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Peritraumatic reactions during the COVID-19 pandemic – The contribution of posttraumatic growth attributed to prior trauma

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ABSTRACT

Trauma survivors who suffer from posttraumatic stress disorder (PTSD) symptoms may be particularly vulnerable when facing the COVID-19 pandemic. Yet trauma exposure may also lead to salutogenic outcomes, known as posttraumatic growth (PTG). Nevertheless, the implications of PTG attributed to prior trauma, for trauma survivors' adjustment when facing additional stressors, are unclear. Addressing this gap, 528 Israeli trauma survivors were assessed for PTG and PTSD symptoms attributed to prior trauma, as well as peritraumatic stress symptoms related to the pandemic, as part of an online survey. Analyses revealed that being younger, female, quarantined, negatively self-rating one's health status, and suffering from PTSD symptoms were associated with elevated peritraumatic stress symptoms. Furthermore, PTG attributed to prior trauma made a significant contribution in explaining elevated intrusion, avoidance, and hyperarousal symptoms. The present results point to the need for clinicians to take into account reports of PTG attributed to prior trauma when treating trauma survivors during the current pandemic.

1. Introduction

The COVID-19 pandemic might be traumatogenic, leading to the development of peritraumatic stress symptoms. Individuals who have a history of trauma exposure and, as a result, suffer from posttraumatic stress disorder (PTSD) symptoms might be particularly vulnerable. At the same time, prior exposure to trauma has also been claimed to have salutogenic effects, known as posttraumatic growth (PTG). Nevertheless, the implications of PTG attributed to prior trauma for trauma survivors' adjustment when they face an additional stressor, such as COVID-19, has yet to be investigated. The rationale of the present study was to shed light on the unique contribution of PTG attributed to prior trauma in explaining peritraumatic stress symptoms related to COVID-19 among trauma survivors.

1.1. Peritraumatic stress symptoms related to COVID-19

The novel coronavirus and the disease it causes, COVID-19, first appeared in Wuhan, China, presenting a global health threat (World Health Organization). Symptoms of infection consist of fever, chills,

cough, coryza, sore throat, breathing difficulty, myalgia, nausea, vomiting, and diarrhea (Chen et al., 2020), and severe cases can result in cardiac damage, respiratory failure, acute respiratory distress syndrome, and death (Holshue et al., 2020). Since late December 2019, when the outbreak was first revealed, the number of cases of this highly contagious virus (Ryu et al., 2020) has escalated exponentially, spreading to many parts of the world (World Health Organization).

According to the World Health Organization (2020), the virus was identified for the first time in Israel at the end of February 2020. Since then, there have been 16,314 confirmed cases of COVID-19, and 238 deaths, with the highest infection rate being documented at the end of March and early April 2020 (World Health Organization). The government of Israel, in an attempt to prevent the spread of the disease, took a variety of stringent measures: issuing shelter-in-place orders (individuals were not to go further than 100 m from their homes, and only for essential goods); closing schools, synagogues, and other places where people might gather; quarantining anyone who might have come into contact with an infected individual, etc.

The manifold stressors entailed by the COVID-19 pandemic could very well have substantial implications for individuals' mental health.

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Being diagnosed with the virus, belonging to a risk group for COVID-19 complications, and appraising one's health negatively, may intensify fears of falling sick, feelings of helplessness, and stigma (Shi et al., 2003; Wang et al., 2020a). Worries about close others who are ill or who belong to a COVID-19 risk group might add to the emotional burden, exacerbating one's psychological distress (Wang et al., 2020a). Social distancing, closures of schools and businesses, and being under quarantine, might fuel negative emotions, which could eventuate in psychopathology (S. K. Brooks et al., 2020; Van Bortel et al., 2016). Lastly, the economic crisis related to the shutdown of businesses and workplaces may result in mental health difficulties (Bareket-Bojmel et al., 2020; Reger et al., 2020).

As such, and as suggested above, the COVID-19 pandemic could very well take a toll on individuals' mental health, leading to the development or exacerbation of psychopathology (Brooks et al., 2020; Lai et al., 2020; Qiu et al., 2020; Shigemura et al., 2020). Furthermore, for some individuals in particular, this pandemic could be highly traumatic, and could lead to trauma-related symptoms (Horesh and Brown, 2020). Peritraumatic stress symptoms – the focus of the present investigation – are responses that occur during and immediately following a traumatic event. These symptoms constitute four clusters: intrusion, avoidance, changes in mood and cognition, and hyperarousal. Intrusion symptoms reflect a reexperiencing of the traumatic event (e.g., intrusive memories, flashbacks, nightmares). Avoidance symptoms are manifested in evading stimuli associated with the event (e.g., avoidance of trauma-related thoughts or feelings and reminders). Changes in mood and cognition consist of pessimistic beliefs (e.g., overly negative thoughts and assumptions about oneself or the world) and negative mood states (e.g., fear, sadness, anger, guilt, shame). Lastly, hyperarousal symptoms reflect increased reactivity to stimuli (e.g., irritability and aggression, difficulty sleeping; American Psychiatric Association, 2013).

