (63%), n = 452 females (37%), 18–64]	Syria	Sweden	Cross-sectional, random sampling	Refugee-related PTEs	Own scale	Anxiety, depression, PTSD	HSCL-25, HTQ	Age, gender, marital status, education, year of arrival in host country	Own scale	Anxiety: n = 386* (31.8%), 95% CI: 29.2–34.7, depression: n = 488* (40.2%), 95% CI: 36.9–43.3, PTSD: n = 363* (29.9%), 95% CI: 27.2–32.6
Vonnahme LA et al., 2015 (68)	n = 386 [n = 204 males (52.85%), n = 182 females (47.15%), 18–83]	Bhutan	USA	Cross-sectional, random sampling	Traumatic events	HTQ	Anxiety, depression, PTSD	HSCL-25, HTQ	Age, gender, residence status	Own scale	Anxiety: n = 69 (18%), depression: n = 80 (21%), PTSD: n = 14 (4%)
Winkler JG et al., 2018 (26)	n = 650 [n = 486 males (74.8%), n = 164 females (25.2%), ≥18]	>3 countries <sup>8</sup>	Germany	Cross-sectional, cluster-based total population-based sampling	Asylum procedure, legal situation	Own scale	Anxiety, depression, PTSD	HSCL-25, PDS	Age, gender, country of origin, duration of stay in host country	Own scale	Anxiety: 340* (52.3%), depression: n = 399* (61.3%), PTSD: 271* (41.7%)
Yang MS & Mutchler JE, 2020 (69)	n = 127 [n = 30 males (24%), n = 97 females (76%), 55+]	China	USA	Cross-sectional, convenience sampling	Hmong refugee status	Own scale	Depression	HSCL-10	Age, gender, marital status, education, employment status, English proficiency	Own scale	Depression: n = 91.44* (72%), M = 2.23 (SD = 0.67)

(Continued)

TABLE 1 (Continued)

Author(s), year	Study participants (n, gender (%), age in years)	Refugee country		Study design, sampling methods	Exposure	Exposure measure	Outcomes	Outcome measure	Confounder	Confounder measure	Results: n (prevalence), M (SD)/95% CI
		Origin	Settlement								
Yun S et al., 2021 (70)	n = 219 [n = 219 females (100%), 23–58]	Iraq	USA	Cross-sectional, random sampling	Acculturative stress, traumatic events	SAFE, HTQ	Anxiety, depression	HSCL-25	Age (when left Iraq), marital status, education, financial capacity, spoken language, prior mental illness	Own scale	Anxiety: 100* (45.6%), M = 1.67 (SD = 0.76), depression: n = 121* (55.3%), M = 1.69 (SD = 0.62)

<sup>A,B</sup>Studies conducted using the same sample; \*Prevalences calculated manually; \*\*Studies conducted using the sample with different outcomes; CI, Confidence Interval; NA, Not Available; M, Mean; SD, Standard deviation; SE, Standard error; ASA-SI, The Adult Separation Anxiety-Structured Interview; BDI, Beck Depression Inventory; BDI-II, Beck's depression inventory-II; CAPS, Clinical Administered PTSD Scale; DASS-21, CES, Centrality of event scale; CES-D, Center for Epidemiologic Studies Depression Scale; CESD 10, Center for Epidemiologic Studies Depression 10; Depression anxiety stress scale; DSM-5, Diagnostic and Statistical Manual of Mental Disorders Fifth Edition; DSM-IV-TR, The Diagnostic and Statistical Manual of Mental Disorders, fourth edition, text revision; ETI, Essen Trauma Inventory; FACES III, Family Adaptability and Cohesion Scale III; GAD-7, General Anxiety Disorder-7; GHQ, General Health questionnaire; HSCL-25, Hopkins Symptom Checklist; HTQ, The Harvard Trauma Questionnaire; HTQ-16, Harvard Trauma Questionnaire-16; IES-R, Impact Event Scale-Revised; K6 scale, Kessler K6 scale; LEC-5, Life Events Checklist-5; LSC-R, Life Stressor Checklist-Revised; MDD, Major Depressive Disorder; MEV, My exposure to violence; MSPSS, Multidimensional Scale of Perceived Social Support; MINI, Mini International Neuropsychiatric Interview; NLAAS, The National Latino and Asian American Survey; OSSS-3, Oslo-3 Social Support Scale; PHQ-SADS, Patient Health Questionnaire Somatic Anxiety and Depression Syndrome; P-CTD, The Post-Cumulative Trauma-Related Disorders Measure; PC-PTSD, Primary Care PTSD Screen; PDS, Posttraumatic stress diagnostic scale; PHQ-8, Patient Health Questionnaire-8; PTEs, Potentially Traumatic Experiences; PMLD, Post migration living difficulties; PMLD-CL, Postmigration Living Difficulty Checklist; RTHC, Refugee Trauma History Checklist; SAFE, The Social, Attitudinal, Familial and Environmental Acculturative Stress; SCID-I, Structured Clinical Interview for DSM-IV; SCL-90-R, Symptom checklist-90-R; SPT-NK, Scale for Past Traumas in North Korea; SPT-D, Scale for Past Traumas during Defection; SSS-PSD, Short Screening Scale for Posttraumatic Stress Disorder; PTSD-SS, PTSD-Symptom Scale; WAEC, War and Adversity Exposure Checklist; WES, War Exposure Scale; WTSS, War trauma screening scale; WHODAS 2.0: World Health Organization Disability Assessment Schedule 2.0; WMH-CIDI, World Mental Health Composite International Diagnostic Interview; GAD, Generalized anxiety disorder; PTSD, Posttraumatic stress disorder; MDD, Major depressive disorder; USA, United States of America.

<sup>1</sup>Congo, Burundian, Somali, Rwanda, Ethiopia, Eritrea, South-Sudan, Sudan, Kenya, Senegal.

<sup>2</sup>Russia and former Soviet union, Middle East and North Africa (Turkey, Iran, Iraq), Africa excluding North Africa (Somalia, Nigeria, Angola, Cameroon), Others (Nicaragua, Albania, Bangladesh, India, Cuba, Kosovo, Sri Lanka).

<sup>3</sup>Iraq, Syria, Iran, Afghanistan, Sri Lanka, Burma, Pakistan, Other.

<sup>4</sup>China, Haiti, Hungary, Jews from Central Europe, Chile, Lebanon, Baltic origins, Ukraine, Vietnam, South Asians from Uganda, Iran, Afghanistan, Bangladesh, Yugoslavia, Palestinian Arabs from Palestine or Israel, Cambodia, Iraq.

<sup>5</sup>Democratic Republic of Congo, Zimbabwe, Burundi, Ghana, Malawi, Mozambique, Rwanda, Uganda.

