

Resilience Emotions and Acute Stress Reactions in the Population of Dimona and the General Population of Israel Two Days after the First Suicide Bombing Attack in Dimona

Daniela Amital MD MHA¹, Howard Amital MD MHA², Cap. Galit Shohat MA³, Col. Yechiel Soffer MA³ and Yaron Bar-Dayan MD MHA⁴

¹Department of Psychiatry, Ness Ziona Mental Health Center, Ness Ziona, affiliated with Sackler Faculty of Medicine, Tel Aviv University, Ramat Aviv, Israel

²Department of Medicine B, Sheba Medical Center, Tel Hashomer, affiliated with Sackler Faculty of Medicine, Tel Aviv University, Ramat Aviv, Israel

³IDF Home Front Command

⁴Faculty of Health Sciences, Ben-Gurion University of the Negev, Beer Sheva, Israel

ABSTRACT: **Background:** On 4 February 2008, two terrorists armed with suicide bombs arrived at the open market in the southern Israeli city of Dimona. One detonated his bomb at approximately 10:30 a.m. causing multiple casualties. Short-term emotional effects and acute stress reactions usually appear among survivors after such incidents.

Objectives: To compare the differences in emotions and in disturbances of daily life activities that emerge a couple of days following such an event and to identify patterns of stress development among resilient and low-resilient members of the population in Dimona and in the general population of Israel.

Methods: A telephone survey of two randomly selected representative samples of adults (428 Israeli residents and 250 Dimona residents) was conducted 2 days after the event.

Results: A higher prevalence of stress and fear and a lower prevalence of joy were reported among the population of Dimona compared to the general population in Israel ($P < 0.05$). Differences were also recorded when the population of Dimona was categorized by its personal degree of resilience ($P < 0.05$). A higher prevalence of disturbances in daily life activities and changes in leisure activity was found in the low-resilient population in Dimona ($P < 0.01$).

Conclusions: This study demonstrates that following a public terror event, self-reported low-resilient subjects have a higher prevalence of disturbances in daily life activities, as well as adverse emotional responses. These differences must be addressed by the relevant social service agencies for immediate public intervention.

IMAJ 2012; 14: 281–285

KEY WORDS: stress, depression, anxiety, post-traumatic stress disorder (PTSD)

For Editorial see page 307

On 4 February 2008 at approximately 10:30 a.m., two terrorists armed with suicide bombs arrived at the open public marketplace in Dimona, a small city in southern Israel. The first bomber detonated his bomb in a crowd of civilians, while inadvertently injuring the second bomber who had arrived with him. As a result of the bomb, a woman was killed and 48 people were injured and evacuated to the local hospital. This was the first terrorist attack in Dimona, which until then was considered to be a quiet and peaceful place to live. The attack was executed by the Izzedine al-Qassam Brigades terrorist squad from the Hebron Hamas organization.

In the last decade, several studies have addressed the psychological impact of disasters and terror attacks on civilian populations. Research following the 1995 bombing in Oklahoma City reported that emotional responses to terror attacks can be highly variable. Six months after that tragic event, one-third of a sample of 182 persons directly exposed to the blast reported patterns of symptoms that met criteria for post-traumatic stress disorder [1]. Smith et al. [2] reported that 3 to 4 months after the bombing, 43% of those living in Oklahoma City experienced four or more stress symptoms compared with 11% of those living in Indianapolis.

Several studies were conducted in Israel during the last decade concerning the psychosocial and emotional effects of suicide bombing attacks. Shalev and co-researchers [3] have shown that continuous terror creates distress levels that are similar in both proximal and remote communities. Bleich et al. [4] reported that following recurrent terror events the Israeli population complained of distress and a lower sense of safety but did not develop higher levels of psychiatric distress. They reasoned that this was due to habituation processes and to coping mechanisms. In follow-up studies, these researchers reported that trauma-related distress was affected by demographic ethnicity (more frequent in Israeli

*The first two authors contributed equally to this paper.

Arabs compared to Israeli Jews), immigrant status, and lower educational level, but was not related to age [5-8].

