



Prevalence and Moderators of Terror-Related Post-Traumatic Stress Disorder Symptoms in Israeli Citizens

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Abstract

Background: A major psychological sequel of terrorist attacks is post-traumatic stress disorder. The relation between certain psychological factors specific to terrorist attacks (e.g., perceived control attributed to oneself/to the military, anticipated duration of terrorism) and PTSD symptoms have not been examined.

Objective: To examine the prevalence, correlates and moderators of PTSD-like symptoms following terrorist attacks in Israel.

Methods: Soon after a long wave of terrorist attacks in Israel in 2002, a convenience sample of 149 Israelis from five cities was assessed for terrorist attack exposure, perceived control, control attributed to the government/military, anticipated duration of the terrorism wave (predictability), and frequency of listening to the news. PTSD-like symptoms were assessed with a brief self-report scale.

Results: We found that 15.4% of the sample was directly exposed to a terrorist attack and 36.5% knew someone close who had been exposed to an attack. "Clinically significant" PTSD-like symptoms were reported by 10.1% of the sample. Correlates of PTSD-like symptoms were: perceived control in men, government control, and education in women (all inversely correlated to PTSD symptoms), and news-listening frequency in women (positively correlated to PTSD symptoms). PTSD-like symptoms were attenuated by the ability to predict the duration of the terrorism wave only in citizens exposed to an attack, and by perceived government control only among citizens listening infrequently to the news.

Conclusions: This study revealed that approximately 10% of Israelis in our sample had relatively frequent PTSD-like symptoms. Correlates of PTSD-like symptoms differed between men and women, and moderator effects were found. These findings reveal additional moderators that may have implications for treating PTSD following terrorist attacks.

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During the past few decades, terrorist attacks have been occurring worldwide and especially in Israel. A frequent psychiatric consequence of terrorist attacks is post-traumatic stress disorder, and terrorist attacks meet Criterion A of the DSM-IV [1] – namely, a

serious threat to a person's well-being. A review of seven studies published prior to the tragic events of 11 September 2001 found a prevalence of approximately 28% PTSD in victims of the attack [2]. After September 11, 7.5% of a sample of Manhattan residents reported symptoms consistent with PTSD, which was associated with ethnicity, prior stressors, a peri-traumatic panic attack, and loss of possessions (e.g., belongings, property) [3]. Recently, a comprehensive Israeli study [4] found a 9.4% prevalence of PTSD, which was associated with female gender, low sense of safety, and use of tranquilizers, alcohol and smoking as a means for coping with terrorist attack stress. Finally, vicarious exposure to a terrorist attack (having a friend who knew a victim) is also associated with PTSD [5].

This study examines the relation between a few additional variables specifically relevant to terrorist attacks and PTSD symptoms. These include controllability and the predictability of terrorism duration, the former inversely correlated with PTSD symptoms [6]. In addition, since such attacks include harm aimed at societies and governments, solutions for the terrorism threat may derive from governments/military, rather than from individuals. Hence, both personal control and control attributed to the government/military may need to be considered as reflecting controllability. An additional untested issue is the relation between information-seeking (listening to news) and PTSD following an attack. Seeking information may be linearly positively associated with anxiety during stress [7], and exposure to media predicted PTSD symptoms in children [5]. Finally, people present a profile of simultaneous factors, whereby controllability, predictability and information-seeking may interact with one another or with previous exposure to a terrorist attack in relation to PTSD after the attack. This would suggest looking at moderator effects of certain variables.

This study examined the prevalence, correlates and moderators of PTSD-like symptoms in a sample of Israeli citizens soon after an enduring and severe wave of terrorist attacks. We hypothesized that perceived personal control, control attributed to the government/military, and the ability to predict duration of the wave (predictability) would be inversely correlated with PTSD-like symptoms. We also hypothesized that frequency of listening to the news would be positively correlated with PTSD symptoms. Given previous reports on gender differences in PTSD [8], we examined these associations

PTSD = post-traumatic stress disorder

in each gender as well. Finally, we examined various moderator (interaction) effects between selected risk factors and PTSD-like symptoms. The effects of predictability on PTSD may depend on prior exposure to a terrorist attack. Effects of control attributed to the government/military may depend on the amount of information (news) citizens receive from such sources. In addition, prior exposure to an attack may interact with frequency of news-listening in relation to PTSD symptoms.

