

# Israeli Civilians under Heavy Bombardment: Prediction of the Severity of Post-Traumatic Symptoms

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*This study was financed by a special emergency grant from the University of Haifa Office of the Dean of Research and a gift from a private donor.*

**Keywords:** bombardment; dissociation; Israeli civilians; post-traumatic stress disorder; resilience; war

## Abbreviations:

KS = Kiryat Schmona  
KY = Kfar Yona  
PDEQ = Petritraumatic Dissociative Experiences Questionnaire  
PSS-SR = Post-traumatic Symptom Scale Self Report  
PTSD = post-traumatic stress disorder

Received: 11 January 2009

Accepted: 13 October 2008

Web publication:

## Abstract

**Context:** The military conflict that occurred between Lebanon and Israel in July and August of 2006 was characterized by the heavy bombardment of specific geographic regions in Israel, resulting in considerable civilian casualties and property damage.

**Objective:** Israeli civilians directly and indirectly exposed to bombardment were compared on exposure to the recent bombardment, trauma history, perceived life threat and peri-traumatic dissociation during the recent bombardment, and current post-traumatic stress disorder (PTSD) symptom severity.

**Design, Setting, and Participants:** Following the conflict, data were collected by telephone from 317 Israeli residents randomly selected from two towns that were subject to differing levels of exposure to the bombardment.

**Intervention(s):** None

**Main Outcome Measure(s):** Exposure to trauma during the Second Lebanon War, prior trauma exposure, PTSD symptom severity, perceived life threat, and peri-traumatic dissociation.

**Results:** The residents directly affected by the bombardment (Kiryat Shmona; KS) endorsed more trauma exposure, ( $p < 0.01$ ); more prior trauma, ( $p < 0.01$ ); more life threat, ( $p < 0.01$ ); and greater PTSD symptomatology (12 % of KY participants and 38% of KS participants had probable PTSD), compared to residents in the comparison town (Kfar Yona; KY). Both groups reported a similar degree of peri-event dissociation (KS:  $M = 7.2 \pm 3.7$ ; KY:  $M = 7.3 \pm 3.0$ ). Perceived life threat mediated the relationship between exposure to bombardment and PTSD symptomatology. Time spent in bomb shelters was not associated with PTSD symptom severity. Prior shelling-related trauma negatively predicted PTSD.

**Conclusions:** The terror of bombardment is a risk factor for PTSD among civilians. Although there is considerable resilience in chronically threatened communities, it is prudent to develop and implement public health approaches to prevent those most distressed during and after attacks from developing PTSD. Because, to a small degree, prior trauma exposure buffers the response to bombardment, interventions should consider leveraging citizens' past successful coping.

Somer E, Zrihan-Weitzman A, Fusé T, PhD, Parker H, Dickstein B, Maguen S, Litz BT: Israeli civilians under heavy bombardment: Prediction of the severity of post-traumatic symptoms. *Prehosp Disaster Med* 2009;24(5):389-394.

## Introduction

The 2006 Lebanon War, known in Israel as the Second Lebanon War, began on 12 July 2006 and ended on 14 August 2006. For more than four weeks, Hezbollah fired thousands of *Katyusha*, as well as much larger Fajr-3 and Fajr-5 rockets (carrying 200 lb warheads)<sup>1</sup> onto populated regions of northern Israel (approximately 100 rockets fired each day). By the end of the war, 43 Israeli civilians had been killed and 4,262 had been injured. The conflict also displaced ~400,000 Israelis.<sup>2</sup>

A short mile and a half east of the boarder with Lebanon is the Israeli town of Kiryat Shmona (KS) [AU: **please provide map**]. Located between the Golan Heights and the Naftali Hills, the citizens of KS have been subjected to a considerable amount of violence occurring between Israel and south Lebanese militants during the past 40 to 50 years. The town has been shelled on so many occasions as to warrant the nickname "Kiryat Katyusha" among its local citizens.<sup>3</sup> Not surprisingly, KS sustained over 1,000 rocket attacks in the Second Lebanon War, more than anywhere else in the country.

