

# Recollection & Traumatic Growth: Unique Mediation Pathways Through Traumatic Stress Components

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## Abstract

Although the severity of the COVID-19 outbreak varies from time to time, the pandemic has affected larger audiences worldwide. Given the increasingly severe measures taken by the authorities, healthcare professionals have experienced positive and negative effects of the events, both personally and vicariously. The main aim is to examine how remembering influences vicarious traumatization and post-traumatic growth in a sample of healthcare workers. We proposed a multiple mediation model testing of distinct roles of stress components (hypervigilance, avoidance, intrusion) on the link between recollective features of remembering and post-traumatic growth, which allows characterizing memory-linked mechanisms underlying the effects of traumatic stress on growth. We demonstrated unique pathways by which remembering influenced traumatic growth. For the links of emotional intensity and imagery with growth, we found full mediation through avoidance and intrusion. Individuals recalling events with high emotional intensity and imagery tend to experience more intrusions of trauma, which then resulted in traumatic growth. On the other hand, the opposite pattern was found for avoidance. Emotionally intense and vivid recall of events increased avoidance responses, but high avoidance reduced traumatic growth. With respect to reliving, while the pattern was similar, we found a partial mediation, showing the significant role reliving has in supporting traumatic growth.

**Keywords:** memory; vicarious memory; recollection, vicarious trauma; traumatic growth

## Introduction

The COVID-19 pandemic has induced not only fear from infection and death but also feelings of uncertainty and emotional exhaustion, over time which resulted in detrimental effects on both the physical and psychological health of individuals (Li et al., 2020). While every situation that threatens physical integrity and life is a cause of intense stress for people, witnessing these situations can also have devastating effects on people's mental and physical health. Lerias & Byrne (2003) indicated that health care professionals working with trauma are highly vulnerable to indirect traumatization, and supporting this, evidence has shown that especially healthcare workers experience vicarious trauma

mostly because they work with people who are experiencing or have recently gone through a trauma. (Bride, 2007; Maytum et al., 2004). Pearlman & Caringi (2009) defined vicarious trauma as “the negative transformation in the helper that results (across time) from empathic engagement with trauma survivors and their traumatic material, combined with a commitment or responsibility to help them”.

In the trauma literature, stress (Ensel & Lin, 1998) and negative coping strategies (Shalev & Ursano, 2003) are mentioned as predictors of vicarious traumatization (Lerias & Byrne, 2003). It has also been observed that situations such as time pressure, working under high expectations, witnessing death play a role in the occurrence of vicarious traumatic reactions (Gökçe & Yılmaz, 2017). Research revealed that increased working hours and difficult conditions could cause healthcare workers to experience burnout which is a significant predictor of post-traumatic stress disorder and vicarious trauma (Jo et al., 2018; Gregson et al., 2013). Besides, previous studies showed that traumatic events affect recalling processes (Rubin et al., 2008) by causing the memory to be strengthened or weakened (Lorenzoni et al., 2014). Therefore, it is important to examine the pandemic in the context of memory by focusing on the impact of traumatic stress components and traumatic growth.

Accordingly, during the pandemic, healthcare workers could be the most affected group as they come across highly negative events both personally (i.e., long working hours under high pressure, fear of infection) and vicariously (i.e., repeated exposure to patients' sufferings and deaths). Building on their own stressful experience, repeated exposure to patients' traumatic experiences makes healthcare workers even more susceptible to vicarious traumatization and to exhibit traumatic stress reactions such as intrusive memories, hyper-vigilance, and avoidant coping. Covid-19 pandemic represents a chronic trauma, especially for healthcare professionals, with highly emotional events recurring over a long period of time. Alike recalling personal memories, how individuals recall the vicarious memories of trauma has a substantial impact on the way trauma is represented.