Studies exploring the implications of COVID-19 for individuals' mental health have documented various types of psychiatric symptoms (Qiu et al., 2020) as well as trauma-related symptoms (Jiang et al., 2020; Lahav, 2020; Wang et al., 2020b). Specifically, increases in psychiatric symptomatology, such as anxiety and depression (Gao et al., 2020; Qiu et al., 2020), have been detected. Findings of a longitudinal study conducted among the general population in China during the pandemic indicated clinically significant peritraumatic stress symptoms, which did not change significantly from the time of the initial outbreak to four weeks later (Wang et al., 2020b). Additionally, a study among 6049 Chinese individuals uncovered three profiles consisting of mild (80.9%), moderate (13.0%), and high levels of peritraumatic stress symptoms (6.1%; Jiang et al., 2020).

1.2. Prior trauma exposure, PTSD symptoms, and peritraumatic stress related to COVID-19

According to scholars, prior trauma exposure and subsequent PTSD symptoms might intensify one's vulnerability when facing additional stressors. Trauma-exposure and PTSD symptoms might drain one's resources (Hobfoll, 2002, 2001), as well as one's coping capacity, and might heighten one's sensitivity to stress (Resnick et al., 1995; Yehuda et al., 1995). Empirical evidence has supported this claim, indicating that a history of trauma exposure and resultant PTSD were associated with an elevated risk for PTSD following a later trauma (Breslau et al., 2008; Cogle et al., 2009; Green et al., 2000; Kessler et al., 2018; Liu et al., 2017b; Ozer et al., 2003). Furthermore, a recent study that explored psychological distress related to COVID-19 indicated that prior trauma exposure and subsequent PTSD symptoms were associated with elevated levels of psychiatric symptomatology and peritraumatic stress symptoms during the pandemic (Lahav, 2020).

1.3. Posttraumatic growth attributed to prior trauma exposure

Alongside the negative ramifications of prior trauma exposure, such exposure may also have salutogenic effects, with posttraumatic growth (PTG) being one of the most prevalent terms used to describe it. Posttraumatic growth denotes the tendency to report a positive transformation in the aftermath of trauma exposure (Tedeschi et al., 2018; Tedeschi and Calhoun, 2004, 1996). This transformation is assumed to reflect changes which go beyond pre-trauma adjustment and which are manifested in an enhanced appreciation for life, changes in priorities, more meaningful relationships with others, a sense of increased personal strength, new possibilities for the future, and existential/spiritual thriving (e.g., Tedeschi et al., 2018).

Reports of PTG have been documented among survivors of various types of traumatic events. These include combat or other military-related traumatic events (Mark et al., 2018; Stein et al., 2020; Zerach, 2020), natural and manmade disasters (S. Brooks et al., 2020; Palgi et al., 2020), accidents, life-threatening physical illnesses (Hefferon et al., 2009), bereavement (Vaughn et al., 2018), and childhood abuse (Kaye-Tzadok and Davidson-Arad, 2016; Lev-Wiesel et al., 2004; Shakespeare-Finch and De Dassel, 2009).

Nevertheless, scrutinizing the clinical and empirical literature suggests that the phenomenon of PTG is yet to be fully understood. In fact, both the essence and implications of PTG for adjustment have been the focus of a great deal of controversy. Whereas some view PTG as reflecting authentic positive changes that result from struggling with the trauma (Tedeschi and Calhoun, 2004, 1996), others claim that PTG might consist of illusory or avoidant elements, which may be maladaptive, at least to some degree (Davis and McKearey, 2003; Maercker and Zoellner, 2004; McFarland and Alvaro, 2000). A recent theoretical model further elaborated on this latter line of thought, and suggested that PTG should be understood in terms of dissociation, which denotes a disruption in the integration of mental processes (Lahav et al., 2016a, 2017b, 2020). According to this perspective, whereas some reports of PTG may in fact reflect a deep, genuine, positive transformation that either has no effect or a beneficial effect on adjustment over time, other reports of PTG may be rooted in dissociative mechanisms and might be maladaptive (Lahav et al., 2020).

Research on the implications of PTG for adjustment has further deepened questions regarding the nature of PTG, as it has provided mixed findings. For example, previous studies exploring the associations between PTG and psychological distress in regard to a wide range of traumatic events revealed positive, negative, and no relations between the two (Helgeson et al., 2006; Linley and Joseph, 2004; Liu et al., 2017a; Shakespeare-Finch and Lurie-Beck, 2014; Zoellner and Maercker, 2006).

1.4. Posttraumatic growth attributed to prior trauma and peritraumatic stress related to COVID-19 – the current study

The theoretical debate and the inconsistent findings regarding the nature and consequences of PTG point to the need to further illuminate the association between PTG, adjustment, and distress. Furthermore, to the best of our knowledge, no research to date has explored the relations between PTG attributed to prior trauma and adjustment in the face of additional trauma exposure. Given the high prevalence of trauma exposure worldwide, and the fact that trauma survivors are argued to suffer from heightened vulnerability in the face of new stressors, investigating this subject matter is imperative.

