

The relationship between intrusive rumination and post-traumatic stress disorder: the mediating role of balanced time perspective

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Abstract: The purpose of the current study was to examine how the balanced time perspective affected the association between intrusive rumination and post-traumatic stress disorder (PTSD). Thus, 540 adults with past traumatic experiences completed the Essen Trauma Inventory, the Intrusive Rumination Scale, and Swedish Zimbardo Time Perspective Inventory. Results: ① intrusive rumination significantly and positively predicted PTSD. ② intrusive rumination positively predicted PTSD by positively predicting balanced time perspective. Conclusion: The association between intrusive rumination and PTSD was partially mediated by the balanced time perspective.

1. Introduction

Rumination belongs to a non-adaptive response style, which refers to the process by which individuals repeatedly think about the causes, consequences, and negative emotions caused by a traumatic event after it has occurred[1]. When this maladaptive response style enters the cognitive process in a compulsive and intrusive state that the individual cannot control, it is called "Intrusive Rumination (IR)"[2]. Intrusive rumination not only increases the individual's psychological stress and weakens psychological adaptation, but also causes post-traumatic stress disorder (PTSD). For instance, follow-up research has demonstrated that intrusive rumination still affects PTSD 12 months later[3]. According to the cognitive theory of PTSD, trauma victims mostly make poor assessments of the traumatic event, such as overgeneralizing, generalizing, and exaggerating the traumatic event, which makes them prone to feelings of threat and fear of even everyday events, and to mitigate this strong emotional response, individuals resort to a range of reactions (e.g., rumination)[4]. Although rumination can alleviate the sense of threat to some extent, it does not solve the actual problem in the long run, because intrusive rumination forces the traumatized individual to repeatedly experience the traumatic situation, leading to easier extraction of negative memories, which in turn increases the original negative emotions and false assessments, and the individual's perception of threat is sharpened, thus exacerbating the occurrence of PTSD[1; 5].

Furthermore, according to cognitive resource theory[6], the constant occurrence of negative

memories consumes a large number of cognitive resources, and positive information is not processed, which seems to lead to the individual being more easily immersed in the past trauma, unable to enjoy the present and imagine the future well. The reason intrusive rumination triggers PTSD symptoms in individuals seems to be related to the impaired time perspective of individuals. People encode, store and allocate personal experiences to time frames[7], and then dynamically transition between the past, present, and future time frames depending on current situational demands. The mental ability mentioned above is called balanced time perspective, which enables individuals to synthesize past experiences, current desires, and future outcomes before making decisions[8]. A low degree of "Past Negative" and "Present Fatalistic," a high level of "Past Positive," and a moderate level of "Present Hedonistic" and Future are the characteristics of a balanced time perspective, respectively.[9; 10]. However, intrusive rumination leads to the gradual solidification of negative past orientations, the individual's inability to flexibly switch to a present or future perspective, and the imbalance in time perspective that is an important characteristic of PTSD patients[11; 12]. Unbalanced time perspective has been linked to PTSD in numerous studies, with past negative orientation being a higher predictor of PTSD symptoms. Research using a sample of war refugees, for instance, discovered that traumatized people had a high inclination toward "Past Negative" and a low tendency toward "Past Positive" and Future[13]. A rise in PTSD symptoms was predicted by both high levels of "Past Negative" and low levels of Future orientation. Studies demonstrated adults with childhood trauma had high levels of "Past Negative" and "Present Fatalistic," and that time perspective influenced the association between trauma and PTSD symptoms to provide evidence from non-refugees that support this theory[14]. This may be because traumatized individuals have impaired autobiographical memory function, trauma memories are often fragmented and do not integrate temporal and contextual information from the situation well[15] The absence of temporal cues leads to an inability to allocate experiences to corresponding temporal domains and confusion in the mental time frame, e.g., traumatized individuals have difficulty recalling the exact chronological order of traumatic experiences[4]. When similar internal and external situational cues appear, the traumatized person will uncontrollably flashback to the past painful memories, causing the trauma to be re-experienced at the conscious level, showing typical PTSD symptoms [15].

