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Structural Modeling of the Relationships of Centrality of Event and Metacognitive Beliefs with Post-Traumatic Stress Symptoms in Individuals with Burn Injuries: The Mediating Role of Cognitive Emotion Regulation

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A B S T R A C T

Purpose: This study aimed to model the structural relationships of centrality of event and metacognitive beliefs with post-traumatic stress symptoms in individuals with burn injuries, considering the mediating role of cognitive emotion regulation.

Methods and Materials: This applied study employed a descriptive-correlational design based on structural equation modeling (SEM). The statistical population consisted of individuals with burn injuries living in Tehran, Iran, from whom 480 participants were selected using cluster sampling. Data were collected using the Post-Traumatic Stress Disorder Checklist (PCL; Weathers et al., 1994), the Centrality of Event Scale (Berntsen & Rubin, 2006), measures of metacognitive beliefs, and the Cognitive Emotion Regulation Questionnaire (Garnefski et al., 2001). Structural equation modeling was used to examine the proposed direct and indirect relationships among the study variables and to evaluate the mediating effects of adaptive and maladaptive cognitive emotion regulation strategies.

Findings: Centrality of event did not significantly predict post-traumatic stress symptoms indirectly through adaptive cognitive emotion regulation strategies ($\beta = -0.009$, $z = -0.643$, $p > .05$). Similarly, the indirect effect of centrality of event on post-traumatic stress symptoms through maladaptive strategies was not statistically significant ($\beta = 0.106$, $z = 1.659$, $p > .05$). In contrast, metacognitive beliefs significantly predicted post-traumatic stress symptoms indirectly through adaptive cognitive emotion regulation strategies ($\beta = 0.045$, $z = 2.811$, $p < .05$). However, the indirect effect of metacognitive beliefs through maladaptive cognitive emotion regulation strategies was not statistically significant ($\beta = 0.190$, $z = 1.588$, $p > .05$). Overall, the proposed structural model demonstrated an acceptable fit to the observed data.

Conclusion: The findings indicate that metacognitive beliefs may contribute to post-traumatic stress symptoms in individuals with burn injuries partly through adaptive cognitive emotion regulation processes, whereas cognitive emotion regulation did not significantly mediate the relationship between centrality of event and post-traumatic stress symptoms.

Keywords: *Post-traumatic stress symptoms; centrality of event; metacognitive beliefs; cognitive emotion regulation; burn injuries*

1. Introduction

Burn injuries constitute a major traumatic health event that can produce enduring physical, psychological, social, and functional consequences. Beyond the immediate threat to life and the intensive medical interventions often required during acute care, survivors may experience prolonged pain, repeated surgical procedures, scarring, altered body image, functional limitations, and disruptions in family, occupational, and social roles. Recovery is therefore not limited to wound healing but involves a multidimensional adaptation process in which individuals must cope with physical discomfort, loss of independence, changes in self-perception, and uncertainty regarding future functioning. Evidence from systematic reviews indicates that recovery of functional independence after major burns can be prolonged and heterogeneous, with the severity and course of impairment varying considerably across survivors (Jawad et al., 2024). Pain is also frequently experienced as a persistent and psychologically burdensome component of rehabilitation, influencing daily functioning, emotional well-being, and the subjective meaning attributed to the burn experience (Kornhaber et al., 2025). These characteristics make burn injury a particularly salient form of trauma with substantial potential to affect long-term psychological adjustment.

Among the psychological consequences of burn injuries, post-traumatic stress symptoms are especially important because they can persist long after physical stabilization and interfere with rehabilitation, social reintegration, and quality of life. Post-traumatic stress disorder (PTSD) is characterized by symptoms involving intrusive recollections, avoidance, negative alterations in cognition and mood, and heightened arousal following exposure to a traumatic event. Burn survivors may be particularly vulnerable because the traumatic event is often accompanied by intense pain, fear of death, distressing medical procedures, visible reminders of the injury, and continuing physical consequences. Large-scale evidence has confirmed that PTSD represents a clinically significant problem among patients with burns (Iglesias et al., 2024). Moreover, a recent systematic review and meta-analysis demonstrated that both clinically significant PTSD symptomatology and formal PTSD diagnoses occur at substantial rates among burn survivors, emphasizing that traumatic stress should be considered a central component of post-burn assessment and rehabilitation rather than a secondary psychological complication (Boersma-van Dam et al., 2025). Consequently, identifying cognitive mechanisms that explain why some burn survivors develop persistent post-traumatic stress symptoms whereas others show more adaptive adjustment remains a major research priority.

