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# Peritraumatic dissociation and posttraumatic stress symptoms: the moderating role of perceived threat

Sarah Bøgelund Dokkedahl <sup>a,b</sup> and Yael Lahav <sup>a</sup>

<sup>a</sup>Department of Occupational Therapy, School of Health Professions, Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel; <sup>b</sup>National Center of Psychotraumatology, Department of Psychology, University of Southern Denmark, Odense, Denmark

## ABSTRACT

**Background:** Although peritraumatic dissociation (PD) is viewed as a risk factor for posttraumatic stress disorder (PTSD), prospective studies taking into account other well-known risk factors for PTSD have been scarce, and the exploration of potential moderators within the relations between PD and PTSD has been lacking.

**Objective:** Filling this gap, this prospective study explored the moderating role of perceived threat within the relations between PD and PTSD, above and beyond age, gender, education, and early trauma-related symptoms.

**Method:** A convenience sample of 200 Israeli civilians filled out self-report questionnaires during the peritraumatic phase (T1) and one to two months after the posttraumatic phase (T2) of being exposed to rocket attacks.

**Results:** The results showed that perceived threat and PD were associated with early trauma-related symptoms and PTSD symptoms. Moreover, perceived threat moderated the relationship between PD and all PTSD symptom clusters apart from avoidance.

**Conclusions:** The present results suggest that the implications of PD are shaped by levels of perceived threat, so that detriments of PD are evident when the trauma is appraised as being highly threatening. Therefore, early interventions that aim to decrease PD may be beneficial in preventing PTSD symptoms of intrusion, hyper arousal, and negative alterations in mood and cognition, for individuals who perceive traumatic events as highly threatening.

## Disociación peritraumática y síntomas de estrés postraumático: el papel moderador de la amenaza percibida

**Antecedentes:** Aunque la disociación peritraumática (DP) es considerada como un factor de riesgo para el trastorno de estrés postraumático (TEPT), los estudios prospectivos que toman en cuenta otros factores de riesgo bien conocidos para el TEPT han sido escasos y ha faltado la exploración de moderadores potenciales dentro de las relaciones entre la DP y el TEPT.

**Objetivo:** Para llenar este vacío, este estudio prospectivo exploró el papel moderador de la amenaza percibida dentro de las relaciones entre la DP y el TEPT, más allá de la edad, género, educación y síntomas tempranos relacionados con trauma.

**Método:** Una muestra por conveniencia de 200 civiles israelíes contestaron cuestionarios de auto-reporte durante la fase peritraumática (T1) y uno a dos meses después de la fase postraumática (T2) de exposición a los ataques con cohetes.

**Resultados:** Los resultados mostraron que la amenaza percibida y la DP estuvieron relacionadas con síntomas tempranos relacionados con el trauma y síntomas de TEPT. Además, la amenaza percibida moderaba la relación entre la DP y todos los grupos de síntomas del TEPT a excepción de la evitación.

**Conclusiones:** Los resultados actuales sugieren que las implicaciones de la DP están determinadas por los niveles de amenaza percibida, de modo que los perjuicios de la DP son evidentes cuando el trauma se evalúa como altamente amenazante. Por lo tanto, las intervenciones precoces que buscan disminuir la DP pueden ser beneficiosas para prevenir los síntomas intrusivos, la hiperalerta y las alteraciones negativas en el ánimo y la cognición del TEPT, para las personas que perciben eventos traumáticos como altamente amenazantes.

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## PALABRAS CLAVE

Amenaza percibida;  
disociación peritraumática;  
TEPT; guerra; trauma



## HIGHLIGHTS

- Perceived threat was related to early trauma-related symptoms and PTSD symptoms.
- Peritraumatic dissociation was related to early trauma-related symptoms and PTSD symptoms.
- Perceived threat moderated the link between peritraumatic dissociation and PTSD symptoms.

