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Follow-up of victims of one terrorist attack in Israel: ASD, PTSD and the perceived threat of Iraqi missile attacks

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Abstract

The first aim of the study was to examine the relationships between acute stress reactions and post-traumatic reactions following exposure to a terrorist attack. The second was to examine whether exposure to a terrorist attack increases the perceived threat and fear of renewed Iraqi missile attacks. Data were collected at two points in time: during the first month after the exposure to a terrorist attack ($N = 54$), and four months later ($N = 44$). Twenty-four percent of the exposed group had acute stress disorder (ASD), and a similar percentage had PTSD. Among participants who had ASD, the chances of developing PTSD were three times greater than among those who had never experienced ASD. Among participants who had been exposed to a terrorist attack and developed PTSD, the perceived threat of an Iraqi missile attack was greater than among those who had been exposed to a terrorist attack but did not develop PTSD, or among the participants in the control group. The discussion deals with the findings in light of the current controversy regarding ASD and the current situation in Israel.

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1. Acute reactions, post-traumatic reactions and their relationship

Although the diagnosis of acute stress disorder (ASD) is relatively new (APA, 1994), comprehensive research has been conducted on its characteristics and the contribution of ASD toward predicting post-traumatic reactions (Bryant, 2003). Recent findings reveal the following rates of ASD among survivors of various traumatic events: 9% among a sample of Manhattan citizens in the first month after the September 11th attack (Galea et al., 2002), 13–25% among motor vehicle casualties (Harvey & Bryant, 1999; Holeva & Tarrier, 2001), 19% among violent attack casualties (Brewin, Andrews, Rose, & Kirk, 1999) and 33% among witnesses of drive-by shootings (Classen, Koopman, Hales, & Spiegel, 1998).

Findings on the relationship between ASD and post-traumatic stress disorder (PTSD) reveal considerable variability in the contribution of acute reactions toward predicting PTSD in subsequent months (for a comprehensive review, see McNally, Bryant, & Ehlers, 2003). The rates of people with ASD who develop PTSD range from 30% among typhoon victims (Stabb, Grieger, Fullerton, & Ursano, 1996) to 87% among burn victims (Difede et al., 2002). In most of the prospective studies (8 out of 13), over 70% of the casualties with ASD developed PTSD (Elklit & Brink, 2004; McNally et al., 2003).

Examining the rates of ASD among people with PTSD in these prospective studies revealed varying levels of predictability. The rates of ASD among people with PTSD ranged from less than 10% among motor vehicle casualties (Schnyder & Moergeli, 2003) to 78% among burn victims. In eight out of 13 prospective studies, the rate of PTSD casualties who had ASD was around or below 50% (Elklit & Brink, 2004; McNally et al., 2003). These findings suggest that while ASD cannot accurately predict PTSD in all of the cases, it raises the probability of identifying those who are at a higher risk for this chronic syndrome.

Another major issue relates to the unique contribution of immediate dissociative symptoms toward predicting PTSD. According to the DSM-IV the diagnosis of ASD requires the presence of at least three dissociative symptoms. This emphasis is consistent with the belief that dissociation mirrors pathological cognitive avoidance, which impedes mental processing and trauma recovery (Spiegel, Koopman, Cardena, & Classen, 1996). Along this line, several studies have found that dissociative symptoms in acute reactions were the strongest predictors of PTSD (Classen et al., 1998; Stabb et al., 1996). By contrast, other studies have found that avoidance (Zoellner, Jaycox, Watlington, & Foa, 2003) hyper-arousal symptoms (Ginzburg et al., 2003) or general distress levels (Koren, Arnon, & Klein, 2001) are the best predictors of PTSD. Therefore, the unique contribution of dissociative symptoms to PTSD is still under debate.

2. The relationship between exposure to a terrorist attack, stress reactions and additional perceived threats

The consequences of exposure to a traumatic event are not limited to emotional reactions. One of the sequelae often observed among victims of various traumatic events is the challenge to and even shattering of their basic cognitive perceptions of the world and themselves (Janoff-Bulman, 1989). They no longer view the world as a safe place, nor do they consider themselves invulnerable

(Janoff-Bulman, 1985). Past research on the beliefs of individuals who were exposed to a range of traumatic events has revealed that they perceive the world as less benevolent (Janoff-Bulman, 1989), less safe, and more dangerous (Magwaza, 1999). In addition, people who have been exposed to traumatic events are often more pessimistic about the future (Solomon & Lavi, 2005) compared with their non-traumatized counterparts.

