

Predictors of mental health outcomes among survivors of torture and ill-treatment in a Médecins Sans Frontières retrospective cohort study in Mexico

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Abstract

Background

Survivors of torture and ill-treatment (SOITs) among forcibly displaced populations have complex mental health needs, yet evidence on treatment predictors and optimal duration in humanitarian settings remains limited. This study examined predictors of treatment outcomes and adherence among SOITs attending a comprehensive care centre (CAI) for migrants and refugees in Mexico.

Methods

We conducted a retrospective cohort study using routinely collected clinical data from 672 SOITs enrolled in the MSF CAI mental health programme in Mexico City (2019–2025). Outcomes were assessed using the Clinical Global Impression of Improvement (CGI-I) and Mental Health Global State (MHGS) scales. Multivariable logistic regression identified predictors of improvement and loss to follow-up (LTFU). Time to improvement was analysed using Kaplan–Meier and Cox proportional hazards models. Among responders, negative binomial regression identified factors associated with sessions needed for improvement.

Results

Baseline clinical severity negatively predicted CGI-I improvement (OR = 0.48; 95% CI 0.27–0.87), while treatment exposure showed a dose–response relationship, with higher improvement beyond three sessions. Children (≤ 15 years) improved faster than adults (HR = 1.37; 95% CI 1.03–1.82), while PTSD diagnosis and severe symptoms were associated with slower improvement and more sessions needed. LTFU was more likely among those with severe baseline symptoms and LGBTQ+ individuals, while younger age and treatment exposure were protective.

Conclusions

SOITs present heterogeneous therapeutic needs, with response profiles ranging from faster (≈ 11 sessions) to very slow responders (22–23 sessions). Baseline severity, PTSD diagnosis, and age predicted both outcomes and LTFU risk. Retention emerges as a key modifiable leverage point for mental health service design in SOIT populations.

BACKGROUND

Despite its legal prohibition, torture remains a systematic practice across Mexico and Latin America (1). Data from the Federal Institute of Public Defenders documents 2,881 cases involving 3,506 victims between 2019 and 2024 (2). The persistence of torture against people on the move, asylum seekers and

refugees reflects broader forms of structural violence rooted in class, race, and gender inequalities. Increasingly restrictive migration policies, the criminalization of migration, and institutionalized racism have created conditions conducive to torture and ill-treatment of migrants (3).

Structural factors increase violence exposure while creating barriers to healthcare access. Survivors of torture and ill-treatment (SOITs) exhibit elevated mental health disorders, with Post-traumatic stress disorder (PTSD) prevalence often exceeding 50% and high comorbidity with depression and anxiety (4–7). Beyond core PTSD symptoms, survivors frequently present complex post-traumatic features including emotional dysregulation, relational difficulties, and negative self-perception (8). A MSF study in northern Nigeria found torture-related potentially traumatic events were significantly associated with high PTSD prevalence, with elevated depression (36.8%) and anxiety (33.6%) rates (9). The WHO recognizes that refugees and migrants face multiple interacting risk and protective factors shaping mental health outcomes (10). Post-migration stressors (including chronic pain, functional disability, unemployment, discrimination, and migration status insecurity) have been shown to be equally or even more determinant of mental health outcomes than prior trauma exposure (11, 12). Recent research shows that responses to trauma-related disorders and psychological treatments vary widely. Distinct clinical profiles can be identified within different population subgroups based on patterns of multiple risk exposures, allowing interventions to be better tailored to the specific needs of each group (9, 13–15). Current evidence supports comprehensive and multidisciplinary interventions for torture survivors that address psychological and physical sequelae alongside social support (16–20). Following these recommendations, Médecins Sans Frontières (MSF) established the Centro de Atención Integral (CAI, Comprehensive Care Center) in Mexico City in 2016, a specialized program that adopts a holistic, biopsychosocial approach tailored to the complexity of the needs of SOIT. CAI provides free care including primary medical attention, psychological and psychiatric support, physical therapy, social integration assistance, recreational and psychoeducational activities, and referral to specialized health centers. Consistent with this holistic approach, services extend to family members of identified SOITs.

However, despite growing evidence on predictors and effectiveness of mental health interventions, limited empirical guidance exists on outcomes within comprehensive care models in real-world clinical settings for SOITs, particularly regarding how baseline characteristics translate into differential, treatment duration and risk of loss to follow-up (LTFU). As noted by Keshk et al., specialized programs for SOITs may not be feasible or necessary across all humanitarian contexts (18). Against this background, the present study aims to generate actionable evidence from the CAI comprehensive care model to inform the development of effective and quality mental health interventions for SOIT, including in non-specialized healthcare settings. Specifically, this study sought to (1) examine the impact of the CAI mental health intervention on SOITs' outcomes, and (2) identify pre- and post-migration predictors of treatment duration and risk of LTFU.

METHODS

Study design and data sources

This retrospective cohort study used routinely collected clinical data from 672 patients enrolled in the MSF CAI mental health programme in Mexico between March 2019 and October 2025. All data were collected as part of routine programme monitoring and clinical care and were not generated specifically for research purposes, their subsequent handling and analysis strictly adhered to MSF ethical protocols. Individual-level data were extracted from MSF standardized mental health patient medical records and Health Management Information Systems (HMIS), and were pseudonymized prior to analysis, ensuring the integrity and confidentiality of the process throughout.

Study population and eligibility criteria

The study population comprised patients who attended at least one individual MHPSS sessions during the study period and who were allocated for mental health care. CAI adopts MSF's (21) definition of torture and ill-treatment, which includes torture, cruel or inhuman treatment, and humiliating or degrading treatment. In the CAI Mexico programme, the study population included patients and, where relevant, family members, who received mental health care for moderate to severe symptoms related to torture, extreme violence, or other cruel, inhuman, or degrading treatment, associated with functional impairment. Consequently, admission to care was determined by clinical diagnosis informed by clinician judgement—considering symptom severity, functional impairment, and contextual factors—rather than strict diagnostic exclusion criteria. Patients frequently presented psychiatric comorbidity and social vulnerability. Accordingly, the present analysis focused on recorded mental health presentations and outcomes as documented in routine clinical practice.