Recollective properties such as reliving, emotional intensity, and visual imagery have been linked to how traumatic events are represented over time—recalling traumatic events accompanied with high visual imagery and a feeling of reliving increases the emotional effect of the trauma (Holmes & Mathews, 2010). Recurrent re-experiencing of emotionally intense and vivid episodes of trauma has been shown to predict the severity of traumatic stress. While recalling trauma with emotional fragments as such has been found to increase the emotional distress, a coherent representation of the event attenuates the negative emotions and helps to leave those events behind (Bisby, Burgess, & Brewin, 2016; Reese et al., 2011).

Traumatic experiences could lead to traumatic growth in the aftermath of trauma as well. Despite all the distress they experienced, they may recover with the lessons they take and achieve emotional closure (Brooks et al., 2019). In the context of the pandemic, for the health care workers, the memories may gradually weaken in their vividness and emotional intensity, indicating a process of healing and growth after traumatic events. However, it is also possible for some people that negative experiences do not fade away over time and maintain their vividness, which keeps traumatic stress and prevents the growth after trauma.

The traumatic stress components, for example, hypervigilance, may drain the individual's resources for recovery and growth by exaggerating emotional responses (Steinmetz, & Kensinger, 2013). Further, avoiding reminders of the event memory not only leads to a vague memory but also prevents adaptive processing, leaving the event fragmented. Berntsen (2009) suggested that involuntary intrusions of nontraumatic experiences are functional in the sense that they may facilitate the processing of the event to make it a coherent whole. However, intrusions of traumatic events may function as facilitators of traumatic growth by preventing avoidance.

In that sense, memory-linked variation has been shown to influence responses to trauma; evidence on the role of distinct recollective properties of traumatic stress and growth reactions is limited.

### Present Study

Here, we aimed to examine how remembering influences vicarious traumatization and post-traumatic growth in a sample of healthcare workers. We proposed a multiple mediation model testing of distinct roles of stress components (hypervigilance, avoidance, intrusion) on the link between recollective features of remembering and post-traumatic growth, which allows us to characterize memory-linked mechanisms underlying the effects of traumatic stress on growth. We expect phenomenological variables to be positively related to traumatic stress and growth. And the direct link between memory variables and growth to be insignificant when traumatic stress is entered in the model is also expected.

## Method

### Participants

The only precondition for participation in the current research was to be a healthcare worker and actively working during the Covid-19 outbreak. Participants were 112 healthcare workers (33.3 medical doctors, 40.9% nurse, 25.5% other) who have been actively working in pandemic hospitals since March 2020 (See Table 1). The sample size was determined using GPower setting an effect size criterion of .80.

The participants who completed all two memory reports, phenomenological ratings, trauma-related stress, and growth measures were included. Those who did not complete these sections were eliminated from the final sample (N=9), leaving us a total of 103 people (60.3% female,  $M_{age} = 55.56$ ,  $SD = 11.14$ ) in the final sample.

The average professional experience of the participants was 10.44 ( $SD = 10.37$ ) years. 56.7% of the participants worked actively in the COVID-19 service during this period and reported that they spent an average of 50.23% ( $SD = 35.52$ ) of their time with COVID-19 patients. 32.4% of the participants at this stage stated that they received the diagnosis of COVID-19.

**Table 1: Demographics and occupational characteristics of participants.**

Occupation	Age			Professional Experience	
	N	M	SD	M	SD
Doctor	39	48.21	12.41	14.76	12.91
Nurse	42	60.26	7.47	8.67	7.95
Novice	12	57.83	10.32	4.33	1.96
Other	10	56.73	8.82	4.70	7.73

### Measures

**Autobiographical Memory Recall** After obtaining consent to participate in the study, participants were asked about the two events that most affected them with the specific instructions below.

*“At this stage, we ask you to describe the two events that affected you the most, considering the events you have experienced or witnessed since the epidemic started. These can be any events, only events that have happened at a particular time. Now please consider these events and describe each event in detail.”*

For each memory reported, participants rated the recollective characteristics of the memories using selected items from the Autobiographical Memory Questionnaire (Rubin et al., 2003). We mainly focused on the emotional intensity, reliving and imagery, and valence of the reported event.