One construct that may contribute to individual differences in responses to trauma is **event centrality**, which refers to the extent to which a traumatic or highly negative event becomes a central reference point for personal identity, autobiographical memory, and interpretation of subsequent life experiences. A traumatic event may become integrated into an individual's life narrative to such an extent that it functions as a turning point, a key component of identity, and a framework through which other experiences are understood. Although the integration of major experiences into autobiographical memory is not inherently pathological, excessive centrality of traumatic events may maintain psychological distress by increasing the accessibility of trauma-related memories and reinforcing the perception that the traumatic event defines the self. Network analyses have demonstrated close associations between event centrality and specific PTSD symptoms, supporting the view that the subjective position of trauma within autobiographical identity is relevant to post-traumatic psychopathology (Guineau et al., 2021).

Longitudinal evidence further suggests that event centrality is not merely a concurrent correlate of distress but may contribute to the persistence of post-traumatic symptoms over time. Among individuals exposed to traumatic injury, greater event centrality has been associated with subsequent PTSD symptoms, suggesting that the extent to which trauma becomes a defining feature of the self may influence the course of psychological recovery (Stevens et al., 2022). At the same time, the role of event centrality is complex because perceiving an event as central to identity may also accompany perceptions of positive psychological change following adversity. Research addressing the apparent paradox between post-traumatic stress and post-traumatic growth has shown that event centrality may be associated with both adverse and potentially growth-related outcomes depending on the broader cognitive and emotional processes accompanying trauma integration (Steinberg et al., 2022). Similarly, research among survivors of severe traumatic events has examined event centrality as a mechanism connecting immediate trauma reactions with later post-traumatic growth, suggesting that centrality may influence how individuals organize the meaning of trauma within their autobiographical narratives (Glad et al., 2020). Thus, event centrality may represent an important cognitive

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vulnerability or meaning-making process whose psychological consequences depend partly on other cognitive regulatory mechanisms.

The relationship between event centrality and post-traumatic stress may be particularly influenced by repetitive negative thinking. When a traumatic event becomes central to identity, individuals may repeatedly attend to its negative implications, engage in rumination, or catastrophically interpret its consequences. During the COVID-19 pandemic, event centrality was associated with post-traumatic stress symptoms through cognitive processes involving attention to negative information, catastrophizing, and rumination, providing evidence that emotion-related cognitive strategies may help explain how centrality becomes translated into psychological distress (Yang et al., 2022). More recent evidence similarly indicates that different forms of ruminative thinking are differentially associated with post-traumatic stress and post-traumatic growth, highlighting the importance of distinguishing maladaptive repetitive thinking from potentially more constructive reflection following trauma (Mertens et al., 2025). Therefore, event centrality may not operate in isolation; instead, its association with post-traumatic stress symptoms may depend on how individuals cognitively regulate emotional responses to trauma-related experiences.

A second important cognitive domain in the development and maintenance of post-traumatic stress involves **metacognitive beliefs**. Metacognition refers broadly to beliefs, appraisals, and regulatory processes concerning one's own thinking. According to metacognitive models of psychological disorders, emotional distress is maintained not simply by the content of negative thoughts but by beliefs about the significance, usefulness, controllability, and danger of thinking itself. Individuals may, for example, believe that worrying helps them anticipate danger, while simultaneously believing that their thoughts are uncontrollable or psychologically harmful. Such beliefs may promote persistent worry, rumination, threat monitoring, and ineffective attempts to control thoughts. Contemporary research has demonstrated that metacognitive beliefs contribute meaningfully to PTSD and may explain variance in post-traumatic stress beyond beliefs focusing only on trauma-related content (Fergus & Bardeen, 2017). This distinction is important because it suggests that psychological reactions to trauma are influenced not only by what individuals think about the event but also by how they interpret and regulate their own cognitive processes.