However, the question is whether the perception of the world as a more dangerous place is associated with the mere exposure to a traumatic event, or only with the traumatic stress that develops following the event. Several studies have found that survivors with PTSD perceive the world as a more dangerous place than do survivors who never developed PTSD (e.g., Foa, Ehlers, Clark, Tolin, & Orsillo, 1999; Solomon, Iancu, & Tyano, 1997).

In this paper, we discuss the consequences of being exposed to both terrorist attack and the threat of conventional and unconventional warfare from Iraq after the American invasion in February 2003. The first aim was to examine the relationship between ASD and PTSD, as well as the relative contribution of each cluster of ASD symptoms toward predicting PTSD among survivors of a terrorist attack. The second aim of the study was to examine whether mere exposure to a terrorist attack is related to increased threats of an Iraqi missile attack, or whether perceived threats of a missile attack are related to traumatic stress reactions that develop after the terrorist incident. To examine this question, we compared perceived threats of an Iraqi missile attack among three groups of participants: people who were exposed to a terrorist attack and did not develop diagnosed stress reactions; people who had been exposed to a terrorist attack and developed ASD or PTSD; and people who had not been exposed to a terrorist attack.

3. Method

3.1. Procedure and participants

The data presented in this paper were collected at two points in time:

Point 1: Telephone interviews were conducted with victims of one terrorist attack 18–28 days after exposure.

Point 2: Telephone interviews with the victims and a control group four months after the attack.

The study was approved by the Helsinki committee of the hospital. Children and adolescents were not included in the study.

The telephone interviews were conducted by a group of hospital social workers, who had clinical experience helping victims of terrorism brought to the hospital following terrorist attacks, and who were specifically trained for the project. In the process of training, the second author briefed them on the aims of the study, reviewed the questionnaire with them, and answered their questions. After conducting the first interview, the social workers discussed their experiences with the second author, and brought up questions and problems in preparation for the subsequent interviews. At the beginning of the interview, the participants were asked to respond to the general

question, “how do you feel?”. Afterwards, they were presented with the specific items in the questionnaires. During the course of the interview, participants were given a chance to elaborate if they wished. The additional information was noted, and the interview continued until the whole questionnaires were completed. Participants who reported distress over the phone were offered psychological assistance at the hospital’s trauma clinic.

3.1.1. Study group

The research sample included the first wave of victims who had been present in a shopping mall of a town in a central region of Israel, and had been evacuated or arrived independently at the emergency room of Meir General Hospital within the first two hours with no physical injuries or with light physical injuries (such as mild bruises or ringing in the ears), and none of them remained hospitalized. No relationship was found between these injuries and ASD or PTSD. Of the 90 participants who had initially arrived at the emergency room, 73 were over the age of 16, and served as the study group. They were asked to participate in a phone survey that would enable follow-up evaluations of their mental and functional state. Nine people did not provide contact information and were not reachable. Out of 64 casualties contacted, an additional seven could not be reached by the interviewers, and three refused to participate. Altogether, a total of 54 people (84%) were interviewed at point 1 of the study.

At point 2 of the study, four months after the event, a total of 50 people were interviewed: 45 out of the 54 (83.3%) who were interviewed during the first stage, and five additional people who had not been located in the first stage.

To examine whether there was selective attrition, we compared the persons who participated in stages 1 and 2 with those who participated only in stage one, and with those who participated only in stage 2. No significant differences in gender, age and level of post-traumatic sequelae were found between the participants in both stages and those who participated only in one of the stages.

3.1.2. Control group

The control group served as a control for the measurement of perceived threat from the Iraqi missile threat at point 2. The group included a convenience sample of 44 participants, who reside near the mall where the terrorist attack took place.

Table 1 presents the socio-demographic variables of the two groups. As can be seen, there were no differences between the two groups with regard to gender, country of birth (χ^2 test) age, and education (t -test).

3.2. Instruments

Point 1. The following questionnaire was answered via telephone interviews with the research group: *Stanford Acute Stress Reaction Questionnaire (SASRQ)*: This self-report questionnaire was developed by Cardeña (1996), and consists of 30 items that describe dissociative, intrusive, avoidant, and hyperarousal symptoms. Participants were asked to rate the extent to which they suffer from each of the symptoms on a 4-point scale, ranging from 1 (not at all) to 4 (to a great extent). The DSM-IV (APA, 1994) was used as the criterion for identifying participants as