## 1. Introduction

War is a severe traumatogenic event that may result in long-term mental detriments (Charlson et al., 2019; Palmieri et al., 2008). It often has irreversible effects on civilians, may destroy communities and families,

and result in long-term physical and psychological harm in children and adults (Murphy & Lakshminarayana, 2006). Posttraumatic stress disorder (PTSD), which reflects such an injury, is a severe psychiatric disorder associated with great loss in the form of

**CONTACT** Yael Lahav  yaellah1@tauex.tau.ac.il  Department of Occupational Therapy, Faculty of Medicine, Tel Aviv University, P.O.B. 39040, Ramat Aviv, Tel-Aviv, 69978, Israel

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decreased quality of life and functional impairment (Goldstein et al., 2019; Jellestad et al., 2021). The key diagnostic criteria for PTSD are distributed across four symptom clusters, which are present for more than one month at the posttraumatic phase: intrusion, avoidance, negative alterations in mood and cognition, and alterations in arousal and reactivity (American Psychiatric Association, 2022). In some cases, symptoms of dissociation can co-occur with PTSD. Therefore, the DMS-5-TR includes a dissociative subtype of PTSD (American Psychiatric Association, 2022), which is associated with decreased treatment success (Wolf et al., 2012).

Nevertheless, given that individuals vary in post-traumatic distress, with the majority exhibiting spontaneous recovery within the first six months after the traumatic events ends (Bonanno, 2004; Galea et al., 2003; Santiago et al., 2013), identifying factors that increase susceptibility to PTSD is of importance. Research to date has revealed several risk factors for PTSD, among them sociodemographic characteristics, early trauma-related symptoms, and perceived threat. Studies have indicated that being younger at the time of trauma (Brewin et al., 2000; Hamam et al., 2021), being a woman (Christiansen & Hansen, 2015; Irish et al., 2011; Neria et al., 2010; Olf et al., 2007), and being less educated (Brewin et al., 2000) put one at higher risk for PTSD. Additionally, evidence has suggested that exposure to a series of potentially traumatic events during war may result in the onset of symptoms that are regularly attributed to the posttraumatic phase at the peritraumatic phase (Charney et al., 2023). These early trauma-related symptoms, such as re-experiencing trauma, avoiding trauma-related stimuli, holding negative beliefs, and suffering from negative mood states and increased reactivity, have been found to contribute to subsequent PTSD (Gelkopf et al., 2019; Lapid Pickman et al., 2017; Neria et al., 2010). Lastly, perceived threat, which is defined as the individual's cognitive assessment of the likelihood and severity of danger, has been consistently documented as a risk factor intensifying one's vulnerability to PTSD (Lancaster et al., 2016; Ozer et al., 2003; van Wingen et al., 2011).

Nonetheless, the implications of one of the most studied reactions during trauma exposure, known as peritraumatic dissociation, for PTSD are far from being fully understood. Peritraumatic dissociation (PD) denotes 'alterations in perception of time, place, and person, which reflect a sense of unreality', during or immediately following a traumatic event (Zoellner et al., 2002, p. 49). Peritraumatic dissociation entails manifold reactions varying from being confused, disoriented, or shocked to experiencing harm or loss of reality orientation, or suffering from fragmentation of consciousness and self (Lensvelt-Mulders et al., 2008; Martin & Marchand, 2003;

Nijenhuis et al., 2001; van der Kolk & van der Hart, 1989). Although the immediate effects of PD may be adaptive (Bryant, 2009), as it allows the individual to tolerate extremely stressful events, its long-term implications are widely assumed to be pathogenetic (Candel & Merckelbach, 2004). According to trauma scholars, PD impedes access to traumatic memories, thereby impairing the ability to process the event (Bryant, 2006; McDonald et al., 2013; Spiegel et al., 1996), and increasing the risk for PTSD (Breh & Seidler, 2007; Marmar et al., 1998; Ozer et al., 2003; Shalev et al., 1996; Sugar & Ford, 2012; van der Velden et al., 2006).

Yet, research exploring this claim has been limited and inconclusive. First, most research consisted of retrospective reports, which may be limited due to recollection bias and the potential effects of the current condition (Ozer et al., 2003; van der Velden et al., 2006). Second, systematic reviews of quasi-prospective (Breh & Seidler, 2007) and longitudinal (van der Velden & Wittmann, 2008) studies have indicated that most research has not taken into account other PTSD risk factors, and therefore could not identify the unique contribution of PD in predicting PTSD. Moreover, these reviews revealed inconsistent findings, with some indicating that PD is a predictor of PTSD (Breh & Seidler, 2007), while others indicated that the independent predictive value is either non-existent or weak after controlling for initial mental health problems (van der Velden & Wittmann, 2008), peritraumatic stress, and psychological distress (van der Velden et al., 2006). Lastly, another prominent limitation of previous research is the lack of exploration of potential moderators in the relations between PD and PTSD (Briere et al., 2005).