Systematic evidence supports the relevance of the metacognitive model to PTSD. A review of research on metacognitive accounts of post-traumatic stress and metacognitive therapy concluded that dysfunctional metacognitive beliefs and associated regulatory processes represent clinically meaningful mechanisms in PTSD (Brown et al., 2022). More recent findings have further demonstrated significant relationships between cognitions, metacognitive beliefs, and PTSD symptoms, reinforcing the proposition that maladaptive beliefs regarding worry, cognitive control, threat, and mental processes are central to trauma-related distress (Nordahl et al., 2024). Experimental research also provides support for a potentially causal role of metacognitive processes. Computerized interventions designed to modify metacognitive cognitive biases have been examined for their capacity to promote more adaptive metacognitive beliefs and reduce the development of PTSD symptoms, suggesting that metacognition is potentially modifiable rather than merely an epiphenomenon of psychological distress (Hett et al., 2022).

Importantly, event centrality and metacognitive beliefs may interact rather than function as independent predictors of post-traumatic adjustment. When a traumatic experience becomes highly central to personal identity, dysfunctional metacognitive beliefs may intensify repetitive attention to the trauma and increase perceptions that trauma-related thoughts are uncontrollable, dangerous, or necessary to monitor. Evidence indicates that event centrality and maladaptive metacognitive beliefs can interact in relation to both post-traumatic stress symptoms and post-traumatic growth (Clauss et al., 2021). This finding suggests that understanding PTSD requires an integrated model in which autobiographical meaning, beliefs about cognition, and emotion-regulatory processes are examined simultaneously. For burn survivors, this integration may be especially relevant because physical scars, medical follow-ups, functional limitations, and pain can repeatedly reactivate memories and interpretations of the original injury, potentially reinforcing both event centrality and maladaptive metacognitive processes.

A further mechanism that may connect these cognitive factors with PTSD is **cognitive emotion regulation**. Cognitive emotion regulation refers to the cognitive strategies individuals use to manage emotional responses to stressful or threatening experiences. These strategies include processes such as acceptance, positive refocusing, refocusing on planning, positive reappraisal, and putting the event into perspective, as well as potentially maladaptive

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processes such as self-blame, other-blame, rumination, and catastrophizing. Emotion regulation is particularly relevant after trauma because individuals must continually process distressing memories, changes in life circumstances, and trauma-related emotional reactions. Evidence suggests that greater difficulties in emotion regulation are closely associated with post-traumatic stress symptoms and that these variables may influence each other over the course of treatment, indicating a potentially reciprocal relationship between impaired regulation and PTSD severity (Meuleman et al., 2024). Thus, cognitive emotion regulation may serve both as a consequence of trauma-related distress and as a mechanism that contributes to its continuation.

Research on trauma-focused treatment further demonstrates the clinical significance of cognitive emotion regulation strategies. Changes in specific cognitive regulation strategies have been associated with symptom improvement during intensive cognitive processing therapy for PTSD, indicating that modification of how individuals cognitively respond to distressing emotional experiences may be one pathway through which treatment exerts its effects (Kovacevic et al., 2025). More broadly, cognitive coping strategies appear capable of reducing post-traumatic stress symptoms, although their effectiveness may depend on contextual factors such as the degree of self-blame accompanying trauma (Sinnott et al., 2022). These findings reinforce the need to distinguish between relatively adaptive and maladaptive cognitive emotion regulation strategies rather than treating emotion regulation as a unitary process.

The relevance of cognitive emotion regulation is particularly pronounced in burn populations. Burn survivors frequently confront continuing reminders of their trauma through pain, visible bodily changes, rehabilitation demands, limitations in everyday functioning, and social reactions. In such circumstances, the strategies used to cognitively manage emotional responses may have substantial implications for psychological adaptation. Research among burn survivors has shown that emotion regulation strategies are associated with positive post-traumatic outcomes and may operate alongside interpersonal resources such as social support in explaining post-traumatic growth (Li et al., 2023). More directly, recent evidence among adults with burn injuries indicates that cognitive emotion regulation mediates the association between illness perception and PTSD, demonstrating that cognitive regulation processes can function as intermediary mechanisms between individuals' interpretations of their condition and trauma-related symptoms (Chen et al., 2025). These findings provide a strong rationale for examining cognitive emotion regulation as a mediator in models of post-traumatic adjustment after burns.