**Post Traumatic Growth Inventory** The scale, developed by Tedeschi and Calhoun (1996) to evaluate the positive changes that may occur in individuals after a traumatic or stressful life event, consists of 21 items, rated on a 0 (never experienced) to 5 (extremely experienced) scale.

**Secondary Traumatic Stress Scale** The scale developed by Bride et al. (2004) was adapted into Turkish by Kahil (2016). The scale measures the stress symptoms in response to vicarious traumatization. The scale consists of 17 items with three subscales of intrusion, hypervigilance, and avoidance. High scores on the scale indicate more severe traumatic stress.

**Procedure** Throughout the data collection period (October–November 2020), the pandemic was highly severe, and we collected the data online. Participants were recruited through calls on social media. After individuals agreed to participate, the survey link was shared with them. After providing demographic information, participants proceed to the recall phase.

Participants were asked to describe the two events they were most affected by during the pandemic and rated the phenomenological characteristics. Lastly, they completed the Traumatic Growth Scale and Traumatic Stress Scale in a counterbalanced order. At the end of the study, participants were debriefed and compensated with shopping vouchers. All procedures were approved by the ethics committee of Kadir Has University.

We expected the relationship between recollective properties of recall and traumatic growth to be mediated by the traumatic stress and the mediational role of traumatic stress to differ for distinct components of stress. We proposed a multiple mediation model testing in which each recollective factor (e.g., emotional intensity, reliving, imagery) was the predictor, and the traumatic growth was the dependent variable. The three components of traumatic stress were used as mediators. We tested the multiple mediation models using the SPSS PROCESS macro (Hayes, 2013). This method has been shown to be more powerful than the causal step approach as it does not require all paths to be significant.

## Results

We first examined the bivariate relationships between target variables (See Table 2 for coefficients). Bivariate correlations were performed to demonstrate the relational pattern among the variables as a first step of the mediation analyses. Although the causal approach in mediation requires significant correlations among variables, SPSS PROCESS does not have such a requirement. Phenomenological characteristics were significantly related to traumatic stress and growth ( $r_s < .30$ ,  $p_s < .01$ ). The only exception was that the relationship between visual imagery and traumatic growth was not significant.

Table 2: Correlations between variables.

	1.	2.	3.	4.	5.	6.	7.
1. Relive	1	.780**	.787**	.332**	.378**	.396**	.299**
2. Imagery		1	.655**	.182	.372**	.334**	.296**
3. Intensity			1	.300**	.305**	.389**	.310**
4. Growth				1	.070	.360**	.038
5. Avoidance					1	.785**	.845**
6. Intrusion						1	.714**
7. Vigilance							1

\*\* Correlation is significant at the 0.01 level (2-tailed).

Before the mediation analyses, the event scores were compared to see whether ratings differ from each other. We found no differences in phenomenological ratings, ensuring two memories have comparable ratings. The ratings were high for both memories, probably because the events were still hot and important, and the context of the memories (the pandemic) is still active. For that reason, we used the average of the ratings. We requested 5000 bootstrapped samples and bias-corrected 95% confidence intervals to determine direct and indirect effects. Confidence intervals that do not contain zero indicate a significant indirect effect. Indirect effects are smaller than the direct effects in SEM, path analysis or multiple mediation models, especially when the variables are measured concurrently (Walters, 2018). When small effects were observed, a significant decision was made based on the confidence intervals.

We tested three separate multiple mediation models in which each recollective factor was used as the predictor. The model for emotional intensity was found to be significant,  $R^2 = .29$ ,  $F(4, 83) = 8.61$ ,  $p < .01$ . While the direct effect of emotional intensity on traumatic growth was not significant, indirect effects through intrusion and avoidance were significant. Individuals recalling events with more emotional intensity tend to experience more intrusions, which enhances traumatic growth. However, for avoidance intensity, related increases in avoidance reduce traumatic growth (See Table 3 for estimates).

