scientific reports

OPEN

The impact of potentially morally injurious experience of betrayal on PTSD and depression following the October 7th terror attack

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With about 1200 individuals murdered, the massacre of October 7th was one of the deadliest terrorist attacks in modern history. The mental health consequences of terrorist attacks have been documented. However, little is known of the impact of the potentially morally injurious experience (PMIE) of betrayal—in which individuals feel betrayed by leaders they once trusted—on levels of psychological burden in the aftermath of such an attack. In this national prospective cohort study, we examined to what extent the PMIE of betrayal exacerbates the risk for posttraumatic stress disorder (PTSD) and depression in the wake of the October 7th terrorist attack. A representative sample of 710 Israeli adults (362 female, 51.1%), Jews (557, 79.9%) and Arabs (153, 20.1%), aged 18–85 ($M = 41.01$, $SD = 13.72$) completed validated self-report questionnaires assessing PTSD, depression, and PMIE-betrayal at two timepoints: T1, in August 2023 (6–7 weeks before the attack) and T2, in November 2023 (5–6 weeks after the attack). In two hierarchical logistic regressions, we found that experience of PMIE-betrayal predicted diagnoses of both PTSD (OR 1.92, 95% CI 1.26–2.92) and depression (OR 2.03, 95% CI 1.37–3.01) at T2, beyond probable PTSD/depression at T1 and demographic and trauma-related variables. Moreover, in two repeated-measure analyses predicting PTSD/depression symptoms, we found significant interactions between PTSD/depression trajectories and PMIE-betrayal, meaning that the increase of PTSD/depression symptoms was significantly higher among participants experiencing betrayal in the context of the attack. Our study highlights the impact of PMIE of betrayal on the dramatic increase in psychopathology following the October 7th terror attack on Israel's population. Clinicians treating individuals coping with PTSD and depression should attend to their patients' possible exposure to betrayal following the attack. Moreover, national leaders and policymakers should take significant steps to repair the public's betrayal experience.

Keywords PTSD, Depression, Betrayal, Moral injury, Terror attack

On October 7th, 2023, Israel came under an unprecedented terror attack led by Hamas, a Palestinian organization that governs the Gaza Strip[1]. In less than 24 h, Hamas terrorists penetrated Israeli cities and villages, murdering about 1200 people and kidnapping 229 individuals (including babies and the elderly). The attack included the perpetration of unspeakable atrocities, including the brutal maiming, torture, and rape of women and children, not differentiating between Jewish and non-Jewish victims[2]. When taking into account the number of victims per capita, the October 7th attack can be considered to be one of the deadliest terrorist attacks the world has seen in modern times[3].

Several studies have examined responses of national representative samples regarding massive terror attacks (e.g. Refs.[4–7]). These studies suggest that the psychological burden may reach far beyond those who are directly exposed to the attacks, indication that terror attack-related posttraumatic stress and depression symptoms are widespread, impacting large groups of citizens and can be seen as collective trauma[8]. However, when examining

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the prevalence of psychological disorders such as PTSD in the aftermath of terror attacks, the percentages were found to be relatively low (e.g. Ref.[9]). More information is needed on the impact of a massive terror attack on the public's mental health and, more significantly, on identifying those at risk for elevated psychopathology following such an attack.

Various risk factors for elevated psychopathology, specifically post-attack PTSD and depression, among nationwide samples have been examined. Recent systematic literature reviews (e.g. Ref.[10]) noted that several factors, including gender, marital status, education, and socioeconomic status, can serve as predictors of the deleterious effect of such attacks on the public. In a recent meta-analysis of psychopathology in the aftermath of a terror attack[6], it was found that factors such as gender, SES, social supports, level of preparedness, level of exposure, as well as pre-existing trauma and mental illness, are the among the most powerful predictors of the presentation of PTSD and depression (see also Ref.[11]). However, no study to date has examined whether the level of the public's trust in the national leadership in times of crisis could comprise a significant risk factor for PTSD and depression in the aftermath of a terrorist attack. Given the impact of trust and betrayal on mental health[12,13], this risk factor may help shed light on individuals who may be at risk in such situations.

As in other countries, Israeli citizens are reliant on their nation's leaders and the army and trust them in all issues relating to ensuring the safety of all citizens. This national obligation includes defending the country's borders and preventing killings and kidnappings of citizens within these borders. In Israel, this trust relates specifically to expectations to protect its citizens from terrorist organizations such as Hamas, which has perpetrated attacks on Israel for many years (e.g. Ref.[14]). Thus, it may be plausible to suggest that on October 7th, the nation's leaders failed to meet the public basic expectations of ensuring the safety of all citizens. Importantly, it was found that a year before the attack Israeli citizens experienced loss of trust in their leaders as a consequence of the legal reform that the government sought to implement[15]. The phenomenon of losing trust in the leaders and their failure to meet basic expectations has been labeled as the *potentially morally injurious experience of betrayal* (PMIE-betrayal)[12,16]. In this study, we aimed to examine the impact of PMIE-betrayal on Israeli citizens' psychopathology in the aftermath of the October 7th terror attack.

Betrayal is a sense of being harmed by a trusted person's intentional action or inaction (e.g. failure to provide support).. Jonathan Shay defined PMIE of betrayal as a "betrayal of what is perceived as right, by someone who holds legitimate authority… in a high stakes situation"[16, p. 281]. Shay posited that feeling betrayed by those with recognized authority (e.g. political leaders and institutional leaders such as commanders-in-chief) inflicts MI, creating distress and leading to an impaired capacity for trust[16,17]. This loss of trust is "replaced by the settled expectancy of harm, exploitation, or humiliation from others"[16, p. 186].