Perceived threat, which has been found to be related to both PTSD (Lancaster et al., 2016; Ozer et al., 2003; van Wingen et al., 2011) and PD (Bovin et al., 2014; Dokkedahl & Lahav, 2023), may serve as such a potential moderator. Evidence suggests that appraisal of threat, rather than the actual environmental stressor, determines the impact of stress exposure (Heir et al., 2016; van Wingen et al., 2011). Furthermore, research has indicated that perceived threat is a better predictor of PTSD symptoms than the actual traumatic event, and that it moderates the neural sequelae of trauma (van Wingen et al., 2011). These findings may raise the question of whether perceived threat has a moderating role in the relationship between PD and PTSD, so that the implications of PD for PTSD are shaped by appraisal of threat. It is plausible that when an event is appraised as less threatening, and thus as less challenging or stressful (Sebastian et al., 2020), the harmful consequences of PD on processing the event are limited. Thus, the effects of PD in predicting PTSD symptoms are insignificant. Conversely, evaluating an event as

greatly threatening may result in strain and stress to which individuals may be markedly vulnerable. Under such conditions, the negative effects of PD on one's ability to process the traumatic event may be prominent, and thus the contribution of PD in predicting subsequent PTSD symptomatology may be substantial.

The present prospective study aimed to explore these suppositions for the first time by assessing Israeli civilians during (T1) and one to two months after (T2) rocket attacks, which were part of Operation Guardian of the Walls. Operation Guardian of the Walls lasted 12 days (10 May 2021 through 21 May 2021), during which time Hamas and the Palestinian Islamic Jihad (PIJ) fired 4,360 rockets at Israel. These attacks exposed hundreds of thousands of Israeli civilians to the threat of rocket fire. Building on previous discrepancies regarding the relationship between PD and PTSD, the present study aimed to explore the relationship between PD and perceived threat at T1 and PTSD symptoms at T2, and to assess the moderating role of perceived threat at T1 in the relationship between PD at T1 and PTSD symptoms at T2, after adjusting for other PTSD risk factors consisting of sociodemographic characteristics (age, sex, and education) and early trauma-related symptoms at T1.

## 2. Materials and methods

### 2.1. Participants and procedure

This research employed a convenience sample of Israeli adults using an online survey. Data was collected at two timepoints: (1) *During the peritraumatic phase (T1)* – 14 May 2021 (the fifth day of the operation) to 21 May 2021 (several hours after the ceasefire); and (2) *During the posttraumatic phase (T2)* – 30 June 2021 to 31 July 2021. The survey was administered using Qualtrics software (QualtricsLabs, Inc., Provo, UT, USA). The Tel Aviv University institutional review board (IRB) approved all procedures and instruments. At both measurements, respondents were notified regarding the research goals, the nature of the questions, and the study's approval by the relevant IRB, and were provided with contact information for the PI (a clinical psychologist who specializes in treating PTSD), as well as for several organizations in Israel that provide support or treatment. Respondents signed a consent form stating that they understood the nature of the study, and that they could withdraw their participation at any point without repercussions. To prevent duplicative entries to the survey, a built-in option of the Qualtrics platform ('Prevent Ballot Box Stuffing') was utilized. Additionally, to identify potential fraudulent entries submitted by bots, records attached to IP addresses that were duplicated in the data were discarded.

At T1, participants were recruited through a Facebook advertisement. Facebook users were eligible for this study if they were  $\geq 18$  years old and living in Israel. The Facebook advertisement was in Hebrew, and consisted of a headline, main text, and link to the survey. The survey was advertised as a study exploring coping with rocket attacks, and the questionnaire completion time ranged between 15 and 30 min. At the end of the survey, participants were asked to leave their email address if they were willing to take part in the second measurement of the study. Participants were informed that their email addresses would be kept in a secured file (protected by password), separately from the dataset, and that there would be no use of their email addresses apart from inviting them to participate in the second measurement of the study. At T2, participants who provided their email addresses were contacted via email and invited to take part in the second measurement. The invitation consisted of a headline, main text, and link to the survey. The questionnaire completion time ranged between 15 and 30 min.