An integrated perspective is also supported by structural research examining metacognition, emotional processes, and PTSD simultaneously. Previous structural equation modeling has demonstrated meaningful relationships among post-traumatic stress symptoms, metacognition, emotional schemas, and emotion regulation, suggesting that PTSD is best understood through interconnected cognitive and affective mechanisms rather than isolated risk variables (Mazloom et al., 2016). Such evidence is consistent with the possibility that metacognitive beliefs influence post-traumatic stress symptoms partly by shaping how individuals cognitively regulate emotions. For example, a person who believes that intrusive thoughts are uncontrollable or dangerous may be more likely to engage in rumination or catastrophizing and less capable of using positive reappraisal or planning. Conversely, individuals who hold more functional beliefs about cognition may be better able to disengage from repetitive negative processing and apply adaptive regulatory strategies.

Despite accumulating evidence regarding event centrality, metacognitive beliefs, and cognitive emotion regulation, important gaps remain. First, these constructs have often been investigated separately, limiting understanding of their simultaneous direct and indirect relationships with post-traumatic stress symptoms. Second, although event centrality has been consistently associated with PTSD, the mechanisms through which trauma centrality contributes to symptoms remain incompletely understood. Cognitive emotion regulation may provide one such pathway because highly central traumatic memories may encourage repetitive attention, rumination, catastrophizing, or other attempts to manage trauma-related affect. Third, while the metacognitive model of PTSD is increasingly supported, less is known about whether metacognitive beliefs influence post-traumatic stress through specific adaptive or maladaptive cognitive emotion regulation strategies. Finally, these relationships require further investigation specifically among burn survivors, for whom the trauma can remain physically visible and functionally consequential long after the acute event. The continuing presence of scars, pain, rehabilitation requirements, and changes in functioning may make autobiographical centrality, metacognitive interpretations, and emotion regulation particularly influential in determining psychological outcomes.

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Clarifying these mechanisms also has practical implications. If cognitive emotion regulation significantly mediates the relationships of event centrality and metacognitive beliefs with post-traumatic stress symptoms, psychological interventions for burn survivors could move beyond general symptom reduction and target specific mechanisms maintaining distress. Interventions might focus on reducing maladaptive trauma-centered identity processes, modifying beliefs about the uncontrollability or danger of trauma-related thoughts, strengthening positive reappraisal and planning, and reducing rumination, catastrophizing, and self-blame. Such a mechanism-oriented approach could complement medical rehabilitation by addressing cognitive processes that influence how survivors interpret and emotionally respond to their injury. At the same time, distinguishing significant from nonsignificant mediation pathways is important because not all cognitive emotion regulation strategies necessarily explain the effects of all trauma-related cognitive variables. Testing these pathways within a structural model can therefore provide a more differentiated account of psychological adjustment and identify the processes most relevant to post-traumatic stress among individuals with burn injuries.

Accordingly, the aim of the present study was to model the structural relationships of event centrality and metacognitive beliefs with post-traumatic stress symptoms in individuals with burn injuries, with adaptive and maladaptive cognitive emotion regulation strategies examined as mediating variables.

2. Methods and Materials

2.1. Study Design and Participants

The present study was applied in terms of purpose and descriptive-correlational in nature and was conducted using structural equation modeling (SEM). The statistical population consisted of all individuals with burn injuries residing in the cities of Tehran, Sari, Zanjan, and Rasht. To determine the sample size, the initial sample size was calculated based on the number of observed variables in the research model, considering a ratio of 15 participants per observed variable. In addition, to compensate for potential sample attrition and incomplete questionnaires, the final sample size was set at 480 participants. Cluster sampling was used to select the participants.