It is safe to infer that a majority of residents of KS were exposed to the terror of bombardment, and many were exposed directly to serious and life-threatening events during the Second Lebanon War, which places them at risk for the development of post-traumatic distress and impairment. Exposure to an event that includes "actual or threatened death or serious injury, or a threat to the physical integrity of self or others" is a prerequisite for a diagnosis of post-traumatic stress disorder (PTSD).<sup>4</sup> Research conducted with civilians exposed to war-related violence suggests that a higher degree of exposure to this type of traumatic experience is associated with increased risk for the development of PTSD.<sup>5</sup> Typically, there is a dose-response relationship between degree of exposure to terror and violence and PTSD symptom severity.<sup>6-8</sup> However, many individuals exposed to trauma do not develop PTSD symptoms,<sup>9</sup> leading investigators to attempt to identify factors other than level of exposure to trauma that moderate or mediate the relationship between trauma exposure and the severity of PTSD symptom severity.

The psychological aftermath for Israeli civilians of the Second Lebanon War must be appreciated in the context of an extensive history of bombings and terror. No known studies have examined the impact of past trauma exposure on the relationship between subsequent exposure to heavy bombardment and the severity of PTSD symptoms among Israeli civilians.

Peri-traumatic factors, that is, the subjective experience of trauma and varying contextual features of traumatic exposure, also are important in the etiology of PTSD. For example, peri-event thoughts and appraisals, such as perceived life threat, typically are strong predictors of psychological distress and the subsequent development of PTSD.<sup>10,11</sup> Furthermore, peri-traumatic dissociation has been shown to increase the risk for the development of PTSD,<sup>12</sup> although this effect has not always been replicated.<sup>13</sup> To date, no known studies have examined peri-traumatic dissociation and perceived life threat in Israeli civilians exposed to heavy bombardment.

To summarize, previous research has investigated factors that increase the risk for developing PTSD symptomatology, many of which are relevant to the type of trauma experienced by the residents of KS. These risk factors include: degree of exposure,<sup>5</sup> history of prior trauma,<sup>14</sup> peri-traumatic dissociation,<sup>12</sup> and perceived direct life threat.<sup>8,15</sup> The effects of staying in a bomb shelter as a potential salutogenic peri-traumatic exposure variable also were examined. It was believed that the shelter experience would create a sense of connection to supportive and empathic others and reduce the perceived threat.

The prevalence of probable PTSD, the severity of PTSD symptoms, exposure to trauma during the Second Lebanon War, trauma history, peri-traumatic dissociation, and perceived direct life threat were studied in a sample of KS citizens and in citizens of Kfar Yona (KY), a town located in central Israel that was out of reach of the Hezbollah rockets, and was unexposed to the attacks. The sounds and images of war had been constantly disseminated in the Israeli media, exposing the Israelis to sounds and sights of destruction and carnage in the North. Data were collected from KY citizens to assess the impact of the war on citizens that had been exposed indirectly. It was hypothesized that the degree of exposure to the rocket attacks, history of trauma, perceived life threat, peri-traumatic dissociation, and current severity of PTSD symptoms would be greater in the KS sample. Furthermore, it was expected that the degree of exposure to the current rocket attacks and history of prior trauma predicts the severity of PTSD symptoms. Also, it was predicted that staying in a bomb shelter would be associated with less PTSD symptom severity. Finally, we predicted that the relationship between exposure to the rocket attacks and PTSD would be moderated by prior trauma exposure, and mediated by perceived life threat and peri-traumatic dissociation.

## Methods

### *Procedure*

Participants were interviewed by telephone. A computer-generated random numbers list was used to call citizens listed in the telephone directory in the two towns being studied. Research assistants were instructed to call consecutive numbers on the list until they were answered. The sample was limited to Hebrew-speaking adults, age 18 years or older. Because most immigrants attend subsidized Hebrew courses shortly after their arrival, it was assumed that this criterion would exclude only a relatively small number of recently arrived individuals. The volatile situation in Israel during data collection required rapid collection of data to ensure equivalence in participants' exposure to the stress of the war and its reports in the media.

