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ORIGINAL RESEARCH

Relationship Between Peritraumatic Dissociation, Beliefs About Losing Control, Resilience, and PTSD on Earthquake Survivors in Turkey

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Purpose: The earthquakes that occurred on February 6, 2023, caused significant losses in Turkey. While a large number of people are exposed to trauma, only a few develop post-traumatic stress disorder (PTSD). It has been suggested that peritraumatic dissociation and dysfunctional beliefs also play a role in the emergence and maintenance of PTSD, and resilience is one of the most important protective factors for PTSD. This study is to test the moderated mediating role of resilience on beliefs about losing control (BALC) and its associations with peritraumatic dissociation and PTSD in earthquake survivors.

Participants and Methods: A total of 112 individuals living in the tent city of Hatay and Kahramanmaraş Provinces, which experienced earthquakes in 2023 in Turkey, were included in the study. Participants completed Sociodemographic Information Form, PTSD Symptom Scale-Self-Report, Brief Resilience Scale, Peritraumatic Dissociative Experiences Questionnaire, and Beliefs about Losing Control Inventory.

Results: Peritraumatic dissociation positively correlated with BALC ($\beta = 0.487$, $p < 0.001$). BALC acts as a mediator and positively predicts post-traumatic stress symptoms (PTSS) ($\beta = 0.321$, $p < 0.001$). The interaction between BALC and resilience also had a significant effect on PTSS ($\beta = 0.032$, $p < 0.05$). The relationship between BALC and PTSS was significant at high and medium resilience levels ($p<0.05$) but not at low resilience.

Conclusion: Peritraumatic dissociation predicts PTSS both directly and through BALC, and higher levels of resilience are more likely than lower levels of resilience to attenuate the effects of BALC on PTSS in earthquake survivors.

Keywords: post-traumatic stress disorder, resilience, peritraumatic dissociation, beliefs about losing control, earthquake survivors

Introduction

Earthquakes are a highly destructive and frequently occurring natural disaster. They often strike without warning, causing devastating impacts on large numbers of people.[1] While natural disasters have been a part of human history, the evaluation of their psychological effects is primarily based on recent events. In a meta-analysis study by Dai et al[2] examining the prevalence of psychological disorders following earthquakes, it was found that Post-Traumatic Stress Disorder (PTSD) was the most common, with a rate of 23.66%. Following the earthquake that occurred in Turkey on February 6, 2023, which is the subject of this study and caused the death of at least 50,000 people, the prevalence rates of PTSD were found to be quite high at 51.4%,[3] and 55.2%.[4] In addition, various studies examining the risk factors for PTSD after the current earthquake have identified age, low social support, bereavement, loss of close family members as significant factors.[4,5] Although current literature suggests a positive link between earthquake exposure and PTSD symptoms,[6] the psychological mechanisms behind this connection are largely unexplored. Research has focused on identifying factors that contribute to the development and maintenance of the disorder.[7] One such factor is peritraumatic dissociation, which refers to the presence of dissociative features during or immediately after trauma and has been identified as a significant risk factor for the development

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of PTSD.[8] In a study conducted with earthquake survivors, participants described their dissociative experiences as feeling "surreal", "absurd", "impossible", and "incredible", indicating a shattered perception of reality and a sense of detachment from their surroundings.[9] Another study found that individuals who experienced an earthquake had higher levels of peritraumatic dissociation and PTSD symptoms compared to controls.[10]

Cognition plays a crucial role in both the development and persistence of PTSD.[11] According to cognitive models of PTSD, maladaptive beliefs about one's sense of control or the perceived uncontrollability of trauma-related emotions and memories contribute to the maintenance of post-traumatic distress and avoidance.[11] The concept of control is a broad topic, encompassing both external and internal stressors as well as actual and perceived control. However, the importance of "beliefs about losing control" has only recently been recognized and its relationship with different psychopathologies is still being studied. This belief has been found to play a role in the development and maintenance of obsessive-compulsive disorder and social anxiety disorder.[12,13] In PTSD, negative beliefs about control have been linked to worse symptoms after exposure to trauma.[14] While previous research has found that having an external locus of control can increase PTSS (post-traumatic stress symptoms),[15] there is still no clear understanding of how and why control beliefs and PTSD symptoms are related.