The immediate mental health effects of the notorious terrorist attacks on September 11, 2001 were assessed using a nationally representative sample of American adults who were asked about their reactions to the terrorist attacks and their perceptions of it. Three to five days after the attack, 44% of this cohort reported that they experienced at least one of five substantial stress symptoms, and 90% reported at least low levels of stress symptoms. Although the people who were close to New York City had the highest rate of substantial stress reactions, others throughout the country, in large and small communities, also underwent substantial stress reactions.

Geographic location and distance from the disaster's center were found to be significant: 7.5% of adults living south of 110th Street in Manhattan reported symptoms consistent with PTSD, and 9.7% reported symptoms consistent with current major depression 5-9 weeks after the World Trade Center attacks. Additionally, those living closest to the site were nearly three times as likely to develop PTSD as those living farther away [9].

Emotional, cognitive and behavioral responses vary even within homogeneous samples of individuals who have been exposed to loss and trauma [10-12]. Yet, information about the range and rates of distress to be expected following such a national trauma is limited. Gaining information about the adjustment process can aid clinicians to identify risk factors for distress [13,14] and can contribute to the design of interventions for individuals coping with stressful life events [15]. Lawyers et al. [16] characterized peritraumatic reactions of residents of New York City during and immediately following the September 11 terrorist attacks, identified predictors of those reactions, and identified predictors of PTSD 4 months later. Three related, but distinct, peritraumatic response patterns were revealed - dissociation, emotional reactions, and panic/physiological arousal. These results support a growing literature concerning the predictive value of peritraumatic reactions in relation to PTSD. Understanding the early-phase emotional disturbances might shed light on the development of the first stages of chronic stress reactions that result from repeated terrorist attacks.

The objective of this study was to compare the differences in the prevalence of public emotions and disturbances in daily life activities 2 days after a suicide bomber attack, between the self-reported resilient and low-resilient population in Dimona and the general population of Israel.

METHODS

DATA COLLECTION

The data reported in this study were derived from a survey conducted on the evening of 6 February 2008, two days after

the first suicide bombing attack in Dimona. The survey was conducted by telephone with randomly selected representative samples of adults. Trained staff conducted the telephone interviews, which had a median duration of 7.5 minutes. The survey sampled two different populations: one included 428 adult Israeli residents (excluding Dimona), termed the "outer circle"; the other sample involved 250 adult residents of Dimona, the "inner circle." The size of the sampling error was $\pm 4.75\%$ for the nationwide sample and $\pm 6.2\%$ for the Dimona sample.

SAMPLE

Adults (> 18 years of age) who were at home when telephoned were eligible for the study. If two or more eligible adults were at home one was randomly selected for the interview. There was no adult at home in 5.9% of the calls that were answered. The interview could not be completed for 10.3% of the people who answered their telephones because of language and translation difficulties. Overall, of the people who answered their telephones 16.8% refused; 678 adults were interviewed.

INSTRUMENT AND KEY MEASURES

In order to assess the population's behavior within 2 days of the terrorist attack, questionnaire items were selected and developed on the basis of prior research [17,18]. The questionnaire included demographic data and questions about immediate and short-term behavioral changes following the terrorist attack. Details on the exact location of the interviewed subjects during the event and on changes in behavior and daily life activities were assessed by means of 26 questions. The differences in emotions, daily life activities, and symptoms of acute stress reaction between the residents of Dimona and the national population were assessed. The association between self-reported resilience and psychological changes were also evaluated.

STATISTICAL ANALYSIS

The differences between the groups were analyzed using the chi-square test. Results were considered significant when $P < 0.05$.

RESULTS

Demographic data of the two samples are shown in Table 1. We verified the known domestic Israeli demographic facts that Dimona has a significantly higher percentage of immigrants ($P < 0.05$), an overall lower education level ($P < 0.001$) and a higher prevalence of religious way of life ($P < 0.001$) than the sample of the general population [Table 1].