<sup>6</sup>Cameroon, Eritrea, Iraq, Nigeria, Syria, Turkey, Venezuela, and refugees from 40 countries.

<sup>7</sup>Puerto Rico, Mexico, Cuba, all other Latins, Philippines, China, Vietnam, Asian.

<sup>8</sup>Syria, Afghanistan, Iraq, Albania, Iran, Moldova, Serbia, Kosovo, Russian Federation, Pakistan, Eritrea, others.

included male and female participants (49.83% vs. 50.17%) except one study which was conducted among Yazidi women in Iraq.

Anxiety, depression and PTSD were reported in 18, 38 and 41 studies, respectively. Most studies used diagnostic measures HTQ (27, 33, 36, 38–40, 42, 44, 46, 48, 60, 67, 68, 72) and HSCL (21, 23, 24, 26, 30, 36, 51, 54, 59, 64, 67–70). Studies also collected data on potential covariates such as socio-demographics (e.g., age, gender, education, marital status, employment status) (21–23, 25–51, 53–58, 60–72), religiosity (57), duration of displacement (49, 66), duration of stay in camp (51, 54), asylum duration (32, 48), family history of mental health diseases (32, 35), personal history of mental health treatment (30), mental health care use (25), difficulty in access to mental health care (27), migration status (23), social support (23, 44, 46), racism and food insecurity (23).

The studies Acarturk et al., 2020 (30) and Fuhr DC et al., 2019 (74) used the same sample and analyzed similar outcomes of anxiety, depression and PTSD. Therefore, only one study was included in the meta-analysis. In the studies by Gottvall et al., 2019 (46) and Tinghög et al., 2017 (67), although study samples were similar, the differences in exposure and outcome measurement scales, study outcomes, and prevalence rates justified the inclusion of both studies in the meta-analysis.

## Anxiety among FDPs in included studies

Studies reporting anxiety disorders were 17 with a total of  $n = 9,407$  FDPs. Of these studies, Bogic et al., 2012 (28) found the lowest prevalence rate of 8.67% (95% CI: 6.78; 10.55) in a study of  $n = 854$  FDPs from former Yugoslavia living in Germany, Italy, United Kingdom (Figure 1). The highest prevalence of anxiety 74.82% (95% CI: 70.61; 79.02) was reported in a study by Carta et al., 2018 (29) of  $n = 409$  FDPs from Mali living in Burkina Faso. The overall prevalence rate was 38.90% (95% CI: 29.63; 48.17) with a substantial heterogeneity of  $I^2 = 99.08\%$  between studies included in the meta-analysis.

## Depression among FDPs in included studies

A total of 37 studies investigated depression with a total number of participants of  $n = 21,706$ . For depression, the range of prevalence rate was broad among included studies reporting the lowest prevalence of 3.68% (95% CI: 0.51; 6.84) in a study Berthold et al., 2014 (36) of  $n = 136$  FDPs from Cambodia to the highest prevalence rate of 71.65% (95% CI: 48.67; 79.49) in a study from Yang & Mutchler, 2020 (69) of  $n = 127$  FDPs from China. The overall pooled prevalence rate was 38.16% (95% CI: 32.16; 44.15) showing a high heterogeneity of  $I^2 = 99.18\%$  (Figure 2).

## PTSD among FDPs in included studies

Overall, 40 studies reported PTSD in a study population  $n = 21,764$  of which 8,007 forcibly displaced populations were diagnosed with PTSD with a pooled prevalence rate of 39.62% (95% CI: 32.87; 46.36). The lowest PTSD prevalence rates were reported in studies by both Rasmussen et al., 2012 (25) ( $n = 345$ ) and Berthold et al., 2014 (36)

( $n = 136$ ) with prevalence rates of 4.70% (95% CI: 3.08; 6.31) and 5.15% (95% CI: 1.43; 8.86) respectively. The highest prevalence rate of 87.68% (95% CI: 84.12; 91.26) was found in a study by Ainamani et al., 2020 (31) of  $n = 325$  FDPs from DRC. There was substantial heterogeneity between studies reporting PTSD ( $I^2 = 99.60\%$ ; Figure 3).

## Subgroup analysis by study and sample characteristics

### Human rights violations by GPI ranking and mental conditions among FDPs

For countries with very low GPI, the prevalence of anxiety was 39.84% (95% CI: 34.20; 45.49) compared to countries with high, moderate and low GPI, where the prevalence of anxiety was 16.09% (95% CI: 10.83; 21.35). The test of group difference yielded a Chi-square statistic of 36.40, ( $p = <0.05$ ) indicating a significant difference in anxiety prevalence rates between these two groups (Figure 4).

Depression prevalence rate among countries with very low GPI was higher at 41.07% (95% CI: 32.03%; 50.12%) than the pooled rate of depression in low GPI countries at 26.67% (95% CI: 9.74%; 43.60%). The difference in the pooled rate was not significant between very low GPI vs. moderate, high GPI countries 40.00% (95% CI: 31.05; 48.95) vs. 41.30% (95% CI: 22.67; 59.92). However, the test for group differences was not statistically significant [very low vs. low: Chi-square 2.16, ( $p = 0.14$ ); very low vs. moderate and high: Chi-square 0.02, ( $p = 0.90$ )], showing no significant difference in depression prevalence rates between these subgroups (Figures 5, 6).

In contrast to anxiety and depression, PTSD prevalence rates were higher in countries with moderate and high GPI than in countries with low GPI at 48.41% (95% CI: 5.18; 91.64), 40.58% (95% CI: 31.13; 50.02) respectively. Also, the pooled rate in low GPI countries was 39.32% (95% CI: 6.14%; 72.91%) which did not show a significant difference from the pooled rate of PTSD in very low GPI countries. However, the test for group differences was not statistically significant (very low vs. low: Chi-square 40.40,  $p = 0.95$ ) very low vs. moderate and high: Chi-square 41.66, ( $p = 0.73$ ), indicating no significant difference in PTSD prevalence rates between various subgroups (Figures 7, 8).

## Prevalence rates of mental health conditions in FDPs by risk of bias

We compared prevalence rates of anxiety and depression by risk of bias probability (moderate and low vs. high and very high) (Supplementary Figures 2–6). For anxiety we did not identify differences by risk of bias subgroups ( $p = 0.74$  for anxiety and  $p = 0.30$  for depression).