After obtaining the necessary approvals from the relevant authorities and coordinating with medical and care centers serving individuals with burn injuries in Tehran, Sari, Zanjan, and Rasht, the sampling process was initiated using cluster sampling among patients attending hospital centers during 2026–2027. Before data collection, the study objectives, participation procedures, and confidentiality of information were explained to the participants, and informed consent was obtained. Participants were also assured that the collected information would be used exclusively for scientific research purposes and that their participation or withdrawal would have no effect on the medical services they received. Subsequently, the research questionnaires, including measures of centrality of event, metacognitive beliefs, cognitive emotion regulation strategies, and post-traumatic stress symptoms, were administered to eligible participants. After receiving the necessary instructions regarding how to respond, the participants completed the questionnaires. When participants required additional clarification to understand the instructions or answer the questions, standardized explanations were provided without directing their responses. It was also emphasized that there were no right or wrong answers and that each participant should respond based on their own experiences and psychological condition.

2.2. Data Collection Tools

The Post-Traumatic Stress Disorder Checklist (PCL) is a self-report instrument used to assess the severity of post-traumatic stress disorder symptoms and to screen individuals who may require further diagnostic evaluation. The instrument was developed by Weathers et al. (1993) based on the diagnostic criteria of the *Diagnostic and Statistical Manual of Mental Disorders*. The original version of the questionnaire consisted of 17 items assessing three principal clusters of post-traumatic stress symptoms: re-experiencing the traumatic event (5 items), avoidance and emotional numbing (7 items), and hyperarousal (5 items). In the initial studies by Weathers et al. (1993), the psychometric properties of the instrument were examined in a sample of 123 Vietnam War veterans. Cronbach's alpha coefficients for the total scale were reported as .97 and .96 in two samples, respectively. Internal consistency coefficients for the symptom clusters ranged from .92 to .93, and the test–retest reliability coefficient over a two- to three-day interval was .96. In addition, correlations between the PCL and the Mississippi Scale, the PK scale of the Minnesota Multiphasic Personality Inventory, the Impact of Event Scale, and the Combat Exposure Scale were .93, .77, .90, and .46, respectively. In this study, a cutoff score of 50 was

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proposed for PTSD screening, yielding a sensitivity of 82% and a specificity of 83%. In a second study involving 1,006 military personnel who had participated in the Gulf War, Cronbach's alpha for the total scale was .96, and the internal consistency coefficients of the symptom clusters were also reported to be satisfactory. The correlation between the PCL and the Mississippi Scale in this sample was .85. In Iran, Goudarzi (2003) examined the psychometric properties of this instrument in a sample of 117 participants. According to the reported results, Cronbach's alpha for the total scale was .93, and the split-half reliability coefficient was .87. Furthermore, the correlation between PCL scores and the Life Events Inventory was .37 and statistically significant (p = .001), providing evidence of concurrent validity.

To assess centrality of event in the present study, the seven-item version of the Centrality of Event Scale (CES-7) was used. This scale was introduced by Berntsen and Rubin (2006) and assesses the perceived importance and salience of a traumatic event in an individual's life and the extent to which the event contributes to personal identity and life narrative. Items are rated on a five-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The total score is calculated by summing the scores of the seven items and ranges from 7 to 35, with higher scores indicating greater centrality of the event to the individual's identity and life narrative. The scale assesses the perceived centrality of an event; therefore, its score alone does not indicate the severity of psychological trauma or the presence of post-traumatic stress disorder. In the validation study of the Persian version of the scale, Azadfar et al. (2021) examined its psychometric properties in a sample of 525 Iranian university students. Confirmatory factor analysis supported the one-factor structure of the scale, with reported fit indices including the comparative fit index (CFI = .97), Tucker–Lewis index (TLI = .95), and root mean square error of approximation (RMSEA = .08). Correlations of the scale with post-traumatic stress symptoms and psychological inflexibility also provided evidence supporting its validity.