Patients were followed longitudinally from enrolment until treatment completion, LTFU, or censoring at the time of data extraction. For analyses requiring longitudinal outcome assessment, patients without a subsequent clinical evaluation after the first session (including those LTFU) or those still undergoing treatment at the time of analysis, were censored after the first visit.

Programme delivery and clinical data collection

MHPSS activities were delivered by trained clinical psychologists, under supervision and with access to psychiatric support when required. All interventions followed the WHO Mental Health Gap Action Programme (mhGAP) guidelines and MSF internal protocols for mental health care in humanitarian settings (22). A comprehensive Health Information System and reference data collection guidelines were used as primary sources for team training and data quality monitoring.

MHPSS CAI interventions were delivered primarily through individual outpatient sessions, typically scheduled weekly and lasting approximately 45 minutes. Session timing and frequency were agreed collaboratively between patient and provider. Treatment exposure was quantified by the number of sessions attended, including the intake, follow-up, and closure sessions. The first session corresponded

to day 0, with subsequent sessions generally occurring at weekly intervals, resulting in a close correlation between the number of sessions and time under psychological interventions.

Clinical data were recorded prospectively at each session by the attending provider using MSF standardized mental health medical history forms. At enrolment, patients were routinely asked to provide sociodemographic information and relevant clinical history. Gender was recorded using two binary categories (male and female) and a third category (“other”), in line with country-level regulatory constraints and confidentiality considerations in routine data collection. The “other” category includes patients who did not identify within the binary options and/or preferred not to disclose, including non-binary and gender-diverse identities; it was also used as a privacy-preserving option for patients whose sexual orientation (LGBTQ+ communities) could not be safely or appropriately specified in routine records. A structured clinical evaluation was conducted to document symptom profiles, perceived severity, and functional impairment. Information on stressors contributing to symptom onset or exacerbation was also recorded. Throughout follow-up, patients’ enrolment date, sociodemographic characteristics, clinical information, symptom severity, treatment modality, and follow-up status were systematically documented.

In line with MSF practice in humanitarian settings, clinical classification was based on symptom presentation. Clinical diagnoses were established by trained clinical psychologists based on the International Classification of Diseases (ICD 10; ICD 11, depending on the year of intake) (23, 24), with supervisory support from psychiatrists when required. Alongside formal clinical diagnosis, symptom categories were systematically recorded as part of routine care, as they constitute the basis for symptom monitoring and severity assessment within the programme.

Measures and instruments

Baseline severity was assessed at enrolment using two complementary instruments. Clinician-rated severity was measured using the seven-point Clinical Global Impression of Severity scale (CGI-S), with scores of 1–3 classified as mild severity, 4 as moderate severity, and 5–7 as severe severity (25). Patients’ perception of symptoms severity and functional impairment were assessed using the Mental Health Global State (MHGS) scale. For patients aged 14 years or younger, the MHGS scale ranged from 1 to 40 points based on eight items, whereas for patients 15 years and older, the scale ranged from 1 to 30 points based on six items. Higher scores indicated greater functional impairment. The MHGS scale was developed by MSF for use in humanitarian contexts and has demonstrated cross-cultural validity (26).

Treatment outcomes were assessed longitudinally at each session using both clinician-rated and patient-reported measures. Improvement based on the clinician’s perspective of the symptoms severity and functionality was measured using the Clinical Global Impression of Improvement scale (CGI-I), which ranges from 1 (“very much improved”) to 7 (“very much worse”). Improvement on the CGI-I scale was defined according to standard cut-offs indicating clinical improvement (25). Improvement on the MHGS

was defined as a clinically meaningful reduction in total score between enrolment and the last recorded session.

Statistical analysis

A structured, multi-level analytical strategy was applied to characterize baseline clinical profiles and to identify determinants of symptom severity, treatment engagement, and clinical improvement. All analyses were conducted using Stata 18 (StataCorp, College Station, TX). Baseline sociodemographic, clinical, and violence-related characteristics were summarized using means and standard deviations or medians and interquartile ranges for continuous variables, and frequencies and proportions for categorical variables. Bivariate associations with clinical improvement were explored separately for CGI Improvement and MHGS functional improvement outcomes using t-tests or Wilcoxon rank-sum tests for continuous variables and χ^2 tests for categorical variables.

Determinants of clinical improvement were examined using multivariable logistic regression models. For the CGI outcome, an initial exploratory model included demographic, clinical, event-related, and treatment-related variables. A final parsimonious model retained variables of conceptual and statistical relevance, including age group, gender, diagnostic group, baseline CGI severity, event category, and session category. Session exposure was modelled using categorical session groups to avoid collinearity and post-treatment bias while retaining clinical interpretability. Model calibration was assessed using the Hosmer–Lemeshow test, and discriminative ability was evaluated using the area under the receiver operating characteristic curve (AUC). An analogous modelling strategy was applied to MHGS improvement, with results reported as supplementary analyses. In addition, factors associated with LTFU were analysed using logistic regression models including demographic, clinical, and treatment-related variables.

Time to clinical improvement was further analysed using Kaplan–Meier methods and log-rank tests, defining time as the cumulative number of sessions until first improvement. Multivariable Cox proportional hazards models were fitted to estimate adjusted hazard ratios (HR), and proportional hazards assumptions were assessed using Schoenfeld residuals. Among patients who achieved clinical improvement, the association between baseline characteristics and the number of sessions required was examined using negative binomial regression to account for overdispersion, which was confirmed through likelihood-ratio tests of $\alpha \neq 0$. Incidence rate ratios (IRR) with 95% confidence intervals were reported, and separate models were estimated for CGI and MHGS outcomes. All statistical tests were two-sided, with significance set at $p < 0.05$. Effect estimates are presented with 95% confidence intervals.