For PTSD, overall prevalence was high in the high risk of bias subgroup at 49.27% (95% CI: 37.18; 61.35). Also, a comparison between the risk of bias subgroups, very high vs. high, revealed a pooled rate of 42.12% (95% CI: 31.66; 52.59) with a Chi-square statistic of 4.55, ( $p = 0.03$ ) indicating a significant difference in PTSD prevalence rates between these two groups. Whereas comparison of the risk of bias subgroups, very high vs. moderate and low, showed a pooled rate of 32.23% (95% CI: 23.39; 41.07) and a non-significant difference in PTSD prevalence rates between these two groups with a Chi-square statistic of 0.42, ( $p = 0.52$ ; Supplementary Figures 7, 8).

## Prevalence rates of mental health conditions in FDPs by study sampling methods

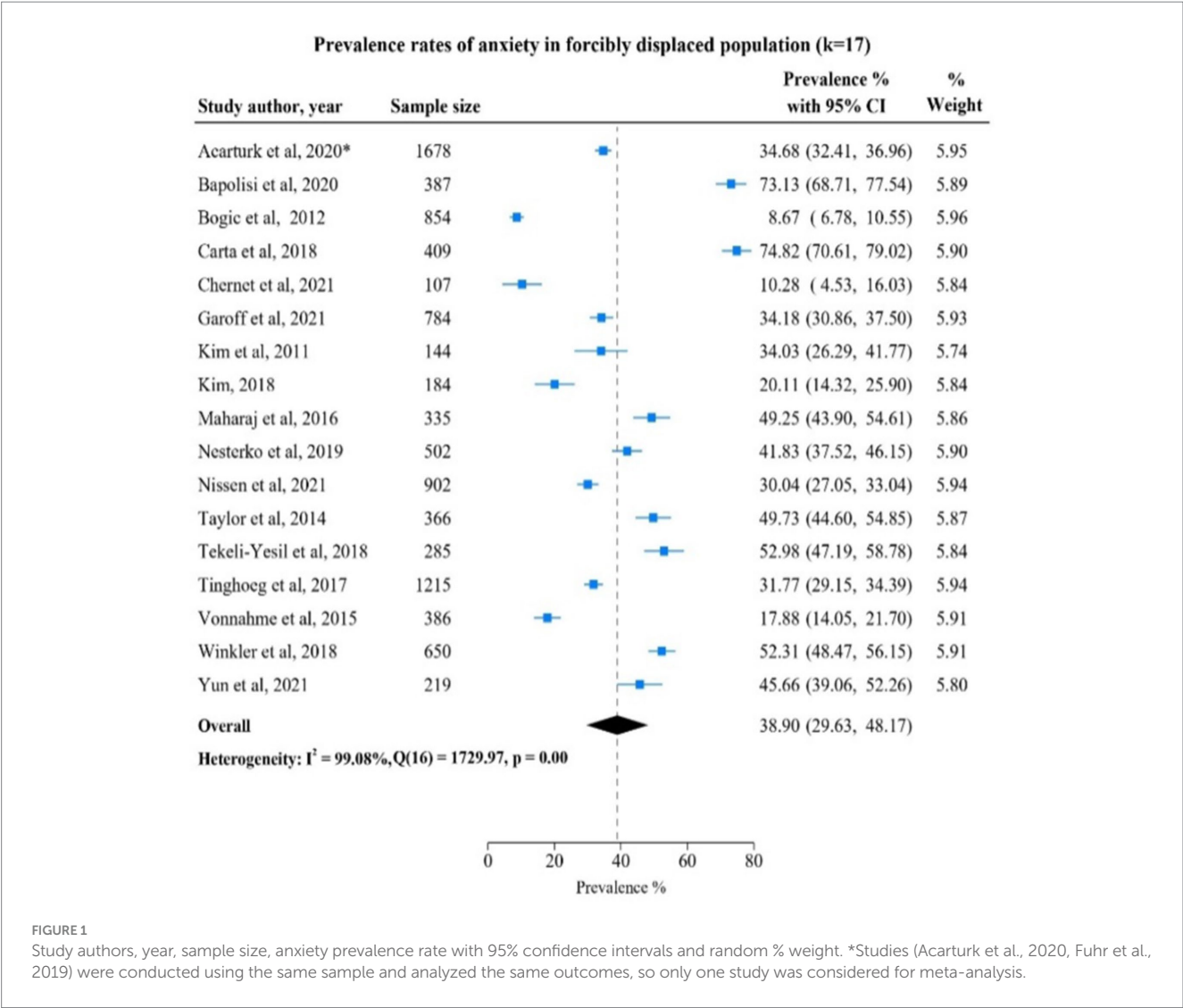
Comparison of prevalence rates of anxiety, depression and PTSD by sampling methods (random and convenience) showed no significant difference: anxiety 40.79% (95% CI: 32.84; 48.75) Chi-square statistic 0.92, ( $p = 0.34$ ); depression 38.27% (95% CI: 32.09; 44.45), Chi-square statistic 0.02 ( $p = 0.88$ ); PTSD 40.01% (95% CI: 31.79; 48.23), Chi-square statistic 0.75, ( $p = 0.39$ ; [Supplementary Figures 9–11](#)).

However, observation of prevalence rates by individual sampling method showed that anxiety prevalence rates by random sampling was 44.71% (95% CI: 32.08; 57.35) which was higher than the overall anxiety prevalence of 38.90 (95% CI: 29.63; 48.17). Whereas PTSD prevalence rate was higher by convenience sampling at 42.83% (95% CI: 31.23, 54.44) compared to the overall PTSD prevalence of 39.62% (95% CI: 32.87; 46.36). Similarly, for depression, there was a slight difference in prevalence rate between by the convenience sampling method of 38.67% (95% CI: 30.45; 46.89) and the depression pooled rate of 38.16% (95% CI: 32.16; 44.15).

## Discussion

In this systematic review with meta-analysis, we found pooled prevalence rates of 38.90% for anxiety, 38.16% for depression and 39.62% for PTSD in FDPs. Additionally, the study results also showed a positive association between the level of peace in the country of origin and the mental health conditions of FDPs. For countries with very high human rights violations, prevalence rates of anxiety (39.84%), depression (41.07%) and PTSD (40.58%) were higher compared to countries with low human rights violations. These findings underscore that repeated and enduring human rights violations, rather than isolated traumatic event, contribute substantially to psychopathology and related findings are suggested by studies on the impact of child maltreatment ([75, 76](#)).