One crucial factor protecting against PTSD is resilience.[16] It can be defined as the ability to adapt positively to negative conditions or overcome challenges.[17] Research has consistently shown that individuals with high levels of psychological resilience are less likely to develop PTSD after a traumatic event. For example, a recent study found that trauma survivors with higher levels of resilience were more likely to accept their experiences and experience fewer post-traumatic stress symptoms.[18] However, it is important to note that resilience can only fully function after the end of a stressful period or event.[19] While there is evidence that psychological resilience is a protective factor against psychiatric disorders in trauma,[4,16] there is a significant lack of research on how resilience moderates the relationship between peritraumatic dissociation, beliefs about losing control, and trauma symptoms after a traumatic event such as an earthquake. In light of the information presented, the purpose of this study is to test the mediating role of beliefs about losing control in the relationship between peritraumatic dissociation and PTSS, and the moderating effect of psychological resilience in the association of beliefs about losing control and PTSS in adult earthquake survivors. Moreover, to the best of our knowledge, there is no study addressing the effect of resilience on these relationships in adult earthquake survivors.

Materials and Methods

Study Design

This study was conducted in accordance with the principles of the Helsinki Declaration and approved by Toros University Noninterventional Clinical Research Ethics Committee (approval no: 121, date: 27.10.2023). Written consent was obtained from the participants after they were thoroughly informed about the research details. The study included individuals over the age of 18 who were exposed to earthquakes centered in Kahramanmaraş with magnitudes of 7.7 and 7.6 on February 6, 2023, and earthquakes centered in Hatay with magnitudes of 6.4 on February 20, 2023. The study was conducted in Hatay and Kahramanmaraş Provincial Tent Cities between November 2023 and January 2024. Participants were evaluated through face-to-face interviews conducted by the psychiatrist and clinical psychologists, who are the authors of the study. Participants who were diagnosed with a mental disorder and/or receiving treatment for a mental disorder (N = 28) were excluded from the study. Reported mental disorder and treatment history were based on self-report.

Instruments

Sociodemographic Data Form

This form was created by researchers to gather information about the study group's socio-demographic characteristics and household situation. The level of damage to the household was also questioned.

Turkish Version of the PTSD Symptom Scale-Self-Report (PSS-SR)

PSS-SR was originally published by Foa et al[20] and aims to measure symptoms within the scope of DSM PTSD diagnostic criteria. It is a self-report scale consisting of 17 items scored between 0 and 3 and three subscales: re-

experiencing, avoidance, and hyperarousal. However, the nine-item subscale in the second part of the scale, which measures impairment in functionality due to post-traumatic symptoms, was not included in this study. The Turkish adaptation of the scale was published by Aydın et al[21] and the internal consistency coefficient of the total scale is 0.90 for re-experiencing, 0.81 for avoidance, and 0.72 for hyperarousal. 15-day temporal stability coefficient for total scale was 0.66. The Cronbach's alpha of the scale in this study was 0.92.

The Brief Resilience Scale (BRS)

This scale was developed by Smith et al[22] and adapted into Turkish by Doğan[23] to measure the psychological resilience levels of individuals. The scale is a self-reporting measurement tool with a 5-point Likert type (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree) and consists of a total of six items. Items 1, 3, and 5 are positively worded, and items 2, 4, and 6 are negatively worded. The BRS is scored by reverse coding items 2, 4, and 6 and finding the mean of the six items. High scores obtained from the scale indicate high psychological resilience. The scale showed good reliability ($\alpha = 0.83$) and Cronbach's alpha was 0.80 and for this study.