Table 1
Distribution of socio-demographic variables according to group

Variable	Victims of Terrorism N (%)	Control group N (%)	
Gender			
Male	16 (35.6)	12 (28.6)	$\chi^2 = 0.49$, df = 1
Female	29 (64.4)	30 (71.4)	
Country of birth			
Israel	37 (82.2)	32 (78.0)	$\chi^2 = 0.24$, df = 1
Other	8 (17.8)	9 (22.0)	
Age	$M = 33.28$ SD (12.60)	$M = 37.57$ SD (13.38)	$t = 1.52$, df = 83
Years of education	$M = 13.05$ SD (2.12)	$M = 14.27$ SD (3.48)	$t = 1.97$, df = 83

having full ASD: endorsement of at least three dissociative symptoms, at least one intrusive symptom, at least one avoidant symptom, and at least one hyper-arousal symptom. This questionnaire has been used to assess ASD among various populations (Cardena, 1996). Its reliability and its construct, convergent, discriminant, and predictive validity have been supported by multiple datasets (Cardena, Koopman, Waelde, & Spiegel, 2000). The Cronbach's alpha for the current sample was 0.93.

Point 2. The following questionnaires were used for both groups. The research group via telephone interviews and the control group filled them in by themselves.

3.2.1. PTSD inventory

PTSD was assessed on the basis of the PTSD Inventory (Solomon, 1988), a self-report scale that used the DSM-IV criteria (APA, 1994). The questionnaire consisted of 17 items that describe intrusive, avoidant, and hyper-arousal symptoms following an exposure to a traumatic event. Participants in the research group were asked to relate to the experience of the terrorist attack. Those in the control group were asked whether they had been exposed to a terrorist attack and or to any other traumatic event. Participants from the research group, and those from the control group who were exposed to a traumatic event were asked to indicate whether or not they had suffered from each symptom over the last month. Participants were identified as having PTSD according to the following criteria: endorsement of at least one intrusive symptom, at least three avoidant symptoms, and at least two hyper-arousal symptoms. This scale also assesses the severity of PTSD, calculated as the number of symptoms endorsed. The scale was found to have a high convergent validity when compared with diagnoses made by clinicians based on structured clinical interviews and high internal consistency (Solomon, 1988). The Cronbach's alpha internal consistency value for the 17 items in the research questionnaire was high (0.93).

3.3. Appraisal of the Iraqi missile attack threat

3.3.1. Cognitive appraisal

Based on a questionnaire that was used during the 1991 Gulf war (Solomon, 1995), participants were asked to appraise the chances that Iraq will attack Israel with; (1) conventional scud missiles and (2) biological or chemical missiles. The scale ranged from 0 (no chance at all) to 4 (high chance). One score was derived on the basis of the mean of the responses to these two questions. The Cronbach's alpha value for the questionnaire was 0.73.

3.3.2. Emotional appraisal

This measure included the participant's appraisal of danger and sense of fear. Appraisal of danger was examined on the basis of Solomon's (1995) questionnaire. Participants were asked to evaluate the extent to which they feel that their own life, their family's life, and the existence of the State of Israel are in danger, on a scale ranging from 0 (not at all) to 3 (very high). One score was derived on the basis of the mean response to the above three questions: the higher the score, the greater the perceived level of danger. The Cronbach's alpha for the current measure was 0.83.

Sense of fear was evaluated on the basis of Gal's (1992) questionnaire, which examined feelings of fear during the first gulf War. Participants were asked to rate their levels of fear in the current situation (i.e., the deployment of American troops in Iraq and the threat of missile attacks on Israel, on a scale ranging from 0 (not at all) to 10 (to a great extent).

3.3.3. Perceived self-efficacy

Participants were asked to rate their anticipated level of functioning in the event of an Iraqi missile attack on a scale ranging from "no problem" to "considerable difficulty".

4. Results

4.1. Acute stress disorder (point 1 $N = 54$)¹

Based on the criteria for acute stress disorder, 24% of the participants had ASD. An additional 13% had sub-clinical ASD (defined as only two dissociative symptoms (Elklit & Brink, 2004). Gender, age and education were not significantly related to acute stress disorder.

To examine whether there are differences among participants in the four clusters of ASD, MANOVA with repeated measurements was conducted. The MANOVA revealed a significant main effect for the four clusters of symptoms ($F(3, 51) = 31.09, p < .001$). A post-hoc Scheffe test revealed that the mean level of dissociation symptoms was lower ($M = 0.86$) than that of the other three clusters of symptoms ($M = 1.43, M = 1.53$ and $M = 1.6$ for avoidance, intrusion and hyperarousal, respectively).

¹ Due to small sample size, for each phase of analysis we made maximum use of the available data.