The current study, conducted among trauma survivors in the midst of the COVID-19 pandemic in Israel, was designed to fill this lacuna. Specifically, it explored the unique contribution of PTG attributed to prior trauma in explaining peritraumatic stress symptoms related to the pandemic, above and beyond background characteristics, COVID-19-related stressors, and PTSD symptoms resulting from past trauma. In this way, the current study aimed to reveal whether PTG resulting from

prior trauma was related to low distress in the face of an additional traumatic event (in this case, COVID-19) or, alternatively, was either unrelated to distress or related to higher levels of distress due to an additional stressor (again, in this case, the pandemic). Being the first, presumably, to address this subject matter, the current study consisted of three main objectives:

1. To describe peritraumatic stress symptoms related to COVID-19, and their relation with background characteristics and COVID-19-related stressors, among trauma survivors.
2. To explore the relation between PTG and PTSD symptoms attributed to prior exposure, on the one hand, and peritraumatic stress symptoms related to COVID-19, on the other hand.
3. To assess the unique contribution of PTG attributed to prior trauma exposure in explaining peritraumatic stress symptoms related to COVID-19, above and beyond background characteristics, COVID-19-related stressors, and PTSD symptoms related to prior trauma exposure.

2. Methods

2.1. Participants and procedure. An online survey was conducted among a convenience

Sample of Israeli adults. The survey was accessible through Qualtrics, a secure web-based survey data collection system. The survey took an average of 25 min to complete and was open from April 2, 2020 to April 19, 2020. It was anonymous, and no data were collected that linked participants to recruitment sources. The Tel Aviv University institutional review board (IRB) approved all procedures and instruments. Clicking on the link to the survey guided potential respondents to a page that provided information about the purpose of the study, the nature of the questions, and a consent form (i.e., the survey was voluntary; respondents could quit at any time; responses would be anonymous). The first page also offered researcher contact information. Each participant was given the opportunity to take part in a lottery that included four \$60 gift vouchers.

A total of 1263 people answered some of the questionnaires. Based on the Trauma History Screen (THS; Carlson et al., 2011), 793 participants were classified as having been exposed to traumatic events. Of them, only 528 participants (66.6%) who had data regarding all of the study's variables were included in the present analyses. No differences were found between participants who were included in the study and those who were not in terms of gender, $\chi^2(1) = 1.12, p = .29$; relationship status, $\chi^2(1) = 0.89, p = .37$; education, $\chi^2(1) = 0.79, p = .37$; or income, $\chi^2(1) = 0.04, p = .85$. However, there was a significant difference between the groups in terms of age, $t(565.48) = 4.80, p < .001$, so that the average age among the group of participants who were not included in the study was higher ($M = 47.67, SD = 15.00$) than among the study sample ($M = 42.61, SD = 13.61$).

Participants' ages ranged from 18 to 75 ($M = 42.61, SD = 13.61$), with the majority of the sample being below the age of 50 (66.1%). Most of the participants were Jewish (96.6%) women (82.8%); were secular (69.9%); had a high school education or below (51.3%); were in a relationship (62.5%); and had an average or below-average income (50.2%).

Traumatic events consisted of exposure to rocket attacks ($n = 238, 45.1\%$), accidents ($n = 111, 21.0\%$), a physical or sexual assault during childhood ($n = 105, 19.9\%$), a natural disaster ($n = 12, 2.3\%$), a physical or sexual assault in adulthood ($n = 80, 15.6\%$), being attacked with a gun, knife, or other weapon ($n = 26, 4.9\%$), the sudden death of a family member or close friend ($n = 194, 36.7\%$), seeing someone die or get badly hurt or killed ($n = 77, 14.6\%$), and seeing something traumatizing during military service ($n = 58, 11.0\%$). The vast majority of participants reported two traumatic events or more (57.6%).

2.2. Measures

Background variables. Participants completed a brief demographic questionnaire that assessed age, gender, education, relational status, religiosity, and income.

COVID-19-related stressors. Participants were asked to generally indicate which of the potential implications of the pandemic were the most concerning to them and to state whether they experienced specific stressors related to the COVID-19 pandemic. These were measured via nine items designed by the research team. Participants were asked 1) how they perceived their own physical health, 2) whether they were diagnosed with the disease, 3) whether they were quarantined, 4) whether they were living alone during the outbreak, 5) whether they belonged to a high-risk group for COVID-19, 6) whether they had close others who belonged to a high-risk group, 7) whether they had close others who had been diagnosed with the disease, 8) whether they had close others who had been hospitalized due to the disease, and 9) whether they had experienced the loss of close others as a result of the disease. Given that only four participants reported being diagnosed with the disease, this specific stressor was not included in the present analyses. In addition, in order to assess a pandemic-related economic stressor, participants were asked whether they had become unemployed or furloughed since the outbreak of the pandemic. All stressors apart from perceived health were coded as dummy variables, with "0" reflecting the absence of stressor and "1" reflecting the presence of stressor. Perceived health ranged from "1" reflecting poor health to "5" reflecting excellent health.

