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Late effect of the Second Lebanon War: Level of exposure and rates of comorbidity of posttraumatic stress symptoms and depresisve symptoms among Israelis from Northern

Menachem Ben-Ezra, PhD*
Yuval Palgi, PhD**
Amit Shira, MA**

* School of Social Work, Ariel University Center of Samaria, Ariel

** Department of Psychology, Tel Aviv University, Tel Aviv

ISRAEL

ABSTRACT – *Background and Objectives*: The objective of the present study was to examine comorbidity of posttraumatic stress disorder symptoms and depressive symptoms in the aftermath of war related stress among two groups differentiated by their level of exposure to the war.

Methods: 336 Israeli citizens were assessed using a convenience sample creating two groups from Northern and Central Israel. The former were exposed to missile attacks while the latter were indirectly exposed to war-related stress. The participants provided demographical information and filled a battery of questionnaire that assessed their physical health, mental health, and subjective well-being.

Results: The Northern group exhibited higher level of comorbidity, depressive symptoms and past satisfaction. Moreover, higher levels of depressive symptoms, psychosomatic symptoms and lower satisfaction with life in the past were associated with higher levels of PTSD symptoms.

Conclusions: Our findings suggest that the long-term effect of war is more salient when examining comorbidity of PTSD and depressive symptoms rather than when examining PTSD or depressive symptoms alone. In line with the dose-response model, it can be assumed that higher exposure to war related stress is related to higher levels of exposure that may lead to a long lasting vulnerability as it appears in a combination of PTSD symptoms and depressive symptoms two years later.

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Introduction

Exposure to traumatic events may results not only in post traumatic stress disorder (PTSD) but also in the development of other mental disorders, especially depression[1]. The U.S. national comorbidity study suggested that PTSD is associated with affective, anxiety and substance abuse disorders[2,3]. Most comorbidity studies focus on domestic trauma, especially violent crimes, sexually-related crimes, along with motor vehicle accidents[4-8]. One of the most prevalent psychiatric conditions that develop after traumatic exposure is depression[9,10]. There is a debate in the literature about the connection between PTSD and depression[11]. The general agreement is that in most cases of post traumatic exposure, depression is comorbid with PTSD. Moreover, there are some independent cases in which depression and posttraumatic symptoms are presented[6,8].

While, there is a plethora of studies that measured comorbidity among soldiers and veterans[12-16], the measurement of comorbidity estimates as a result of war-related exposure among civilians was previously done on hospital personnel[17]. However, there is a lacuna in psychiatric epidemiology with regard to the consequence of war on comorbidity estimates among civilians.

The basic conceptualization for our study is derived from the dose-response model for severe stress[18,19]. This model postulates that higher levels of traumatic stress exposure will lead to higher levels of post traumatic symptoms and stress-related illnesses. Thus, one can expect higher levels of comorbidity between PTSD symptoms and depressive symptoms among populations with higher war-related exposure. Another conceptual framework is derived from the resilience and vulnerability model for trauma exposure[20]. After exposure to traumatic event, the vulnerability model postulates that the psychological defense mechanisms are breached, thus making the individual more susceptible to future stress or traumatic event. In this case, there is a higher likelihood of mental health problems and an elevated risk for PTSD. Contrary to the vulnerability model, the resilience approach postulates that exposure to traumatic event can have an inoculation component by broadening one's coping repertoire and by promoting views that perceive the traumatic event as a challenge rather than as a catastrophe. An integration of these models was proposed[21] with reference to the combination of vulnerability and resilience, as both can exist at the same time, but in different functional domains. For example, an individual exposed to traumatic event can present psychiatric symptoms on the one hand, and still think that s/he prevailed adversity. In this case, we can expect that the individual will show a sign of vulnerability in certain psychiatric aspects but will not differ from unexposed individuals in other psychosocial and psychiatric domains.

The purpose of this study was to learn how exposure to different war-related stress is associated with different rates of comorbidity. To the best of our knowledge, no study examined the late effects of war on differential exposure in areas with different levels of exposure to war-related stress. The present study aimed to examine late effects of the Second Lebanon War in which Northern Israel was targeted by thousands of rockets (more than 4000) while Central Israel was not exposed to direct war-related stress. It should be noted that there are similar rates of domestic traumas (Motor vehicle accidents, crime rate and natural disasters) in Northern and Central Israel[22], and there was no major national event from August

2006 (the end of the Second Lebanon War) till December 2008 (the date in which the study was performed). Therefore, it is possible that any differences in the rate of comorbidity between PTSD symptoms and depressive symptoms between Northern and Central Israel may be attributed to different exposure to war-related stress. Based on the does-response model and the vulnerability approach, we hypothesized that the level of PTSD symptoms and depressive symptoms would be higher among those who were exposed to direct war related stress (the Northern group). Our second hypothesis was more complex and was based on the combination of resilience and vulnerability approaches. The main argument of this hypothesis was that vulnerability would present itself in higher comorbidity rate of PTSD symptoms and depressive symptoms that would be higher in Northern Israel in comparison to Central Israel, while other psychosocial and psychiatric domains would remain similar between the groups. This will delineate the co-existence of vulnerability and resilience as a result of exposure to traumatic event.