Ethics

As this study used routine programmatic data and took the necessary steps to protect patient confidentiality, it was exempted from full review by the MSF Ethical Review Board and the Ethics

Committee of *Instituto Nacional de Psiquiatría Ramón de la Fuente Muñiz* (INPRFM). All study procedures were performed in accordance with the Declaration of Helsinki.

RESULTS

Baseline sociodemographic and clinical characteristics

A total of 672 patients were included in the descriptive analysis, of whom 51% identified female ($n = 343$) and 44.6% identified male ($n = 300$); a small proportion identified with another gender ($n = 29$) and were included only in the overall totals. Children and adolescents aged ≤ 15 years accounted for 21.0% of the sample ($n = 141$), while the majority were older than 15 years (79.0%, $n = 531$). The mean age at session was 29.0 years (SD 13.6), with a median of 29 years (IQR 18–39).

Educational level was heterogeneous, although primary education (31.4%, $n = 211$) and secondary education (19.2%, $n = 129$) were the most frequent categories. Most patients were from Central America, particularly Honduras (40.8%, $n = 274$), followed by Guatemala (13.7%, $n = 92$) and El Salvador (10.9%, $n = 73$), with smaller proportions from Mexico, Venezuela, Colombia, and other countries.

Regarding clinical presentation, post-traumatic stress disorder (PTSD) was the most frequent diagnosis (58.6%, $n = 394$), followed by depression (12.9%, $n = 87$) and anxiety disorders (6.8%, $n = 46$). At baseline, most patients presented moderate (33.8%, $n = 227$) to severe symptoms (46.0%, $n = 309$) according to the CGI-S, while 19.0% ($n = 128$) reported mild symptom severity.

The most frequent events the patients were exposed to were other forms of violence (41.4%, $n = 278$), sexual violence (21.3%, $n = 143$), and kidnapping (19.3%, $n = 130$), followed by torture (10.0%, $n = 67$). In terms of timing, most patients reported that the triggering event had occurred more than one year prior to session (35.6%, $n = 239$) or within the previous 4–12 months (30.8%, $n = 207$).

The number of sessions received varied widely: 25.0% of patients attended three or fewer sessions ($n = 168$), whereas 25.4% ($n = 171$) received more than 20 sessions, indicating substantial heterogeneity in treatment duration (Table 1). Further details stratified by age group and sex are presented in Table 1, while the Supplementary Materials provides the bivariate analysis describing the distribution of the study population across covariates considered for inclusion in the logistic regression models (Supplementary Table 1).

Table 1
Baseline sociodemographic and clinical characteristics, by age group and gender.

Variable & Category	≤ 15 years (n = 141)	> 15 years (n = 531)	Female (n = 343)	Male (n = 300)	Total (n = 672)
Age at session (years)					
Mean (SD)	10.0 (3.8)	34.0 (10.4)	29.3 (13.0)	28.4 (14.5)	29.0 (13.6)
Median (IQR)	11 (7–13)	33 (26–42)	31 (20–37)	28 (15–41)	29 (18–39)
Education level					
Secondary	24 (18.6%)	105 (81.4%)	74 (57.4%)	45 (34.9%)	129
College	1 (0.6%)	160 (99.4%)	73 (45.3%)	83 (51.6%)	161
Illiterate	32 (43.8%)	41 (56.2%)	38 (52.1%)	33 (45.2%)	73
Primary	83 (39.3%)	128 (60.7%)	105 (49.8%)	100 (47.4%)	211
University	0 (0.0%)	86 (100.0%)	47 (54.7%)	36 (41.9%)	86
Country of residence					
El Salvador	12 (16.4%)	61 (83.6%)	30 (41.1%)	39 (53.4%)	73
Guatemala	24 (26.1%)	68 (73.9%)	51 (55.4%)	38 (41.3%)	92
Honduras	72 (26.3%)	202 (73.7%)	135 (49.3%)	123 (44.9%)	274
Mexico	8 (17.4%)	38 (82.6%)	23 (50.0%)	23 (50.0%)	46
Nicaragua	0 (0.0%)	2 (100.0%)	0 (0.0%)	2 (100.0%)	2
Venezuela	5 (11.4%)	39 (88.6%)	24 (54.6%)	18 (40.9%)	44
Cuba	0 (0.0%)	2 (100.0%)	2 (100.0%)	0 (0.0%)	2
Haiti	0 (0.0%)	15 (100.0%)	12 (80.0%)	3 (20.0%)	15
Colombia	6 (23.1%)	20 (76.9%)	17 (65.4%)	9 (34.6%)	26
Ecuador	0 (0.0%)	5 (100.0%)	0 (0.0%)	5 (100.0%)	5
Other countries*	12 (13.5%)	77 (86.5%)	45 (50.6%)	40 (44.9%)	89
Clinical diagnosis					
Post-Traumatic Stress Disorder	36 (9.1%)	358 (90.9%)	211 (53.6%)	160 (40.6%)	394