In the first assessment (T1), a total of 794 responses were collected, of which 739 (93%) reported being exposed to rocket attacks and answered some of the survey's questionnaires, and 488 participants provided data regarding the study variables. Exposure to rocket attacks referred to a direct exposure, namely, being in places that were fired upon by rockets. When a rocket was fired, sirens sounded in the targeted area, and people were directed to immediately seek shelter. Of these, 315 (64.5%) agreed to be invited via email to take part in the second assessment. In the second assessment (T2), 236 participants answered some of the survey's questionnaires, and 200 provided data regarding the study variables. Hence, the current sample consists of 200 participants who provided data regarding the study variables in both assessments. The participants were all Jewish. Their ages ranged from 20 to 75 ( $M = 37.8$ ,  $SD = 10.4$ ), and the majority of the sample was female ( $N = 161$ , 80.5%). Most of the sample stated being secular (68.5%), being in an intimate relationship (61.5%), having an undergraduate or graduate degree (65%), and earning an average or above-average income (56%).

### 2.2. Measures

**Background Variables.** Participants completed a brief demographic questionnaire that assessed age, gender, education, relationship status, religiosity, and income.

**Peritraumatic Dissociation (T1).** Peritraumatic dissociation at T1 was measured using the Peritraumatic Dissociative Experiences Questionnaire (PDEQ; Marmar et al., 1998), which was translated into Hebrew (Shalev et al., 1997). The scale assesses experiences of peritraumatic dissociation, including



depersonalization, derealization, and altered time perception. The PDEQ comprises eight items that are scored on a 5-point Likert scale ranging from '1 = not at all true' to '5 = extremely true'. One of the items refers to analgesia in the aftermath of physically injury. Given that less than 1% of participants reported being physically injured during the operation, this item was omitted. The PDEQ (Marmar et al., 1998) and the Hebrew version of the PDEQ (Shalev et al., 1997) have good psychometric properties. In the present study, internal consistency was good ( $\alpha = .85$ ).

**Perceived Threat (T1).** Perceived threat was measured by asking respondents to indicate their sense of threat from the rocket attacks during the operation on a scale of 0 ('not at all') to 100 ('highly threatened').

**Posttraumatic Stress Symptoms Related to Operation Guardian of the Walls (T2).** Posttraumatic stress symptoms in response to Operation Guardian of the Walls were measured the PTSD Checklist (PCL-5; Weathers et al., 2013), which was translated into Hebrew by the Israel Ministry of Defense ([https://www.health.gov.il/Services/Committee/psychologistscouncil/Documents/PCL-5\\_info.pdf](https://www.health.gov.il/Services/Committee/psychologistscouncil/Documents/PCL-5_info.pdf)). In this 20-item self-report measure, participants were asked to indicate the extent to which they experienced each PTSD symptom, on a 5-point Likert scale ranging from 0 (*not at all*) to 4 (*extremely*). Items corresponded to the newly approved PTSD symptom criteria in the *DSM-5-TR* (American Psychiatric Association, 2022). For the current study, the original version was adapted, such that the timeframe for experiencing each symptom was changed from 'in the past month' to 'since ceasefire', and the index event was the rocket attacks during the Operation Guardian of the Walls. Although not a definitive diagnostic measure, preliminary research suggests a cutoff score of 33 is a useful threshold to indicate symptomatology that may be at clinical levels (Bovin et al., 2016). The PCL-5 demonstrates high internal consistency and test-retest reliability (Bovin et al., 2016). In this study the PCL-5 had good internal consistency reliabilities for intrusion, avoidance, negative alterations in mood and cognition, and hyperarousal clusters ( $\alpha = 0.90, 0.88, 0.91, 0.86$ , respectively).

**Control Variables.** Given that age, gender, education, and early trauma-related symptoms have been known to be associated with PTSD symptoms (Brewin et al., 2000; Christiansen & Hansen, 2015; Hamam et al., 2021; Neria et al., 2010), these factors were treated as control variables in this analysis. Early trauma-related symptoms in response to rocket attacks were measured at T1 via a modified version of the PCL-5 (Weathers et al., 2013). The original version was adapted so that the timeframe for experiencing each symptom was changed from 'in the past month' to 'during the current rocket attacks', with the index event being the rocket attacks that were part of Operation Guardian of the

Walls. Participants were asked to indicate the extent to which they experienced each symptom on a 5-point Likert scale ranging from 0 (*not at all*) to 4 (*extremely*). In this study the PCL-5 had good internal consistency reliabilities for intrusion, avoidance, negative alterations in mood and cognition, and hyperarousal clusters ( $\alpha = 0.87, 0.78, 0.84, 0.84$ , respectively).