The experience of multiple traumatic events can be assumed in states of human rights violations. This is in line with studies suggesting that the number of traumatic events is a main predictor of mental health conditions ([77, 78](#)). These associations are potentially mediated by neurobiological mechanisms ([79](#)) involving changes in the hypothalamic–pituitary–adrenal (HPA) axis activity. Stress events stimulate the HPA axis and sympathetic nervous system (SNS),



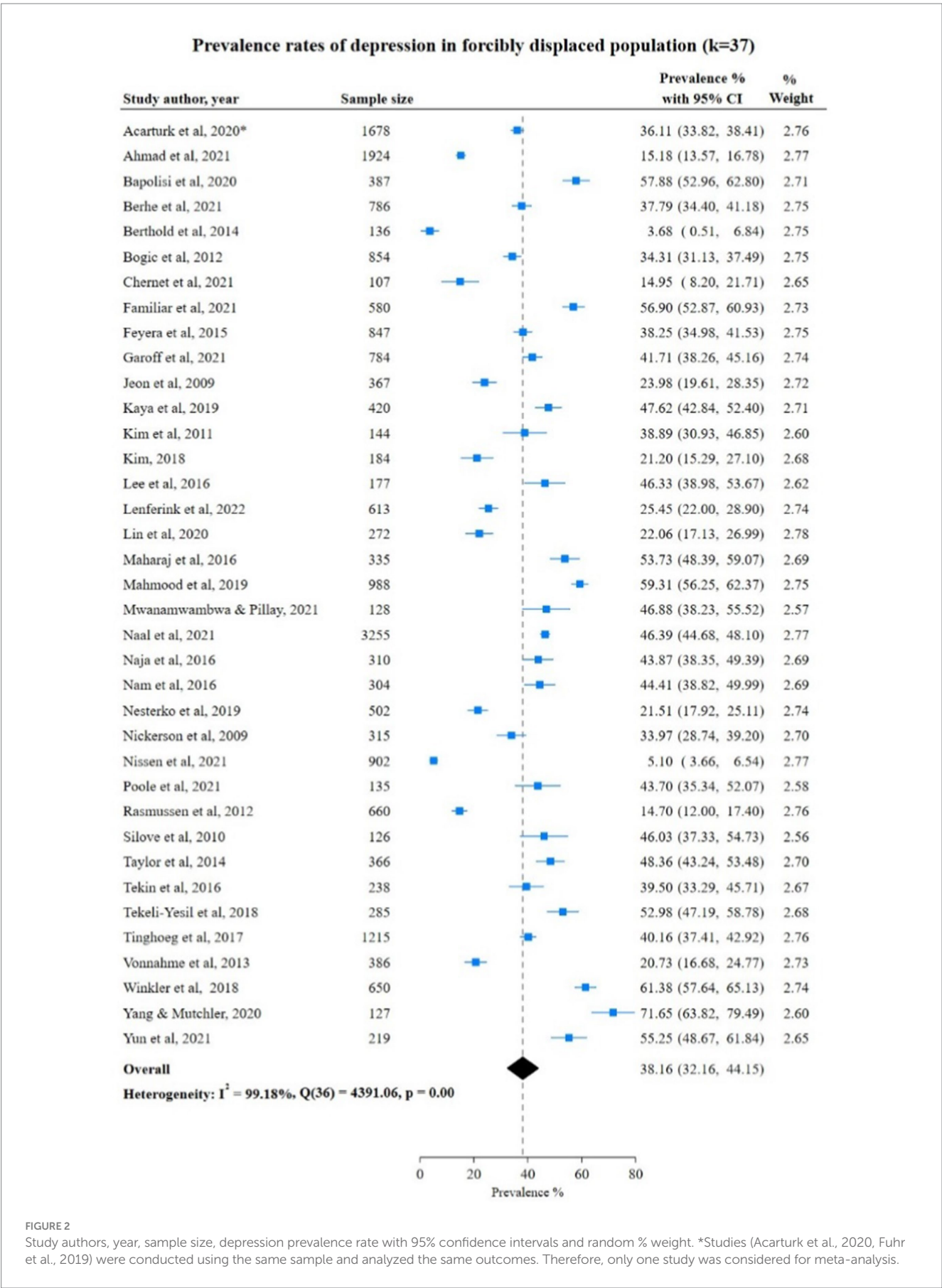


FIGURE 2 Study authors, year, sample size, depression prevalence rate with 95% confidence intervals and random % weight. \*Studies (Acarturk et al., 2020, Fuhr et al., 2019) were conducted using the same sample and analyzed the same outcomes. Therefore, only one study was considered for meta-analysis.