The Peritraumatic Dissociative Experiences Questionnaire (PDEQ)

The scale was developed by Marmar et al[24] and adapted into Turkish by Geyran et al[25] to retrospectively evaluate the dissociation experienced by the person at the time of the trauma. The Cronbach's alpha was 0.85 and higher scores on the scale mean greater incidence of peritraumatic dissociation. Individuals diagnosed with PTSD, it was observed that the scale was associated with all types of trauma. Furthermore, it was determined to be 0.93 for this study.

Beliefs About Losing Control Inventory (BALCI)

It was developed by Radomsky and Gagné[13] and adapted into Turkish by Mercan and Kabadayı[12] to measure negative beliefs about losing control. It consists of 18 items on a five-point scale and three factors. Items are rated from 0 ("Not at all") to 4 ("Very much"). The Cronbach's alpha of the total scale was 0.93. In addition, it was found that the dimension of thought, emotion, behavior was 0.92, the dimension of importance of staying in control was 0.84, and the dimension of body / bodily functions was 0.66. The test-retest reliability coefficient was 0.70 for the total scale. For this study, the Cronbach's alpha was 0.92.

Statistical Analysis

Descriptive statistics were used to obtain values related to the sample and measurement tools. Since the variables were found to be normally distributed, parametric analyses were used. Relationships between variables were examined using Pearson correlation analysis. A moderated mediation analysis was conducted using Hayes PROCESS macro to investigate the mediating role of beliefs about losing control in the relationship between the peritraumatic dissociation and PTSD symptoms.[26] The moderating effect of resilience on these relationships was investigated through Process Analysis (PROCESS macro, Model 14). The bootstrap method, which involves resampling the data to compute confidence intervals, was employed in the mediation analysis. A result is considered significant if the bias-corrected 95% confidence interval does not include zero. This statistical technique generates multiple samples from the original dataset to estimate the accuracy of the sample. By doing so, it helps determine confidence intervals, which provide a likely range of values for the true population parameter.[27] In this study, the bootstrap method was applied to analyze the data and assess the significance of the findings. It is known for yielding reliable results, even with small sample sizes or non-normally distributed variables.[28] For the mediation analysis, 5000 bootstrap samples were used, enhancing the precision and dependability of the results. Statistical analyzes of the study were conducted using SPSS V. 23 for correlational analyzes, and PROCESS for moderated mediational model. Statistically significance level was accepted as 0.05.

Results

Before conducting the analyzes, missing and extreme values were examined, and 2 individuals were excluded from the analysis due to univariate outliers ($z > 3.29$). In order to ensure a normal distribution of the data, Kurtosis and Skewness values were used as a criterion of −1.5 to +1.5.[29] The sample of the study consisted of 112 individuals, with 55 (49%) women and 57 (51%) men, aged 18–83 ($M = 42.01$, $SD = 13.44$). Of the participants, 73 (65.2%) were married and 39

(34.8%) were single. The percentage of individuals whose houses were destroyed in the earthquake was 25.9% (n=29), while 17% (n=19) had severe damage, 5.4% (n=6) had moderate damage, and 32.1% (n=36) had slight damage. The remaining 19.6% (n = 22) had no damage to their homes. As all participants were exposed to the earthquake, 15 people (13.4%) lost first-degree relatives, while 97 people (86.6%) did not experience any loss (Table 1).

The descriptives of the measurements are shown in Table 2. Relationships between the variables were analyzed using Pearson correlation analysis (Table 3). The results indicated that PTSD was negatively correlated with resilience ($r = -0.49$, $p < 0.001$), and positively correlated with peritraumatic dissociation ($r = 0.45$, $p < 0.001$) and beliefs about losing control ($r = 0.59$, $p < 0.001$). Resilience was negatively correlated with peritraumatic dissociation ($r = -0.28$, $p < 0.01$) and beliefs about losing control ($r = -0.39$, $p < 0.001$). Lastly, peritraumatic dissociation was positively correlated with beliefs about losing control ($r = 0.39$, $p < 0.001$).