Many studies have highlighted that PMIE-betrayal can lead to deleterious mental effects, such as shame and loneliness, and eventually to the emergence of mental health problems, such as PTSD, depression, and suicide ideation in different populations[12,18–20]. For example, PMIE-betrayal was found to facilitate the experience of entrapment, which can lead to PTSD and depression symptoms among active-duty combatants[21] and combat veterans[20]. An additional study among health workers during the COVID-19 pandemic found that experiencing betrayal was related to elevated levels of depression and anxiety[22]. Whereas these studies targeted specific occupations (combatants, physicians), it is critical to note that PMIE-betrayal has also been found to facilitate deleterious psychological effects in the general public. A recent study focusing on civilian protesters in long-term protests against government actions in Israel revealed betrayal to be a powerful predictor of PTSD and depression symptoms[15]. Bearing in mind the high levels of distress among civilians[23] and the possibility of loss of trust in leadership following mass trauma events[24,25], we can presume the experience of betrayal to have high predictive value on psychopathology in the Israeli public post-October 7th attack. However, to our knowledge, no quantitative study has examined experiences of betrayal relating to mental health outcomes in a nationwide sample in the aftermath of a terror attack.

The present study

In this cohort study, we utilized data from a nationally representative sample of Israeli citizens collected during the month of August 2023 (6–7 weeks before the terror attack). These data were collected as part of our study on the psychological consequences of the Israeli government's proposed judicial reform. Over 35 weeks, many citizens participated in massive demonstrations, riots, and various other non-violent resistance activities out of concern that the government's judicial overhaul would constrain the judiciary's role in Israel's system of checks and balances[15]. Thus, our initial measurement was designed to examine the mental burden among the general population as an outgrowth of these mass protests. We conducted a second administration of the study measures with the same cohort in mid-November 2023, 5–6 weeks after the terror attack. The timing of these data collections enabled us to examine the temporal and immediate changes in probable psychiatric diagnosis and psychological burden following the October 7th terror attack and the impact of betrayal-related MI on the trajectories of PTSD and depression. Measuring the impact of betrayal in a prospective study presented a unique opportunity to extend extant knowledge of the relationship between the betrayal experience and the mental health consequences of exposure to terror attacks. This examination has critical immediate implications relating to screening, interventions, and large-scale actions that could be initiated in this unfolding situation.

We posited two hypotheses:

1. The experience of PMIE of betrayal will predict probable diagnoses of PTSD and depression at T2 beyond demographic and trauma-related characteristics and probable diagnoses at T1.
2. Changes in PTSD and depression symptoms from T1 to T2 will be significantly higher for participants who experienced PMIE-betrayal following the attack than for those who did not.

Methods

Participants

A sample of 710 individuals (362 female, 51.1%) aged 18–85 ($M = 41.01$, $SD = 13.2$) participated in this longitudinal national survey study. Inclusion criteria comprised Israeli citizens above 18. The initial survey, conducted from August 20th to 30th, 2023, involved 908 adults. Of those who completed the research questionnaires at T1, 710 (response rate = 78.1%) also participated at T2, conducted on November 9th-19th, 2023. Comparing those participating only at T1 with those at both T1 and T2, we found no significant differences in most sociodemographic variables. Moreover, the sample at T2 comprises a close representation of the Israeli population (e.g. the proportion of Jews and Arabs, gender, and age).

Procedure

Study participants were recruited online via a professional survey company (Panel4All), which specializes in online studies and offers a probability-based pool panel of about 100,000 Israeli panelists, thus enabling a representative sampling of Israeli society according to various criteria. The company always provides monetary compensation to panelists for their participation. For participant recruitment, we set quotas on key demographic variables before data collection to ensure a demographically balanced sample. We used a quota sampling approach with quotas matching the Israeli national census data regarding age, gender, ethnicity, education, and socioeconomic status (SES), as reported by Israel's Central Bureau of Statistics[26]. The sampling was discontinued after the quotas for each variable were reached (e.g. percentage of males/females) and the target sample size ($n = 900$) was reached. This approach ensured that the sample was demographically comparable to these variables' national distribution.

Participants were provided a link to the online questionnaire, constructed using Qualtrics software[27]. Participants participated voluntarily in the panel and were offered vouchers by the survey company for their participation. Informants were provided with a recruitment letter outlining the purpose of the study and the researchers' contact information. The participants were assured anonymity, confidentiality, and their right to withdraw from the study at any time in both waves. Participants agreeing to participate were required to sign an informed consent form. All participants at T1 were approached again via email and asked to complete a second questionnaire (T2). The ethics committee at the Ruppin Academic Center approved the study (protocol No. 175/2023). All methods were performed in accordance with the relevant guidelines and regulations.