Variable & Category	≤ 15 years (n = 141)	> 15 years (n = 531)	Female (n = 343)	Male (n = 300)	Total (n = 672)
Age at session (years)					
Depression	18 (20.7%)	69 (79.3%)	53 (60.9%)	33 (37.9%)	87
Anxiety disorder	12 (26.1%)	34 (73.9%)	20 (43.5%)	25 (54.4%)	46
Psychotic and Bipolar disorder	0 (0.0%)	3 (100.0%)	2 (66.7%)	1 (33.3%)	3
Adjustment disorder	27 (39.7%)	41 (60.3%)	24 (35.3%)	42 (61.8%)	68
Other / Unspecified	45 (68.2%)	21 (31.8%)	29 (43.9%)	35 (53.0%)	66
Baseline CGI Severity					
Mild (1–3 points)	62 (48.4%)	66 (51.6%)	57 (44.5%)	67 (52.3%)	128
Moderate (4 points)	50 (22.0%)	177 (78.0%)	120 (52.9%)	101 (44.5%)	227
Severe (5–7 points)	26 (8.4%)	283 (91.6%)	163 (52.8%)	127 (41.1%)	309
Main event group					
Sexual violence	27 (18.9%)	116 (81.1%)	97 (67.8%)	34 (23.8%)	143
Torture	1 (1.5%)	66 (98.5%)	23 (34.3%)	43 (64.2%)	67
Kidnapping	21 (16.2%)	109 (83.8%)	61 (46.9%)	65 (50.0%)	130
Other forms of violence	66 (23.7%)	212 (76.3%)	136 (48.9%)	132 (47.5%)	278
Separation / Loss	17 (70.8%)	7 (29.2%)	10 (41.7%)	14 (58.3%)	24
Medical / antecedents	3 (23.1%)	10 (76.9%)	3 (23.1%)	9 (69.2%)	13
Other	6 (40.0%)	9 (60.0%)	12 (80.0%)	3 (20.0%)	15
Time since event					
≤ 1 week	3 (37.5%)	5 (62.5%)	4 (50.0%)	4 (50.0%)	8
1–12 weeks	37 (18.3%)	165 (81.7%)	92 (45.5%)	99 (49.0%)	202
4–12 months	39 (18.8%)	168 (81.2%)	109 (52.7%)	87 (42.0%)	207
> 1 year	57 (23.9%)	182 (76.1%)	129 (54.0%)	104 (43.5%)	239
Intervention					

Variable & Category	≤ 15 years (n = 141)	> 15 years (n = 531)	Female (n = 343)	Male (n = 300)	Total (n = 672)
Age at session (years)					
SOIT Family	86 (52.1%)	79 (47.9%)	75 (45.5%)	88 (53.3%)	165
SOIT Patient	55 (10.9%)	452 (89.1%)	268 (52.9%)	212 (41.8%)	507
Number of sessions					
≤ 3 sessions	50 (29.8%)	118 (70.2%)	71 (42.3%)	91 (54.2%)	168
4–6 sessions	17 (22.4%)	59 (77.6%)	43 (56.6%)	33 (43.4%)	76
7–10 sessions	22 (22.9%)	74 (77.1%)	42 (43.8%)	50 (52.1%)	96
11–20 sessions	33 (20.5%)	128 (79.5%)	83 (51.6%)	70 (43.5%)	161
> 20 sessions	19 (11.1%)	152 (88.9%)	104 (60.8%)	56 (32.8%)	171

Table 1 presents the baseline sociodemographic and clinical characteristics of the study population stratified by age group (≤15 years vs. >15 years) and sex (female vs. male). Percentages represent row percentages (i.e., the proportion of each category within the corresponding variable). Patients identifying with a gender other than female or male (n = 29) were not included in the sex-stratified columns but are counted in the overall totals. Age-stratified analyses and diagnosis-stratified analyses exclude missing values for the corresponding variable but otherwise include the full sample.

*Other countries include countries such as Iran, Iraq, Ghana, Uganda, Argentina, Peru, Russia and Spain (among others with very low individual frequencies).

Predictors of clinical improvement

Multivariable logistic regression indicated that baseline clinical severity was a strong negative predictor of improvement, with patients classified as severe having significantly lower odds of improvement compared with those presenting with mild–moderate symptoms (OR = 0.48; 95% CI 0.27–0.87). In contrast, treatment exposure showed a clear and pronounced dose response relationship. Compared with patients attending three or fewer sessions, the odds of improvement increased markedly among those receiving 4–6 sessions (OR = 4.73; 95% CI 2.24–9.99), 7–10 sessions (OR = 12.75; 95% CI 5.69–28.59), 11–20 sessions (OR = 19.17; 95% CI 8.94–41.14), and more than 20 sessions (OR = 136.94; 95% CI 30.01–624.75).

By contrast, age group, gender, clinical diagnosis, and type of potentially traumatic event were not independently associated with CGI-I scale variation after adjustment, and none were significant predictors of outcome (Table 2). The final multivariable logistic regression model predicting MHGS improvement is presented in Supplementary Materials (Supplementary Table 2), detailing the

independent associations of baseline severity, event type, and number of sessions with functional improvement.

Table 2
Final adjusted logistic regression model predicting CGI improvement

Predictor	OR	95% CI	p-value
Gender (ref: Female)			
Male	0.91	0.51–1.60	0.734
Other	1.54	0.19–12.64	0.687
Age group (ref: ≥25 years)			
≤ 15 years (Children)	1.45	0.66–3.19	0.352
16–19 years (Adolescents)	1.04	0.30–3.59	0.951
20–24 years (Young adults)	0.69	0.31–1.52	0.357
Clinical diagnosis (ref: Anxiety disorder)			
PTSD	0.55	0.15–1.98	0.364
Depression	0.47	0.12–1.88	0.289
Other disorders	0.52	0.13–2.11	0.358
Baseline CGI Severity (ref: Mild–Moderate)			
Severe	0.48	0.27–0.87	0.016
Main event group (ref: Sexual violence)			
Torture	0.48	0.16–1.40	0.176
Kidnapping	0.76	0.31–1.89	0.560
Other violence / GBV	0.91	0.41–2.02	0.823
Other events	0.35	0.10–1.21	0.097
Number of sessions (ref: ≤3 sessions)			
4–6 sessions	4.73	2.24–9.99	< 0.001
7–10 sessions	12.75	5.69–28.59	< 0.001
11–20 sessions	19.17	8.94–41.14	< 0.001
> 20 sessions	136.94	30.01–624.75	< 0.001
Outcome: CGI Improvement (1 = improved, 0 = not improved). Final adjusted multivariable logistic regression model evaluating independent predictors of clinical improvement. Odds ratios (OR), 95% confidence intervals (CI), and p-values are shown. The model adjusted for gender, age group, clinical diagnosis, baseline CGI severity, type of traumatic event, and session category. Model calibration was excellent (Hosmer–Lemeshow p = 0.83), and discrimination remained strong (AUC = 0.85).			