## Prevalence of PTSD in forcibly displaced population (k=40)

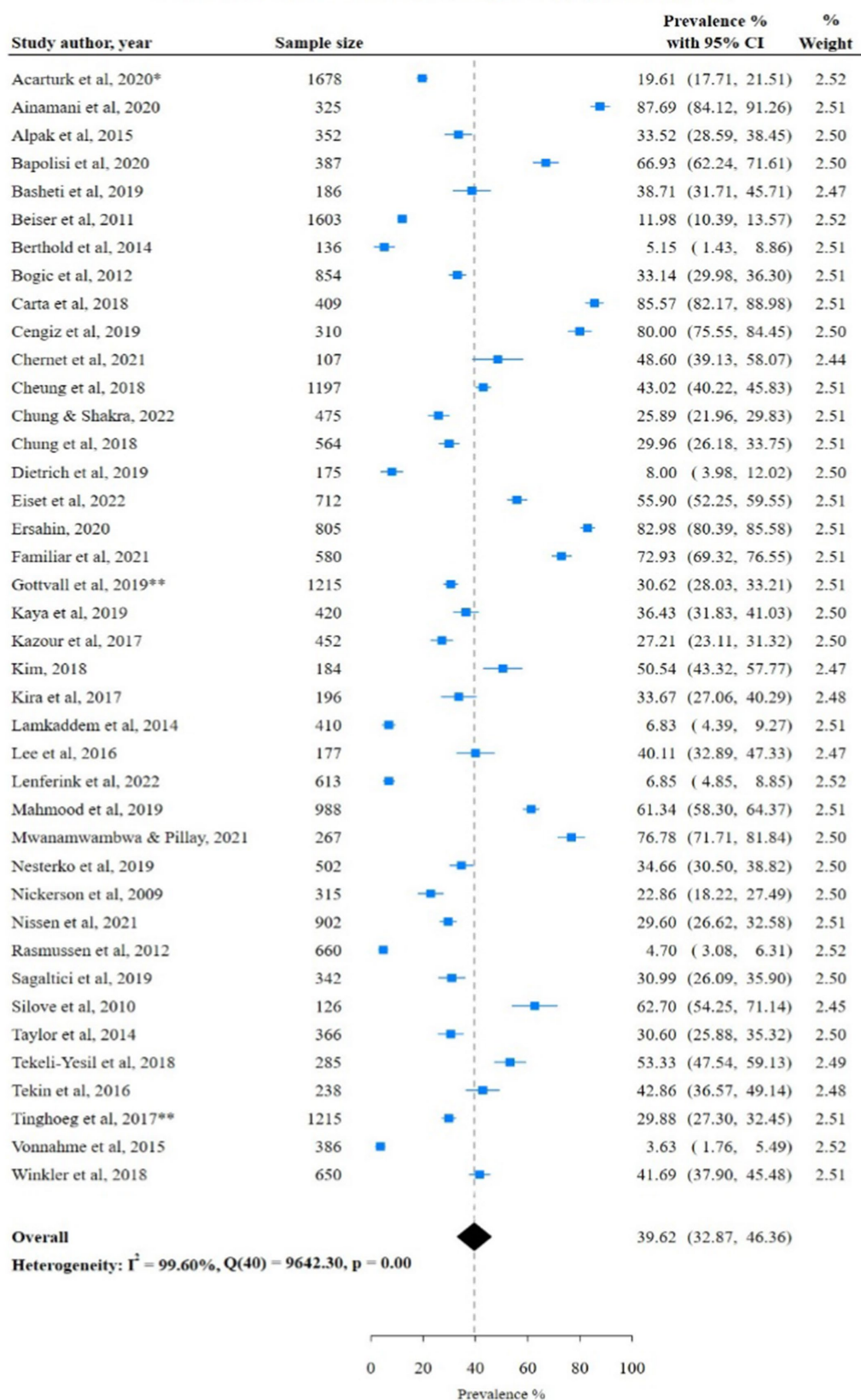


FIGURE 3

Study authors, year, sample size, PTSD prevalence rate with 95% confidence intervals and random % weight. \*Studies (Acarturk et al., 2020, Fuhr et al., 2019) conducted using the same sample and analyzed the same outcomes. Therefore, only one study was considered for meta-analysis; \*\*Studies conducted using the same sample with different outcomes.

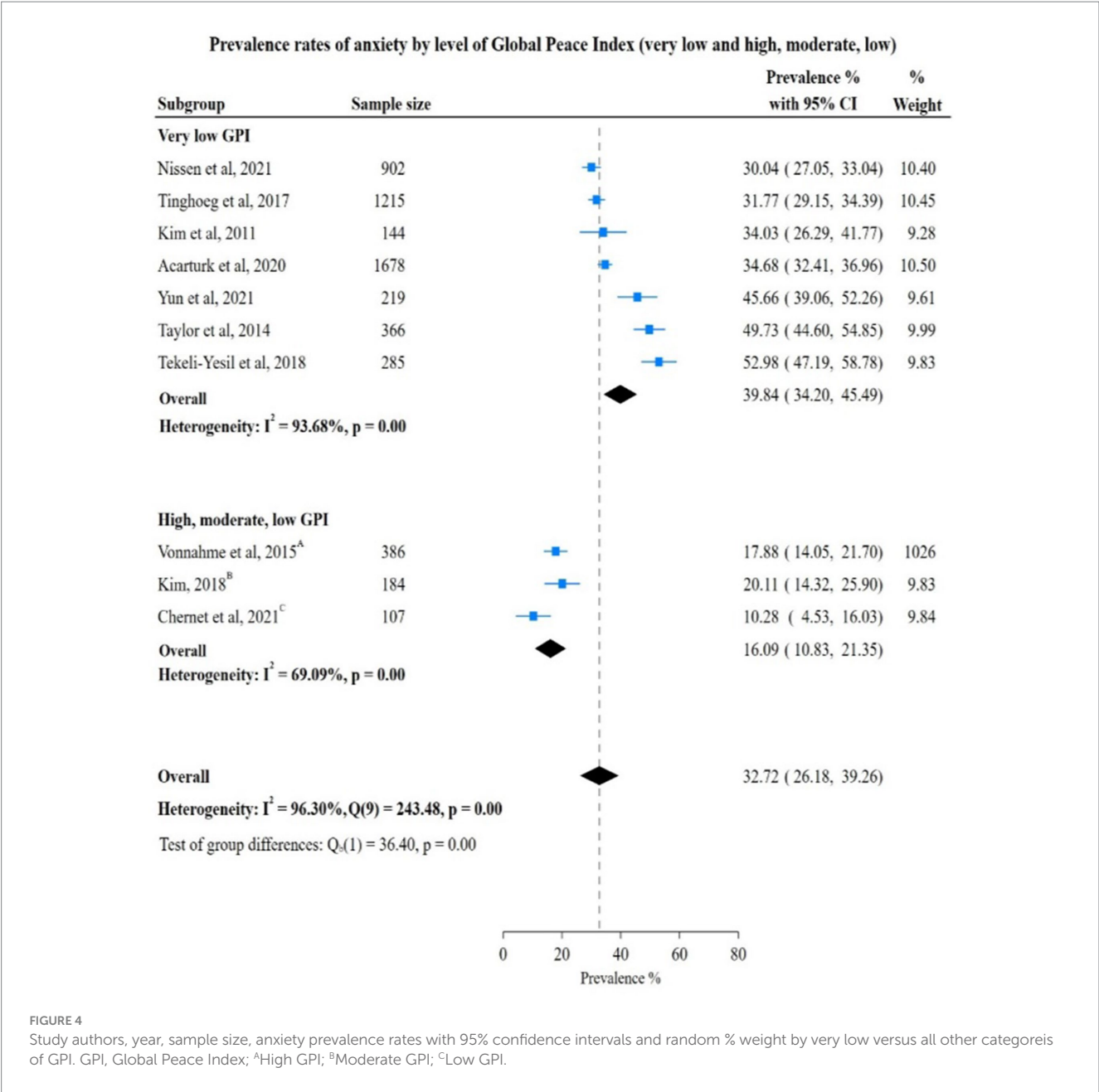


FIGURE 4 Study authors, year, sample size, anxiety prevalence rates with 95% confidence intervals and random % weight by very low versus all other categories of GPI. GPI, Global Peace Index; <sup>A</sup>High GPI; <sup>B</sup>Moderate GPI; <sup>C</sup>Low GPI.

resulting in an increase in cortisol, alpha-amylase, and heart rate (80), which is positively associated with increased levels of heart rate, mood changes also mental health (81–83).

For the first time ever to the best of our knowledge, we identified an association between the level of human rights violations and the prevalence of anxiety, depression, and PTSD. Human rights violations can be understood as an act of exclusion disrupting the individual's sense of safety and belonging in society making them more vulnerable to mental health conditions. Human rights violations have been found to be significant determinants of poor mental health in some populations but are outside the usual scope of psychiatric and social epidemiology (84). Few studies have advocated a comprehensive assessment of human rights violation's impact on health (85, 86). Our findings challenge the traditional understanding of refugee health,

which often emphasizes traumatic experiences during forced migration over political and social determinants embodied prior to displacement.