Methods

Event

On 12 July 2006 at 9:30 am, war erupted between Israel and Lebanon. Israel suffered 163 fatalities (44 civilians and 119 soldiers) and 2400 wounded (2000 civilians and 400 soldiers). During the war, Northern Israel was targeted by thousands of missiles (more than 4000). Most of the citizens in the north were in their shelters for a month, waiting for the war to end. Meanwhile, in Central Israel, the citizens continued with their daily routine, with only a minor stress as a result of threats from local flare-ups.

Participants

Participants were 336 Israeli citizens who were recruited using a convenience sample.

Each participant was contacted either by phone or personally and then interviewed face to face. The response rate was about 70%. The most common reason for refusal was 'not interested'. The study was conducted simultaneously in Northern and in Central Israel. The inclusion criteria of the Northern Israeli group were: 1) Being in Northern Israel during the Second Lebanon War in 2006 and being exposed to constant missile attacks for at least two weeks. 2) Age of 18 and above. The sample had two biases. One bias was as a result of the mass recruitment to the army reserve forces during the war that led to oversampling of women over men. A second bias was as a result of oversampling of participants from Central Israel in order to reflect the actual proportion of the Israeli population in Northern and Central Israel (ratio of 1:2.31). The participants were recruited during September-December 2008. All the participants were interviewed by trained social workers. The mean age of the entire sample was 27.25 (S.D. = 10.33), 74.1% of the sample were women (n = 241), 38.7% were married (n = 130), 30.7% were secular (n = 103), the mean years of education was 13.77 (2.27), and the salary based on the monthly average in Israel (7812 N.S = 1365 €) distributed as 82.4% (n = 234) below average, 9.9% (28) average, and 7.7% (n = 22) above average. The demographics along with other study variables are presented for each of the two study groups (North and Central Israelis) in Table 1.

There were demographic differences between the groups in marital status (χ^2 = 3.835; p = 0.001) and education (t = -3.740; p = 0.001). These differences correspond with the demographic population distribu-

tion in Northern Israel in comparison to Central Israel. According to the Central Bureau of Statistics[22], the population in Northern Israel is younger and less educated in comparison to Central Israel, an area that is considered much more socio-economically stronger[22].

The study was approved by the Helsinki committee at School of Social Work in Ariel University Center of Samaria.

Table 1
Participants' Characteristics According to Missile Exposure (n = 336)

	Northern Israel (n = 120)	Central Israel (n = 216)	Test statistics	*p* value
Age, y, Mean (S.D)	26.01 (12.52)	27.94 (8.84)	t = -1.647	0.101
Gender, women, n (%)	84 (70.0)	165 (76.4)	$\chi^2 = 1.279$	0.201
Marital status, married, n (%)	30 (25.0)	100 (46.3)	$\chi^2 = 3.835$	0.001
Religiosity, n (%)			$\chi^2 = 0.368$	0.713
Secular	26 (21.6)	77 (35.6)		
Traditional	47 (39.2)	36 (16.7)		
Religious	47 (39.2)	103 (47.7)		
Years of education, Mean (S.D)	13.12 (2.12)	14.11 (2.28)	t = -3.740	0.001***
Income, n (%)			$\chi^2 = 1.689$	0.091
Below average (1365 €)	57 (76.0)	177 (84.7)		
About average (1365 €)	10 (13.3)	18 (8.6)		
Above average (1365 €)	8 (10.7)	14 (6.7)		
Subjective health, Mean (S.D)	3.38 (.51)	3.34 (.56)	t = 0.741	0.459
GHQ score, Mean (S.D)	9.93 (6.10)	9.78 (5.37)	t = 0.242	0.809
PSP score, Mean (S.D)	9.00 (6.63)	7.86 (5.34)	t = 1.721	0.086
SWLS score, Mean (S.D)	24.38 (7.04)	24.72 (5.61)	t = -0.488	0.626
PCLC = > 50, n (%)	30 (26.3)	54 (26.7)	$\chi^2 = 0.080$	0.936
SCESD = > 10, n (%)	39 (32.5)	59 (27.4)	$\chi^2 = 0.974$	0.330
Comorbidity, n (%)	20 (17.6)	18 (8.9)	$\chi^2 = 2.365$	0.018*

GHQ = General Health Questionnaire.
SWLS = Satisfaction With Life Scale.
SCES-D = Short Center for Epidemiologic Studies Depression.
PCL-C = PTSD Check List – Civilian version.