Table 1 Frequency and Percentage Values of Socio-Demographic Variables

	N	%
Gender		
Woman	55	49
Male	57	51
Marital Status		
Married	73	65.2
Divorced	39	34.8
Household Status		
House Destroyed	29	25.9
Heavily Damaged	19	17
Moderately Damaged	6	5.4
Slightly Damaged	36	32.1
Undamaged House	22	19.6

Table 2 Descriptives of the Measurements

Variables	Mean	Standard Deviation	Range	Skewness	Kurtosis
PR	18.42	4.60	6–29	−0.51	0.61
PD	21.11	11.75	0–40	−0.19	−1.09
BALC	47.87	14.65	18–78	−0.23	−0.72
PTSS	27.10	12.29	0–48	−0.42	−0.70

Abbreviations: BALC, beliefs about losing control; PD, peritraumatic dissociation; PR, psychological resilience; PTSS, post-traumatic stress symptoms.

Table 3 Pearson Correlations

	1	2	3
1. PTSD			
2 BRS	−0.49***		
3 PDEQ	0.45***	−0.28**	
4 BALCI	0.59***	−0.39***	0.39***

Notes: **p < 0.01; ***p < 0.001.
Abbreviations: BALCI, beliefs about losing control inventory; BRS, brief resilience scale; PDEQ, peritraumatic dissociative experiences questionnaire; PTSD, post-traumatic stress disorder.

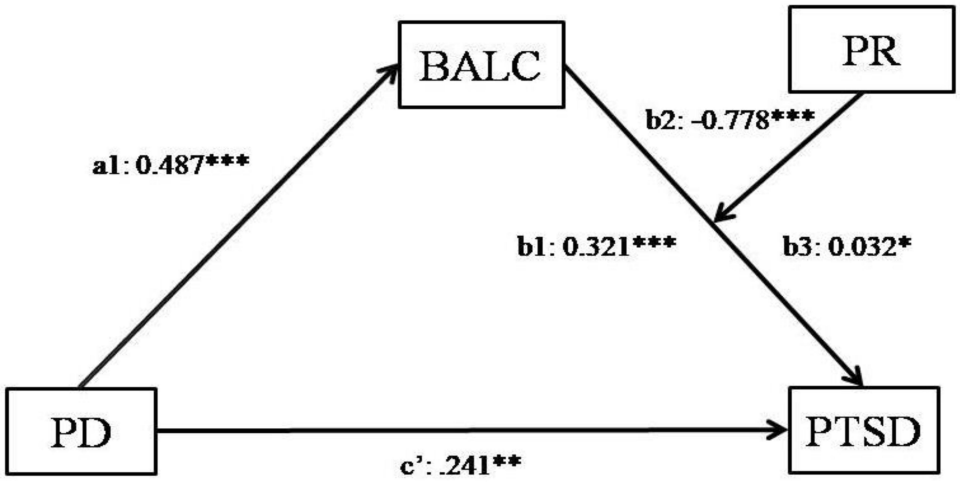

Figure 1 Moderated mediational model.
Notes: *p < 0.05; **p < 0.01; ***p < 0.001.
Abbreviations: PR, psychological resilience; PD, peritraumatic dissociation; BALC, beliefs about losing control; PTSD, post-traumatic stress disorder.

Moderated Mediation Model

This study sought to examine whether beliefs about losing control mediated the relationship between peritraumatic dissociation and PTSS and whether the mediating effect of beliefs about losing control on PTSS was moderated by resilience (Figure 1).