Furthermore, in the subgroup analysis based on risk of bias, studies with moderate and low risk of bias showed higher prevalence rates of anxiety (40.76%). However, the number of studies meeting the criteria for subgroup analysis was limited. On the other hand, for depression and PTSD, studies with a high risk of bias had higher prevalence rates (43.34 and 49.27%) compared to studies with a very high risk of bias. The difference could be due to the higher number of studies qualifying for the high risk of bias category. In the subgroup analysis based on study sampling methods, anxiety prevalence rate was high (44.71%) by random sampling while the prevalence rate of PTSD (42.83%) was high by convenience sampling.

## Prevalence rates of depression by level of Global Peace Index (very low and low)

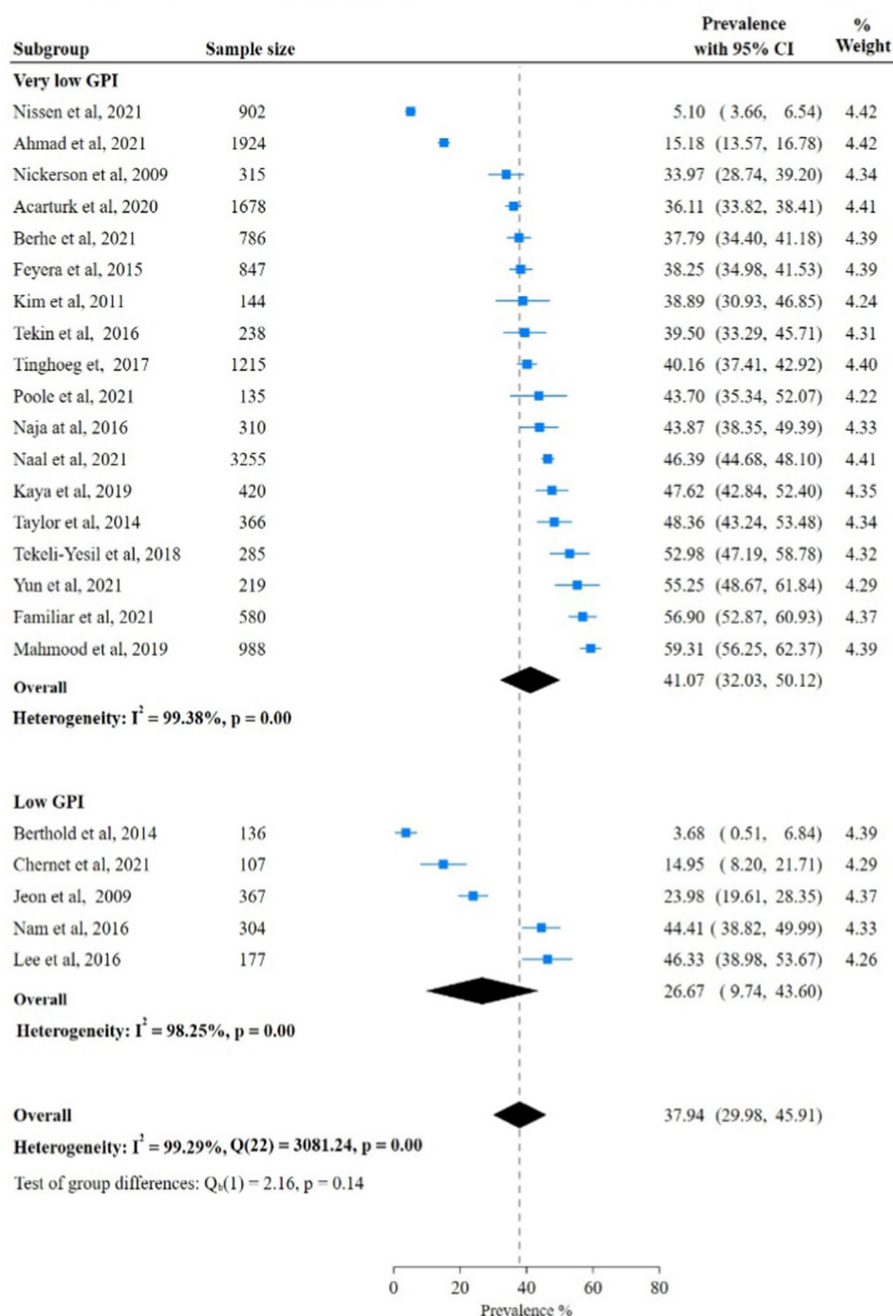


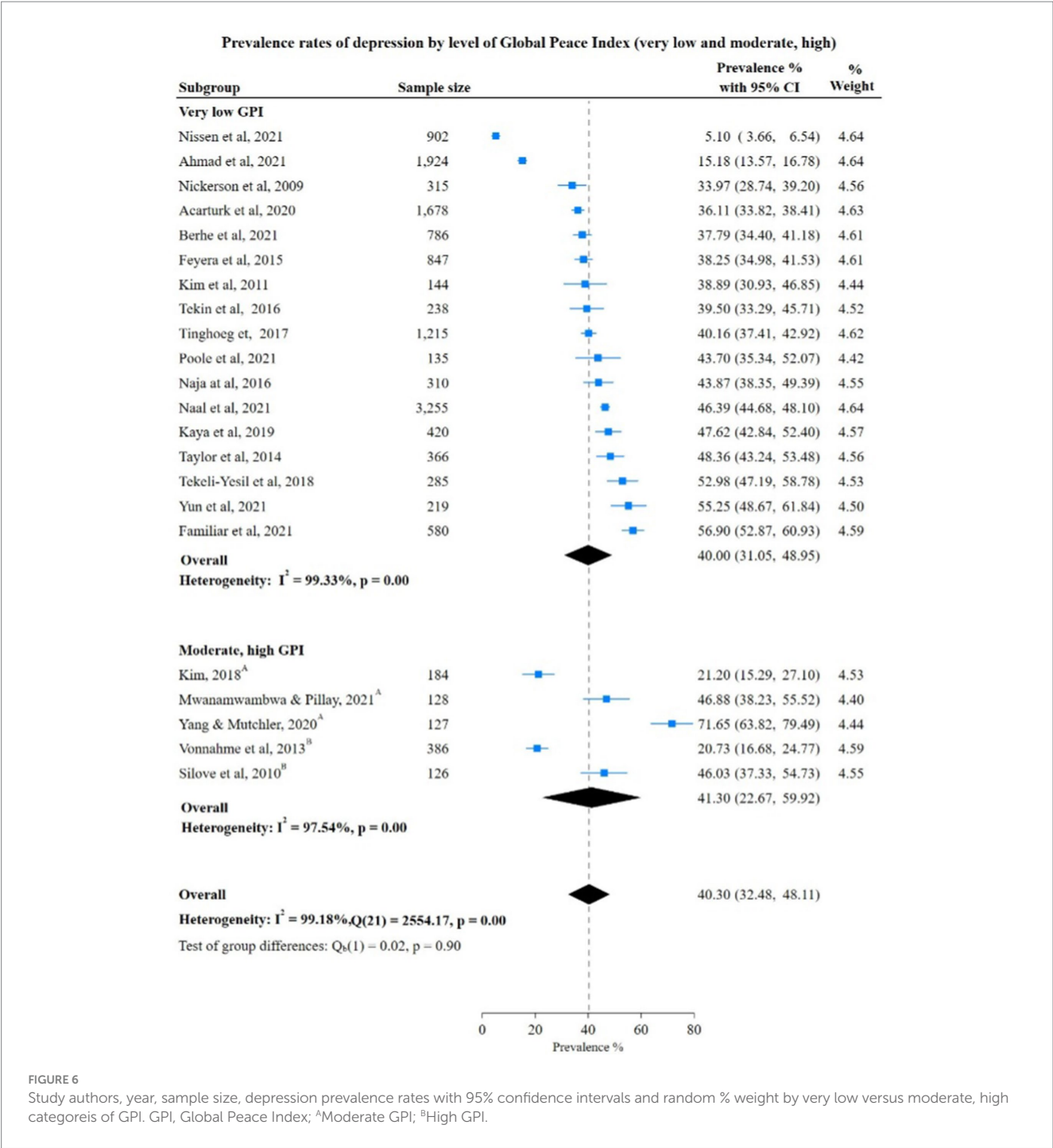
FIGURE 5

Study authors, year, sample size, depression prevalence rates with 95% confidence intervals and random % weight by very low versus low GPI. GPI, Global Peace Index.

The study is not without limitations, including reliance on self-report measures at a single time point, lack of data on the duration and timing of human rights violations, and potential exclusion of relevant studies.

We did an additional search on individuals fleeing from territories occupied by Russia. However, due to the difficulties in the territories occupied by Russia no study provided data on refugees from these areas. In case of countries occupied it is almost impossible