Measures

The respondents provided demographical information (age, gender, marital status, years of education, and income). Gender was coded as 1 (men), and 2 (women). Marital status was coded as 1 (no married) after aggregating the following options (bachelor, divorced or separated, widowed), and 2 (married or living in cohabitation). Following the demographic variables, participants answered a battery of questionnaires that assessed their physical health, mental health, and psychological well-being.

Subjective health was indicated by asking the participant to rate his/her health on a scale of 1 (bad), 2 (fair), 3 (good), and 4 (excellent). This measure is known as an excellent measure for predicting one's health condition[23].

PTSD symptoms were measured by The PTSD Checklist Civilian Version (PCL-C) [24], which uses 17 items (e.g., 'having physical reactions (e.g., heart pounding, trouble breathing, or sweating) when something reminded you of a stressful experience from the past?', 'repeated, disturbing memories, thoughts, or images of a stressful experience from the past?', 'repeated, disturbing dreams of a stressful experience from the past?') addressing the DSM-IV diagnostic criteria for PTSD. Respondents used a 5-point scale to evaluate each symptom. Higher scores indicate greater post-traumatic symptomatology. Cronbach's alpha coefficient for the PCL-C for this sample was 0.97. A score of 50 and above is an indicator for an elevated level of PTSD symptoms[24].

Depressive symptoms were measured by The Short Center for Epidemiologic Studies Depression Scale (SCES-D)[25], which is a 10-item scale (e.g., 'I did not feel like eating: my appetite was poor', 'I felt that I could not shake off the blues even with help from my family or friends') intended to measure the severity of depressive symptoms caused by individual experiences. The items are rated by frequency on a 4-point scale, where higher scores reflect higher risk of depression. The Cronbach's alpha coefficient in this sample was 0.92. A score of 10 or above is an indicator for an elevated level of depressive symptoms[26].

Psychological distress was measured by the General Health Questionnaire (GHQ)[27], which contains 12 items (e.g., 'felt you couldn't overcome your difficulties?', 'been losing confidence in yourself?') for 12 specific psychological symptoms such as anhedonia and personal competence. Each item is rated by its frequency over the past few weeks on a 4-point scale. Higher scores indicate poorer mental health. Cronbach's alpha coefficient for this sample was 0.93.

Subjective well-being was measured by the satisfaction with life scale (SWLS)[28], a widely used measure of subjective well-being that contains 5-items (e.g., 'in most ways my life is close to my ideal', 'the conditions of my life are excellent'). The scale defines life satisfaction as a conscious cognitive judgment of life in which individuals compare their life circumstances to a self-imposed standard. The scale employs a seven-point Likert scale (1 – strongly disagree to 7 – strongly agree), with higher values corresponding to greater satisfaction. The SWLS has shown good reliability and validity[29]. Cronbach's alpha coefficient for this sample was 0.93.

Psychosomatic symptoms were measured by the Psychosomatic Problems Scale (PSP)[29]. The PSP is an eight-item scale and it is constructed through summation of the participants responses (raw scores) across the following eight items (e.g., 'had difficulty in concentrating', 'had difficulty in sleeping').

The response categories for all of these items, which are in the form of questions, were coded as 0 (never), 1 (seldom), 2 (sometimes), 3 (often), and 4 (always). The categories are ordered in terms of implied frequency month and the greater the frequency, the greater the psychosomatic distress. The justification of the scoring procedure has been examined with psychometric analysis using the Rasch model[29]. Cronbach's alpha coefficient for this sample was 0.84.

Statistical Analysis

We used descriptive statistics, t-tests and chi-square tests for measuring differences between respondents from Northern and Central Israel along with cross-tabulations of comorbidity for each region in Israel. Finally, we conducted a multiple regression in order to examine the association between the following variables: age, gender, marital status, religiosity, years of education, income, subjective health, GHQ scores, PSP scores, SWLS scores, and SCESD scores to PCLC scores. Finally, we have conducted two separate logistic regressions. The first logistic regression used the S-CESD cut off > 10 as elevated level of depressive symptoms as the independent variables whereas the dependent variable was elevated level of PTSD symptoms by measured by the PCLC cut off > 50. This logistic regression was used on Northern Israel group. The second logistic regression was the same as the first one and was used on the Central Israel group.

All the analyses were conducted using SPSS (SPSS, version 16, Chicago, IL).