A higher prevalence of perceived personal resilience was observed compared to perceived community resilience; this trend was noticed in both samples ($P < 0.001$). No significant differences were found between the frequency of personal resilience, satisfaction with personal coping or community

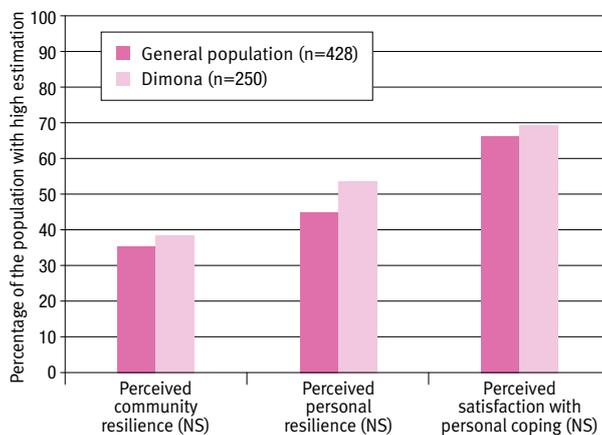
PTSD = post-traumatic stress disorder

Table 1. Demographic characteristics of the Dimona sample compared with the nationwide sample (rates presented in percentages)

Demographic parameter	Dimona	General population	P value
Male	49.2	50.1	NS
Female	50.8	49.9	NS
Age (yrs)			
18–24	16.4	10.9	NS
25–34	19.2	15.1	NS
35–44	18.4	19.6	NS
45–54	17.2	18.7	NS
55–64	12.8	14.7	NS
65+	16	20.9	NS
Marital status			
Single	20.4	18.0	NS
Married with children	61.2	68.0	NS
Married without children	2.4	2.3	NS
Divorced	15.6	10.3	NS
Born in Israel	52.4	68.6	<0.05
Education			
Elementary	8.8	5.5	NS
High school	56.4	39.3	< 0.001
Above high school	18	21.7	NS
Academic	15.6	32.4	< 0.001
Income			
High above average	2	2.7	NS
Above average	14.8	16.7	NS
Average	30.8	34.6	NS
Below average	28	20.2	NS
Way below average	12	11.5	NS
Religiosity			
Ultra-Orthodox	2.4	4.9	NS
Orthodox	16.4	12.7	NS
Somewhat religious	55.6	31.3	< 0.001
Non-religious	24.4	48.4	< 0.001

NS = not significant

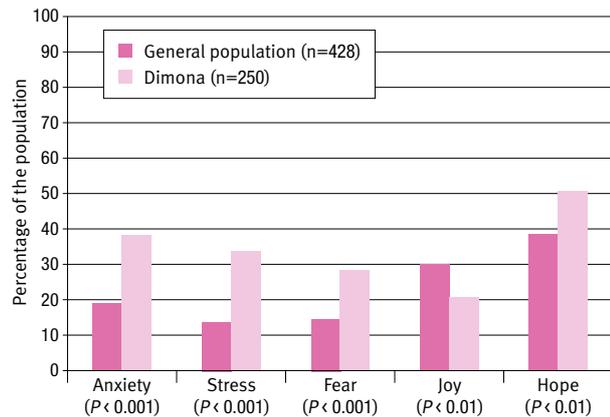
Figure 1. Differences in resilience between the Dimona and the general population of Israel 2 days after the suicide bomber attack in Dimona



resilience in the subjects from Dimona compared to the general population [Figure 1].

A significantly higher prevalence of anxiety, stress, fear and hope and a lower prevalence of joy were reported by the population of Dimona compared with the general population ($P <$

Figure 2. Differences in emotions between the population of Dimona and the general population in Israel 2 days after the first suicide terrorist attack in Dimona



0.01) [Figure 2]. A significantly higher prevalence of perceived psychological disturbance following the traum was reported by people in Dimona compared with the general population ($P < 0.01$).

A high percentage of the population of Dimona reported the importance of maintaining normal family life and stated that they were back to full routine 2 days after the suicide bomber attack. No significant differences were found between the low-resilient and the high-resilient population of Dimona regarding this aspect. A significantly higher prevalence of daily life activity disturbances and leisure activity changes was found among the low-resilient compared with the high-resilient population of Dimona ($P < 0.01$).

A higher prevalence of stress and fear and a lower prevalence of joy and hope were reported by the low-resilient population compared with the high-resilient population of Dimona ($P < 0.01$) (data not shown). A higher, yet not significant, prevalence of other symptoms of acute stress reaction was reported by the Dimona population compared with the general population.