Subjects and Methods

Participants and period of assessment

A community convenience sample of 149 men and women voluntarily and anonymously participated in this study. Citizens were assessed a few days after a severe wave of terrorist attacks in Israel during March-April 2002 which killed dozens of innocent people. Participants' consent was provided verbally by agreeing to answer the questions anonymously as part of a study. Unfortunately, the refusal rate was not documented. Participants' age ranged from 15 to 83 years. To increase the representativeness of the sample, the participants were recruited in five Israeli cities with varying levels of exposure to recent terrorist attacks – Ashkelon, Ramat Gan, Beer Sheva, Tel Aviv and Netanya. Citizens were recruited on main streets, with an attempt to randomly select them using random numbers. However, this was not always possible due to difficulties in accessing people, who were rushing to get to their destination during that tense period.

Measures

- *Background information.* This included participants' age, gender, years of education, and prior exposure to a terrorist attack. Exposure was assessed by asking participants whether they were ever exposed directly to an attack during their life (yes/no), and whether a close friend/family member had ever been exposed directly to an attack (yes/no).
- *Psychological predictors.* In general, we intentionally used brief single-item direct scales or revised short scales in order to reduce subject attrition due to the tense climate and context in which the study was conducted, similarly to Gidron et al. [9]. We included two questions of perceived control: a) How much control do you have over your daily life, and b) How much control do you think the government/military has over the current situation? Each question included a 10-item response option (1 = no control, 10 = full control). A single question was asked on whether participants could estimate "how much longer they anticipate the current wave of terrorist attacks would last" (termed predictability) with the following responses: Do not know, a few more days, several weeks, several months, more than several months. Finally, we asked participants how frequently they listened to the news (radio and TV) per day. Responses to this question included: never, 1–2 times a day, 3–6 times a day, every hour.
- *PTSD-like symptoms.* We assessed symptoms of PTSD with a brief measure of PTSD specifically developed for the present study. We shortened the post-traumatic diagnostic scale (PTDS) [10], originally including 17 items with subscales for Intrusions,

Avoidance, and Arousal. Questions were asked in relation to frequency of symptoms during the past month. Each item includes four response options (0 = never or only once, 1 = once a week or less, 2 = two to four times/week, 3 = five or more times/week). Scores on each item were summed, with a higher score indicating worse PTSD symptoms. For the present study, we selected six items from the full scale using data of a previous study conducted by our researchers [11]. Two items from each subscale, with the largest corrected item-total correlation with the full scale score, were selected. This yielded a six-item PTSD-like symptom scale which assessed re-experiencing the event, physical reactions, avoidance, reduced interest, sleep difficulties, and anger attacks. With the previous data [11], the six-item scale achieved high internal reliability (Cronbach's alpha = 0.93), and its scores were highly correlated with the full scale scores ($r = 0.96$). In the present study, the internal reliability of the six-item scale was moderate (Cronbach's alpha = 0.72). To obtain a more "clinically significant" score, we considered each of the six symptoms as positive if participants selected a response of 2 or higher. We considered participants as having "clinically significant" symptoms of PTSD if they reported at least one positive symptom of Intrusions, two of Avoidance and one of Arousal.

Statistical analysis

This included Pearson correlations between each of the continuous background and psychological variables with PTSD symptoms, and *t*-tests for categorical variables. These were tested for the entire sample and for men and women separately. To examine interactions among psychological correlates, we grouped participants into those scoring high/low on each factor using median split cutoffs, and used analyses of variance (ANOVA). Simple effects of significant interactions were then examined with *t*-tests.

Results

Of the 149 participants 23 (15.4%) were directly exposed to a terrorist attack, and 54 (36.5%) reported a close friend/family member who was exposed to an attack. Since even indirect exposure to an attack has been associated with PTSD [5], and to create more equal groups for further analyses, directly and indirectly exposed participants were grouped together as the "exposed" group. Table 1 depicts the sample characteristics. Approximately half the sample included women, 57% of the sample was either directly or indirectly exposed to a terrorist attack, and one-quarter of the sample could not estimate how much longer the wave of attacks would continue (unpredictable response).