Results

The results revealed that the population in Northern Israel exhibited higher comorbidity rate of PTSD symptoms and depressive symptoms (χ^2 = 2.365; p = 0.018). See Table 1 for more details. The comorbidity prevalence in Northern Israel (17.6%) was about twice than in Central Israel (8.9%). See Tables 2 and 3 for more details. Surprisingly, no significant differences were found between the groups on the separate scales of PCL-C and SCES-D. The results of the multiple regression revealed that having higher levels of depressive symptoms (S-CESD; β = 0.200; t = 2.051; p = 0.041), and psychosomatic symptoms (PSP; β = 0.200; t = 2.270; p = 0.024) were associated with higher levels of PTSD symptoms. Furthermore, the results of the logistic regression showed the participants from Northern Israel who had elevated level of depressive symptoms (S-CESD > 10) were 8.5 times more likely to have elevated risk of PTSD symptoms (HR = 8.500; 95% C.I = 3.340-

Table 2
Comorbidity of Increased Risk of PTSD and Depression in Northern Israel (n = 114)

	PCL-C < 50, n (%)	PCL-C = >50, elevated risk for PTSD, n (%)
SCESD < 10, n (%)	68 (59.6)	16 (14.0)
SCES-D => 10, elevated risk for depression, n (%)	10 (8.8)	20 (17.6)

SCES-D = Short Center for Epidemiologic Studies Depression.

PCL-C = PTSD Check List – Civilian version.

Table 3
Comorbidity of Increased Risk of PTSD and Depression in Central Israel (n = 202)

	PCL-C < 50, n (%)	PCL-C = >50, elevated risk for PTSD, n (%)
SCESD < 10, n (%)	108 (53.5)	40 (19.8)
SCES-D => 10, elevated risk for depression, n (%)	36 (17.8)	18 (8.9)

SCES-D = Short Center for Epidemiologic Studies Depression.
PCL-C = PTSD Check List – Civilian version.

Table 4
Multiple regression predicting PCLC scores (n = 336)

	β	t	p value
Age	0.007	0.087	0.931
Gender,	-0.008	-0.129	0.897
Marital status,	0.028	0.413	0.680
Religiosity	0.026	0.465	0.642
Years of education	0.058	0.879	0.380
Income	0.002	0.027	0.978
Subjective health	0.089	1.436	0.152
GHQ score	0.100	1.174	0.241
PSP score	0.211	2.501	0.013
SWLS score	-0.045	-0.649	0.517
SCESD score	0.204	2.139	0.033

GHQ = General Health Questionnaire.
SWLS = Satisfaction With Life Scale.
SCES-D = Short Center for Epidemiologic Studies Depression.
PCL-C = PTSD Check List – Civilian version.
*$p < 0.05$; ** $p < 0.01$; ***$p < 0.001$.

21.635; $p < 0.001$). However, these results were found to be non-significant among the Central Israel group (HR = 1.350; 95% C.I = 0.689-2.644; p = 0.381).

Discussion

The results indicated that level of exposure to war-related stress was associated with different comorbidity rates of PTSD symptoms and depressive symptoms. The results revealed that civilians from Northern Israel had a higher rate of comorbidity in comparison to civilians from Central Israel. It is interesting to see that on the other hand the prolonged effect of war on PTSD symptoms and depressive symptoms separately was not significant. It is to say that war has a unique long-term effect on comorbidity that is different from its effect on PTSD and de-

pression alone. In line with the dose-response model[18,19], it can be assumed that the combination of PTSD and depression might be a more sensitive indicator to assess long lasting vulnerability to war-related stress. Another possible explanation that is concurrent with the second hypothesis and the results is the integration of vulnerability and resilience. While most people cope with the aftermath of psychological trauma in various levels, there is a group of people who present vulnerability. Since the vulnerability is specific, it is to say that this specific vulnerability and a more general resiliency is predicted by the integrated model[21]. The number of studies regarding comorbidity as a result of war-related stress are few[17,30,31]. One lesson from this study can be applied to prospective studies in the case of large-scale disasters whether originated by man or attributed to the forces of nature. This is the measurement of level of exposure between exposed and non-exposed areas.

The main limitation of our study is the sampling method we used – a convenience sample. Although there were demographic differences between our groups, these are well-documented differences that represent the true nature of these regions, as seen in central bureau of statistics reports[22]. In light of our study, it is recommended to examine differential exposure on comorbidity rates of depressive symptoms and PTSD symptoms in other sources of trauma.

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Address for correspondence:
Dr. Menachem Ben-Ezra
School of Social Work
Ariel University Center of Samaria
Ariel 40700, Israel
Tel: +97236760285
E-mail: menbe@ariel.ac.il