Table 3: Estimates for the emotional intensity-stress-growth model.

Independent variable (X)	Mediator (M)	Posttraumatic Growth (Y)				
		Direct effect of X on Y				
		Effect	SE	p	LLCI	ULCI
Emotional Intensity		.49	.25	.05	-.01	.99
		Indirect effect(s) of X on Y				
		Effect	BootSE	BootLLCI	BootULCI	
	Intrusion	.73	.23	.33	1.22	
	Vigilance	-.19	.13	-.49	.03	
	Avoidance	-.28	.16	-.61	-.02	

The model testing the reliving as the predictor was found to be significant as well,  $R^2 = .32$ ,  $F(4, 83) = 9.70$ ,  $p < .01$ . However, it was a partial mediation pattern. Reliving maintained its direct effects on traumatic growth while having positive and negative indirect effects on intrusion and avoidance, respectively (See Table 4 for estimates).

Table 4: Estimates for the reliving-stress-growth model.

Independent variable (X)	Mediator (M)	Posttraumatic Growth (Y)				
		Direct effect of X on Y				
		Effect	SE	p	LLCI	ULCI
Reliving		.67	.25	.01	.17	1.17
		Indirect effect(s) of X on Y				
		Effect	BootSE	BootLLCI	BootULCI	
	Intrusion	.75	.24	-.13	.50	
	Vigilance	-.14	.12	-.42	.06	
	Avoidance	-.44	.20	-.86	-.09	

The pattern for imagery was comparable to emotional intensity, showing a full mediation. The model was significant,  $R^2 = .28$ ,  $F(4, 83) = 7.93$ ,  $p < .01$ . Intrusion and avoidance were found to mediate the link between imagery and growth.

The model suggested that high imagery for recalled events enhanced intrusions, which supported traumatic growth. However, the indirect effect of imagery through avoidance was negative, suggesting the debilitating effect of avoidance on traumatic growth (See Table 5 for estimates).

**Table 5: Estimates for the imagery-stress-growth model.**

Independent variable (X)	Mediator (M)	Posttraumatic Growth (Y)				
		Direct effect of X on Y				
		Effect	SE	p	LLCI	ULCI
Visual Imagery		.35	.26	.18	-.16	.86
		Indirect effect(s) of X on Y				
		Effect	BootSE	BootLLCI	BootULCI	
	Intrusion	.68	.23	.26	1.19	
	Vigilance	-.16	.13	-.43	.06	
Avoidance	-.41	.20	-.85	-.70		

## Discussion

Previous studies have found that the way individuals remember traumatic events predicts the emotional responses to trauma in the aftermath. The current study focuses on healthcare professionals, and their vicarious trauma during the Covid-19 process as Jo et al. (2018) argued that healthcare professionals have to work longer under stressful conditions through which they are exposed to indirect trauma. The current research aimed to characterize the link between recollective properties of healthcare professionals' memories along with traumatic stress and growth reactions. We expected memory characteristics to be linked with traumatic stress reactions in distinct ways, which will predict the extent of traumatic growth. More specifically, we tested a multiple mediation model to examine whether traumatic stress reactions such as avoidance, hypervigilance, and intrusion mediated the link between recollective properties and traumatic growth.

We demonstrated unique pathways by which remembering influenced traumatic growth. For the links of emotional intensity and imagery with growth, we found full mediation through avoidance and intrusion. As the emotional intensity of the memories increased, the feeling of reliving the memories and the visual imagery values of the memories became higher. In this context, it is noteworthy that with the increase in coping skills of healthcare workers, memory characteristics such as reliving and visual imagery became higher. This situation can be interpreted as a functional process consistent with Berntsen's (2009) explanation of post-traumatic memory structure.