Based on previous studies, it appears that the intrusive rumination could exacerbate an imbalanced time perspective and subsequently causes high levels of PTSD. Numerous investigations, however, have concentrated on the connection between intrusive rumination and PTSD or the association between time perspective and PTSD, but the precise connection between intrusive rumination, time perspective, and PTSD has not been firmly established in earlier studies. Therefore, our main hypotheses were that intrusive rumination would be positively correlated with PTSD, balanced time perspective would also be positively correlated with PTSD, and intrusive rumination would influence PTSD via the mediating role of balanced time perspective.

2. Methods

2.1. Participants

Simple random sampling was used to find participants on social networking sites, and each one was advised of the relevant risks and required to sign an informed consent form before doing the survey. The entire study was conducted online. The inclusion criteria, based on the Essen Trauma Inventory and age, were ① A person who has experienced or/and witnessed a traumatic event ② Age ≥ 18 years. In the end, the study had 540 participants, between the ages of 18 and 55, there were 323 females and 217 males ($M_{age} = 27.28$, $SD_{age} = 5.34$).

2.2. Instruments

2.2.1. The Essen Trauma Inventory (ETI)

The scale contains items such as traumatic event inventory, objective and subjective life-threatening and PTSD symptoms[16]. In this investigation, the Chinese version was employed[17]. A 4-point Likert scale is used by the ETI (0=not at all, 3=a lot). A score between 16 and 27 is considered as suspected PTSD, and a score of ≥ 27 can be considered as confirmed PTSD, with higher scores representing more severe PTSD symptoms. For the entire scale, Cronbach 's α was 0.937.

2.2.2. Intrusive rumination scale

The scale is derived from the subscales of The Event Relative Rumination Inventory (ERRI)[2], which consists of 10 questions. Participants rank each item on a 4-point Likert scale (0=never and 3=always), with more intense intrusive rumination indicated by higher scores according to their personal experience. The scale's Cronbach's α in the current study was 0.907, and it was used to measure reliability.

2.2.3. Swedish Zimbardo Time Perspective Inventory (S-ZTPI)

The S-ZTPI is a 64-item scale divided into six dimensions: Past Negative (PN, negative perception of the past); Past Positive (PP, positive perception of the past); Present Fatalistic (PF, belief in a given fate and lack of hope for the future); Present Hedonistic (PH, spontaneous desire for pleasure, not considering risks and consequences); Future Positive (FP, believing the future is promising and actively pursuing goals); and Future Negative (FN, worry and anxiety about the future). A 5-point Likert scale (1 = not at all, 5 = totally) is used to score the S-ZTPI. The more points a dimension received, the more oriented it was to the time perspective, and the overall scale's Cronbach's alpha was 0.906.

The balanced time perspective was determined in the current study using the Rönnlund, ström, and Carelli[18] modified Deviation from the balanced time perspective Extended (DBTP-E), which suggests that the higher the score, the more imbalanced the time perspective. The formula is as follows.

$$\sqrt{(oPN - ePN)^2 + (oPP - ePP)^2 + (oPF - ePF)^2 + (oPH - ePH)^2 + (oFP - eFP)^2 + (oFN - eFN)^2} \quad (1)$$

O = observation score and E = optimal critical value. According to Zimbardo & Boyd[19] suggested, the optimal critical value of eFN was the 10th percentile of the dimension. In this study ePN=1.95, ePP=4.60, ePF=1.50, ePH=3.90, eFP=4.00, and eFN=2.60.

2.3. Data processing and analysis

The obtained data were analyzed descriptively and the correlation between variables using SPSS 25.0. Secondly, Model 4 in PROCESS is used to test the hypothesis model.

3. Results

3.1. Common method bias

Using Harman's single-factor test, it was determined whether there was any common method bias in this study. However, exploratory factor analysis revealed that there were 19 eigenvalues

larger than 1, and the first common factor accounted for 16.05 per cent of the variance for all the items included in the three scales. Thus, our study did not suffer from a significant common method bias.

3.2. Descriptive statistics and correlation analysis of variables

Gender would be controlled for in the following hypothetical model as Table 1 demonstrates a strong relationship between intrusive rumination and gender. Additionally, intrusive rumination and PTSD showed a strong and positive correlation, as did DBTP-E and intrusive rumination, respectively.