### 2.3. Analytic strategy

All analyses were conducted using SPSS 29. To assess the associations between the study variables, Pearson correlation tests (for continuous variables), independent samples *t*-tests, and Chi-square tests with Yate's continuity correction (for the dummy variable of gender) were conducted. To assess the moderating role of perceived threat in the relations between PD and PTSD symptoms above and beyond the effects of age, gender, education, and early trauma-related symptoms four hierarchical regression analyses were conducted for each of the PTSD symptom clusters. The analysis included five blocks. The first block consisted of age, gender, and education. The second consisted of perceived threat. The third comprised early trauma-related symptoms. The cluster type of early trauma-related symptoms varied between analyses, so that it was identical to that of PTSD symptoms (the dependent variable). The fourth encompassed PD. The fifth block consisted of the interaction between perceived threat and PD. All the variable scores were standardized. Next, significant interactions were probed using the PROCESS computational macro extension for SPSS (Hayes, 2012).

## 3. Results

### 3.1. Posttraumatic stress symptoms in the aftermath of Operation Guardian of the Walls

Of the total sample, 45.5% ( $n = 91$ ) reported at least one intrusion symptom, 30.0% ( $n = 60$ ) reported at least one avoidance symptom, 48.5% ( $n = 97$ ) reported at least one symptom reflecting negative alterations in mood and cognition, and 70.0% ( $n = 140$ ) reported at least one hyperarousal symptom. Furthermore, 19.0% ( $n = 38$ ) of the participants had a PTSD total score of 33 or above, indicating that their symptoms were clinically significant.

### 3.2. Associations between PD, perceived threat, and PTSD symptoms

As can be seen in Table 1, participants' PD and perceived threat at T1 were related to elevated PTSD symptoms at T2: the higher the levels of PD, the higher the levels of all four clusters of PTSD symptoms. Similarly, the higher the levels of perceived threat, the

**Table 1.** Inter-correlations of the study variables and PTSD symptoms ( $n = 200$ ).

Measure	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Age	–												
2. Gender	.25***	–											
3. Education	–.02	.04	–										
4. Perceived threat (T1)	–.05	.25***	–.02	–									
5. Peritraumatic dissociation (T1)	–.22**	.14*	–.21**	.32***	–								
6. Early trauma-related symptoms – Intrusion (T1)	–.27**	.24***	–.27***	.42***	.67***	–							
7. Early trauma-related symptoms – Avoidance (T1)	–.17*	.13	–.09	.29***	.66***	.68***	–						
8. Early trauma-related symptoms – Negative alterations in mood and cognition (T1)	–.21*	.08	–.08	.26***	.61***	.68***	.69***	–					
9. Early trauma-related symptoms – Hyperarousal (T1)	–.33**	.20**	–.12	.45***	.57***	.69***	.60***	.72***	–				
10. PTSD symptoms – Intrusion (T2)	–.14*	.18**	–.19**	.35***	.59***	.68***	.61***	.57***	.51***	–			
11. PTSD symptoms – Avoidance (T2)	–.13	.13	–.12	.30***	.52***	.57***	.56***	.57***	.45***	.81***	–		
12. PTSD symptoms – Negative alterations in mood and cognition (T2)	–.16*	.03	–.14	.21**	.57***	.52***	.57***	.61***	.40***	.77***	.80***	–	
13. PTSD symptoms – Hyperarousal (T2)	–.12	.11	–.17*	.27***	.63***	.61***	.55***	.56***	.51***	.81***	.71***	.80***	–
M/%	37.8	80.5	15.9	56.4	9.9	3.9	1.4	5.6	8.8	6.9	2.8	9.3	9.3
(SD)/category	10.4	(Female)	3.1	27.9	4.3	4.4	1.9	5.8	5.3	3.2	1.6	4.3	4.1

Note. \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

higher the levels of all four clusters of PTSD symptoms. Peritraumatic dissociation and perceived threat at T1 were also related to early trauma-related symptoms at T1. The higher the levels of PD and perceived threat, the higher the levels of all four clusters of early trauma-related symptoms.