Measures

PTSD: international trauma questionnaire (ITQ; Ref.[28])

The ITQ is an 18-item self-report measure for PTSD and complex PTSD. As our focus in this study was on PTSD, we used only the nine PTSD-related items. The first six items tapped three symptom clusters (re-experiencing, avoidance, and sense of threat). These items (two items per symptom cluster) are presented on a 5-point Likert-type scale, ranging from 0 (*not at all*) to 4 (*extremely*). Moreover, three additional items measure functional impairment, assessing the symptoms' impact on (i) relationships and social life, (ii) work or ability to work, and (iii) other central life domains, such as parenting, school, or college work. The ITQ was operationalized in this study in two ways: (1) as a dichotomized self-report probable 'diagnosis' of PTSD and (2) as a continuous variable and a total symptom severity score of PTSD symptoms. A probable PTSD 'diagnosis' required reporting one of each symptom cluster pair as well as indicating functional impairment in the last three items. Previous ITQ versions have been shown to be reliable and valid measures of PTSD[30], and the currently used version has recently been demonstrated to provide a valid measure for PTSD diagnosis based on the ICD-11[28]. For the continuous PTSD symptoms (PTSS) severity measure, a sum of symptoms was calculated, with the total score ranging between 0–24. We used a validated Hebrew translation of the ITQ[29]. For the current sample, the ITQ yielded high internal consistency for PTSS ($\alpha = 0.86$).

Depression: patient health questionnaire-2 (PHQ-2; Ref.[30])

This 2-item depression screening scale is derived from the full scale (PHQ-9; Ref.[31]). The PHQ-2 begins with the stem question: "Over the last 2 weeks, how often have you been bothered by the following problems?" The PHQ-2's items correspond to the two DSM-5 diagnostic core criteria for depressive disorders[32]: "little interest or pleasure in doing things" and "feeling down, depressed, or hopeless." Items are presented on a 4-point Likert-type scale, ranging from 0 (*not at all*), 1 (*several days*), 2 (*more than half the days*), to 3 (*nearly every day*). Similar to the ITQ, the PHQ-2 was operationalized in this study in two ways: (1) as a dichotomized probable self-report probable 'diagnosis' of depression and (2) as a continuous variable and a total symptom severity score of depression levels. To yield a probable depression diagnosis, we used the validated cutoff score of ≥ 3[30], which differentiates between the normal range and probable cases of depression (e.g. Ref.[33]). For the continuous depression severity measure, a sum of the items was calculated, with the total score ranging between 0 and 6. The scale has been found to have high validity and a good resemblance to the full PHQ-9 scale[34]. We used a validated Hebrew translation of the PHQ-2[15]. For the current sample, the PHQ-2 yielded good internal consistency ($\alpha = 0.78$).

Moral injury events scale-civilian (MIES-C; Ref.[35])

The MIES-C is a 9-item self-report measure assessing PMIEs among civilians. This scale is based on the moral injury events scale (MIES; Ref.[18]), designed primarily for investigating moral injury in the military context. Compared with the original MIES, various instructions and items were modified in the MIES-C to remove military references. For example, "I feel betrayed by fellow service members whom I once trusted" was changed to "I feel betrayed by friends whom I once trusted"[35].

The MIES-C taps exposure to perceived transgressions and comprises three subscales- PMIE-Self, PMIE-Other, and PMIE-betrayal. In this study, our focus was on PMIE-betrayal, with three items assessing exposure to PMIE resulting from the respondent's perceiving having been deceived or betrayed by others (e.g. "I feel betrayed by leaders whom I once trusted"). The three statements were presented on a 6-point Likert-type scale, ranging from 1 (*strongly disagree*) to 6 (*strongly agree*). Thomas et al.[36] and Zerach & Levi-Belz[37] demonstrated strong construct validity and positive associations with betrayal constructs.

For this study, we followed other studies (e.g. Ref.[20]) and used a dichotomic variable of exposure to PMIE-betrayal by calculated endorsement of at least one betrayal item at the *agree* (5) or *strongly agree* (6) level. We used a validated Hebrew translation of the MIES[15].

Sociodemographic and traumatic-related characteristics
We collected various demographic variables, including age, gender, educational level, SES, marital status, and ethnicity. Additionally, we collected the participants' trauma-related profile, comprising two factors: 1. direct exposure to the traumatic events of October 7th (e.g. individuals present at the Gaza envelope communities or at the nearby towns in southern Israel that were infiltrated by terrorists during the attack or those participating in the Nova music festival massacre) and 2. having a loved one who was directly harmed during the attack (murdered, kidnapped, or injured).

Data analysis

First, we computed descriptive statistics of the reported demographics and questionnaires. A series of Chi^2/ANOVAs were used to determine the proportion of participants with MI-betrayal in terms of demographic and trauma-related variables. Second, to understand the contribution of PMIE of betrayal to PTSD and depression, we conducted two separate phases of analysis: In phase one, we carried out two logistic regression analyses to examine the specific contribution value of PMIE-betrayal to probable PTSD and depression following the terrorist attack, beyond baseline mental health symptoms, demographics, and October 7th-related trauma exposure. In both analyses, we applied a four-step model: In Step 1, we entered the pre-attack probable diagnoses (PTSD/depression, respectively) to examine T1's prediction of T2 diagnoses. In Step 2, we entered the demographic predictors of gender, age, SES, education, marital status, and ethnicity. In Step 3, we entered the terror attack-related profile of direct exposure (present in the Gaza envelope communities during the attack) and having a loved one who was harmed (murdered/kidnapped/injured) during the attack. The final step, the experience of betrayal (yes/no), was entered to examine this variable's unique contribution beyond all other variables.

In the second phase, we conducted two repeated-measures analyses to understand the contribution of PMIE-betrayal to the PTSD and depression symptom trajectories from T1 to T2. In both analyses, we used age, gender, SES, education, marital status, ethnicity, and trauma-related profile (direct exposure or having a loved one harmed during the attack) as covariates.