Time to clinical improvement: survival analyses

As shown in Fig. 1, the cumulative probability of clinical improvement according to the CGI-I increased rapidly over the first sessions. Across diagnostic groups, most patients achieved improvement within the first 10–15 sessions, although treatment response differed significantly by age. Children (≤ 15 years) improved faster than older adolescents and adults, with a higher instantaneous probability of improvement (HR = 1.37 [95% CI 1.03–1.82]; $p = 0.033$), and significant separation of survival curves across age groups (log-rank $p = 0.001$).

Diagnosis also influenced the tempo of improvement. Patients with PTSD showed a slower rate of improvement compared with those with anxiety disorders (HR = 0.54 [95% CI 0.36–0.82]; $p = 0.004$), while depression and other disorders followed intermediate patterns. Overall differences between diagnoses were statistically significant (log-rank $p < 0.001$).

Baseline severity further influenced the time to improvement. Patients presenting with severe symptoms improved more slowly than those with mild–moderate severity (HR = 0.80 [95% CI 0.64–0.98]; $p = 0.033$), indicating a delayed probability of achieving improvement, despite eventual convergence over longer follow-up. Differences between severity groups were also statistically significant (log-rank $p < 0.001$). All hazard ratios were derived from Cox proportional hazards regression models, which are presented in the Supplementary Materials (Supplementary Table 3). A parallel Kaplan–Meier analysis and Cox regression models were also conducted using functional improvement defined by the MHGS scale; however, no statistically significant associations were found. The corresponding curves and models are presented in the Supplementary Materials (Supplementary Fig. 2 and Supplementary Table 4).

Treatment dose and patterns of treatment response

In this analysis, the negative binomial model estimates the expected number of sessions required to achieve improvement as a continuous outcome, from which approximate values are derived. A negative binomial regression model was used to examine factors associated with the number of sessions required to achieve clinical improvement on the CGI scale among responders (Table 3), allowing the identification of empirically distinct response patterns based on treatment dose.

Table 3

Negative binomial regression for number of sessions required to achieve improvement by CGI

Predictor	IRR (95% CI)	p-value
Age group (ref: >15 years)		
≤ 15 years	0.80 (0.66–0.96)	0.020
Clinical diagnosis (ref: All diagnosis)		
PTSD	1.30 (1.10–1.53)	0.002
Baseline CGI Severity (ref: Mild–Moderate)		
Severe	1.23 (1.06–1.43)	0.006
Negative binomial regression model evaluating baseline predictors of the number of sessions required to reach first documented clinical improvement according to the CGI Improvement scale. The analysis was restricted to patients who achieved improvement during follow-up (responders only). The outcome was defined as the cumulative number of sessions until improvement. The model included age group, clinical diagnosis, and baseline CGI severity. Incidence rate ratios (IRR) and 95% confidence intervals are reported. Overdispersion was assessed using a likelihood-ratio test ($\alpha \neq 0$; $p < 0.001$), supporting the use of a negative binomial model over a Poisson specification. CGI-I = Clinical Global Impression of Improvement; IRR = incidence rate ratio.		

Baseline CGI severity remained a key determinant of treatment dose. Patients presenting with severe symptoms required approximately 23% more sessions than those with mild–moderate severity (IRR = 1.23; 95% CI 1.06–1.43). Given a median of 14 sessions among responders, this corresponds to an expected increase to 17–18 sessions for patients entering care with severe symptoms. These patients can be characterized as slower responders, requiring extended treatment exposure before achieving improvement.

Clinical diagnosis also independently influenced treatment duration. Patients diagnosed with PTSD required on average 30% more sessions compared with patients with other diagnoses (IRR = 1.30; 95% CI 1.10–1.53), corresponding to an estimated 18–19 sessions increase, further reinforcing a slow-responder pattern.

When severe baseline symptoms and PTSD co-occurred, their effects compounded multiplicatively, resulting in an estimated increase of approximately 60% in the number of sessions required to achieve improvement (around 22–23 sessions). This subgroup presents a high-complexity and very slow respond pattern, characterized by markedly prolonged treatment duration.

In contrast, age group showed an inverse association with treatment dose. Children aged ≤ 15 years required approximately 20% fewer sessions than patients older than 15 years (IRR = 0.80; 95% CI 0.66–0.96), corresponding to an expected 11 sessions, indicating shorter treatment courses in younger patients. This is consistent with a faster respond pattern marked by earlier improvement.

Predictors of loss to follow-up (LTFU)

LTFU occurred predominantly at the very beginning of care. Among all patients who disengaged from treatment (24.8%, $n = 167$), more than one third were lost within the first two sessions, and almost half of the patients abandoned within the first three sessions. Multivariable logistic regression identified several factors independently associated with LTFU. Younger age emerged as a key protective factor, with children aged ≤ 15 years showing substantially lower odds of LTFU compared with adults aged ≥ 25 years (OR = 0.32; 95% CI 0.16–0.64). Clinical diagnosis was also strongly associated with retention: patients diagnosed with depression (OR = 0.20; 95% CI 0.08–0.52) and those with other disorders category (OR = 0.13; 95% CI 0.05–0.32) were significantly less likely to discontinue care than patients with anxiety disorders.