### 3.3. Peritraumatic dissociation and PTSD symptoms: the moderating role of perceived threat

The four hierarchical regressions models were significant, and explain 53.0% of the variance in intrusion symptoms,  $F(7,192) = 30.91$ ,  $p < .001$ ; 37.6% of the variance in avoidance symptoms,  $F(7,192) = 16.52$ ,  $p < .001$ ; 47.2% of the variance in negative alteration in mood and cognition,  $F(7,192) = 24.53$ ,  $p < .001$ ; and 45.7% of the variance in hyperarousal symptoms,  $F(7,192) = 23.10$ ,  $p < .001$  (see Table 2). The models revealed significant effects for early trauma-related symptoms in predicting all four PTSD symptoms clusters, and a significant effect for PD in predicting PTSD hyperarousal symptoms. More importantly, the results indicated that perceived threat had a significant effect in moderating the relationship between PD and all PTSD symptoms clusters except avoidance. These significant interactions were probed using the PROCESS (Model 1) computational macro (Hayes, 2012) by computing their conditional effects at 1 SD below and 1 SD above the mean of the moderator, that is, levels of perceived threat. Probing these interactions revealed a similar trend: whereas, under conditions of low levels of perceived threat, PD had a non-significant effect in explaining intrusion, negative alteration in mood and cognition, and hyperarousal symptoms ( $\beta = .12$ ,  $p = .35$ ;  $\beta = -.10$ ,  $p = .47$ ;  $\beta = .09$ ,  $p = .52$ ,

respectively); under conditions of high levels of perceived threat, PD predicted elevated intrusion, negative alteration in mood and cognition, and hyperarousal symptoms ( $\beta = .32$ ,  $p < .001$ ;  $\beta = .38$ ,  $p < .001$ ;  $\beta = .52$ ,  $p < .001$ , respectively).

## 4. Discussion

Earlier research has suggested that perceived levels of threat (Lancaster et al., 2016; Ozer et al., 2003; van Wingen et al., 2011) and PD (Breh & Seidler, 2007; Marmar et al., 1998; Shalev et al., 1996) are risk factors for the development of PTSD. The present study found that, although both were associated with early trauma-related symptoms at T1 and PTSD symptoms at T2, the implications of PD for PTSD symptoms were moderated by perceived threat. Thus, under conditions of low levels of perceived threat, PD had a non-significant effect in explaining PTSD symptoms, whereas, under conditions of high levels of perceived threat, PD predicted elevated levels of PTSD symptoms. It is noteworthy that this moderating effect was found for PTSD symptoms of intrusion, negative alterations in mood and cognition, and hyperarousal, but not for avoidance symptoms.

As described, perceived threat is understood to reflect the individual's cognitive assessment of the likelihood of danger and how severely this danger will affect them, and has been argued to determine the impact of trauma exposure (Heir et al., 2016; van Wingen et al., 2011). The current findings further suggest that perceived threat may shape the implications of PD for future PTSD symptomatology: whereas PD among individuals who appraise the traumatic event as less threatening may be less detrimental, PD among individuals who appraise the traumatic

**Table 2.** The moderating role of perceived threat in the relations between peritraumatic dissociation and PTSD symptoms ( $n = 200$ ).