To control for the non-proportional sampling effect of the dataset, an iterative proportional fitting (ranking) method was employed, compensating for unequal selection probabilities resulting from issues such as disproportionate stratification and non-response. The weights were adjusted to make the weighted sample totals conform to the population totals obtained from reliable CBS sources[26]. Box-Tidwell tests were applied to examine the linearity assumption underlying the logistic regression model for quantitative predictors. We found no violations of the linearity assumptions. The statistical significance of the coefficients was confirmed by constructing 95% confidence intervals using a percentile bootstrap procedure[38] with 1000 resamples. SPSS (v26.0 for Windows) was used for all analyses.

Results

Participants' demographics and trauma exposure

The sample's demographics and October 7th attack-related variables are presented in Table 1. The study sample ($n = 362$, 51% women) had a mean age of 41 years ($SD = 13.7$) and a mean level of education that exceeded secondary, as measured by years of schooling ($M = 14.15$, $SD = 2.01$). The sample comprised 80% Jewish Israeli citizens and 20% Arab Israeli citizens, reflecting their national proportionality. The vast majority of the sample ($n = 669$, 95.7%) were not directly exposed to the October 7th attack; however, almost one in five participants ($n = 131$, 18.6%) had a close friend or family member who was harmed during the attack.

Prevalence of probable PTSD, depression, and PMIE-betrayal

We calculated descriptive statistics and rates of self-reported probable PTSD and depression at T1 and T2, as well as descriptive statistics on the experience of betrayal following the attack (T2). Regarding PTSD, 16.2% ($n = 115$) of the cohort met the criterion for probable PTSD diagnosis at T1, and this prevalence was doubled to 29.8% of the cohort ($n = 211$) at T2. Regarding depression, the prevalence of probable depression based on a cutoff score was 31.3% ($n = 205$) at T1, and this prevalence increased to 44.8% of the cohort ($n = 293$) at T2. The percentages of endorsed PMIE-betrayal items were 42.1% for "I feel betrayed by leaders whom I once trusted," 14.1% for "I feel betrayed by other people whom I once trusted," and 9.8% for " I feel betrayed by friends whom I once trusted." As 46% ($n = 324$) of the sample endorsed at least one PMIE-betrayal item following the attack at the *agree* or *strongly agree* levels, it indicates that in our sample, the betrayal experience relates mainly to the betrayal of leaders.

Variables		M (SD)	n (%)
Sociodemographic characteristics			
Age (years)		41.01 (13.72)	
Education (years of schooling)		14.15 (2.02)	
Gender	Male		346 (48.9%)
	Female		362 (51.1%)
SES[1]	Far below average		130 (23.0%)
	Below average		159 (28.1%)
	Average		147 (26.0%)
	Above average		104 (18.4%)
	Far above average		26 (4.6%)
Ethnicity	Jewish		557 (79.9%)
	Arab		153 (20.1%)
Exposure to the October 7th attack			
Direct exposure (e.g. present at Gaza envelope communities or towns in Southern Israel infiltrated during the attack)	Yes		30 (4.3%)
	No		669 (95.7%)
Harmed loved one (a nuclear family member or close friend murdered, kidnapped, or injured)	Yes		131 (18.6%)
	No		575 (81.4%)
Betrayal experience	Yes		324 (45.7%)
	No		386 (54.3%)

Table 1. Characteristics of the study participants (N = 710). [1]The average salary in Israel is approx. US$3300 per month.

Differences in post-attack PMIE-betrayal as a function of demographic and trauma-related profiles

To discern if and how demographic and trauma-related characteristics relate to differences in post-attack betrayal experiences, we conducted a series of comparisons (Chi^2 or ANOVAs). The results, presented in Table 2, show that females and participants with college degrees experienced significantly more betrayal experience than males and those not holding an academic degree. No differences were revealed in other demographics or the trauma-related profile regarding the betrayal experience.

PMIE-betrayal as a predictor of probable PTSD and depression at T2

We sought to understand the predictive value of the perceived betrayal experience in predicting participants' PTSD/depression diagnoses at T2 after adjusting for pre-October 7th mental health diagnoses (i.e. PTSD and depression at T1) and demographics and trauma-related characteristics. The results of the two hierarchical logistic regression analyses in which PTSD and depression at T2 were the outcome measures can be seen in Table 3.

Predictor	Categories	PMIE-betrayal experience		F/chi², significance
		No ($n = 369$)	Yes ($n = 324$)	
Age		$M = 39.91$ $SD = 13.79$	$M = 41.56$ $SD = 13.86$	$F = 2.45$, NS
SES		$M = 2.41$, $SD = 1.16$	$M = 2.41$, $SD = 1.16$	$F = 2.35$, NS
Gender	Male	57% (191)	49.7% (144)	Chi^2 = 3.65, $p < 0.05$
	Female	43% (174)	50.3% (176)	
Marital status	Married	66.4% (243)	63.3% (212)	Chi^2 = 0.02, NS
	Single/divorced/widowed	33.6% (123)	33.7% (108)	
Academic education	No	57.9% (210)	48.7% (154)	Chi^2 = 5.64, $p < 0.05$
	Yes	42.1% (153)	52.3% (162)	
Immigration status	Born in Israel	87% (321)	11.4% (287)	Chi^2 = 0.62, NS
	Born abroad	13% (48)	50.3% (37)	
Direct exposure	No	53.7% (352)	46.7% (304)	Chi^2 = 0.56, NS
	Yes	46.3% (14)	53.3% (16)	
Harmed loved one (murdered/kidnapped/injured)	No	53.7% (303)	51.2% (369)	Chi^2 = 0.27, NS
	Yes	46.3% (63)	48.8% (66)	

Table 2. Differences in betrayal experience as a function of demographic and trauma-related characteristics.