4.2. Post-traumatic stress disorder

Examining PTSD revealed that twelve participants from the research group (24%) fulfilled the criteria for PTSD, whereas none of the participants from the control group had PTSD. To examine whether there are significant differences in the levels of symptoms among participants in the three clusters of PTSD, MANOVA with repeated measurements was conducted. The MANOVA revealed significant differences between the three clusters of symptoms ($F(2, 48) = 8.79, p < 0.001$). The level of avoidance symptoms is significantly lower ($M = 1.66$) than the levels of the intrusion ($M = 1.87$) and hyper-arousal ($M = 1.89$).

4.3. Relationships between ASD and PTSD

Chi square test of the association between acute stress disorder (clinical and sub-clinical) and PTSD revealed a significant effect ($\chi^2 = 5.01, df = 1, p < 0.03$). Table 2 presents the joint distribution of ASD and PTSD.

As can be seen in Table 2, the chances of developing PTSD among participants who had ASD were three times greater (44%) than for those who did not have ASD (14%). However, over half of the participants who had ASD did not develop PTSD.

In addition, we sought to examine the unique contribution of each of the four clusters of the ASD (intrusion, avoidance, hyper-arousal and dissociation) to explaining the mean number of PTSD symptoms. Stepwise regression analysis revealed that hyper-arousal symptoms made a significant contribution to the explained variance of PTSD symptoms ($F(1, 43) = 49.55$, adjusted $R^2 = 54.1\%$, $\beta = 0.74, p < 0.001$). Dissociative symptoms entered the regression in the second step ($F(2, 420) = 29.41$, change $R^2 = 4.8\%$ $\beta = 0.33, p < 0.001$), whereas intrusion and avoidance symptoms did not contribute toward explaining PTSD distress.

4.4. Perceived threat of missile attack

To examine the association between exposure to terrorism and PTSD on the appraisal of the Iraqi missile attack threat a 4×3 MANOVA, was conducted. Cognitive, emotional and perceived self-efficacy were the dependent variables and participants' mental state was the independent variable (exposed to terrorism/PTSD, exposed to terrorism/no PTSD, and no exposure to terrorism) revealed a significant overall effect ($F(4, 78) = 7.06, p < 0.001$). Table 3 presents the means, standard deviations, and univariate test results.

Table 2
Distribution of PTSD according to ASD status^a

Group	PTSD <i>N</i> (%)	No PTSD <i>N</i> (%)	Total count
ASD (<i>N</i> = 16)	7 (43.8)	9 (56.3)	16 (100%)
No ASD (<i>N</i> = 29)	4 ^a (13.8)	25 (86.2)	29 (100%)
Total	11	34	44

^a Please note that one of the cells is less than 5.

Table 3
Means, standard deviations and *F* results of appraisal measures

Variables	Research group		Control group (<i>N</i> = 40) (<i>c</i>)	<i>F</i> (2, 84)
	PTSD (<i>N</i> = 12) (<i>a</i>)	Non-PTSD (<i>N</i> = 30) (<i>b</i>)		
Cognitive appraisal				
<i>M</i>	3.50	2.75	2.56	8.66 ^{***}
SD	(0.74)	(0.84)	(0.58)	<i>a</i> > <i>b</i> , <i>c</i>
Sense of danger				
<i>M</i>	2.38	1.66	1.70	8.85 ^{***}
SD	(0.38)	(0.64)	(0.53)	<i>a</i> > <i>b</i> , <i>c</i>
Sense of fear				
<i>M</i>	6.88	4.07	3.42	7.63 ^{***}
SD	(3.25)	(2.86)	(2.56)	<i>a</i> > <i>b</i> , <i>c</i>
Perceived self efficacy				
<i>M</i>	2.00	2.67	2.52	4.48 [*]
SD	(0.82)	(0.61)	(0.68)	<i>a</i> > <i>b</i> , <i>c</i>

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

Univariate analyses followed by post-hoc Scheffe tests revealed that participants who had been exposed to a terror attack and developed PTSD perceived the chances of a missile attack on Israel as higher, experienced greater feelings of danger and fear, and perceived their ability to cope as lower than participants in the other two groups. No significant differences between participants who had been exposed to a terrorist attack but did not develop PTSD and participants in the control group were found. No significant correlation was found between ASD and the perceived danger of the expected Iraqi threat.

5. Discussion

Approximately one out of four (1/4) people who were evacuated to the hospital after a terrorist attack were identified, 3–4 weeks later, with an acute stress disorder, and as many as one out of three (1/3) endorsed the criteria for sub-clinical ASD. Our findings are similar to those found in some studies of traffic accidents (Holeva & Tarrier, 2001), and violent attacks (Brewin et al., 1999; Elklit & Brink, 2004). The rates of sub-clinical ASD are similar to those that were reported in other studies (Elklit & Brink, 2004).