To test mediation moderation model (Model 14) by Hayes[26] was utilized. The significance of the mediating effect was tested using a confidence interval obtained from 5000 repeated hypothetical sample bootstraps (95% confidence interval). The regression coefficients are given on Table 4. The results showed that peritraumatic dissociation positively predicted beliefs about losing control (a1: B = 0.487, 95% CI = 0.270 − 0.704, p < 0.001) and beliefs about losing control as a mediator positively predicted PTSS (b1: B = 0.321, 95% CI = 0.189–0.453, p < 0.001). The interactive effect of beliefs about losing control and resilience on PTSS was also significant (b3: B = 0.032, 95% CI = 0.003−0.061, p = 0.031). The indirect effect of peritraumatic dissociation on PTSS through beliefs about losing control depended on resilience (ω = 0.487[0.321 + 0.032v], v = resilience).

The bootstrapping method was utilized to test the moderated mediation effect of resilience (Table 5). The test revealed that higher levels of resilience were accompanied by greater moderated mediation effects (−1SD = − 14.65, +1SD = 14.65) (Figure 2).

Table 4 Moderated Mediation Effect Outcomes

	Unstandardized Coefficients					
	β	**SE**	**t**	**p**	**LLCI**	**ULCI**
PD → BALC (a1)	0.487	0.109	4.443	< 0.001	270	704
PD → PTSD (c')	0.241	0.080	3.023	< 0.05	0.083	0.399
BALC → PTSS (b1)	0.321	0.067	4.812	< 0.001	0.189	0.453
PR (b2)	−0.778	0.205	−3.791	< 0.01	−1.84	−0.371
BALC * PR (b3)	0.032	0.015	2.181	< 0.05	0.003	0.0607

Abbreviations: PD, peritraumatic dissociation; BALC, beliefs about losing control; PTSS, post-traumatic stress symptoms; PR, psychological resilience; β, standardized path coefficients; LLCI, lower level of the 95% confidence interval; ULCI, upper level of the 95% confidence interval.

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Table 5 Bootstrap Estimate Results of Moderated Mediation

Psychological Resilience	Indirect Effect	SE	LLCI	ULCI
Mean −1SD	0.085	0.056	−0.011	0.208
Mean	0.156	0.057	0.060	0.277
Mean +1SD	0.227	0.077	0.098	0.399
Index of moderated mediation Psychological Resilience	0.015	0.008	0.002	0.033

Abbreviations: LLCI, lower level of the 95% confidence interval; SE, standard error; ULCI, upper level of the 95% confidence interval.

Discussion

The current study aimed to examine if beliefs about losing control mediates the relationship between peritraumatic dissociation and posttraumatic stress symptoms, resilience moderates the association between beliefs about losing control and PTSS in earthquake survivors.

Considering the direct effects, the relationship between PD and PTSD symptoms was significant. In line with previous studies, individuals who experienced peritraumatic dissociation are more likely to develop PTSD symptoms.[8] After the recent earthquake in Turkey, the studies conducted have mentioned similar findings.[8] With respect to the primary hypothesis, the findings demonstrated that beliefs about losing control was associated positively with both peritraumatic dissociation and PTSD symptoms. That is, peritraumatic dissociation predicts PTSS both directly and through BALC. It is well known that dysfunctional beliefs or cognitions play a significant role in the development and maintenance of PTSD.[11,30] These beliefs have also been linked to the severity of PTSD symptoms, and it has been reported that trauma-focused treatments effectively reduce these beliefs.[11] This finding is consistent with previous research, as individuals who believe they will lose control may experience more symptoms of PTSD when faced with an uncontrollable and traumatizing experience, such as an earthquake.