Predictors	PTSD T2 (ITQ)		Depression T2 (PHS–2)	
	Adjusted OR, 95% CI	p	Adjusted OR, 95% CI	p
Step 1				
Probable PTSD/depression at T1[1]	4.87 (3.02–7.85)	0.0001	3.57 (2.41–5.32)	0.0001
	Nagelkerke R square = 0.11		Nagelkerke R square = 0.10	
Step 2				
Probable PTSD/depression at T1[1]	4.84 (2.94–8.02)	0.0001	3.42 (2.27–5.15)	0.0001
Gender[2]	1.89 (1.21–2.87)	0.01	2.27 (1.54–3.32)	0.001
Age	0.98 (0.96–1.00)	NS	0.98 (0.97–1.00)	NS
SES	0.95 (0.78–1.16)	NS	1.08 (0.90–1.31)	NS
Education	0.96 (0.81–1.11)	NS	1.12 (0.96–1.13)	NS
Marital status[3]	0.68 (43.–1.11)	NS	1.26 (0.89–1.32)	NS
Ethnicity[4]	1.79 (1.07–2.99)	0.02	1.45 (0.87–2.42)	NS
	Nagelkerke R square = 0.16		Nagelkerke R square = 0.16	
Step 3				
Probable PTSD/depression at T1[1]	4.55 (2.72–7.60)	0.0001	3.31 (2.20–5.08)	0.0001
Gender[2]	1.88 (1.24–2.87)	0.01	2.29 (1.55–3.39)	0.0001
Age	0.98 (0.96–1.99)	0.04	0.99 (0.97–1.00)	NS
SES	0.96 (0.78–1.13)	NS	1.01 (0.96–1.31)	NS
Education	0.95 (0.81–1.13)	NS	1.12 (0.87–1.13)	NS
Marital status[3]	0.64 (0.43–1.17)	NS	1.26 (0.80–1.92)	NS
Ethnicity[4]	1.91 (1.13–3.22)	0.01	1.50 (0.87–2.51)	NS
Direct exposure[1]	2.01 (0.87–4.77)	NS	1.94 (0.88–4.68)	NS
Loved one harmed (murdered/kidnapped/injured)[1]	1.71 (1.04–2.89)	0.03	1.33 (0.84–2.27)	NS
	Nagelkerke R square = 0.18		Nagelkerke R square = 0.17	
Step 4				
Probable PTSD/depression at T1[1]	4.45 (2.63–7.42)	0.0001	3.11 (2.13–4.82)	0.001
Gender[2]	1.72 (1.14–2.69)	0.003	2.13 (1.43–3.17)	0.001
Age	0.98 (0.96–0.99)	0.03	0.98 (0.97–1.00)	NS
SES	0.93 (0.76–1.12)	NS	1.05 (0.87–1.27)	NS
Education	0.94 (0.79–1.11)	NS	1.12 (0.94–1.29)	NS
Marital status[3]	0.66 (0.41–1.05)	NS	1.24 (0.82–1.92)	NS
Ethnicity[4]	2.07 (1.21–3.52)	0.007	1.63 (0.72–2.46)	NS
Direct exposure[1]	1.91 (0.80–4.62)	NS	1.82 (0.76–4.82)	NS
Harmed loved one (murdered/kidnapped/injured)[1]	1.62 (1.00–2.72)	0.04	1.31 (0.80–2.18)	NS
Exposure to PMIE-betrayal	1.92 (1.26–2.92)	0.002	2.03 (1.37–3.01)	0.0001
	Nagelkerke R square = 0.21		Nagelkerke R square = 0.22	

Table 3. Predictors of probable PTSD and depression at T2—5–6 weeks after the October 7th terror attack (N = 710). *ITQ* international trauma questionnaire, *PHQ-2* patient health questionnaire-2, *PMIE* potentially morally injurious event, *OR* odd ratio, *CI* confidence interval, *NS* non-significant. [1] 1 = yes, [2] 1 = female, [3] 1 = Married, [4] 1 = Jewish.

PTSD
Step 1, which included the diagnosis of probable PTSD at T1, significantly predicted the probable PTSD diagnosis at T2 (see Table 3). Participants revealing a PTSD diagnosis at T1 were almost five times more likely to report a probable PTSD diagnosis at T2 (OR 4.87 95% CI 3.02–7.85). In Step 2, gender and ethnicity were found to significantly predict a PTSD diagnosis at T2, as the odds of probable PTSD were significantly higher for women (OR 1.89 95% CI 1.21–2.87) in compared to man, and for Israeli Arabs (OR 1.79 95% CI 1.07–2.99) in compared to Israeli Jews. Having a loved one harmed (i.e. murdered/kidnapped/injured during the attack) was also found to significantly predict a PTSD diagnosis at T2 (OR 1.77 95% CI 1.04–2.89), when compared to participants hose loved ones were not harmed. Notably, in the final step, the betrayal experience was found to significantly predict a probable PTSD diagnosis at T2, above and beyond all other variables. Participants who experienced PMIE-betrayal following the attack were almost twice as likely to present a probable PTSD diagnosis, compated to participants not reporting PMIE-betrayal (OR 1.92 95% CI 1.26–2.92). The total χ^2 of the model was 85.43, $p < 0.0001$.