Four research assistants received training to ensure standardized administration of the research instruments. These individuals were undergraduate students or college educated. Because the interview process was fairly simple to perform, involving reading aloud from printed statements and questions, standardization was achieved during a single two-hour training session. The research assistants observed one of the investigators complete several interviews, and then were permitted to make calls themselves. To ensure fidelity, random checks were conducted during the interviewing process. Corrective feedback was offered on rare occasions when minor modifications in interviewing style were warranted. In addition, one senior researcher was on-call during data collection to resolve specific dilemmas as they arose.

During the first two weeks of September, 2006, data were collected in KS. During the last two weeks of September, 2006, data were collected in KY, a town of similar size and socio-economic status to KS.

### Measures

Participants completed several self-report measures designed to assess participants' degree of exposure to trauma during the Second Lebanon War, history of trauma exposure, and severity of PTSD symptoms associated with exposure to the recent bombardment and its aftermath. Perceived threat and peri-traumatic dissociation also were measured.

**Trauma Exposure**—Based on previous research and news reports, exposure to trauma during the Second Lebanon War we assessed using a rationally-derived, 12-item situation-specific questionnaire (Appendix A). The scale evaluated physical injury, property damage, receiving assistance, leaving Kiryat Shmona, staying in a shelter, and knowing others who were physically injured. The majority of the questions were in a binary format (i.e., yes/no responses), although three questions (e.g., number of days spent in a shelter) were scored on a continuous scale. All of the questions were collapsed across various types of exposure; binary and continuous data were merged by treating displacement and shelter stay as dichotomous variables.

**Trauma History**—The occurrence of traumatic life events experienced prior to the Second Lebanon War was assessed using a 12-item measure adapted from the Life Events Scale.<sup>16</sup> Participants received an overall score that reflected the number of traumatic life events experienced prior to the Second Lebanon War (Appendix B).

**PTSD Symptomatology**—PTSD symptoms were assessed by telephone interview using the Post-Traumatic Symptom Scale, Self-Report (PSS-SR).<sup>17</sup> The PSS-SR has been translated into Hebrew and used in a variety of studies in Israel.<sup>18</sup> The Cronbach's alphas for the re-experiencing, avoidance, and arousal subscales ranged from 0.76 to 0.84.

**Perceived Threat**—A 4-item measure was developed to evaluate how strongly participants believed their lives or the lives of their loved ones were in danger during the war. The items were: (1) "my life was in danger during the last Lebanon War"; (2) "the lives of people dear to me were in danger during the last war"; (3) I anticipate that my life could be endangered by mortar and rocket attacks; and (4) "I anticipate that lives of people dear to me could be endangered by mortar and rocket attacks". Questions were scored on a Likert-type scale from 1 ("I didn't experience it at all") to 5 ("I experienced it very often"), and summed for a total perceived threat score. The internal consistency of this derived scale was 0.71.

**Peri-Traumatic Dissociation**—Dissociative symptoms occurring during the war were assessed using a four-item measure adapted from the Peri-traumatic Dissociative Experiences Questionnaire (PDEQ).<sup>19</sup> The four items represented various dissociative symptom clusters. Participants responded to the following four questions: (1) "there were moments when I lost contact with the flow of events, I passed out, I disconnected, or I somehow felt I was not part of what was going on"; (2) "I found myself reacting in a very automatic manner—I did things that I found out, retrospectively, I had no

intention of doing"; (3) "the things that happened seemed unreal, as if it was a dream, or a movie"; and (4) "I felt that I was observing what was happening to me, floating above the place or looking from the side, as if I was not involved in what was going on". The PDEQ was translated into Hebrew and has been previously used with Israeli samples.<sup>12</sup> In this study the measure had a Cronbach's alpha of 0.68.