Fifteen participants (10.1%) had "clinically significant" PTSD-like symptoms. Participants with clinically significant PTSD-like symptoms had nearly three times the total PTSD scores (14.1) than those without clinically significant symptoms [5.2; $t(144) = 8.86$, $P < 0.001$]. The only psychological variable distinguishing participants reporting clinically significant PTSD-like symptoms from others was frequency of listening to the news [$t(146) = 1.83$, $P < 0.05$]. Participants with clinically significant PTSD-like symptoms listened more frequently to the news.

Table 2 depicts the correlations between background and

Table 1. Characteristics of a sample of Israeli citizens (n = 149)

Variable	Mean	(SD)
Age (yrs)	37.9	(16.1)
Education (yrs)	12.7	(3.0)
Gender		
Percent men	48.3%	
Percent women	51.7%	
Percent exposed to an attack*	57.0%	
City of assessment (%)		
Beer Sheva	21.1%	
Ashkelon	26.8%	
Tel Aviv	18.1%	
Netanya	14.8%	
Ramat Gan	20.1%	
Perceived control (1–10)	7.9	(2.1)
Government/military control (1–10)	6.1	(2.4)
News-listening frequency	1.8	(0.9)
PTSD score (0–18)	6.2	(4.5)

* Directly + indirectly exposed

Table 2. Pearson correlations between background and psychological variables with PTSD-like symptoms in the total sample and by gender

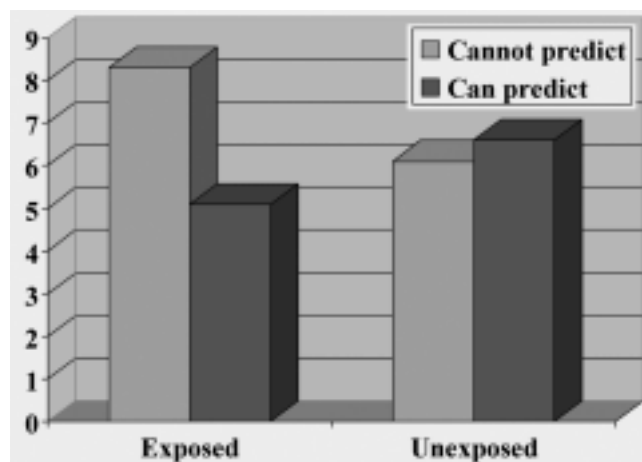
Variable	Total sample	Men	Women
Age	-0.07	-0.03	-0.05
Education	-0.10	-0.08	-0.20*
Perceived control	-0.13	-0.20**	-0.07
Government/military control	-0.10	0.15	-0.19**
Frequency of news listening	-0.10	0.01	0.26*

* $P < 0.05$

** $P = 0.05$

psychological variables with continuous PTSD-like symptoms in the entire sample and in men and women separately (data concerning categorical correlates are described below). In the total sample, women reported significantly more frequent PTSD-like symptoms (7.73) than men [4.65; $t(144) = 4.38$, $P < 0.001$]. Exposure to an attack (direct or indirect vs. no exposure) was unrelated to PTSD-like symptoms [$t(144) = 0.77$, not significant]. In men, only perceived control was inversely correlated with PTSD symptoms. Men able to anticipate duration of the wave of attacks tended to report less frequent PTSD symptoms (4.11) than men unable to anticipate this duration [6.22; $t(28) = 1.65$, $P < 0.06$]. Men exposed (directly or indirectly) to a terrorist attack did not differ in PTSD symptoms (4.10) from those not exposed to an attack [5.08; $t(69) = 1.03$, not significant]. In women, education level and control attributed to the government/military were inversely correlated, and frequency of listening to the news positively correlated with PTSD-like symptoms. Women who were able to anticipate duration of the wave did not differ in PTSD-like symptoms (7.68) from women unable to anticipate this duration [7.89; $t(73) = 0.18$, not significant]. Women exposed (directly or indirectly) to an attack did not differ in PTSD symptoms (7.69) from those not exposed to an attack [7.77; $t(73) = 0.07$, not significant].