By contrast, higher baseline clinical severity increased the risk of attrition, with severe CGI scores associated with higher odds of LTFU (OR = 1.82; 95% CI 1.15–2.90). Treatment exposure showed the strongest and most consistent protective effect: compared with patients attending three or fewer sessions, the odds of LTFU decreased progressively among those receiving 4–6 sessions (OR = 0.27; 95% CI 0.14–0.54), 7–10 sessions (OR = 0.12; 95% CI 0.06–0.25), 11–20 sessions (OR = 0.17; 95% CI 0.10–0.31), and more than 20 sessions (OR = 0.03; 95% CI 0.01–0.07).

Regarding gender, no differences were observed between male and female patients; however, individuals classified in the “other” gender category showed higher odds of LTFU compared with females (OR = 2.77; 95% CI 1.06–7.22) (Table 4).

Table 4
Logistic regression model for loss to follow-up (LTFU)

Predictor	Odds Ratio (OR)	95% CI	p-value
Gender (ref: Female)			
Male	1.04	0.68–1.61	0.848
Other	2.77	1.06–7.22	0.037
Age group (ref: ≥25 years)			
≤ 15 years (Children)	0.32	0.16–0.64	0.001
16–19 years (Adolescents)	1.89	0.84–4.29	0.125
20–24 years (Young adults)	1.10	0.58–2.09	0.763
Clinical diagnosis (ref: Anxiety disorder)			
PTSD	0.59	0.27–1.28	0.184
Depression	0.20	0.08–0.52	0.001
Other disorders	0.13	0.05–0.32	< 0.001
Baseline CGI Severity (ref: Mild–Moderate)			
Severe	1.82	1.15–2.90	0.011
Number of sessions (ref: ≤3 sessions)			
4–6 sessions	0.27	0.14–0.54	< 0.001
7–10 sessions	0.12	0.06–0.25	< 0.001
11–20 sessions	0.17	0.10–0.31	< 0.001
> 20 sessions	0.03	0.01–0.07	< 0.001
Multivariable logistic regression examining predictors of LTFU, defined as discontinuation of care before therapeutic completion. Outcome: LTFU (1 = yes, 0 = no). Final adjusted multivariable logistic regression model evaluating independent predictors of LTFU. Odds ratios (OR), 95% confidence intervals (CI), and p-values are shown. The model adjusted for gender, age group, clinical diagnosis, baseline CGI severity, and session category. Model calibration was acceptable (Hosmer–Lemeshow $p = 0.64$), and discrimination was good (AUC = 0.81).			

DISCUSSION

This study provides an analysis of mental health interventions at the MSF CAI mental health programme for SOITs in a predominantly transit setting for Latin American migrants, asylum seekers and refugees. Among nearly 700 survivors of torture, baseline symptom severity, diagnosis, age group and treatment length emerged as the main determinants of clinical improvement, indicating that patients' clinical

characteristics should be considered when programming mental health interventions. Overall, these results suggest that early clinical profiling may help tailor duration of treatment and improve programme efficacy, supporting the adoption of stepped-care approaches, whereby treatment duration are adjusted according to individual clinical needs and response.

Baseline severity emerged as the most robust predictor of treatment outcomes, associating with both longer treatment duration and slower improvement, which suggests that initial symptom burden is not only a marker of clinical need but also a practical determinant of the number of sessions required to achieve meaningful change. Clinically, this pattern is plausible because patients with more severe symptoms typically face greater functional impairment, comorbidity, ongoing stressors, so they often need more time and sessions before experience improvement (27). This finding is consistent with other MSF studies conducted in conflict-affected settings, including MHPSS programs in Borno State, Nigeria, where patients categorized as severe were less likely to present improvement compared to mild/moderate patients (9, 28). More broadly, this finding aligns with previous literature showing poorer or slower outcomes among refugees or forcibly displaced patients presenting with greater baseline severity (12, 29, 30), reinforcing the idea that baseline severity should be treated as a central stratification variable in both outcome analyses and service delivery planning.

Treatment duration varied by age, with children and adolescents demonstrating more rapid improvement than adults. This finding may reflect two complementary mechanisms. First, most minors enrolled in the program were children of parents who had not directly experienced torture or ill-treatment, suggesting a less severe clinical presentation and, consequently, greater responsiveness to intervention. Second, parental participation in the therapeutic process may have facilitated more favourable treatment outcomes. The more favourable outcomes observed among children in our study are consistent with findings from Gutermann et al. and Pine et al., whose meta-analysis showed that mental health interventions for trauma-related symptoms tend to be particularly effective in younger populations (31, 32). However, evidence on age as a treatment outcome moderator remains mixed. Mollica et al. found older age associated with increased mortality among Bosnian refugees (33); Tol et al. reported beneficial effects for adults but heterogeneous results in younger populations (34). A prior study by MSF also found age-improvement relationships varied by sex among conflict-related sexual violence survivors (28).

In this study, PTSD emerged as the clinical diagnosis associated with the slowest pattern of treatment response and the greatest therapeutic demands in terms of treatment duration and number of sessions required. Regarding exposure to potentially traumatic events, no event categories were independently associated with improvement, time-to-improvement, treatment dose, or LTFU after adjustment for baseline severity and diagnosis. This suggests diagnosis and symptom presentation, rather than trauma nature, determine more directly recovery likelihood. However, evidence on specific trauma types as predictors remains limited: Mollica et al. examined cumulative exposure without differentiating by category (33); Kurath et al. found insufficient evidence for interpersonal trauma types (12). Rawers et al. concluded that post-migration factors may be more significant predictors than pre-migration trauma