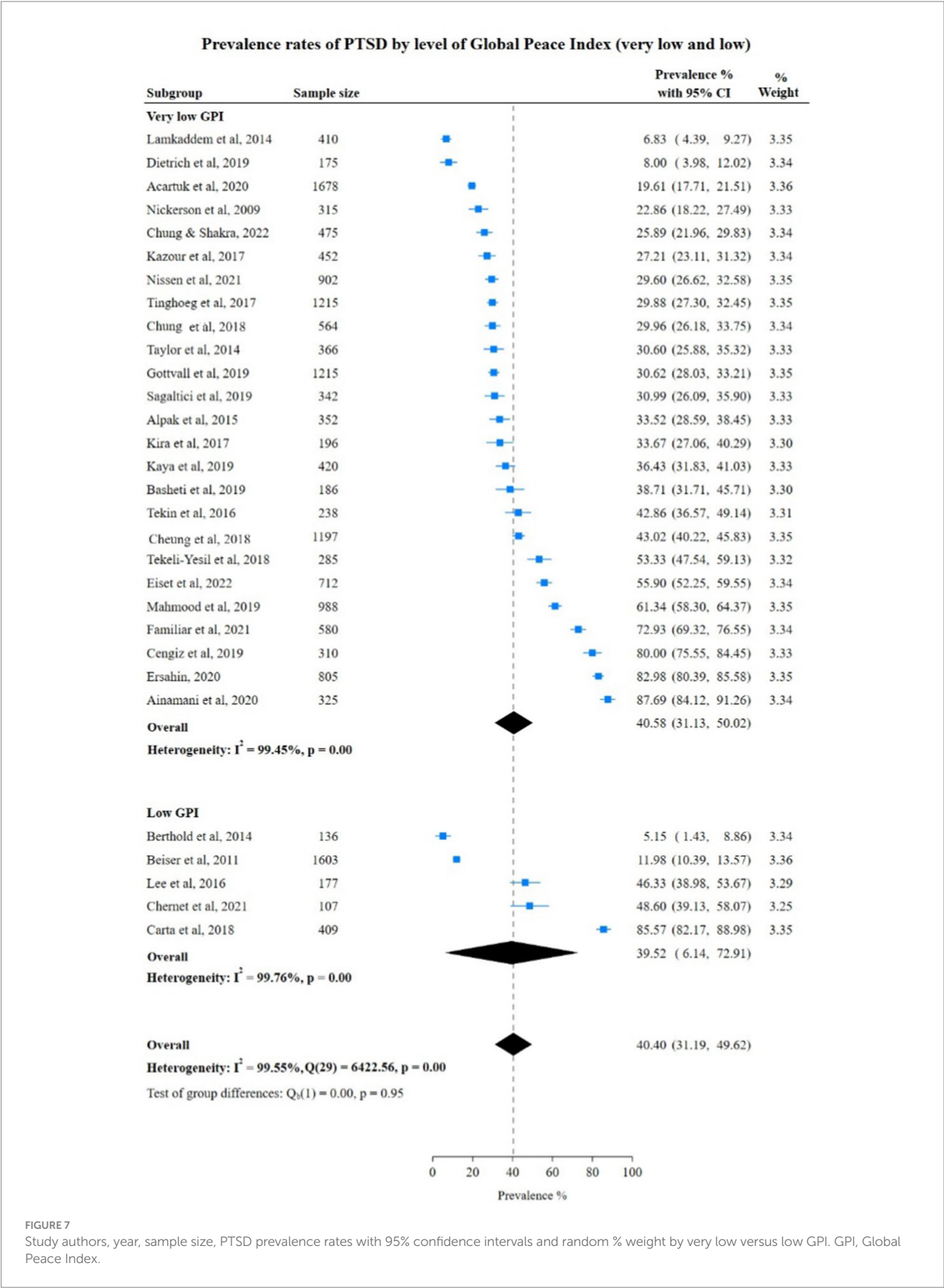
to conduct a representative study. Recent studies on the impact of the Ukraine conflict from the occupied territories are not available. In the future it might be possible to use technology for collecting real time data in territories occupied. However, these data can only be obtained if data protection and safety of the study participants is possible. We acknowledge that new wars, such as the war in Ukraine and in Sudan, are happening at the moment. The current review aimed to synthesize data from the time period January 1994 – June 2022. As it



is difficult to keep up to date as new wars are emerging almost on a regular basis we acknowledge that our review might provide knowledge for a certain time period (January 1994 – October 2024) and needs a regular update. Further approaches such as a living systematic review may build on our review. This living review could evaluate the association of human rights violations and mental health conditions and integrate continuously data on emerging human rights violations. One limitation of the review is that we did not include grey literature which could include further groups of forcibly displaced persons. Further research could involve conducting a

systematic search of the grey literature. Grey literature could help incorporate information about additional groups of forcibly displaced individuals.