We then examined the interactions (moderating effects) among the psychological correlates in relation to PTSD symptoms. To avoid

**Figure 1.** Effects of prior exposure to terror and predictability of terror duration on PTSD-like symptoms (vertical axis).

Type I error due to multiple statistical tests, this analysis was restricted to the entire sample. PREDICTABILITY had no significant effect on PTSD-like symptoms [$F(1,142) = 1.78$, not significant], nor did EXPOSURE to an attack affect PTSD-like symptoms [$F(1,142) = 0.60$, not significant]. However, the interaction of PREDICTABILITY by EXPOSURE significantly affected PTSD-like symptoms [$F(1,142) = 4.61$, $P < 0.05$]. In participants without prior exposure to an attack, those able to estimate duration did not differ in PTSD symptoms (6.6) from those unable to estimate duration [6.1; $t(80) = 0.41$, not significant]. However, among those *exposed* to an attack, participants *able* to estimate duration reported significantly less frequent PTSD-like symptoms (5.1) than those unable to estimate duration [8.3; $t(62) = 2.50$, $P < 0.05$] [Figure 1].

We then tested the interaction between attributing control to the government/military (GOV.CONTROL) and listening to the news (NEWS). GOV.CONTROL and NEWS did not significantly affect PTSD symptoms [$F(1,139) = 0.13$, not significant; $F(1,139) = 0.31$, not significant, respectively]. However, there was a significant GOV.CONTROL by NEWS interaction [$F(1,139) = 4.32$, $P < 0.05$]. In participants listening *infrequently* to the news, attributing *more* control to the government/military was associated with significantly less frequent PTSD-like symptoms (4.9) than when attributing little control to the government/military [6.9, $t(63) = 2.03$, $P < 0.05$]. In contrast, in participants listening frequently to the news, attributing more control to the government/military did not result in significantly different PTSD-like symptoms (6.9) than not attributing such control [5.8; $t(76) = 1.04$, $P > 0.05$].

Finally, EXPOSURE [$F(1,141) = 0.83$, not significant], NEWS [$F(1,141) = 0.56$, not significant] or their interaction [$F(1,141) = 0.66$, not significant] were not associated with PTSD-like symptoms.

Discussion

The present study attempted to identify the prevalence, correlates and moderators of PTSD-like symptoms associated with terrorist attacks in Israel. Though the sample is not representative of the Israeli adult population, it includes people from cities with varying incidences of terrorist attacks (minimal, moderate, and frequent).

Ten percent of the sample had clinically elevated PTSD-like symptoms, especially among citizens listening frequently to the news. This prevalence is very similar to that obtained with a representative sample of Israeli adults (9.4%) using other measures of PTSD [4]. In the present study, approximately 15% were directly exposed to an attack, and approximately 36% knew someone close who had been exposed to an attack. These figures are also highly similar to those reported by Bleich et al. [4]. The similar pattern of exposure to terrorist attacks, the nearly identical prevalence of clinically significant PTSD symptoms, and the similar mean age and gender representation in both studies support the reliability of our findings.

The prevalence of “clinically significant” PTSD symptoms observed in the present study is close to that of PTSD diagnosis reported by Galea et al. [3] among residents of Manhattan following the tragic September 11 attack. However, these figures are considerably lower than the prevalence of 28% reported in the review of Gidron [2]. However, in most of the studies in that review, the samples included mainly citizens directly exposed to an attack, unlike the present study. The prevalence of PTSD diagnosis or symptoms may be lower in more general community samples.

Women had significantly more frequent symptoms of PTSD than men. This is consistent with many previous studies, for example the study by Breslau [8]. This may result from “real” worse symptomatology in women or from lower reporting biases in women. Alternatively, this difference may result from women reporting higher levels of dissociation than men [12], a predictor of PTSD [13]. These issues need to be investigated in future studies.