Peritraumatic stress symptoms related to COVID-19. Peritraumatic stress symptoms in response to COVID-19 were measured via a modified version of the PTSD Checklist (PCL-5) (Weathers et al., 2013). This 20-item self-report measure asks participants 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 correspond to the newly approved PTSD symptom criteria in the Diagnostic and Statistical Manual of Mental Disorders (5th ed., DSM-5; American Psychiatric Association, 2013). The original version was adapted so that the timeframe for experiencing each symptom was changed from "in the past month" to "since the outbreak of the COVID-19 pandemic and subsequent to the pandemic," and the index event was the COVID-19 pandemic. A total score of peritraumatic stress symptoms was calculated by summing all 20 items. Although not a definitive diagnostic measure, preliminary research suggests that a cutoff score of 33 is a useful threshold to indicate symptomatology which may be at clinical levels (Bovin et al., 2016). The PCL-5 demonstrates high internal consistency and test-retest reliability (Bovin et al., 2016). Internal consistency reliability in this study for intrusion, avoidance, negative alterations in mood and cognition, and hyperarousal clusters, as well as the PCL-5 total score, ranged from good to excellent ($\alpha = 0.89, 0.82, 0.83, 0.83, 0.94$, respectively).

PTSD symptoms as a result of prior trauma exposure. PTSD symptoms were measured via the PCL-5 (Weathers et al., 2013). Participants were asked to anchor responses to "stressful/traumatic life experiences" other than the pandemic, which they had experienced in the past and reported via the THS (Carlson et al., 2011), on a scale ranging from 0 (*not at all*) to 4 (*extremely*). A total score is also calculated to assess the overall PTSD severity. Internal consistency reliability in this study for the PCL-5 total score subscales was excellent ($\alpha = 0.95$).

PTG attributed to prior trauma exposure. PTG attributed to prior trauma exposure was assessed via the Post Traumatic Growth Inventory (PTGI; Tedeschi and Calhoun, 1996). For each of the 21 statements in the questionnaire, participants were asked to rate the extent to which the indicated change occurred in their lives as a result of their stressful/traumatic life experiences" other than the pandemic, which they had experienced in the past and reported via the THS (Carlson et al., 2011). Each item was scored on a 4-point scale ranging from 1 (*I didn't experience this change at all*) to 4 (*I experienced this change to a very great*

degree). The total score was computed according to five subscales: relating to others (i.e., “I learned a great deal about how wonderful people are”), new possibilities (i.e., “I established a new path for my life”), personal strength (i.e., “I discovered that I’m stronger than I thought I was”), spiritual change (i.e., “A better understanding of spiritual matters”), and appreciation of life (i.e., “Appreciating each day”). The PTGI has shown good internal consistency, construct, convergent and discriminant validities (Tedeschi and Calhoun, 1996). Internal consistency reliabilities were good ($\alpha = 0.91, 0.90, 0.89, 0.70, 0.80, 0.96$, for relating to others, new possibilities, personal strength, spiritual change, appreciation of life, and total score, respectively).

2.3. Analytic strategy

The current analyses were conducted using SPSS 25. To assess associations between

Background characteristics and COVID-19-related stressors, on the one hand, and peritraumatic stress symptoms related to COVID-19, on the other, four linear regressions were conducted for each of the clusters of peritraumatic stress symptoms. To assess the associations between PTSD symptoms and PTG as a result of prior trauma exposure, on the one hand, and peritraumatic stress symptoms related to COVID-19, on the other, Pearson correlation analyses were conducted.

Lastly, to explore the unique contribution of PTG attributed to prior trauma exposure in explaining peritraumatic stress symptoms related to the pandemic, above and beyond background characteristics, COVID-19-related stressors, and PTSD symptoms resulting from prior trauma, four hierarchical regressions were conducted for each cluster of peritraumatic stress symptoms. To determine whether including the independent and control variables in the regression analyses was adequate, we assessed for multicollinearity and examined the variance inflation factors (VIFs) for the study’s variables. Findings indicated that all were within the acceptable range (all VIFs were smaller than 2), indicating that multicollinearity was not a problem in our analyses. The analyses included four blocks. The first block consisted of background characteristics. The second block consisted of COVID-19-related stressors. The third block consisted of PTSD symptoms related to prior trauma exposure. The fourth block consisted of the PTG total score attributed to prior trauma exposure.

3. Results

3.1. COVID-19-related stressors

Respondents reported experiencing several COVID-19-related stressors. These consisted of being quarantined ($n = 58, 11.0\%$), living alone during the outbreak ($n = 78, 13.8\%$), belonging to a high-risk group for COVID-19 ($n = 175, 33.1\%$), perceiving one’s physical health in a negative fashion ($n = 46, 8.8\%$), having a close other who was diagnosed with COVID-19 ($n = 38, 7.2\%$), having a close other who belonged to a high-risk group ($n = 467, 88.4\%$), having a close other hospitalized due to the disease ($n = 11, 2.1\%$), experiencing the loss of close others as a result of the disease ($n = 6, 1.1\%$), and becoming unemployed or furloughed since the outbreak of the pandemic ($n = 114, 21.6\%$).

These COVID-19-related stressors seemed to capture respondents’ main areas of concern regarding the pandemic, which consisted of potential threats to their own health or their close others’ health ($n = 222, 42.0\%$), negative economic consequences ($n = 109, 20.6\%$), social distancing and loneliness ($n = 62, 11.7\%$), and other ($n = 135, 25.6\%$).

3.2. Peritraumatic stress symptoms related to COVID-19

Of the total sample, 43.2% ($n = 228$) reported at least one intrusion symptom, 29.7% ($n = 157$) reported at least one avoidance symptom, 61.7% ($n = 326$) reported at least one symptom reflecting negative

alterations in mood and cognition, and 66.3% ($n = 350$) reported at least one hyperarousal symptom. Furthermore, 13.4% ($n = 71$) of the participants had a peritraumatic stress symptom total score of 33 or above, indicating that their symptoms were clinically significant.