Depression
Reviewing Step 1, a depression diagnosis at T1 was a significant predictor of a similar diagnosis at T2 (see Table 3). Participants with depression at T1 were three times more likely to present a probable depression at T2

than those not having a depression diagnosis at T1 (OR 3.54 95% CI 2.41–5.32). In Step 2, gender was found to be a significant predictor of a depression diagnosis at T2: The prospect of a probable PTSD diagnosis was significantly higher for women than for men (OR 2.27 95% CI 1.54–3.32). Importantly, in the final step, it was found that the betrayal experience was a significant contributor to a probable depression diagnosis at T2 beyond all other variables. Thus, the prospect of a probable depression diagnosis was twice as high for participants who reported betrayal following the attack than for those not reporting it (OR 2.03 95% CI 1.37–3.01). The total χ^2 of the model was 87.30, $p < 0.0001$.

Betrayal experience as a moderator of PTSD/depression symptoms trajectories

We examined the moderating role of MI-betrayal in the trajectories of PTSD symptoms and depressive symptoms from T1 to T2 by two repeated-measure analyses, one with the trajectory of PTSD symptoms and one with the trajectory of depressive symptoms:

PTSD symptoms
The time trajectory of PTSS from T1 to T2 was found significant, $F_{(1,652)} = 175.79$ ($p < 0.0001$), meaning that PTSD symptom levels at T1 significantly predicted PTSD symptom levels at T2. The between-participants group effect of betrayal was found significant, $F_{(1,652)} = 23.81$ ($p < 0.0001$), indicating that participants who experienced betrayal reported higher levels of PTSD symptoms. More critical to the study hypotheses, we found a significant Time X PMIE-betrayal interaction, $F_{(1,652)} = 7.87$ ($p < 0.01$). As seen in Fig. 1, participants who experienced betrayal reported a significantly higher increase in PTSD symptom levels, $F_{(1,652)} = 165.18$ ($p < 0.0001$), than those not experiencing betrayal, $F_{(1,652)} = 61.54$ ($p < 0.0001$).

Depressive symptoms
The time trajectory of depressive symptoms from T1 to T2 was found significant, $F_{(1,652)} = 90.03$ ($p < 0.0001$), meaning that depressive symptoms at T1 significantly predicted depressive symptoms at T2. The between-participants group effect of betrayal was found significant, $F_{(1,652)} = 28.71$ ($p < 0.0001$), indicating that those experiencing betrayal reported higher levels of depression symptoms than those not experiencing betrayal. Critical to Hypothesis 2, a significant Time X PMIE-betrayal interaction was revealed, $F_{(1,652)} = 7.78$ ($p < 0.01$). As seen in Fig. 2, participants who experienced betrayal reported a significantly greater increase in depressive symptoms, $F_{(1,652)} = 83.66$ ($p < 0.0001$), than those not experiencing betrayal, $F_{(1,652)} = 36.07$ ($p < 0.0001$).

Discussion

This study's primary goal was to shed light on the contribution of betrayal to the mental health consequences in the aftermath of the October 7th terrorist attack among Israeli civilians. As anticipated, we found the mental health impact of the October 7th attack to be high in comparison with other studies that focused on terrorist attack mental effects (e.g. Ref.[9]), manifested in the increased prevalence of both PTSD and depression relative to the pre-attack measure (T1), especially among civilians who had direct exposure to the attack[23,39,40]. However, the striking results of our study reveal that these increases in PTSD and depression differ in the nature of the participants' experience of betrayal-based PMIE. Specifically, we found that experiencing betrayal comprised the robust contributor to probable PTSD and depression, as well as the moderate PTSD and depression trajectories from pre (T1) to post (T2) October 7th terror attack beyond known risk factors such as age, gender, SES, ethnicity, and trauma-related status[6,7]. Bearing in mind that about half of our sample reported feeling betrayed by their leaders, this sense of betrayal may partially explain the sharp increase between T1 and T2 of a probable
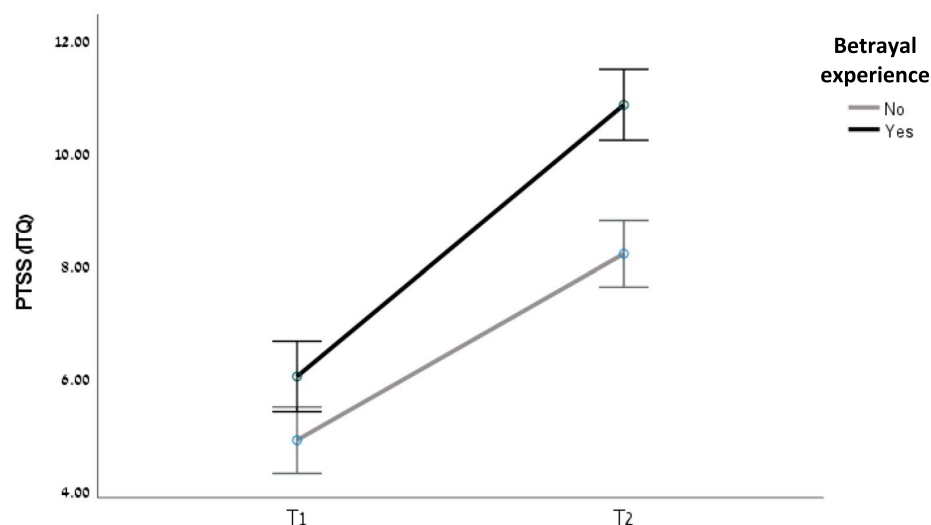