### Data Processing

Descriptive statistics were calculated for both groups of study participants on the following variables: years of education obtained, number of children living in the home, birthplace, gender, religiosity, and family status. Independent samples *t*-tests were used to compare KS and KY residents on each of these demographic variables.

Summary scores were obtained for each participant on each of the measures described above. A series of independent samples *t*-tests were performed to test for group differences between KS and KY residents on each of the following variables: (1) amount of previous trauma exposure; (2) Second Lebanon War-related trauma exposure; (3) perceived life threat during the recent bombardment; (4) peri-traumatic dissociation; and (5) current PTSD symptomatology.

A hierarchical regression analysis was conducted to examine the relationship between current and past trauma exposure and the severity of PTSD symptoms.<sup>20</sup> In step 1, the main effects of current and past trauma were examined. In step 2, the interaction term was added to determine whether it predicted PTSD above and beyond the main effects.

Two exploratory meditational analyses were conducted to examine whether peri-traumatic dissociation or perceived life-threat mediate the relationship between exposure to trauma and the severity of PTSD symptoms.

## Results

### Participants

A total of 558 calls were answered during the time spent collecting data in KS. Of these, 50 had poor Hebrew comprehension, and 79 were out of town. In total, 442 individuals were contacted, and verbal consent was obtained from 237 (54% response rate). Twelve individuals dropped out before completion of the entire interview leaving a sample of 203 participants. The mean value for the ages of the participants was 42.3 ±12.8 years and the majority were female (63%). Individuals who evacuated KS spent an average of 18.7 ±14.2 days away from their home. Those who remained and resided in shelters spent 13.4 ±13.3 days in those shelters.

A total of 714 calls were answered during the time spent collecting data in KY. Of those contacted, 74 had poor Hebrew comprehension, and three reported that they were not in Israel during the war. Verbal consent was obtained from 123 individuals (19% response rate), and nine dropped out before completion of the entire interview leaving a sample size of 114. The mean age was 45.0 ±14.0 years and the majority were female (59%).

### Demographics

Independent samples *t*-tests showed that citizens in KY reported more years of education (mean value = 13.6 ±3.2 years) compared to citizens in KS (*M* = *X*, *SD* = *X*) [*AU*:

what is this?];  $t(309) = 3.4$ ;  $p = 0.001$ , and had more children living in their home (KY mean value =  $2.8 \pm 1.2$ ; KS mean value =  $2.2 \pm 1.8$ ;  $t(233) = 3.2$ ,  $p = 0.002$ ). Chi-square analyses indicated that the groups also differed across birthplace, chi-square (6) = 28.8,  $p = 0.001$ ; residents of KS were more likely to be first or second generation immigrants. There were no differences between the two towns on gender, religiosity, and family status.

#### *Second Lebanon/July War-Related Exposure*

Kiryat Schmona residents reported more war-related exposure during the Second Lebanon War (mean  $16.5 \pm 13.4$ ) compared to KY residents (mean =  $2.7 \pm 4.8$ );  $t(308) = 13.5$ ,  $p = 0.001$ ,  $R^2 = 0.37$ .

#### *History of Previous Trauma*

KS residents reported more life event stressors that occurred prior to the war (KS mean =  $1.7 \pm 1.5$ ; KY mean =  $1.1 \pm 1.3$ ,  $t(314) = 4.0$ ,  $p = 0.000$ ); however, the effect size was small ( $R^2 = .04$ ).

#### *PTSD Symptomatology*

The KS group reported greater PTSD symptom severity (KS mean =  $12.8 \pm 11.5$ ) than the KY group (mean =  $6.8 \pm 7.8$ ). Using a PSS-SR total score of 14 as a cutoff for probable PTSD,<sup>21</sup> 12% of KY subjects and 38% of KS subjects had probable PTSD (Odds ratio = 3.54,  $p < 0.01$ ).

