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Confidence in the “Iron Dome” Missile Defense System Combined With a Sense of Resilience Reduced the Effect of Exposure on Posttraumatic Stress Disorder Symptoms After Missile Attacks

To the Editor: In this study, we examined posttraumatic stress disorder (PTSD) symptoms in Israeli civilians following the 2014 Israel-Gaza conflict, during which more than 4,500 missiles were fired on 70% of the Israeli population.¹ We addressed how 2 main putative protective factors may mitigate the impact of exposure to missile threat on PTSD symptom development.² The first factor, resilience, refers to a trait or an intrapsychological process that results in positive adaptation to trauma.³⁻⁵ Psychological resilience, potentially related to adaptive belief systems,⁶ typically reduces the detrimental effects of trauma exposure on PTSD symptoms.^{7,8} Herein we address whether resilience effects can be strengthened when coupled with a second factor, namely, one’s belief in the external protection of the new “Iron Dome” missile defense system. This system was developed in a joint United States/Israel venture, which was employed for the first time on a national scale during the 2014 Israel-Gaza conflict.¹ Therefore, our main research question was whether internal resilience coupled with belief in external protection further mitigates the impact of exposure on PTSD.

Methods. This study was conducted from December 2014 until January 2015. Respondents (N = 1,268, mean ± SD age = 36.97 ± 13.62, 53.2% women) completed an online questionnaire comprising exposure level to the missile threat, PTSD symptoms (PTSD Checklist for DSM-5,⁹ Cronbach α = .93), and resilience (Connor-Davidson Resilience Scale,¹⁰ Cronbach α = .91)—3 items addressing confidence in the Iron Dome system (Cronbach α = .83). We additionally examined a single item addressing estimated probability of Iron Dome success rate (0%–100%). Demographics (age, sex, marital status) and subjective health were also recorded. For more details, see eAppendix 1 at PSYCHIATRIST.COM.

Results. Resilience was moderately related to confidence in the Iron Dome system ($r = 0.21, P < .001$) and unrelated to probability

of successful intercepts attributed to the system ($r = -0.001$). These correlations suggest that resilience and beliefs regarding the Iron Dome are relatively distinctive variables (for additional descriptive statistics, see Supplementary eTable 1). Next, PTSD symptoms were regressed in a hierarchical regression analysis on exposure level, resilience, confidence in the Iron Dome system, their three 2-way interactions, and their single 3-way interaction. The significant 3-way interaction ($B = -0.81, t_{1,247} = -2.32, P = .02$) was probed by a computational procedure¹¹ applying equations estimating effects when confidence in the Iron Dome system and national resilience values were at ±1 SD from the mean. Level of exposure was positively related to PTSD symptoms under all conditions ($P < .01$) except under high resilience coupled with high-level confidence in the Iron Dome system, in which the effect of exposure on PTSD was no longer significant ($B = 0.83, t_{1,247} = 1.88, P = .07$). Similarly, the 3-way interaction between exposure, resilience, and estimated probability of Iron Dome success rate was significant ($B = -0.06, t_{1,227} = -2.65, P = .008$). Again, level of exposure was positively related to PTSD symptoms under all conditions ($P < .01$) except for high resilience combined with high estimated probability of successful Iron Dome intercepts, where the effect of exposure on PTSD was no longer significant ($B = 0.72, t_{1,227} = 1.61, P = .10$). Both 3-way interactions remained significant after controlling for age, sex, marital status, and subjective health ($P < .05$). Approximately 13% of the variance in PTSD symptoms was explained by each model (Table 1).

Following these findings, high resilience and high confidence in Iron Dome protection may be seen as 2 aspects of an adaptive belief system, respectively referring to the estimated internal and external sources of strength. The combination of these 2 components may have an overadditive effect on one’s sense of safety, an important factor associated with reduced symptoms in the aftermath of traumatic events.¹² Although sampling was constrained and possibly biased by Internet usage, these results call for additional examination of the mutual effects of estimated inner strength, coupled with belief in or appraisal of external protection, on PTSD symptoms.

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Table 1. Posttraumatic Stress Disorder Symptoms Predicted by Demographics, Exposure to Missiles, Resilience, “Iron Dome” Variables, and Their Interactions^a