Our hypotheses concerning the role of perceived control, control attributed to the government/military, predictability, and information-seeking were partly supported by the study findings. None of these factors was correlated with PTSD symptoms in the entire sample; however, several relationships were found in each gender separately. In men, perceived personal control was inversely correlated with PTSD-like symptoms, while in women education level and control attributed to the government/military were inversely correlated, and frequency of listening to the news was positively correlated with PTSD-like symptoms. Highly educated women may have more internal and external resources for coping with a terrorist attack, possibly reducing their risk of PTSD. That *personal* control was a correlate of PTSD symptoms in men and that control attributed to the *government/military* was a correlate of PTSD symptoms in women may be related to the fact that during stress women have less reliance on personal resilience than do men [14]. That listening to news (information-seeking) was positively correlated with PTSD-like symptoms is supported by previous findings during laboratory stress [7]. However, given the correlational design of the present study, it cannot be ruled out that more PTSD symptoms elicit more news-listening, reflecting anxiety.

We found two important moderators (interactions) among the correlates of PTSD symptoms. First, predictability attenuated PTSD-like symptoms only in citizens directly/indirectly exposed to a terrorist attack, but not in those not exposed at all to an attack. It is possible that exposed individuals may have a more vivid mental representation of the attack. This vivid representation can be

pathologic and intrusive. The ability to predict or anticipate duration of a terrorism wave may provide these exposed individuals a sense of cognitive control over such intrusions, possibly yielding less prevalent PTSD symptoms.

The second moderation effect revealed that control attributed to the government/military attenuated PTSD symptoms as long as citizens were listening *infrequently* to the news. This may reflect a benefit from believing in the government/military's control over terrorist attacks as long as individuals are not exposed to the *actual* partial control any government/military really has over terrorism. Frequent listening to the news reveals that the government's control over terrorism is limited, therefore maintaining a belief in the government's ability to control terrorism may be ineffective for reducing PTSD symptoms.

This study had several methodological limitations. First, our sample was not a representative sample of Israeli citizens, nor do we have information concerning the refusal rate. Our sampling procedure may have excluded severe cases of PTSD, who possibly avoid exposure to crowded places such as main streets, reflecting part of their avoidance symptomatology. Hence, the prevalence of “clinically significant” symptoms found in our study needs to be taken with caution. Nevertheless, our prevalence figures are highly similar to those from a representative Israeli sample [4], supporting the reliability of our findings. Second, due to logistic constraints, we did not include a clinical interview for assessing PTSD, which would have provided more valid estimates of the disorder. Third, we used single-item scales for assessing the hypothesized correlates of PTSD. Owing to the logistic constraints of assessing citizens on main streets during such a stressful period, we used brief instruments. Single-item scales of risk factors have been used in previous studies and were shown to predict PTSD; for example, Dougall et al. [15]. Finally, the constructs of anticipated duration of a wave of attacks and frequency of listening to the news may reflect varying degrees of attention span and cognitive ability *resulting* from PTSD symptoms, rather than causing them in any form. Given the cross-sectional design of our study, this possible direction of events cannot be ruled out.

Despite these limitations, our findings may have implications for prevention of PTSD in the context of a terrorist attack. However, given the cross-sectional design of the present study the following implications must be taken with caution. Men may need to be taught greater control-enhancing skills, such as learning to identify and increase self-controllable aspects in their life during an ongoing period of terrorism. Women may need to be taught to trust government/military resources by learning about their efforts and previous successful activities against terrorism. The latter may need to be coupled with encouraging moderate frequency of listening to the news. Finally, the observed moderating role of predictability suggests that people exposed to an attack may need to hear an estimation of the expected future duration of the terrorist wave. While providing an accurate duration may be impossible and unethical, therapists and attack victims may arrive through discussion at an estimated duration of ongoing terrorism. Our results suggest that the mere ability to do so is associated with lower PTSD symptoms among people exposed to an attack. The

ability to estimate/predict the duration of terrorism may reduce symptoms of PTSD by inducing a sense of cognitive control or coherence during such a chaotic period, and this sense needs to be strengthened in people exposed to an attack.

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