Figure 1. Changes in posttraumatic stress symptoms from pre- to post-october 7th terror attack as a function of betrayal experience ($N = 710$).
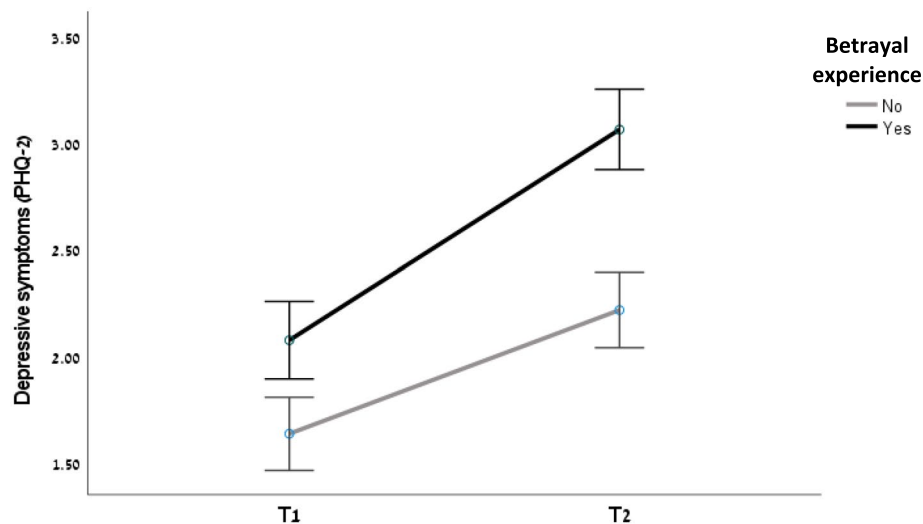
Figure 2. Changes in depressive symptoms from pre- to post-october 7th terror attack as a function of exposure to betrayal experience ($N = 710$).

PTSD diagnosis (from 16.2 to 29.8%) and a probable depression diagnosis (from 31.1 to 44.8%) in the aftermath of the terrorist attack.

The notion that exposure to profound ethical and moral injury is linked to psychopathology and distress in the aftermath of traumatic events has been posited conceptually (e.g. Ref.[12]) and substantiated by empirical studies (e.g. Ref.[41–43]). More specifically, PMIE of betrayal has been identified as a profoundly deleterious experience linked to PTSD and depression among military personnel (e.g. Ref.[44]), health workers[45,46] and civilians[15]. However, this study is the first to demonstrate the critical effect of the betrayal experience in its association with psychologically adverse consequences among civilians in the aftermath of a terrorist attack in an unfolding situation. This understanding carries important implications regarding assessment, interventions, and leadership actions that could restore the foundations of trust that may contribute to easing the psychological burden on civilians after the terrorist attack.

Betrayal encompasses a high-magnitude PMIE as it relates to a faulty action performed by a trusted leader[47]. In the context of the October 7th terrorist attack and its aftermath, the betrayal experience may be associated with leaders who betrayed citizens' basic ethical expectations of their actions and responsibility for critical events. Regarding the October 7th attack, these expectations likely included leaders' being responsible for securing the country's borders and ensuring that the IDF was prepared for any scenario that could undermine security, such as terrorists penetrating Israeli towns and villages. Leaders were reasonably expected to be supportive of the citizens, providing them with an adequate sense of security and allocating the necessary national resources that could have saved lives[48–50].

Notably, a consequence of the betrayal experience could be a fundamental lack of trust in leadership[12], recognized as a significant risk factor for psychological burden and psychopathology in various settings[49,50]. Individuals' capacity for coping and resilience in the aftermath of the terrorist attacks may have weakened for those feeling they could no longer trust the national authorities and leaders, perhaps explaining the rise in PTSD and depression from T1 to T2.

Some studies have suggested that betrayal experiences may place the betrayed individuals at risk for perpetrating other transgressive acts and increase their vulnerability to adverse consequences[51]. Considering military personnel, Shay[17] speculated that betrayal perpetrated by commanding authorities corrodes the military units' cohesion and effectiveness, as well as the combat personnel's safety and security. In the current situation of the post-October 7th attack, the betrayal experience may prove to weaken Israeli society's inner fabric, increase civilians' levels of insecurity and loneliness, and exacerbate the uncertain conditions that had already peaked due to the October 7th attack. It is critical to note that our findings indicate that betrayal was experienced among all layers of society, as no demographic variables were found to distinguish any sub-groups regarding the presence or absence of post-attack betrayal. Thus, PMIE-betrayal can be considered a general risk factor for psychological burden in the aftermath of the attack, with no relation to specific sub-groups in Israeli society.

It is important to note that in the nine months prior to the October 7th attack, Israel was occupied with a nationwide civil protest against the government's efforts to implement a judicial and legislative overhaul aimed at weakening Israel's democratic institutions[52], thus elevating the betrayal experience among many Israeli citizens[15]. Although the specific views of this study's participants on the noted legislative issues cannot be determined, we suggest that the baseline levels of betrayal were affected by the noted large-scale protests against the government, thus explaining the high baseline relative to what would have been expected in standard circumstances. This "compounded betrayal" phenomenon may also have impacted the citizens' post-October 7th resilience and vulnerability levels.