Table 1: Descriptive statistics and correlation analysis of variables

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11
1.Gender			1.00										
2.Age	27.28	5.34	-.127**	1.00									
3.PTSD	40.32	13.34	-0.08	-0.06	1.00								
4.IR	18.19	6.40	-0.092*	-0.07	0.854**	1.00							
5.PP	3.44	0.51	-0.02	-0.01	-0.103*	-0.07	1.00						
6.PN	3.53	0.64	-0.096*	-0.01	0.712**	0.703**	-0.06	1.00					
7.PH	3.61	0.50	-0.086*	-0.04	0.503**	0.449**	0.344**	0.622**	1.00				
8.PF	3.54	0.64	-0.07	-0.01	0.640**	0.607**	-0.120**	0.801**	0.618**	1.00			
9.FP	3.46	0.42	-0.04	-0.02	0.07	0.07	0.624**	0.146**	0.479**	0.108*	1.00		
10.FN	3.36	0.57	-0.089*	-.108*	0.614**	0.603**	-0.168**	0.778**	0.543**	0.768**	0.05	1.00	
11.DBTP-E	3.18	0.80	-0.07	-0.04	0.651**	0.628**	-0.415**	0.825**	0.408**	0.876**	0.146**	0.814**	1.00

Note: * at 0.05 level (two-tailed), ** at 0.01 level (two-tailed), *** at 0.001 level (two-tailed), significant correlations. IR=Intrusive Rumination, PP=Past Positive, PN=Past Negative, PH=Present Hedonistic, PF=Present Fatalistic, FP=Future Positive, FN=Future Negative, DBTP-E=Deviation from the Balanced Time Perspective Extended. Same below.

3.3. The mediating effect of time perspective

The mediating impact of time perspective between intrusive rumination and PTSD symptoms was investigated using model 4 of the PROCESS program after gender was taken into account. According to Table 2, intrusive rumination strongly predicted both DBTP-E and PTSD, and DBTP-E significantly predicted PTSD. The effect of intrusive rumination on PTSD remained significant after the addition of DBTP-E, indicating that the association between intrusive rumination and PTSD was partially mediated by DBTP-E. The bootstrap method was used to calculate 95% confidence intervals, and the outcomes displayed in Table 3 demonstrated that the mediated pathway's confidence interval did not contain 0. Therefore, the mediated effect of DBTP-E is significant, and the percentage of mediated effect is 14%.

Further regression analysis reveals that whereas the other dimensions are not significant, PN ($\beta=0.11$, $p=0.01$), PP ($\beta=-0.08$, $p=0.005$), and PH ($\beta=0.132$, $p<0.001$) have a more substantial impact in the association between intrusive rumination and PTSD.

Table 2: Mediating effect of DBTP-E

	DBTP-E		PTSD		PTSD	
	<i>t</i>	<i>p</i>	<i>t</i>	<i>p</i>	<i>t</i>	<i>p</i>
Gender	-0.22	0.83	0.09	0.93	0.16	0.88
IR	18.59	0.00	37.85	0.00	26.48	0.00
DBTP-E					6.83	0.00
R^2	0.39		0.73		0.75	
F	174.69		722.00		537.86	

Table 3: Decomposition of the total effect, mediated effect and direct effect

	Effect	BootSE	BootLLCI	BootULCI	Effectiveness Ratio
Total effect	1.78	0.05	1.69	1.87	
IR->PTSD	1.53	0.06	1.42	1.65	86%
IR->DBTP-E->PTSD	0.25	0.04	0.17	0.34	14%

4. Discussion

This study set out to investigate how the balanced time perspective affected the association between intrusive rumination and PTSD. The first finding indicates that intrusive rumination positively predicts PTSD, consistent with previous studies[20; 21]. This result validates the cognitive resource theory[6], and it shows that individuals repeatedly thinking about trauma cues take up a lot of cognitive resources, and positive information from internal and external sources is not processed. Therefore, individuals are immersed in negative emotions, resulting in negative perceptions of self, others and society and an altered state of mind, which is consistent with the finding of more self-blame and self-criticism in PTSD patients[22]. Traumatic memory intrusion (i.e., flashbacks) is the core symptom of PTSD symptoms[23]. Intrusive rumination seems to enhance the accessibility of traumatic memories in internal retrieval. In other words, individuals are more likely to recall traumatic situations under the cue of internal and external cues and realize traumatic situation re-experience, which makes PTSD symptoms worse.