A higher, but not significant, prevalence of reported psychological experience and distressful reexperiencing of the event, together with a higher prevalence of acute stress reaction symptoms, were reported by the low-resilient compared with the high-resilient population of Dimona [Table 2]. Nevertheless, lack of social interest and inability to express feelings were significantly more prevalent among the low-resilient population ($P < 0.01$).

DISCUSSION

In this study we found a significantly higher prevalence of stress and fear and lower prevalence of joy among the population in close proximity to the attack compared to the general

Table 2. Differences in symptoms of acute stress reaction related to the terrorist event in Dimona between the resilient and the non-resilient population of Dimona 2 days after the first suicide bomber attack in Dimona

Symptom	Low resilience (% of population who reported they have the symptom)	High resilience (% of population who reported they have the symptom)
Experiencing psychological trauma	16	9
Distressful re-experiencing of the event*	9.8	4.2
Avoidance of thinking of the event	10.6	4
Lack of social interest	10.2	2.2
Difficulty to remember the event	10.6	4.2
Inability to express feelings (cry, joy, etc.)*	6.6	1
Feeling that there is no future	4.6	1
Sleep disturbances	8.2	4.2
Nervousness, inability to concentrate	6.4	3
Anxiety or startling	11.2	6
Work disturbances	7.8	3

* $P < 0.01$

population in Israel and among the self-reported low-resilient population of the inner circle, namely, the subjects who live in the city of Dimona. A significantly higher prevalence of disturbances in daily life activities and changes in leisure activity were found in the self-reported low-resilient population in Dimona.

The effect of geographic proximity to a terror event on acute stress reactions and PTSD was previously reported [19,20]. In our study, as in others, we found a higher percentage of adverse emotional responses in the inner circle at the early phase after a terrorist attack compared to the national population. This was not the case in recurrent terrorist attacks over a long period. A previous study conducted in Israel concerning emotions and post-traumatic stress disorders after a long period of recurrent terrorist attacks found no differences in adverse emotions between the local and the remote areas [21].

Our study is the first report on the relationship between self-reported resilience and adverse emotional responses or early symptoms of an acute stress reaction after a first occurrence of a terrorist attack in a small, peaceful town.

This study has limitations. The Dimona population differs from the general population in Israel in the parameters of education, religiosity, and origin (country of birth) due to the high rate of immigrants residing in the city. These differences could be confounding factors that might interfere with the

differences found between those found in the inner and the outer circles of the event.

Little is known about the prevalence of emotions, behavior, and acute stress reactions immediately after a terror attack. This study is important for understanding the early emotional and behavioral responses following such an exposure and might help clinicians to anticipate their occurrence and perhaps even underscore the elements that precede the development of PTSD.

This study also emphasizes the immediate differences between proximal and remote geographic circles in adverse emotional and behavioral responses to an act of terrorism. We have quantified the degree of resilience and have shown that self-reported low-resilient subjects have a higher prevalence of disturbances of daily life activities and develop more adverse emotional responses and symptoms of acute stress reactions. Targeting low-resilient individuals might give the clinician a key for preventing or mitigating acute stress reactions that eventually turn into post-traumatic stress disorders.

We conclude by stating that low-resilient populations in close proximity to terror attacks have higher rates of interferences with daily life activities, as well as adverse emotional responses. These differences must be addressed by the social services following such events.

Corresponding author:

Dr. H. Amital

Dept. of Medicine B, Sheba Medical Center, Tel Hashomer 52621, Israel

Phone: (972-3) 530-2652

Fax: (972-3) 530-4796

email: hamital@netvision.net.il

References

1. North CS, Nixon SJ, Shariat S, et al. Psychiatric disorders among survivors of the Oklahoma City bombing. *JAMA* 1999; 282 (8): 755-62.
2. Smith DW, Christiansen EH, Vincent R, Hann NE. Population effects of the bombing of Oklahoma City. *J Okla State Med Assoc* 1999; 92 (4): 193-8.
3. Shalev AY, Tuval R, Frenkiel-Fishman S, Hadar H, Eth S. Psychological responses to continuous terror: a study of two communities in Israel. *Am J Psychiatry* 2006; 163 (4): 667-73.
4. Bleich A, Gelkopf M, Solomon Z. Exposure to terrorism, stress-related mental health symptoms, and coping behaviors among a nationally representative sample in Israel. *JAMA* 2003; 290 (5): 612-20.
5. Bleich A, Gelkopf M, Melamed Y, Solomon Z. Emotional impact of exposure to terrorism among young-old and old-old Israeli citizens. *Am J Geriatr Psychiatry* 2005; 13 (8): 705-12.
6. Bleich A, Gelkopf M, Melamed Y, Solomon Z. Mental health and resiliency following 44 months of terrorism: a survey of an Israeli national representative sample. *BMC Med* 2006; 4: 21.
7. Bleich A, Gelkopf M, Berger R, Solomon Z. The psychological toll of the Intifada: symptoms of distress and coping in Israeli soldiers. *IMAJ Isr Med Assoc J* 2008; 10 (12): 873-9.
8. Solomon Z, Gelkopf M, Bleich A. Is terror gender-blind? Gender differences in reaction to terror events. *Soc Psychiatry Psychiatr Epidemiol* 2005; 40 (12): 947-54.
9. Galea S, Ahern J, Resnick H, et al. Psychological sequelae of the September 11 terrorist attacks in New York City. *N Engl J Med* 2002; 346 (13): 982-7.
10. Wortman CB, Silver RC. The myths of coping with loss. *J Consult Clin Psychol* 1989; 57 (3): 349-57.

-
11. Bonanno GA, Wortman CB, Lehman DR, et al. Resilience to loss and chronic grief: a prospective study from preloss to 18-months postloss. *J Pers Soc Psychol* 2002; 83 (5): 1150-64.
 12. Boerner K, Wortman CB, Bonanno GA. Resilient or at risk? A 4-year study of older adults who initially showed high or low distress following conjugal loss. *J Gerontol B Psychol Sci Soc Sci* 2005; 60 (2): 67-73.
 13. Norris FH, Friedman MJ, Watson PJ. 60,000 disaster victims speak: Part II. Summary and implications of the disaster mental health research. *Psychiatry* 2002; 65 (3): 240-60.
 14. Norris FH, Friedman MJ, Watson PJ, Byrne CM, Diaz E, Kaniasty K. 60,000 disaster victims speak: Part I. An empirical review of the empirical literature, 1981-2001. *Psychiatry* 2002; 65 (3): 207-39.
 15. Chemtob CM, Tomas S, Law W, Cremniter D. Postdisaster psychosocial intervention: a field study of the impact of debriefing on psychological distress. *Am J Psychiatry* 1997; 154 (3): 415-17.
 16. Lawyer SR, Resnick HS, Galea S, Ahern J, Kilpatrick DG, Vlahov D. Predictors of peritraumatic reactions and PTSD following the September 11th terrorist attacks. *Psychiatry* 2006; 69 (2): 130-41.
 17. Peltz R, Ashkenazi I, Schwartz D, et al. Disaster healthcare system management and crisis intervention leadership in Thailand – lessons learned from the 2004 Tsunami disaster. *Prehosp Disaster Med* 2006; 21 (5): 299-302.
 18. Peltz R, Visar-Shohat G, Bar-Dayyan Y. Differences in public emotions, interest, sense of knowledge and compliance between the affected area and the nationwide general population during the first phase of a bird flu outbreak in Israel. *J Infect* 2007; 55 (6): 545-50.
 19. Galea S, Ahern J, Resnick H, et al. Psychological sequelae of the September 11 terrorist attacks in New York City. *N Engl J Med* 2002; 346 (13): 982-7.
 20. Schuster MA, Stein BD, Jaycox L, et al. A national survey of stress reactions after the September 11, 2001, terrorist attacks. *N Engl J Med* 2001; 345 (20): 1507-12.
 21. Shalev AY, Tuval R, Frenkiel-Fishman S, Hadar H, Eth S. Psychological responses to continuous terror: a study of two communities in Israel. *Am J Psychiatry* 2006; 163 (4): 667-73.