Additionally, we conducted subgroup analyses to investigate potential sources of heterogeneity. Subgroups were combined when the number of studies in each subgroup category was less than four which would have affected the pooled prevalence rates and effect sizes in corresponding analysis. Also, some subgroup analyses were not feasible due to a lack of data availability. Furthermore, our review might have missed some relevant



### Prevalence rates of PTSD by level of Global Peace Index (very low and moderate, high)

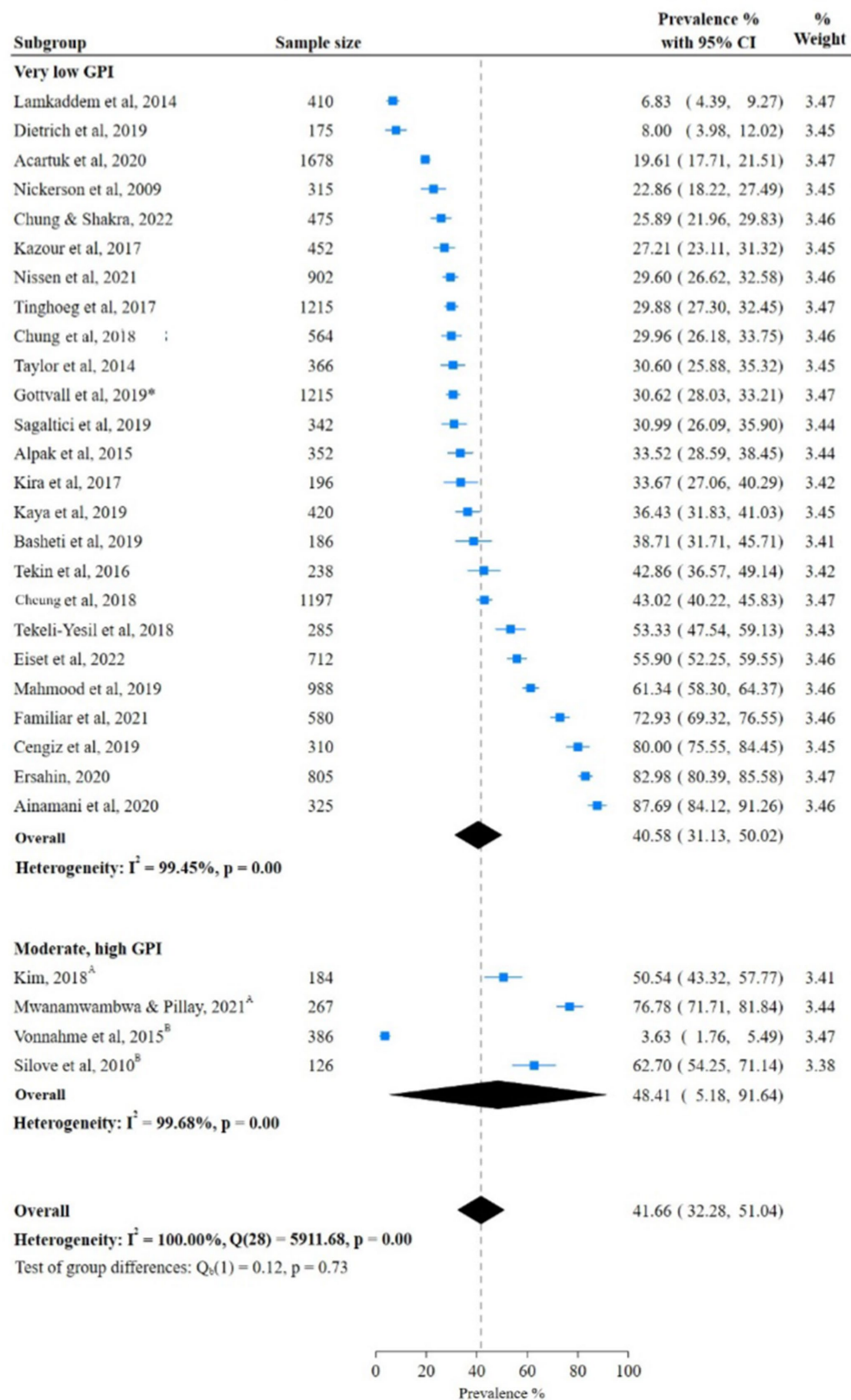


FIGURE 8

Study authors, year, sample size, PTSD prevalence rates with 95% confidence intervals and random % weight by very low versus low GPI. GPI, Global Peace Index; <sup>A</sup>Moderate GPI; <sup>B</sup>High GPI.

studies. Nevertheless, our review provides the first empirical evidence on the association between human rights violations and mental health conditions. Future research should expand the scope of assessment to include detailed information on the nature, duration, and type of human rights violations. Additionally, further studies are needed to interpret the pathways through which human rights violations impact mental health and to address the existing knowledge gaps in this area.

## Conclusion

To summarize, the results of this study add to the knowledge of mental health conditions of FDPs. The findings highlight the association between human rights violations and mental health conditions among forcibly displaced populations. The study results are relevant for other conflict-affected and persecuted communities where basic human rights are systematically violated. It might be of value to conduct in the future a scoping review on this topic including grey literature. While mental health services are crucial for addressing anxiety, depression, and PTSD, they alone cannot fully alleviate the burden. To make an impact, policymakers, politicians, and service providers must continue to provide mental health services aimed at reducing the mental health conditions among these population groups. However, addressing mental health conditions alone is not sufficient to reduce the burden of mental health conditions among these populations. Further research is required to study the effects of systematic continuous human rights violations in conflict prone areas is essential to identify methods to alleviate the burden of these mental health conditions in FDPs. This effort will require substantial resources and long-term advocacy by all major stakeholders involved in this area.

## Data availability statement

The datasets presented in this article are not readily available because datasets are available on request from the corresponding author. Requests to access the datasets should be directed to Jutta Lindert, [jutta.lindert@hs-empden-leer.de](mailto:jutta.lindert@hs-empden-leer.de).

## Author contributions

FS: Data curation, Formal analysis, Investigation, Software, Validation, Writing – review & editing. PC: Formal analysis, Investigation,

Software, Validation, Visualization, Data curation, Writing – review & editing. PB: Investigation, Methodology, Writing – review & editing. HK: Investigation, Writing – review & editing. JL: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Supervision, Validation, Writing – original draft, Writing – review & editing.

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## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The author(s) declared that they were an editorial board member of Frontiers, at the time of submission. This had no impact on the peer review process and the final decision.

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## Supplementary material

The Supplementary material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpubh.2024.1454331/full#supplementary-material>

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