Individuals recalling events with high emotional intensity and imagery tended to experience more intrusions of trauma, resulting in traumatic growth. The relationships with remembering characteristics were examined, coping skills 2394

were associated with recalling memories with high emotional intensity and feeling of reliving. This situation may reflect the individuals' efforts to cope actively.

As events are remembered vividly, and with high emotional impact, individuals may feel the negative effects of events more. This situation may activate existing coping strategies. On the other hand, the opposite pattern was found for avoidance. Emotionally intense and vivid recall of events increased avoidance responses, but high avoidance reduced traumatic growth. With respect to reliving, while the pattern was similar, we found a partial mediation, showing the significant role of reliving in supporting traumatic growth.

When the correlation structures were examined, it was seen that individuals with high coping skills also had higher levels of traumatic development. This situation supports the findings that the post-traumatic development and adaptation process function better in individuals who can maintain their coping skills when stress is chronic (Jopp & Schmitt, 2010).

Traumatic stress reactions of avoidance, hypervigilance and intrusions are all common following the trauma, but current findings show that each of them has a unique role in how individuals deal with traumatic experiences. Avoidance is characterized by the denial of the traumatic experience; repressing or rejecting them thoughtfully prevents adaptive processing of the event, which as well, hampers the resolution of trauma. It is important to note that resolution is highly important for post-traumatic growth because resolution can be achieved only after individuals engage in an active meaning-making process. As Joseph et al. (2012) suggested, appraisal and reappraisal processes in the aftermath of trauma help individuals consolidate the event in a more abstract and adaptive form, which is less emotionally intense, paving the way for traumatic growth.

After traumatic events, there could be an alteration in memory processes that are similar to directly experienced events; witnessing others' negative experiences could trigger traumatic reactions. As we demonstrated, vivid, intense memories of traumatic events interfere with the remembering process; however, those intrusions could be adaptive and help individuals to fully experience and acknowledge the events (Berntsen, 2009), and this process facilitates traumatic growth. On the contrary, memory-linked increases in avoidance symptoms block post-event processing and, thus, the integration of event fragments into a whole trauma narrative (Bisby et al., 2020), which not only blocks growth but also likely to maintain the stress symptoms. The mediational role of traumatic stress further suggests that to achieve traumatic growth rather than avoiding stressors, individuals have to experience the stress reactions, process, and deal with the traumatic stress. Although this has been shown in previous empirical and clinical research, it is important to underline that the effect of recollection is not direct but rather operates through stress. When the memory becomes vague over time, traumatic stress reactions decrease as well, which opens up the way for traumatic growth.

## Limitations and Future Directions

Current findings demonstrated the unique role of traumatic stress components on the link between recollection and traumatic growth. In addition to the strength of this study, not including individual differences such as personal characteristics can be seen as a limitation. However, it is still unknown whether the pattern operates comparably across individuals. For example, rumination has been shown to enhance the negativity of recall (Moulds, Kandris, & Williams, 2007) and the course of traumatic stress (Szabo, Warnecke, Newton, & Valentine, 2017). In line, it is possible that rumination may moderate the mediational role of intrusion on traumatic growth. Emotion regulation strategies, as well, may influence the effect of traumatic stress components. Suppression may support the debilitating impact of avoidance on growth (Daches, Mor & Hertel, 2017). Thus, further research could focus on the individual differences that characterize how memory influences traumatic stress and growth reactions. It is also important to note that at the time of the data collection, the pandemic was still severe in Turkey, with the number of cases exceeding thousands. In that sense, it is possible to have a trauma-free period in which individuals undergo a growth process without being exposed to negative episodes reminding them the acute phase. Thus, further longitudinal research may focus on the memory-linked changes in traumatic stress and growth reactions at longer intervals.

Finally, intervention programs can be developed to reduce negative impacts due to the vicarious traumatization of healthcare professionals working under difficult conditions.

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