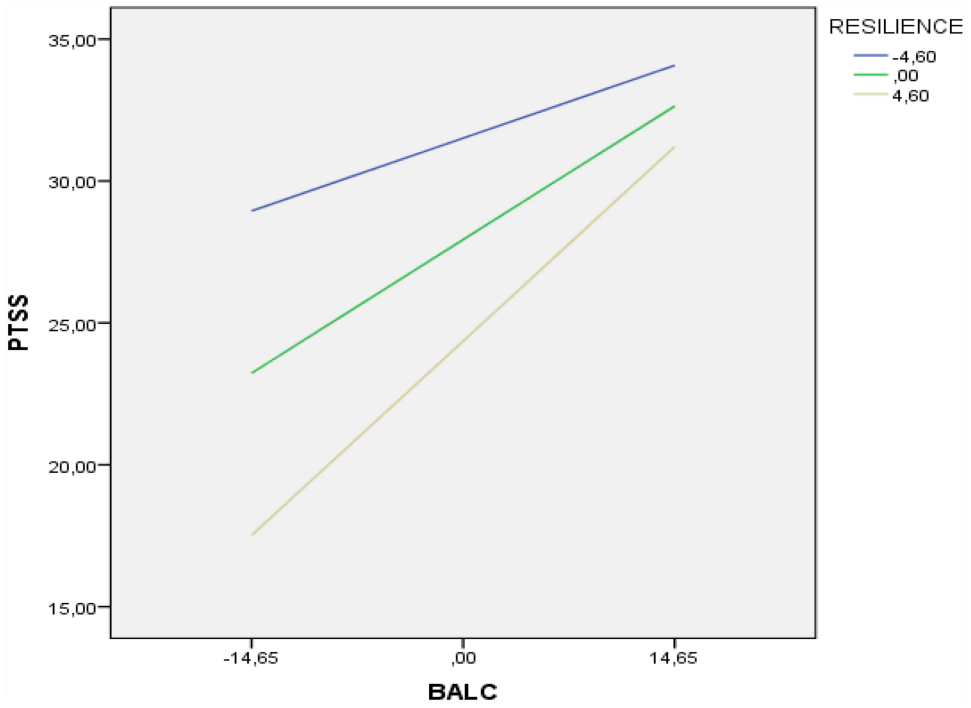

Figure 2 The moderating effect of resilience on peritraumatic dissociation and posttraumatic stress symptoms.
Abbreviations: BALC, beliefs about losing control; PTSS, post traumatic stress symptoms.

To our knowledge, this is the first study investigating the mediating role of beliefs about losing control in the relationship between PD and PTSD symptoms. While there is limited research on the relationship between PD and BALC, one study did find that the relationship between PD and PTSD was partially mediated by loss of control.[31] The current study is consistent with previous findings, but it offers a unique perspective. The earthquake, with its uncontrollable and traumatic nature, has been shown to reveal dissociative elements and these can be seen as maladaptive coping strategies, and they contribute to an increased fear of losing control. The current study's mediation analysis reveals an order effect, indicating that peritraumatic dissociation leads to an increased fear of losing control. This finding addresses the question of whether the fear of losing control is a cause or a result of dissociation.[31] Loss of control has a central role in the development of PTSD.[14] A study conducted with survivors of the earthquakes in Turkey has also found that perceived life control is related to PTSD.[32] Although intrusive thoughts about losing control occur for many individuals, they are unlikely to cause problems unless the individual attaches importance to them. In other words, recognizing that the fear of losing control is usually learned rather than based on actual evidence is essential. When people believe that it is important or necessary to control their thoughts, emotions, and behavior, they become afraid of losing control.[33] Considering that lower perceived control (the belief that I have no overall control over my life) is associated with higher PTSD symptom severity,[34] and PTSD is characterized by a sense of loss of control,[35] trying to maintain control (by adhering to rigid routines or avoiding situations) can be a self-protective measure against further traumatization. The result of beliefs about losing control, which are maladaptive, can increase PTSD symptoms (avoidance, re-experiencing, arousal, etc). and should be evaluated in this context.