(15). Using a treatment-dose approach based on negative binomial regression, our findings reveal empirically distinct response patterns within the cohort. Differences in the number of sessions required to achieve improvement delineate faster versus slower response patterns, primarily structured by baseline severity, PTSD diagnosis, and age. These results support the clinical relevance of early stratification and are consistent with stepped-care models that tailor duration of care to patient complexity. Taken together, we observed a gradient in treatment requirements, with some patients improving after fewer sessions and others requiring prolonged care, which has direct implications for planning, expectation management and resource allocation. Our findings are consistent with person-centred evidence showing heterogeneity in trauma-response patterns and treatment outcomes. The systematic review by Galatzer-Levy et al. identified prototypical response patterns, resilience, recovery, chronicity, and delayed onset across diverse populations and contexts (35). Critically, these authors found that individual psychological characteristics and contextual factors influenced trajectory membership more than objective event severity, which aligns with our finding that baseline severity and PTSD diagnosis, rather than trauma exposure per se, predict treatment response speed. Similarly, a previous MSF study found that patients with mild to moderate severity achieved clinical improvement after approximately three sessions, while severe patients required at least six (9). Although our study identified higher session thresholds, likely reflecting greater clinical complexity among survivors of torture, both studies converge on the principle that baseline severity structures treatment duration. Recent latent class analyses study in refugee populations similarly identify subgroups based on symptom profiles and, in some cases, exposure patterns (13–15, 36). These findings converge toward a common framework: while previous studies identify subgroups based on symptom or exposure profiles, our treatment-dose approach complements this literature by quantifying how baseline differences translate into differential treatment requirements. This convergence across diverse humanitarian contexts reinforces the clinical validity of early stratification and supports stepped-care models that calibrate therapeutic duration to patient complexity, stepping patients up to longer or more intensive care when improvement is insufficient and stepping down when therapeutic goals are met. For programmes operating in transit settings with high caseloads, this framework can help balance limited clinical resources with the heterogeneous needs of the population served.

A key finding of this study is that the number of treatment sessions emerged as the most consistent predictor of clinical improvement across both CGI and MHGS measures. Rather than a simple dose-response relationship, this result likely reflects treatment retention and therapeutic continuity as modifiable programmatic factors, consistent with evidence that clients who improved attended more sessions and that a minimum session threshold appears necessary for significant symptom reduction (37, 38), and that intervention benefits are maintained with sustained treatment exposure in humanitarian settings (39). From a programmatic perspective, although this analysis does not disentangle treatment dose from engagement or continuity of care, the findings suggest that sustaining treatment exposure long enough for patients to receive an effective therapeutic dose may be more consequential than modifying treatment intensity or protocol length alone. This interpretation aligns with qualitative evidence identifying retention and continuity of care as persistent implementation challenges

in humanitarian settings and provides a clear rationale for examining LTFU as a key determinant of outcomes (40).

Higher baseline severity was also associated with increased LTFU, in line with prior studies indicating that greater symptom burden may hinder sustained engagement in care, particularly in unstable or resource-constrained settings (41, 42). In this study, LTFU occurred predominantly during the early stages of care and was mainly associated with this factor, as well as age, and diagnosis, supporting the interpretation of LTFU as a structural rather than an individual phenomenon. Although the programme's LTFU rate was comparable to similar humanitarian programmes (18, 43, 44), measures to mitigate dropouts should still be considered. The experience of Keshk et al. in a similar MSF clinic, suggested that it can be attributed to structural constraints such as financial and transportation difficulties (18). While prior studies often report higher dropout among younger patients (41, 42, 45, 46), our finding of greater LTFU among adults may reflect the protective effect of parental involvement, as nearly all minors received care alongside caregivers. This interpretation aligns with evidence that family-based interventions improve mental health outcomes in refugee populations (47) and that parental involvement enhances treatment efficacy for adolescents, particularly for externalizing problems (32). These studies suggest that the presence of caregivers may have facilitated better retention and engagement among minors in our sample. LTFU was markedly higher among LGBTIQ+ patients, which is also consistent with intersectional stigma evidence (48, 49), as LGBTIQ+ refugees experience "multiple minority stress" from forced migration trauma intersecting with identity-based persecution (50–52), and the therapeutic team has observed specific protection needs requiring targeted measures to prevent LTFU in this subgroup. A recent meta-synthesis of qualitative studies with sexual and gender minority migrants found that fears of judgment, prior experiences of discrimination, and non-affirming behaviours from health professionals can contribute to the service avoidance and can compound feelings of shame and hesitancy (53). Similarly, studies with LGBTIQ+ refugees have documented how discrimination and harassment from other service users create additional barriers to accessing essential services (54). These findings highlight the need for addressing LGBTIQ+-affirming and trauma-informed approaches, including staff training, partnerships with LGBTIQ+ organizations, and safe disclosure environments (54, 55). Taken together, these findings reinforce retention as a key, modifiable leverage point for improving outcomes in humanitarian mental health programmes, particularly among survivors of torture and other severe forms of violence.

Limitations

This study has some limitations that should be considered when interpreting the findings. The CAI is a comprehensive care centre that provides integrated support beyond mental health care, including medical and social services. As we did not capture patients' exposure to these other components, improvements in mental health and functioning may partly reflect the combined effect of multidisciplinary support rather than mental health treatment alone. These differences in assessment sources, along with potential variations in sensitivity and conceptual focus, may partly explain the divergent associations observed across outcome measures. As such, generalizability to other

populations, care models, or humanitarian contexts should be approached with caution. Finally, although clinical diagnoses were established by trained psychologists with psychiatrist support when required, the diagnostic framework did not differentiate complex PTSD from PTSD. Patients meeting criteria for complex PTSD were therefore grouped under PTSD, which may have masked heterogeneity in symptom profiles, time to response, and treatment needs within this diagnostic category.