3.3. Background characteristics, COVID-19-related stressors, and peritraumatic stress symptoms

Table 1 presents the results of linear regressions exploring the contribution of background characteristics and COVID-19-related stressors in explaining peritraumatic stress symptoms related to COVID-19. The independent variables included in the regressions consisted of the background characteristics of age, gender, and education – all three of which variables had the largest contribution in explaining peritraumatic stress symptoms compared to the other background variables – as well as COVID-19-related stressors.

As can be seen in the table, age, gender, and education were related to peritraumatic stress symptoms. Being younger was associated with higher levels in all clusters of peritraumatic stress symptoms. Being female and having a high school education or below were also associated with higher intrusion, hyperarousal, and negative alterations in mood and cognition symptoms.

COVID-19-related stressors were associated with peritraumatic stress symptoms as well. Negative perceived health was related to higher levels in all clusters of peritraumatic stress symptoms. Living alone during the outbreak was related to higher levels of hyperarousal and negative alterations in mood and cognition symptoms, and being quarantined was related to higher levels of negative alterations in mood and cognition symptoms. All other COVID-19-related stressors had a nonsignificant effect in explaining peritraumatic stress symptoms.

3.4. The relation between PTSD symptoms and PTG attributed to prior trauma exposure, and peritraumatic stress symptoms related to COVID-19

Pearson correlations between PTSD symptoms resulting from prior trauma exposure, PTG attributed to prior trauma exposure, and peritraumatic stress symptoms related to COVID-19 are presented in Table 2. As can be seen in the table, PTSD symptoms subsequent to prior trauma exposure were significantly associated with peritraumatic symptoms related to COVID-19. The higher the PTSD symptoms subsequent to prior trauma exposure, the higher the levels of all peritraumatic symptom clusters. Posttraumatic stress disorder symptoms were significantly associated with PTG attributed to prior exposure. The higher the PTSD symptoms, the higher the PTG scores. Furthermore, results indicated significant associations between PTG attributed to prior trauma exposure and peritraumatic symptoms related to COVID-19. The higher the PTG scores subsequent to prior trauma exposure, the higher the scores in all peritraumatic symptom clusters.

3.5. The unique contribution of PTG attributed to prior trauma exposure in explaining peritraumatic stress symptoms related to COVID-19

To explore the unique contribution of PTG in explaining peritraumatic stress symptoms, above and beyond background characteristics, COVID-19-related stressors, and PTSD symptoms, four hierarchical regressions were conducted. The first block consisted of the background characteristics of age, gender, and education – all three of which variables had the largest contribution in explaining peritraumatic stress symptoms compared to the other background variables. The second block consisted of the COVID-19-related stressors of perceived health, living alone during the outbreak, and being quarantined – all three of which variables had the largest contribution in explaining peritraumatic stress symptoms compared to the other COVID-19-related stressors. The third block consisted of PTSD symptoms resulting from prior trauma exposure. The fourth block consisted of the PTG total score attributed to prior trauma exposure. Results of the analyses are presented in Table 3.

Table 1

Regression models exploring the contribution of background characteristics and COVID-19-related stressors in explaining peritraumatic stress symptoms (n = 528).

	Intrusion symptoms		Avoidance symptoms		Negative alterations in cognition and mood		Hyperarousal symptoms	
	β	R ²	β	R ²	B	R ²	β	R ²
Age	-.11*	.09	-.13**	.08	-.29***	.17	-.31***	.15
Gender	.11*		.06		.07		.11*	
Education	-.08*		-.07		-.08*		-.01	
In quarantine	.06		.07		.09*		.07	
Belong to risk group	.06		.06		-.03		.08	
Perceived health	-.18***		-.15**		-.22***		-.17***	
Live alone during outbreak	.06		.09*		.14**		.09*	
Close other in risk group	-.02		-.00		-.05		.03	
Close others diagnosed with the disease	-.01		.04		-.02		-.01	
Close others hospitalized due to the disease	-.05		-.02		-.06		.00	
Loss of close others as a result of the disease	.08		.01		.05		.03	
Unemployed or furloughed	.01		.01		.02		.02	

Note: Gender values: 0 = male, 1 = female; education values: 0 = high school education or below, 1 = higher level education. All stressors apart from perceived health were coded as dummy variables, with “0” reflecting the absence of stressor and “1” reflecting presence of the stressor. Lower scores on perceived health reflect negative perceptions of one’s health. *p < .05, **p < .01, ***p < .001.

Table 2

Inter-correlations between PTSD symptoms and PTG attributed to former trauma exposure, and peritraumatic stress symptoms related to COVID-19 (n = 528).