	PTSD symptoms Intrusion (T2)		PTSD symptoms Avoidance (T2)		PTSD symptoms Negative alteration (T2)		PTSD symptoms Hyperarousal (T2)	
	$\beta$	$\Delta R^2$	$\beta$	$\Delta R^2$	$\beta$	$\Delta R^2$	$\beta$	$\Delta R^2$
Block 1								
Age	-.07	.08***	-.09	.04*	-.15	.03	-.07	.05*
Gender	.18*		.12		.01		.11	
Education	-.19*		-.11		-.11		-.17*	
Block 2								
Age	-.07	.10***	-.09	.07***	-.15	.04**	-.07	.06***
Gender	.09		.05		-.05		.05	
Education	-.18*		-.10		-.10		-.16*	
Perceived threat (T1)	.33***		.28***		.21**		.25***	
Block 3								
Age	.05	.30***	-.02	.23***	-.02	.31***	.08	.18***
Gender	.01		.03		-.03		.03	
Education	-.02		-.07		-.08		-.14*	
Perceived threat (T1)	.08		.14*		.06		.04	
Early trauma-related symptoms <sup>a</sup> (T1)	.62***		.48***		.54***		.50***	
Block 4								
Age	.06	.04***	-.01	.03**	-.01	.06***	.08	.15***
Gender	.02		.03		-.05		.01	
Education	-.02		-.04		-.03		-.06	
Perceived threat (T1)	.07		.11		.01		-.01	
Early trauma-related symptoms <sup>a</sup> (T1)	.46***		.35***		.38***		.25***	
Peritraumatic dissociation (T1)	.25***		.22**		.30**		.47***	
Block 5								
Age	.06	.03***	-.01	.01	-.01	.03***	.10	.02**
Gender	.05		.04		-.02		.04	
Education	-.01		-.04		-.03		-.06	
Perceived threat (T1)	.08		.12		.02		-.01	
Early trauma-related symptoms <sup>a</sup> (T1)	.47***		.35***		.40***		.30***	
Peritraumatic dissociation (T1)	.11		.16		.15		.32***	
Perceived threat (T1) X peritraumatic dissociation (T1)	.20***		.08		.22***		.19**	

Note: All study variables were standardized. \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

<sup>a</sup>In each analysis, the cluster of Early trauma-related symptoms was identical to that of PTSD symptoms.

event as highly threatening may serve as a risk factor for future PTSD. Hence, these findings imply that elevated perceived threat may not only trigger PD as a defense mechanism (Lanius, 2015), but may also increase vulnerability to its detriments over time.

It may be that in cases when the traumatic event is assessed as less threatening, and thus as less demanding or stressful (Sebastian et al., 2020), reprocessing it is not essential. Hence, even though one may experience PD during trauma exposure, it may not have the same harmful long-term effects. Conversely, it may be that appraising a traumatic event as greatly threatening results in one experiencing elevated strain and stress (Heir et al., 2016; van Wingen et al., 2011), and thus the need for reprocessing the event becomes critical to overcoming it. Thus, under these conditions, the potential effects of PD in interfering with encoding of the traumatic memory as well as with processing it (Bryant, 2006; McDonald et al., 2013; Spiegel et al., 1996) become particularly prominent, and may result in symptoms of re-experiencing, negative alterations in mood and cognition, and hyperarousal at the posttraumatic phase.

This proposed explanation may elucidate the mixed results concerning the relations between PD and later

PTSD symptomatology found in the literature (Breh & Seidler, 2007; Kumpula et al., 2011; Marmar et al., 1998; Ozer et al., 2003; van der Velden et al., 2006; Wittmann et al., 2006), given that previous studies did not consider individuals' threat appraisals. Nonetheless, future prospective studies should further explore this prospect. It is further important to note that previous research has indicated that symptoms of persistent dissociation may be a stronger predictor of the development and maintenance of later PTSD symptomatology, compared with PD (Panasetis & Bryant, 2003; Werner & Griffin, 2012). It would be relevant to study how threat appraisal relates to symptoms of persistent dissociation, and whether such an association is influenced by the extent and type of trauma.

Avoidance was the only PTSD symptom cluster for which the level of perceived threat did not moderate the relationship with PD. In the multivariate model, only early trauma-related symptoms at T1 were a significant predictor of avoidance symptoms at T2. Hence, neither perceived threat, PD, nor the interaction between them, predicted avoidance symptoms when all other factors were accounted for. Although research examining the relationship between



peritraumatic responses and specific PTSD symptom clusters has been scarce (Dewey et al., 2014), these findings are consistent with the few available studies (deMello et al., 2022; Massazza et al., 2021; van der Velden et al., 2006). For instance, a recent cross-sectional study by deMello et al. (2022) revealed significant correlations between PD and all PTSD symptom clusters except for avoidance in women who had recently been sexually assaulted. Moreover, Massazza et al. (2021) investigated the factor structure of six well-known peritraumatic measures and their relationship with the four PTSD symptom clusters. Interestingly, PD and data-driven processing (e.g. disproportionate perceptual processing), which loaded on the same factor, and are labelled as ‘cognitive overload’, were associated with intrusion, negative alterations in mood and cognition, and arousal, but not with avoidance (Massazza et al., 2021). Finally, van der Velden et al. (2006) found that PD was not an independent predictor of avoidance reactions or PTSD-symptoms when initial psychological distress was accounted for.