The current findings should be considered in light of several limitations. First, the single post-baseline point of measurement (T2) to determine the change in the prevalence of probable diagnoses is a limitation. While this

study's findings highlight the high early mental health impact of the October 7th terrorist attack, many participants presenting probable diagnoses a month after the attack may show spontaneous recovery or even a delayed onset of these short-term PTSD, depression, and anxiety symptoms in subsequent months (e.g. Refs.[53,54]). Thus, it is crucial to continue examining the impact of terrorist attacks on the general population over longer periods. Moreover, this limitation also holds true with regard to the betrayal experience: Feelings of betrayal may change over time in the wake of subsequent actions of national leaders. Thus, further study of these factors' trajectories over time is critical.

In addition, PTSD, depression, and MI-betrayal were assessed by participants' subjective accounts rather than by clinical interviews. Thus, these measures may be biased due to social desirability factors. However, as a sense of betrayal results from a perceived clash with the individual's inner moral code, subjective self-reports of this experience can be seen as legitimate.

Second, only three items from the MIES-C inventory were used to assess MI-betrayal in the current study. These items have yet to be fully validated for assessing MI-betrayal among civilians exposed to national crises. Future studies should assess the experience of betrayal more thoroughly, specifically for large scale, national exposure to trauma. Lastly, it should be acknowledged that this study focused on an Israeli sample in a unique cultural context, which encompasses the long-term Israel-Palestinian conflict[14], comprising a backdrop to the October 7th attack. While the current sample represents the demographics of the Israeli population, it may not include a representative sample of active military personnel (both regular conscripts and reserve soldiers) due to their reduced availability for participation in the study, as they were engaged in active duty in the Israel-Hamas conflict that began following the October 7th attack. Moreover, due to panelists being compensated for participation, the possibility of selection bias cannot be discounted.

Conclusions and implications

On October 7th, 2023, Israel fell victim to one of the deadliest terrorist attacks on civilians in modern-day history. At this writing, Israel's general population continues to endure war conditions in its conflict with the Hamas terror organization. During this unprecedented time, civilians have reported substantially high levels of psychological burden, reflecting both individual and collective trauma[8]. One of the robust risk factors found to facilitate higher psychological burden among civilians was experiencing betrayal, which was associated with increased levels of both PTSD and depression symptoms and their probable diagnoses in the aftermath of the attack.

This study's findings have several urgent clinical implications. First, the significant contribution of MI-betrayal to psychological burden and probable diagnoses in our sample underscores the importance of active screening, i.e. early assessment and identification of the betrayal experience among civilians. Individuals who develop moral injury-related mental health complications are often reticent to speak about guilt or shame[45], and, in the coming months, they may also experience feelings of anger related to the events. Consequently, clinicians should inquire sensitively about betrayal exposure among civilians who present with mental health difficulties during these times. For example, the three PMIE-betrayal items used in this study could be supplemented to civilians' routine assessment to detect the loci of betrayal.

Second, the results underscore the importance of enhancing preventive and tailored interventions regarding the betrayal experience (e.g. Ref.[55]). If MI-betrayal evidence is presented, psychological support for the affected civilians should be prioritized and made more readily accessible. Importantly, as many mental health professionals are unfamiliar with MI and its gold-standard treatment options[56], seminars and courses on MI intervention opportunities should be offered, given their critical importance during this period.

It is critical to note that the subjective appraisal of PMIE-betrayal depends, to some extent, on the individual's basic world assumptions that have been violated[57]. Thus, feelings of outrage and despair after feeling betrayed by leaders (such as failing to protect citizens from attack) might occur when fundamental assumptions exists, such as that leaders should be generally trusted. These basic assumptions are much more evident in democratic societies, where the rule of law is effectuated. In other political systems, such as dictatorships, while betrayal may always be present, the citizens' expectations of their leaders are likely not to be violated. This distinction is vital because when fundamental assumptions of trust are violated in democratic societies, it may potentially undermine one's basic sense of safety and security. The impact of violating this sense may go beyond PTSD and depression (particularly when the perceived betrayal persists over time or when a call for restoring trust is ignored), potentially affecting one's sense of belongingness, togetherness, and even the nation's social fabric[12].

Taking that into account, the study findings highlight the critical role of the national and army leaders (such as the Prime Minister, other ministers, and the army Chief-of-Staff) in allocating all efforts required to build and restore civilian trust in this unfolding situation. These efforts may include accepting full responsibility for the events leading to the attack; implementing all the interventions needed to help those who were affected by the terrorist attack, such as psychological treatment and compensation for damaged homes and livelihood; giving public acknowledgment and recognition of the trauma and grief processes among the affected individuals as well as the entire citizenry. Most importantly, national and army leaders should be transparent to the public in their communication and decision-making. The leadership should convey their support for those going through trying times and make efforts to revitalize a sense of camaraderie and belongingness, which are known to buffer between MI-betrayal and distress[58]. These crucial steps by the national leaders can contribute to the journey of repairing the experience of betrayal[12,59] and, consequently, may ease the impact of the attack on the public's heavy psychological burden.

Data availability

The datasets generated by the survey research during and/or analyzed during the current study are available upon request from the corresponding author (YLB).

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Author contributions

Competing interests

The authors declare no competing interests.

Additional information

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