#### *History of Previous Trauma, Second Lebanon War Exposure and Severity of PTSD Symptoms*

The main effect of prior trauma was found to negatively predict PTSD ( $\beta = -0.26$ ,  $t = -4.75$ ,  $df = 306$ ,  $p < 0.00$ ). This suggests that to a mild degree, prior trauma exposure buffered the degree of current distress. By contrast, exposure to the Second Lebanon War positively predicted PTSD, although to a mild degree ( $\beta = 0.11$ ,  $t = 2.07$ ,  $df = 306$ ,  $p < 0.04$ ).

#### *Dissociation and Perceived Threat*

The KS group (mean =  $16.1 \pm 3.4$ ) reported greater perceptions of life threat relative to participants in the KY group (mean =  $11.6 \pm 3.6$ ;  $t(315) = 11.1$ ,  $p = 0.000$ ,  $R^2 = 0.28$ ); however, participants in both groups reported a similar degree of peri-event dissociation during the war (KS:  $M = 7.2$ ,  $SD = 3.7$ ; KY:  $M = 7.3$ ,  $SD = 3.0$ ).

#### *Moderator Analyses for Trauma History and Time Spent in Bomb Shelter*

A history of previous trauma did not moderate the relationship between exposure to the Second Lebanon War and current PTSD symptom severity ( $\beta = 0.25$ ,  $t = 0.68$ ,  $df = 305$ , ns) and number of days spent at a bomb shelter was not found to predict current severity of PTSD symptoms ( $\beta = -0.90$ ,  $t = -1.37$ ,  $df = 197$ , ns).

#### *Meditational Analyses for Peri-traumatic Dissociation and Perceived Life Threat*

Perceived life threat mediated the relationship between trauma exposure and current severity of PTSD symptoms (Sobel's  $Z = 4.29$ ,  $p < 0.01$ ), whereas peri-traumatic dissociation did not (Sobel's  $Z = 0.781$ ;  $p = 0.43$ ).

## Discussion

The 33-day long rocket and mortar attack on Israel's civilian centers in the summer of 2006 was an unprecedented threat that forced more than a million citizens to either flee from their homes or hide in bomb shelters. While many communities had experienced direct fire for the first time, for the residents of the border town of KS, this was an all-too-familiar occurrence. Kiryat Schmona was hit by one-quarter of the total incoming rockets fired at Israel during the Second Lebanon War. Kiryat Schmona residents reported significantly more exposure to the recent bombardment, prior trauma, perceived life threat, and severity of PTSD symptoms than did the citizens living in KY, a town subjected to the national threat exclusively through media coverage or by having friends or family in cities that were attacked.

The relationship between degree of exposure and severity of PTSD symptoms was not moderated by exposure to previous trauma. This implies that there is a significant mental health burden associated specifically with the exposure to bombardment during the Second Lebanon War that the citizens of KS experienced, but that the residents of KS were not made more vulnerable by previous trauma exposure. In fact, overall, prior trauma exposure served as a partial buffer to distress. This would suggest that, to a mild degree, KS citizens have developed resilience to repeated bombardments and terror.

Although hypothesized to be a resilience factor, time spent in a bomb shelter was not associated with severity of PTSD symptoms. It may be that the experience of the crowded, austere bomb shelters combined with the terror experience cancelled out any sense of shared experience and social support.

Kiryat Schmona residents reported a greater perceived life threat than did the KY residents. However, no group differences in peri-traumatic dissociation were observed. Furthermore, perceived life threat, but not peri-traumatic dissociation was found to mediate the relationship between trauma exposure and severity of PTSD symptoms. As the two groups of Israeli citizens did not differ in peri-traumatic dissociation, despite experiencing significant differences in current and past trauma exposure, it may be that peri-traumatic dissociation is associated with individual difference (i.e., trait) factors instead of specific peri-traumatic phenomena. There is reason to believe that KY citizens who were particularly upset by the news coverage of the war were more agreeable to take part in this research study. Therefore, it is conceivable that many of them were anxiety- and dissociation-prone.