To assess metacognitive beliefs in the present study, the 30-item Metacognitions Questionnaire was used. The questionnaire was developed by Wells and Cartwright-Hatton (2004) based on the metacognitive model of emotional disorders and assesses individuals' beliefs about their thoughts, worries, and cognitive processes. The instrument comprises five subscales: (1) positive beliefs about worry, referring to beliefs that worry is useful for coping with problems; (2) negative beliefs about the uncontrollability and danger of thoughts and worry; (3) cognitive confidence, referring to the individual's appraisal of the reliability of memory and cognitive functioning; (4) beliefs concerning the need to control thoughts; and (5) cognitive self-consciousness, referring to the tendency to repeatedly attend to and monitor thoughts and mental processes. Items are rated on a four-point Likert scale ranging from 1 (*do not agree*) to 4 (*agree very much*). Each subscale score is calculated by summing the scores of its corresponding items, with higher scores indicating a higher level of the respective dimension of metacognitive beliefs. The total score is obtained by summing all 30 items and ranges from 30 to 120. Higher scores indicate stronger metacognitive beliefs or greater involvement in the metacognitive processes assessed by the instrument. In the original study by Wells and Cartwright-Hatton (2004), Cronbach's alpha coefficients for the subscales ranged from .72 to .93. Test–retest reliability coefficients over intervals ranging from 22 to 118 days were reported as .75 for the total score and .79, .59, .69, .74, and .87 for positive beliefs about worry, negative beliefs about uncontrollability and danger, cognitive confidence, need to control thoughts, and cognitive self-consciousness, respectively. Khanzadeh et al. (2013) were among the first researchers in Iran to investigate the psychometric properties of this questionnaire in a sample of university students. They reported satisfactory face and content validity. The two-week test–retest reliability coefficient for the total questionnaire was .78, and Cronbach's alpha coefficients for the subscales ranged from .59 to .73.

To assess cognitive emotion regulation strategies in the present study, the short form of the Cognitive Emotion Regulation Questionnaire (CERQ-Short) was used. The original questionnaire consists of 36 items and was developed by Garnefski et al. (2001). The 18-item short form was subsequently introduced by Garnefski and Kraaij (2006). This version comprises nine subscales: self-blame, other-blame, acceptance, rumination, positive refocusing, refocus on planning, positive reappraisal, catastrophizing, and putting into perspective. Each subscale is assessed by two items. These subscales assess the cognitive strategies individuals use to regulate their emotions when confronted with unpleasant events or stressful situations. Items are rated on a five-point scale ranging from 1 (*almost never*) to 5 (*almost always*). In the present study, the subscales were classified into adaptive and maladaptive strategy groups. Adaptive strategies included acceptance, positive refocusing, refocus on planning, positive reappraisal, and putting into perspective. In contrast, self-blame, other-

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blame, rumination, and catastrophizing were classified as maladaptive strategies. The score for each group was calculated by summing the scores of the corresponding subscales, and the two indices were used separately in the statistical analyses. Accordingly, the sum of all 18 items was not used as a single overall score in this study. A higher score in each group indicates greater use of the cognitive strategies belonging to that category. In an examination of the psychometric properties of the Persian short version of this questionnaire, Hasani et al. (2024), using a sample of 1,825 Iranian participants, obtained evidence supporting the nine-factor structure, convergent and discriminant validity, measurement invariance, and reliability of the Persian short form.

2.3. Data Analysis

After the questionnaires were collected, responses were examined for completeness and suitability for analysis, and incomplete questionnaires or those failing to meet the predetermined data-entry criteria were managed accordingly. Eligible data were then coded and entered into statistical software. During the analysis stage, descriptive indices of the study variables were first calculated. Subsequently, based on the research objectives and the hypothesized relationships among the variables, structural equation modeling was used to examine the direct and indirect relationships of centrality of event and metacognitive beliefs with post-traumatic stress symptoms and the mediating role of cognitive emotion regulation strategies. Throughout all stages of the study, research ethics principles, including confidentiality of information, protection of participants' rights, and use of data exclusively for research purposes, were observed.

3. Findings and Results

The demographic characteristics of the sample indicated that, of the 480 participants, 230 were women (47.92%) and 250 were men (52.08%). Regarding educational attainment, the largest proportion of participants had a high school diploma (130 participants, 27.08%), whereas doctoral-level education had the lowest frequency (16 participants, 3.33%). Other educational levels included primary education (23 participants, 4.79%), lower secondary education (65 participants, 13.54%), associate degree (75 participants, 15.62%), bachelor's degree (83 participants, 17.29%), and master's degree (88 participants, 18.33%). Approximately half of the participants had experienced the burn injury less than six months before the study. The most frequent type of burn was caused by hot liquids or hot objects.