Measure	1	2	3	4	5	6	7	8	9	10	11
1. PTSD symptoms (prior exposure)	–										
2. PTG - relating to others (prior exposure)	.26***	–									
3. PTG - new possibilities (prior exposure)	.25***	.80***	–								
4. PTG - personal strength (prior exposure)	.25***	.82***	.80***	–							
5. PTG - spiritual change (prior exposure)	.26***	.60***	.64***	.60***	–						
6. PTG - appreciation of life (prior exposure)	.24***	.75***	.72***	.77***	.61***	–					
7. PTG - total score (prior exposure)	.28***	.94***	.91***	.92***	.73***	.86***	–				
8. Peritraumatic intrusion symptoms	.44***	.19***	.13**	.18***	.25***	.21***	.21***	–			
9. Peritraumatic avoidance symptoms	.37***	.24***	.18***	.20***	.27***	.21***	.24***	.68***	–		
10. Peritraumatic negative alterations in mood and cognition	.55***	.19***	.14**	.16***	.22***	.17***	.20***	.68***	.57***	–	
11. Peritraumatic hyperarousal symptoms	.58***	.24***	.16***	.20***	.22***	.21***	.23***	.67***	.58***	.76***	–
M (SD)	12.36 (13.98)	1.92 (.87)	1.84 (.92)	2.21 (1.03)	1.75 (.93)	2.21 (1.02)	1.98 (.84)	3.53 (3.98)	1.47 (1.83)	5.47 (4.88)	5.89 (4.70)
Range	68	3	3	3	3	3	3	19	8	26	21

p < .01. *p < .001.

As can be seen in Table 3, PTG attributed to prior trauma exposure had a unique effect in explaining intrusion, avoidance, and hyperarousal peritraumatic stress symptoms. Higher scores of the PTG total score were associated with higher intrusion, avoidance, and hyperarousal symptoms related to COVID-19. These effects were found above and beyond background characteristics, COVID-19-related stressors, and PTSD symptoms. The only exception was found in regard to the “alteration in cognition and mood symptoms” cluster, where PTG had a non-significant effect.

4. Discussion

This study described the unique contribution of PTG attributed to prior trauma in explaining trauma-related symptoms during the COVID-19 pandemic, among trauma survivors. Findings indicated that more than a quarter of the sample reported having at least one peritraumatic stress symptom related to the pandemic, and 13.4% of the participants had a peritraumatic stress symptom total score of 33 or above, indicating that their symptoms were clinically significant. These findings provide further support for the notion that the COVID-19 pandemic has the potential to be traumatogenic (Horesh and Brown, 2020), and are in line with findings of recent studies that documented peritraumatic stress symptoms as a result of COVID-19 (Jiang et al., 2020; Qiu et al., 2020;

Wang et al., 2020b).

Our results revealed that several background characteristics and COVID-19-related stressors were associated with peritraumatic stress symptoms during the pandemic, even after taking into account PTSD symptoms and PTG attributed to prior trauma. Consistent with recent studies that explored the effects of the COVID-19 pandemic (Jiang et al., 2020; Wang et al., 2020b), we found that young age and being female were associated with elevated peritraumatic stress symptoms. The increased vulnerability of the female population when facing trauma has been consistently documented in trauma research (e.g., Haskell et al., 2010; Sareen, 2014) and might be the result of sex differences in psychophysiology, threat appraisal, and coping style (Irish et al., 2011; Olf et al., 2007). In regard to the age factor, the relation between younger age and elevated peritraumatic reactions found in our study might reflect the negative effects of exposure to information about the pandemic via social media (Roberts et al., 2018) – exposure which is presumed to be higher among younger than older individuals. In addition, and in line with previous findings (e.g., Fiorillo and Gorwood, 2020; Wang, Pan, Wan, Tan, Xu, Ho, et al., 2020), we found that being in quarantine and negatively self-rating one’s health status explained elevated levels of peritraumatic stress reactions. Being quarantined might impair feelings of belongingness, as well as limit social support; the latter (limited social support) has been found to have buffering

Table 3

Regression models exploring the unique contribution of PTG attributed to prior trauma exposure in explaining peritraumatic stress symptoms (n = 528).

	Intrusion symptoms		Avoidance symptoms		Negative alterations in cognition and mood		Hyperarousal symptoms	
	β	R ² Change	β	R ² Change	β	R ² Change	β	R ² Change
Step 1								
Age	-.03	.03**	-.06	.02*	-.22***	.08***	-.24***	.08***
Gender	.13**		.08		.10*		.12*	
Education	-.12**		-.10*		-.12**		-.05	
Step 2								
Age	-.09*	.05***	-.12**	.05***	-.29***	.08***	-.30***	.06***
Gender	.11**		.06		.08		.10*	
Education	-.10*		-.08		-.09*		-.02	
Perceived health	-.20***		-.17***		-.21***		-.20***	
In quarantine	.06		.07		.09*		.07	
Live alone during outbreak	-.06		-.09*		-.14**		-.09*	
Step 3								
Age	-.03	.14***	-.07	.09***	-.21***	.20***	-.21***	.24***
Gender	.09*		.04		.05		.07*	
Education	-.08*		-.06		-.07		.00	
Perceived health	-.11**		-.10*		-.10**		-.08*	
In quarantine	.05		.06		.07*		.05	
Live alone during outbreak	.00		.04		.05		.00	
PTSD symptoms	.39***		.32***		.48***		.52***	
Step 4								
Age	-.03	.01*	-.08	.02***	-.22***	.00	-.22***	.01*
Gender	.08*		.03		.04		.06	
Education	-.07		-.06		-.07		.01	
Perceived health	-.12**		-.11*		-.11**		-.09*	
In quarantine	.05		.06		.07*		.05	
Live alone during outbreak	-.01		.03		.05		-.01	
PTSD symptoms	.37***		.28***		.46***		.50***	
PTG total score	.08*		.15***		.06		.09*	