With respect to the secondary hypotheses, the findings showed that psychological resilience moderated the relationship between BALC and PTSS. As individuals' psychological resilience decreases, their beliefs about losing control increase, making them more susceptible to exhibiting PTSD symptoms. In other words, higher levels of resilience were more likely than lower levels of resilience to attenuate the effects of BALC on PTSS in earthquake survivors. On the other hand, high BALC levels are associated with high PTSS levels regardless of resilience. These findings confirm prior empirical evidence on how resilience acts as a moderating factor for negative outcomes after experiencing stressful events.[16] Resilience can be formed through understanding the reality of how trauma can transform responses to earthquakes. An individual's belief about their control in dealing with certain events in life is one of the factors that contributes to resilience.[36,37] When evaluated in this context, it is not surprising that the fear of losing control (ie, beliefs about losing control over one's own emotions, thoughts, and behaviors) increases symptoms and is more prevalent in those with high resilience. The results of the present study suggest that earthquake survivors who experienced peritraumatic dissociation and also have high levels of resilience may benefit more from interventions targeting beliefs about losing control to reduce posttraumatic stress symptoms than those with lower levels of resilience. This protective role of psychological resilience have been reported by various previous studies. For example, resilience was found to be a protective factor against increased depression and anxiety during COVID-19 pandemic.[16] The findings highlight how crucial resilience resources are for an individual's ability to handle stressful life situations effectively.

In this study, since the measurements were taken after the earthquake, the participants' current resilience levels were measured, and on the other hand, retrospective measurements were taken regarding their dissociative experiences during the trauma. Therefore, the pre-traumatic resilience levels of these participants could not be addressed. However, the fact that resilience is conceptualized as a dynamic, ongoing process rather than a result,[38] and the fact that cross-sectional studies cannot reveal the temporal nature of the relationships between variables have guided the interpretation of the findings. It is not simple to explain the connection between resilience and peritraumatic dissociation, especially through cross-sectional studies. There is limited information in the literature regarding which factors predict peritraumatic dissociation.[39] Because peritraumatic dissociation reflects past reactions, psychological resilience is dynamic and relevant current variables, temporal sequence of their relationships cannot be determined. It was intended to examine the moderating role of resilience, which is a protective factor for PTSD, in the relationship between only BALC and PTSD, but it was thought that it would not be appropriate to examine its moderating effect on the relationship between PD and PTSD. According to the model 14 analysis results that were decided for these reasons suggest that resilience is an important factor that clinicians should consider when assessing the PTSD risk of a patient exposed to trauma.

Limitations

The present study has certain limitations that could affect how the results are interpreted. One of the main limitations of this study is the small sample size and the fact that the participants were selected from two regions. In order to improve the reliability and validity of future studies, it is important to use larger sample sizes and select participants from multiple regions. Additionally, the data collection process relied on self-report, so it would be beneficial to conduct experimental studies in the future to better understand the predictors of PTSD. As the literature on cognitions related to loss of control is still in its early stages, this study can provide valuable insights into the impact of control cognitions on PTSD. Future studies could also explore the role of other cognitive factors, such as other control-related cognitions, in PTSD. Additionally, since this study is a cross-sectional study, the findings should not be interpreted as a cause-effect relationship.

Conclusion

This study aimed to examine the mediating role of beliefs about losing control on the relationship between peritraumatic dissociation and PTSD symptoms and also moderating role of resilience and it was found that moderated mediation model was significant. In trauma-focused therapies, addressing distorted control cognitions, particularly during exposure exercises, can help individuals understand that remembering the traumatic event will not cause them to go crazy or lose control.

Overall, this study highlights the importance of considering multiple variables in understanding the development of PTSD symptoms in earthquake survivors. Future research could further investigate the mechanisms through which resilience impacts PTSD symptoms, and intervention strategies could be developed to enhance resilience and reduce the long-term impact of traumatic events on individuals' mental health.

Data Sharing Statement

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Ethical Standards

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

Informed Consent

All subjects provided written informed consent for inclusion before they participated in the study.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Disclosure

The authors declare no conflicts of interest in this work.

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