Table 1

Descriptive Statistics for the Main Study Variables

Study Variable	Mean	Standard Deviation	Skewness	Kurtosis
Centrality of event	19.87	6.68	0.13	-0.58
Metacognitive beliefs	70.01	19.95	-0.32	0.01
Adaptive strategies	3.10	0.72	-0.26	-0.20
Maladaptive strategies	2.29	0.61	0.08	-0.70
Post-traumatic stress symptoms	48.05	13.43	-0.08	-0.42

The means and standard deviations of the study variables are presented in Table 1. Skewness and kurtosis indices are also reported. As shown, both indices fell within the range of -1 to +1, indicating approximately normal distributions of the variables. Variance inflation factor (VIF) and tolerance indices were also examined. As reported in Table 2, tolerance values were greater than .01 and VIF values were below 10; therefore, no problematic multicollinearity was observed among the independent variables.

Table 2

Variance Inflation Factor and Tolerance Indices

Variable	VIF	Tolerance
Centrality of event	2.29	0.44
Metacognitive beliefs	1.61	0.62
Adaptive strategies	1.87	0.53
Maladaptive strategies	2.05	0.49

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After the statistical assumptions had been examined, the initial model was specified based on the research hypotheses. The results of the structural equation modeling analysis indicated that the model demonstrated an acceptable overall fit.

Table 3

Fit Indices for the Final Modified Model

Fit Index	Obtained Value	Recommended Criterion
RMSEA	0.08	< 0.08
CFI	0.93	> 0.90
SRMR	0.08	< 0.08
TLI	0.74	> 0.90

As shown in Table 3, the obtained values for all fit indices except the TLI were within the desirable range. Given the complexity of the model, the TLI did not reach the recommended threshold. Accordingly, the indirect relationships among the variables were subsequently examined.

Table 4

Indirect Relationships of Centrality of Event and Metacognitive Beliefs With Post-Traumatic Stress Symptoms Through Adaptive and Maladaptive Cognitive Emotion Regulation Strategies

Predictor Variable	Mediating Variable	Criterion Variable	Path Coefficient (β)	SE	*z*	*p*
Centrality of event	Adaptive strategies	Post-traumatic stress symptoms	-0.009	0.014	-0.643	.520
Centrality of event	Maladaptive strategies	Post-traumatic stress symptoms	0.106	0.064	1.659	.097
Metacognitive beliefs	Adaptive strategies	Post-traumatic stress symptoms	0.045	0.016	2.811	.005
Metacognitive beliefs	Maladaptive strategies	Post-traumatic stress symptoms	0.019	0.012	1.588	.112

The indirect effects of centrality of event through the two dimensions of cognitive emotion regulation showed that centrality of event did not significantly predict post-traumatic stress symptoms in individuals with burn injuries through adaptive strategies (β = -0.009, z = -0.643, p > .05). Similarly, centrality of event did not significantly predict post-traumatic stress symptoms through maladaptive strategies (β = 0.106, z = 1.659, p > .05). Therefore, because the significance levels of both indirect pathways exceeded the 5% significance threshold (p > .05), centrality of event did not exert a statistically significant indirect effect on post-traumatic stress symptoms through either dimension of cognitive emotion regulation. In contrast, metacognitive beliefs significantly predicted post-traumatic stress symptoms indirectly through adaptive cognitive emotion regulation strategies (β = 0.045, z = 2.811, p = .005). However, metacognitive beliefs did not significantly predict post-traumatic stress symptoms through maladaptive cognitive emotion regulation strategies (β = 0.019, z = 1.588, p = .112).

4. Discussion and Conclusion

The present study examined the structural relationships of event centrality and metacognitive beliefs with post-traumatic stress symptoms in individuals with burn injuries, with adaptive and maladaptive cognitive emotion regulation strategies considered as mediating variables. The findings showed that event centrality did not exert a statistically significant indirect effect on post-traumatic stress symptoms through either adaptive or maladaptive cognitive emotion regulation strategies. In contrast, metacognitive beliefs significantly predicted post-traumatic stress symptoms indirectly through adaptive cognitive emotion regulation strategies, whereas the indirect pathway through maladaptive cognitive emotion regulation strategies was not statistically significant. Overall, the structural model showed an acceptable fit, although the Tucker–Lewis index did not reach the conventional recommended threshold. These findings suggest that the cognitive mechanisms underlying post-traumatic stress symptoms in burn survivors are differentiated rather than uniform and that metacognitive

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beliefs may be more closely linked to emotion-regulatory processes than event centrality within the proposed model.