Note: Gender values: 0 = male, 1 = female; education values: 0 = high school education or below, 1 = higher level education. All stressors apart from perceived health were coded as dummy variables, with "0" reflecting the absence of stressor and "1" reflecting presence of the stressor. Lower scores on perceived health reflect negative perceptions of one's health. *p < .05, **p < .01, ***p < .001.

effects when one faces psychological trauma (Kaniasty and Norris, 2008). Appraising one's health negatively may produce fears of becoming ill (Wang et al., 2020a) and may lead to evaluating the pandemic as particularly threatening and traumatic. Conversely, becoming unemployed or furloughed since the outbreak of the pandemic was unrelated to peritraumatic stress symptoms. These findings are surprising and inconsistent with former findings that indicated the negative implications of the pandemic-related economic crisis for individuals' mental health (Bareket-Bojmel et al., 2020; Reger et al., 2020). It might be that the negative effects of economic difficulties are not manifested in trauma-related symptoms, but in other types of psychopathology such as depression or anxiety, which were not assessed in the current study. Alternatively, it might be that the economic stressor that was assessed in this study was only one of potentially many such stressors and did not capture the full economic implications of the pandemic.

Our results revealed that PTSD symptoms resulting from prior trauma were associated with trauma-related symptoms during the COVID-19 pandemic, with effect sizes ranging from medium to large. These findings are in line with theory, as well as with empirical evidence (Breslau et al., 2008; Kessler et al., 2018), suggesting that PTSD might heighten trauma survivors' vulnerability when facing additional traumas. A number of processes might be at the basis of this susceptibility. These include physiological alterations related to PTSD, such as greater brainstem and hippocampal activity in response to threat stimuli (Felmingham et al., 2010; Nutt and Malizia, 2004), which might intensify arousal and distress; negative appraisals of new stressors (Lee et al., 2020), which might further fuel distress; as well as a tendency to adopt avoidant coping strategies that are known to impede adjustment to trauma (Badour et al., 2012; Foa and Kozak, 1986).

Although the present findings regarding the adverse implications of PTSD symptoms may be somewhat predictable, our investigation of the contribution of PTG yielded innovative findings. The current results indicated that PTG attributed to prior trauma was associated with elevated peritraumatic stress symptoms related to COVID-19; specifically, the higher the level of PTG, the higher the scores on the peritraumatic stress symptoms. Furthermore, we found that PTG made a unique contribution in explaining elevated peritraumatic stress symptoms, above and beyond background characteristics, COVID-19-related stressors, and PTSD symptoms resulting from prior trauma. This trend was found in regard to all of the clusters of peritraumatic stress symptoms, apart from the cluster of negative alterations in cognition and mood. In view of the heightened vulnerability of traumatized individuals when facing new stressors (e.g., Kessler et al., 2018; Ozer et al., 2003), and given the high prevalence of reports of PTG among this population (Tedeschi et al., 2018), the questions concerning the quality and implications of PTG raised by the present findings are weighty. Several explanatory routes can be proposed in regard to these results.

First, the present findings may reflect a greater willingness on the part of trauma survivors who experienced PTG to acknowledge their distress. According to Calhoun and Tedeschi (2014), a positive transformation resulting from trauma stems from schema reconstruction. Trauma survivors who report PTG seem to experience, as a result of their trauma, the rebuilding of their schemas, which eventually leads to wider, more complex, and integrated views, consisting of both negative and positive cognitions (Calhoun and Tedeschi, 2014). As part of this new belief system, trauma survivors might view themselves as "vulnerable yet stronger" (Calhoun and Tedeschi, 2014, p.5); that is, they may experience themselves as less immune or impervious to life's adversities, but at the same time, as having the strength to cope with and

survive it. Thus, it might be that the current study participants who experienced positive changes as a result of their prior trauma were more inclined to recognize and report their distress when facing COVID-19.

At the same time, it could be that the reports of PTG in the present study were shaped by participants' current distress and reflected their efforts to rely on positive retrospective appraisals of prior trauma as a way to cope with the threat of the pandemic. Trauma survivors who participated in the present study and suffered from elevated peritraumatic stress symptoms during the pandemic might have painted their prior trauma in bright, positive colors, attributing to it beneficial effects, as a way to find comfort and better cope with their current plight. Previous research has provided some support for this explanation, indicating that perceptions of personal improvement might reflect strongly-held illusions that are aimed at helping the individual cope with threatening life events (McFarland and Alvaro, 2000).

Finally, the results of this study could also reflect illusory-defensive aspects of reports of PTG, which might be maladaptive, at least to some degree (e.g., Maercker and Zoellner, 2004). This illusory-defensive facet of PTG may be rooted in an over-reliance on dissociative mechanisms which – although potentially providing emotional relief in the short term – may hamper an individual's ability to reprocess and overcome the trauma in the long term (Lahav et al., 2016a). Thus, it may be that whereas trauma survivors are generally more vulnerable to distress when exposed to additional stressors, those who report PTG may end up being even more susceptible to the various negative effects of such future traumas, such as those posed by today's global pandemic. Specifically, these individuals might suffer from elevated levels of intrusion, avoidance, and hyperarousal peritraumatic stress symptoms. Previous findings which have indicated associations between PTG and various negative outcomes (Dekel et al., 2015; Lahav et al., 2016b, 2017a; Liu et al., 2017a; Shakespeare-Finch and De Dassel, 2009) provide some support for this explanation.