It should be noted that there is a possibility that the higher levels of current PTSD symptom severity observed among KS residents may reflect the fact that these data were collected very soon after the cease-fire (less than one month); perhaps before KS residents had an adequate opportunity to process and cope with their trauma. Furthermore, a limitation of the current study is that KY residents were interviewed two weeks after KS residents. As emotional distress and PTSD symptoms generally are highest in the weeks immediately following trauma exposure, the higher severity of PTSD symptoms observed among KS residents may at least partially reflect the differ-

ence in time between exposure and assessment. Because response rates were low in KY and moderate in KS, the reader is cautioned that the results cannot necessarily be generalized to the population in each of these cities. This is especially germane to KY; the most frequent reason provided by KY residents for declining our invitation to participate in this study was that the war in the north of Israel had no effect on them. On the other hand, low response rates do not necessarily confer bias; response rates between 30% and 70% show little bias.<sup>22</sup>

Future research examining individuals exposed to bombardment will improve our understanding of risk factors for PTSD in civilians exposed to bombardment and terror. These efforts will serve to help develop public health approaches to foster resilience and interventions designed to facilitate recovery in those most impacted.

## Conclusions

The terror of bombardment is associated with considerable risk for the development of PTSD. Residents with higher prior trauma exposure were not more vulnerable to the development of PTSD. Rather, prior exposure may act as a buffer to distress. Public health-based stress management

interventions are relatively common in Israel for communities affected by terror and war. Further prospective research is needed to assess if stress prevention programs have an immunizing effect beyond personal resilience and successful coping with prior stressful events.

Although hypothesized to be a resilience factor, time spent in a bomb shelters was not associated with the severity of PTSD symptoms. It may be that the experience of the crowded, austere bomb shelters combined with the terror experience cancelled out any sense of shared experience and social support.

Finally, it seems that residents of locales subjected to national threats exclusively through media coverage or by having friends or family in cities that were attacked also can be at risk for the development of post-traumatic distress. Reports of peri- and post-traumatic distress among indirectly exposed citizens should underscore the need for national outreach programs outside of the perimeter of direct impact.

## Acknowledgements

The authors thank the Municipality of Kiryat Shmona for their assistance with this study.

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### Appendix A—Second Lebanon War Exposure Inventory

Please mark the most appropriate answer with regard to your experience during the recent war:

1. Have you stayed in a bomb shelter? Y N
2. How long have you stayed in a bomb shelter? \_\_\_\_
3. Do you know anybody whose home was hit by a rocket? Y N
4. Have you been physically injured? Y N
5. Do you know anybody who has been physically injured? Y N
6. Have you received help for post-traumatic anxiety? Y N
7. Has your home been hit by a rocket?
8. Have you sustained other property damages (e.g., to your car or other equipment?) Y N
9. Have you left the town during the war? Y N
10. If so, how many days have you stayed out of town? \_\_\_\_
11. If so, in how many different places have you stayed during the war? \_\_\_\_

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### Appendix B—Second Lebanon War Trauma History Inventory

Have you ever experienced one of the following events prior to the recent Lebanon War? Please mark the most appropriate answer.

1. A motor vehicle accident? Y N
2. Another accident (e.g., occupational, domestic or recreational)? Y N
3. Mortar or Katyusha rocket fire? Y N
4. Physical Assault (e.g., slaps, kicks, punches, beatings, etc.)? Y N
5. Assault with a weapon (e.g., bat, knife, gun)?
6. Sexual assault, including sexual harassment, rape, attempted rape, or any other sexual coercion? Y N
7. House damaged by a mortar or rocket attack? Y N
8. Injury or life threatening illness? Y N
9. Extreme human suffering? Y N
10. Sudden violent death? Y N
11. A turn to the worst in your financial situation? Y N
12. Moving? Y N

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