CONCLUSION

Treatment outcomes and loss to follow-up (LTFU) are key indicators in quality-focused approaches to MHPSS program evaluation and were therefore prioritized in this analysis. This study suggests that SOITs receiving care in humanitarian settings do not constitute a homogeneous group in terms of their mental health needs. The identification of distinct patterns of clinical response revealed differential session requirements to achieve clinically significant improvement. Findings indicate that baseline symptom severity, PTSD diagnosis, and age are significant predictors of pattern of treatment response, tending to require more intensive treatment doses. Notably, these same factors were also associated with increased risk of LTFU, underscoring a critical challenge: patients with greater severity are simultaneously those most vulnerable to treatment discontinuation. These findings support the consideration of baseline severity as a key predictor of both treatment duration and attrition, and where high rates of LTFU pose significant challenges to program delivery. Additionally, specific protection needs were identified among the LGBTIQ+ population, who may be at particularly high risk of LTFU, highlighting the importance of implementing affirming and trauma-informed approaches for this subgroup. Taken together, these results reinforce retention as a key, modifiable leverage point for improving outcomes in mental health programmes serving survivors of torture and other severe forms of violence. Although derived from a specific humanitarian context, these findings have broader applicability and could inform the design and delivery of mental health services for SOIT across diverse settings. Future research should examine whether these patterns of treatment response replicate across other populations and contexts and explore variables that may refine the early identification of patients at risk of both requiring intensive intervention and discontinuing treatment prematurely.

LIST OF ABBREVIATION

CAI Comprehensive Care Center (from the Spanish acronym)

CGI-I Clinical Global Impression-Improvement scale

CGI-S Clinical Global Impression-Severity scale

ICD-10 International Disease Classification 10 Manual

ICD-11 International Disease Classification 11 Manual

LTFU Loss to Follow Up

MSF Médecins Sans Frontières

mhGAP Mental Health Gap Action Programme

MHGS Mental Health Global State scale

MHPSS Mental Health and Psychosocial Support

PTSD Post-Traumatic Stress Disorder

SOIT Survivor of Ill-Treatment

Declarations

Ethics Approval and Consent to Participate

This study was based on a retrospective analysis of routinely collected, de-identified clinical data and did not involve prospective recruitment of participants. Individual informed consent was therefore not required and was formally waived. The study protocol was reviewed and approved by the Comité de Ética en Investigación (CEI) of the Instituto Nacional de Psiquiatría Ramón de la Fuente Muñiz (INPRFM), Mexico City, Mexico (Ref.: CEI/019/2026, approved 16 February 2026), in accordance with the ethical standards of the Declaration of Helsinki and applicable Mexican regulations on research in health.

Consent for Publication

Not applicable.

Availability of Data and Materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing Interests

The authors declare that they have no financial or non-financial competing interests.

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Authors' Contributions

SC, SMT, CCG, and MJS conceived of the study and participated in its design, literature research, data cleaning, statistical analysis, drafted the manuscript and coordination. RG participated in the study conceptualization, data interpretation and technical review of the manuscript. AEL, UERG, MJCU and SBG provided rigorous review and approved the final draft prior to submission.

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Availability of data and materials

The datasets generated and analyzed during the current study are not publicly available due to confidentiality, and access is restricted for non-MSF staff. However, it is available from the corresponding author on reasonable request.

Clinical trial number

Not applicable.

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Figures

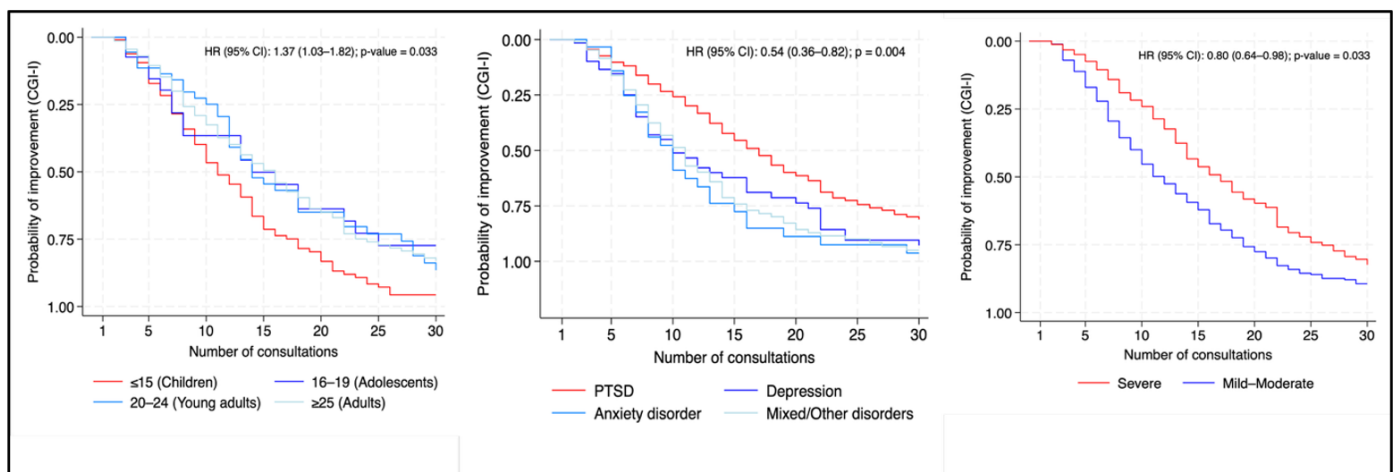


Figure 1

Kaplan–Meier curves for time to clinical improvement according to the CGI-I scale

Kaplan–Meier curves show the cumulative probability of clinical improvement over the number of sessions, stratified by age group, clinical diagnosis, and baseline CGI severity at intake. Time was defined as the number of sessions until first documented improvement. Hazard ratios (HR) shown were derived from Cox proportional hazards regression models. Between-group differences were evaluated using log-rank tests. CGI-I = Clinical Global Impression of Improvement.

Supplementary Files

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