Variable	Model 1			Model 2		
	B	β	P	B	β	P
Step 1: Demographics						
Age	-0.05	-0.06	.033	-0.05	-0.07	.037
Sex (women) ^b	3.74	0.17	.000	3.74	0.17	.000
Familial status (married) ^c	-0.44	-0.03	.225	-0.44	-0.04	.215
Subjective health	-1.70	-0.15	.000	-1.60	-0.14	.000
Step 2: Main effects						
Iron-Dome	-1.18	-0.07	.009	-0.04	-0.05	.100
Resilience	-2.49	-0.16	.000	-2.64	-0.17	.000
Exposure	1.77	0.20	.000	1.93	0.27	.000
Step 3: Two-way interactions						
Iron Dome × resilience	-0.15	-0.01	.757	-0.01	-0.01	.563
Iron Dome × exposure	0.31	0.26	.370	0.00	0.00	.967
Resilience × exposure	-0.73	-0.06	.028	-0.88	-0.07	.007
Step 4: Three-way interaction						
Iron Dome × resilience × exposure	-0.75	-0.06	.028	-0.06	-0.07	.010
R²	0.124			0.129		

^aModel 1 (n = 1,237): subjective belief in Iron Dome; Model 2 (n = 1,217): subjective probability of Iron Dome success.

^bWomen signifies the higher value.

^cMarried signifies the higher value.

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Supplementary Material

Article Title: Confidence in the “Iron Dome” Missile Defense System Combined With a Sense of Resilience Reduced the Effect of Exposure on Posttraumatic Stress Disorder Symptoms After Missile Attacks

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List of Supplementary Material for the article

1. [eAppendix 1](#) Supplementary Methods
2. [eTable 1](#) Descriptive Statistics of the Study Variables

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This Supplementary Material has been provided by the author(s) as an enhancement to the published article. It has been approved by peer review; however, it has undergone neither editing nor formatting by in-house editorial staff. The material is presented in the manner supplied by the author.

Supplementary Material

Letter Title: **Confidence in the 'Iron-Dome' Missile Defense System Combined with a Sense of Resilience Reduced the Effect of Exposure on Posttraumatic Stress Disorder Symptoms Following Missile Attacks**

Authors: Yaakov Hoffman, Sara Cohen-Fridel, Ehud Bodner, Ephraim Grossman, & Amit Shrira

List of Supplementary Material for the letter

1. eAppendix 1

Supplementary Methods and Results

Supplementary Methods

All participants provided written informed consent to procedures approved by the Institutional Review Board at Bar-Ilan University. We included only civilians who were in Israel during Operation Protective Edge, and remained within the missile range during this period. We recruited 40 research assistants for this study, with the goal of each research assistant recruiting 40 subjects. Questionnaires were administered to a convenience sample via a link sent through email or social media.

Exposures to missile attacks was indexed by seven items addressing threat of death or physical injury either to oneself or to others (e.g., "were you injured by missile attacks," "was someone close to you injured by missile attacks").

Endorsement of these items was conducted in a dichotomous "yes/no" fashion.

The exposure variable was calculated as the sum of endorsed items (1-7) addressing threat of death or physical injury to oneself and to others.

Confidence in the 'Iron-Dome' defense system was indexed by three items ("I am confident in the 'Iron-Dome' system," "The 'Iron-Dome' system reduces casualties," and "The 'Iron-Dome' system constitutes good protection from missiles"), which were rated on a 5-point Likert scale ranging from 1 ("not true at all") to 5 ("very true").

Data Analysis

In order to test the study hypotheses, we performed two hierarchical multiple regressions, one for each 'Iron-Dome' measure (subjective confidence and estimated probability of successful interception of missiles). All continuous variables (age, self-rated health, exposure, resilience, 'Iron-Dome' variables, and PTSD symptoms) were mean-centered. In each of the two models, the demographic variables were entered in Step 1, resilience, exposure and 'Iron-Dome' in Step 2, all three two-way interactions in Step 3, and the three-way interaction (Resilience X 'Iron-Dome' X Exposure) in Step 4.

The significant three-way interaction was probed by using the PROCESS computational tool¹. This tool calculates the main effect of exposure on PTSD symptoms within specific values of the moderators (i.e., Resilience, 'Iron-Dome' confidence): at 1 SD below the average level of the moderator, at the average level of the moderator, and 1 SD above the average level of the moderator.

Supplementary Results

Table 1. Descriptive Statistics of the Study Variables

Variables	
Age	
M	36.64
SD	13.58
Range	17-82
Gender (%)	
Women	47.30
Men	52.70
Marital Status (%)	
Not married ^a	10.55
Married ^b	89.45
Subjective health	
M	4.10
SD	0.95
Range	1-5
Sum PTSD symptoms	
M	28.88
SD	11.07
Range	20-82
Exposure	
M	2.50
SD	1.05
Range	1-7
Resilience	
M	3.69
SD	0.69
Range	1-5
'Iron-Dome' belief	
M	4.28
SD	0.65
Range	1-5
'Iron-Dome' probability	
M	0.81
SD	0.14
Range	0-1

Note: Maximal $N = 1147$. ^aIncludes the categories of 'never married', 'divorced' and 'widowed'. ^bIncludes the categories of 'married' and 'living with partner'.

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