The second conclusion indicates that imbalanced time perspective and PTSD severity are positively correlated. Traumatized individuals with high time perspective imbalance also exhibit high levels of PTSD tendencies, which is consistent with previous research findings[13; 24]. In this study, after comparing the mean observed values of the dimensions of time perspective with the optimal critical values[18], we found that the main imbalances of time perspective in traumatized individuals were: High Past Negative, Present Fatalistic, and Future Negative levels, moderate Present Hedonistic levels, low Past Positive and Future Positive levels. Notably, the participants in this study exhibited a stronger negative time perspective and were easily immersed in a unidimensional view of time, which may lead to individuals' inability to understand the meaning of events across the entire timeline, breaking the ability of time perspective to have the ability to give events sequential, meaningful and coherent[8]. This also validates the theoretical elaboration at the beginning of this paper: Impaired autobiographical memory in post-traumatic individuals leads to the absence of temporal information in forming traumatic memories, which affects the individual's ability to form a rational and coherent temporal framework, with split experiences and flashback memories with and other PTSD symptoms.

The third conclusion suggests that intrusive rumination and PTSD symptoms are partially mediated by balanced time perspective. The cause might be because intrusive rumination brings up unpleasant memories again, lowering the person's psychological distance from the traumatic experience. Even if the event appeared long ago, the individual still feels that it occurred very

recently[25] and cannot allocate the event to a corresponding time frame, causing an imbalance in the individual's stateful time perspective. Moreover, under the condition of repeatedly thinking about the traumatic situation, the transient time perspective imbalance may cause a long-term imbalance. By analyzing different temporal perspectives, it seems that individuals' attitudes toward the past are more indicative of their psychological states than the present and future, whether the past is positive or negative has an important impact on subsequent PTSD, which suggests that past experiences are the most important basis for individuals to foresee the future[26]. Among the two past time views, a negative past perspective is the most important factor causing PTSD. Individuals have subjective psychological time after objective time stimuli, and these past negative time perceptions are integrated into their subsequent life experiences[27]. If victims persist in reflecting on their experiences, they will remain trapped in the past and use this trauma perspective to experience the present[28]. In addition, present hedonistic also plays a large role in PTSD, a result that contradicts Walg's result[13]. Present hedonistic is usually an assertion that individuals enjoy the present moment, but it more often refers to avoiding pain without concern for the long-term consequences of the behaviour leading to impulsive behaviour [29]. Although the painful emotions are suppressed for a short period, the accumulation of excessive negative emotions over time contributes to PTSD.

This study has drawbacks as well. First off, the current study primarily employed cross-sectional research techniques, and while it can infer tentative conclusions about the relationship between variables, it is unable to clearly illustrate how time perspective patterns change before and after trauma or comprehend the role of intrusive rumination in this process. The exact causal relationship needs to be verified using longitudinal studies. Secondly, all variables in this study were self-reported with questionnaires, without strict control of other influencing factors, and more rigorous experimental studies could be developed in the future.

In conclusion, this study examines and demonstrates the mediating function of balanced time perspective for the first time, and it analyzes and explains how intrusive rumination affects PTSD symptoms. For PTSD symptom prevention and therapeutic strategies, these discoveries have theoretically and practical significance. Time perspective therapy is a brand-new narrative therapy that researchers have currently developed that is based on time perspective theory. By reaffirming the patient's time perspective and seeing any possible biases in the person's perceptions of the past, present, and future, we can improve psychological resiliency to the future[12], effectively stopping intrusive rumination from trapping the individual's psyche in the past to reduce PTSD symptoms, and is recognized for its clinical effectiveness[11]. To further understand the therapeutic intervention effects of time perspective treatment, future research should examine the function of the balanced time perspective in affecting and preventing PTSD.

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