Several contributing factors may explain how a single brief exposure to a blast event can cause acute stress disorder in a quarter to a third of those who were exposed. For one, a terrorist attack impacts those who are unaware and least prepared to deal with such an onslaught. Then, there is the symbolic factor, of being hit in the very safety of one's daily routine and environment, like shopping centers, restaurants and buses. The knowledge that the traumatization was intentionally

perpetrated by humans might increase the sense of vulnerability and intensify the sense of fear among the victims of terrorism.

In our study ASD (including the sub-clinical cases) was found to be a risk factor for developing PTSD. Forty-three percent of those victims who displayed ASD symptoms at 3–4 weeks subsequently developed PTSD three months later. However, more than half of the people who had ASD recovered and had no subsequent symptoms of a recognized disorder four months after the event.

As for the significance of the individual clusters as predictors of PTSD, the findings suggest that hyperarousal symptoms contributed most substantially to the prediction of PTSD. This finding is consistent with studies conducted among other populations such as victims of severe trauma (Mellman, David, Bustamante, Fins, & Esposito, 2001), MI patients (Ginzburg et al., 2003), burn injuries (Difede et al., 2002), victims of violent crime (Brewin et al., 1999), and victims of terror (Shalev et al., 1998). It may be that just like persistent elevated heart rate, suggests dis-regulation of the autonomic nervous system (Bryant, 2003), persistent hyper arousal and the inability to return to base level responses may reflect an adjustment failure of wider psycho-physiological systems.

Our findings should be considered in the context of the debate regarding the status of ASD as a distinct clinical phenomenon (Bryant, 2003). On the one hand, the diagnosis of ASD is based on a large set of data, which indicate that initial stress reactions not only cause severe distress but are also implicated in long-term adjustment difficulties (Solomon, 1993). On the other hand, consistent with other studies (e.g., Blanchard et al., 1997; Ginzburg et al., 2003; Rothbaum, Foa, Riggs, Murdoch, & Walsh, 1992). ASD was found to be a transient phenomenon for more than half of the sample.

A quarter of our sample had PTSD four months after the event. This rate is similar to the rates of PTSD which were found after a violent attack (Brewin et al., 1999) and victims of terrorist attacks (Shalev et al., 1998). In addition, survivors with PTSD appraised the Iraqi threat as more dangerous and frightening, and themselves as less capable of coping with it, than people who were exposed to a terrorist attack and did not develop PTSD. These results are consistent with those of other studies, which found that PTSD was related to distorted cognitive appraisals in general, and to threat, fear and losing control in particular (Foa et al., 1999; Solomon et al., 1997). Consistent with our findings, a recent study found that the participants' perception of their ability to cope with a simulated threat was related to the severity of their PTSD symptoms. Moreover, the perceived ability to cope with a threat mediated the relationship between heart rate recovery and PTSD (Kibler & Lyons, 2004). These findings suggest that cognitive appraisal may play an active role in symptom maintenance.

Together, our findings support the prevailing notion that future vulnerability is not related to mere exposure to traumatic events or to acute reactions. However, future vulnerability is related to persistent distress. Survivors who developed PTSD were those who perceived the additional threat as being higher. Moreover, the relationship between a perceived ability to cope and real time coping has been documented (Benight & Harper, 2002). We therefore assume that in a case of an actual missile attack those with PTSD would have displayed a greater degree of maladjustment compared to those without PTSD.

Notwithstanding the contribution of the research findings, several limitations should be noted. First, the sample was relatively small, and the statistical validity of dividing a sample of this

nature into several groups is problematic. Moreover, the data of the research group were collected in telephone interviews, and the findings may have been different if clinical interviews had been conducted. Additionally, generalization is limited due to the fact that the Israeli population has been coping with the tension caused by ongoing threat of terrorist attacks. Moreover, although all the participants in the research group had been exposed to the same terrorist attack, the possible effect of variability in the specific characteristics of exposure (such as the distance of the event) was not examined.

To conclude, although ASD might predict future PTSD, the acute reactions often represent only a temporary symptomatic adjustment phase prior to recovery. However, from a clinical perspective, the fact that those with ASD are at a higher risk of developing PTSD, may serve as an important guideline. By identifying those with ASD, more directed and focused intervention efforts can, and should be invested in early on, in the hope of averting chronic PTSD.

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