The idea that reports of PTG are reflective of dissociative beliefs might also explain the lack of PTG's contribution in regard to the negative alterations in cognition and mood cluster, found in the present study. These dissociative beliefs are argued to reflect the formation of a fragmented and disintegrated belief system that includes, in a disconnected manner, cognitions regarding a positive transformation attributed to prior trauma, on the one hand, and negative cognitions that echo the pain and suffering caused by the trauma, on the other (Lahav et al., 2016a, 2020). Hence, although these beliefs might be associated with individuals' distress when facing an additional trauma, such as the COVID-19 pandemic, they may be unrelated to the co-existing split-off negative cognitions, which remain separated and detached. Empirical evidence that has revealed associations between reports of PTG and dissociation (Greene, 2018; Lahav et al., 2016a, 2020) suggest such a prospect. Nevertheless, as the present investigation did not explore the mechanisms underlying the relations between PTG and peritraumatic stress symptoms, all three explanations offered herein are speculative.

The present findings must be considered in light of several limitations. First, a major limitation of the present study is its cross-sectional design. Although participants in the present study were specifically asked to report peritraumatic stress symptoms subsequent to the COVID-19 pandemic, the present data does not allow identifying the time of the symptoms' onset. Additionally, based on the current data the direction of association between PTG and peritraumatic stress symptoms cannot be inferred. Second, the present study relied on convenience sampling. The majority of participants in the sample were below the age of 50, and there was an overrepresentation of the female gender. These trends, which have been found in other surveys on the COVID-19 pandemic (Lai et al., 2020; Mazza et al., 2020; Wang et al., 2020b), should be acknowledged prior to generalizing from the results to the population at large. Third, although many COVID-19-related stressors were explored in this study, there was only one pandemic-related economic crisis stressor explored (i.e., becoming unemployed or furloughed since the outbreak of the pandemic). Thus, other effects of the economic crisis on

trauma-related symptoms during the pandemic might not have been identified. Fourth, the current study relied on self-report measures, which may be subject to response biases and shared method variance. Additionally, the validity of the Posttraumatic Growth Inventory (Tedeschi and Calhoun, 1996), one of the most commonly used measurements of PTG, was, in an earlier study, called into question (Frazier et al., 2009). Future studies should therefore include additional methods of data collection such as clinical interviews and other types of self-report measures tapping PTG. Fifth, the present study did not include data regarding the time that had passed since the prior trauma, a factor that might affect the process of schema reconstruction that lies at the basis of PTG. Furthermore, we did not include data regarding potential mechanisms that might underlie the link between PTG and peritraumatic distress, such as avoidance coping strategies. Finally, our analyses focused on Israeli trauma survivors, and thus the study's generalizability might be limited. Future prospective studies should explore the relation between PTG attributed to prior trauma and adjustment in the face of additional traumas over time, among survivors of various traumatic events with diverse cultural backgrounds.

Bearing in mind these limitations, this study represents a step toward understanding the potential implications of trauma survivors' PTG under conditions of additional trauma exposure. Though the processes at its basis are yet to be investigated, the current findings reveal associations between PTG attributed to prior trauma, on the one hand, and peritraumatic stress symptoms in the face of additional trauma, on the other. In light of a possible second wave of COVID-19, and the expected long-term repercussions of this pandemic, the results indicate the need to provide therapy to trauma survivors and particularly to those who suffer from PTSD symptoms. Adapting evidence-based treatments for trauma, such as prolonged exposure therapy (Foa et al., 2007) or eye movement desensitization and reprocessing therapy (EMDR; Shapiro, 2017) to the current conditions, and providing them online (Wind et al., 2020), might allow traumatized individuals to reprocess their prior traumatic event as well as their current peritraumatic reactions during the pandemic, and thus alleviate their distress. Furthermore, the current results suggest that clinicians should not only assess PTSD symptoms attributed to prior trauma but PTG as well, and should take a cautious approach when treating trauma survivors who report PTG, given that the essence of PTG is still unclear. Reports of PTG might reflect a positive transformation subsequent to prior trauma, or alternatively may mirror efforts to cope with current distress or maladaptive dissociative beliefs. Exploring patients' reports of PTG while taking into account their current distress as well as their tendency to rely on dissociative mechanisms may help clinicians to treat these patients more effectively. Nevertheless, future longitudinal studies exploring the implications of PTG for individuals' mental health in the face of additional stressors, while assessing potential mechanisms underlying these effects, are needed in order to promote the development of clinical practice guidelines.

CRedit authorship contribution statement

Asmaa Abu Hamam: Writing - review & editing. **Shai Milo:** Writing - review & editing. **Inbar Mor:** Writing - review & editing. **Elit Shaked:** Writing - review & editing. **Ayala Sultana Eliav:** Writing - review & editing. **Yael Lahav:** Conceptualization, Methodology, Writing - original draft, Supervision.

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