Research has shown that the dysfunctional brain circuits that underly PTSD are different for each PTSD symptom cluster (Fenster et al., 2018). Therefore, it might be that PD does not contribute to dysfunctional brain circuits associated with avoidance. In fact, evidence suggests opposite patterns of brain activity related to avoidance vs. dissociation – whereas avoidance was associated with increased amygdala and insula activation (Fenster et al., 2018; Schlund & Cataldò, 2010), the dissociative subtype of PTSD was associated with decreased amygdala and insula activation (Fenster et al., 2018). Yet, the neurobiological underpinning of avoidance is surprisingly understudied, and further research in this area is warranted (Fenster et al., 2018).

Important limitations of the study should be noted. First, the study relied on self-report measures rather than on a thorough clinical assessment of participants’ symptomatology. Second, female and secular participants were overrepresented in the study. Previous research has suggested that religiousness may be related to resilience in the face of stress (see, e.g. Kaplan et al., 2005). Additionally, earlier studies have demonstrated that both perceived threat and PD can help explain gender differences in later PTSD symptomatology (Irish et al., 2011; Olf et al., 2007), and women are more likely to develop PTSD than are men (Olf et al., 2007). Although the present study controlled for the effects of gender, future research should replicate these findings in a male sample, and take into account participants’ religiosity. Third, this study was conducted among Israeli participants. Research has emphasized the toll of the Israeli-Palestinian conflict on citizens on both sides of the border (Ayer et al., 2017), and has revealed elevated

psychological distress and PTSD among Palestinian civilians (Lavi et al., 2014). Thus, future research among this population is greatly needed. Furthermore, although both Jewish and non-Jewish Israeli citizens were exposed to rocket attacks during the operation, the current sample included Jewish participants only. This may be due to the fact that all study materials (i.e. advertisement, questionnaires) were in Hebrew. Hence, future research should include materials both in Hebrew and Arabic in order to explore the implications of rocket attacks on Jewish and non-Jewish Israeli citizens. Fourth, the drop-out rate was high from T1 to T2. Unfortunately, this is common for this type of study, and it may have affected the results. Fifth, it is possible that the type of trauma examined in this study influenced the results. Although perceived threat, PD, early trauma-related symptoms, and PTSD have been associated with a variety of traumatic events, the type of trauma may affect the way that the event is perceived. Hence, replicating these findings in different trauma populations is necessary.

Despite these limitations, the present study has noteworthy strengths. First and foremost, it was prospective in nature, which allowed us to assess perceived threat and PD in real time with limited risk of recall bias. Moreover, it allowed us to examine symptom development in the posttraumatic phase. Finally, the present study bridged an important gap by exploring a potential moderator in the relationship between PD and PTSD (Briere et al., 2005).

Insight into the relationship between peritraumatic risk factors and later PTSD symptomatology enables advancing our understanding of PTSD development and the course of PTSD symptomatology. Furthermore, important clinical implications can be drawn from the present investigation. Our findings suggest that individuals who perceive traumatic events as particularly threatening and rely on PD may be particularly vulnerable to PTSD symptoms of intrusion, hyper arousal, and negative alterations in mood and cognition. Such clients may benefit from interventions provided during the peritraumatic phase to help them process the trauma and overcome the harmful effects of PD. Interventions like prolonged exposure therapy (Leaman et al., 2013) and Eye Movement Desensitization and Reprocessing (EMDR; Buydens et al., 2014) have previously proven successful. At the same time, however, our findings indicated that it is initial avoidance symptoms, rather than appraisals of threat or PD, that predict future PTSD avoidance symptoms, and therefore it is these that should be targeted via evidence-based interventions provided during the peritraumatic phase.

### Disclosure statement

No potential conflict of interest was reported by the author(s).

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## Data availability statement

Due to the nature of this research, participants of this study did not agree for their data to be shared publicly, so supporting data is not available.

## ORCID

Sarah Bøgelund Dokkedahl  <http://orcid.org/0000-0003-3090-4660>

Yael Lahav  <http://orcid.org/0000-0003-1242-9042>

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