The first major finding was that event centrality did not significantly predict post-traumatic stress symptoms through adaptive cognitive emotion regulation strategies. This result indicates that the extent to which the burn experience becomes central to personal identity and life narrative does not necessarily influence post-traumatic stress symptoms by altering the use of adaptive strategies such as acceptance, positive refocusing, planning, positive reappraisal, or putting the event into perspective. Previous research has consistently shown that event centrality is associated with post-traumatic stress symptoms, but the mechanisms explaining this association appear to be complex. Guineau et al. demonstrated that event centrality is closely embedded within networks of PTSD symptoms, suggesting that trauma centrality may operate as a cognitive representation directly connected with symptom expression rather than exclusively through downstream emotion-regulation processes (Guineau et al., 2021). Similarly, longitudinal evidence has shown that greater event centrality is associated with the persistence of post-traumatic stress following traumatic injury, supporting its role as a meaningful cognitive predictor of trauma-related distress (Stevens et al., 2022).

The nonsignificant mediation through adaptive strategies may also reflect the conceptual distinction between autobiographical centrality and emotion-regulation competence. Event centrality primarily concerns the degree to which a traumatic event becomes integrated into self-definition, autobiographical memory, and expectations about the future. Adaptive cognitive emotion regulation, by contrast, reflects strategies used to manage the emotional consequences of stressful experiences. A traumatic event may therefore remain highly central to the self even when a person uses adaptive regulatory strategies effectively. This interpretation is consistent with research showing that event centrality may be associated not only with post-traumatic stress but also with post-traumatic growth. Steinberg et al. showed that event centrality can be related to apparently contradictory post-traumatic outcomes, suggesting that a highly central event may simultaneously organize distress and personal meaning (Steinberg et al., 2022). Likewise, Glad et al. found that event centrality may participate in pathways toward post-traumatic growth, indicating that the psychological significance of trauma centrality cannot be reduced to a simple maladaptive mechanism (Glad et al., 2020).

The second finding was that event centrality also failed to show a significant indirect effect on post-traumatic stress symptoms through maladaptive cognitive emotion regulation strategies. This result contrasts partly with studies suggesting that rumination and catastrophizing may transmit the influence of event centrality to post-traumatic symptoms. For example, Yang et al. found that attention to negative information, catastrophizing, and rumination were involved in the association between event centrality and post-traumatic stress symptoms (Yang et al., 2022). However, the current finding does not necessarily contradict that evidence. Rather, it suggests that in individuals with burn injuries, a broad composite of maladaptive strategies may not function as the principal intermediary mechanism linking event centrality to PTSD symptoms. It is possible that specific strategies, especially rumination or catastrophizing, are more important than the aggregate maladaptive regulation score. Mertens et al. similarly emphasized that different forms of ruminative thinking are not equivalent and may show distinct relationships with post-traumatic stress and growth (Mertens et al., 2025). Accordingly, combining several maladaptive strategies into a single latent or composite category may obscure stronger effects associated with individual regulatory processes.

Another explanation concerns the unique characteristics of burn trauma. Burn injuries often remain physically salient through scarring, pain, medical procedures, functional limitations, and repeated reminders of the injury. Consequently, the centrality of the event may influence post-traumatic stress more directly through autobiographical memory, self-identity, threat perception, or persistent environmental reminders rather than indirectly through cognitive emotion regulation. The clinical relevance of PTSD in burn survivors has been well documented, with large-scale studies showing substantial levels of post-traumatic stress among burn patients (Iglesias et al., 2024). A systematic review and meta-analysis has likewise confirmed that PTSD symptomatology and formal diagnoses are common among burn survivors (Boersma-van Dam et al., 2025). Because physical consequences may repeatedly reactivate the traumatic event, event centrality may remain psychologically potent even when emotion-regulatory strategies vary.

The third and most important finding was that metacognitive beliefs significantly predicted post-traumatic stress symptoms through adaptive cognitive emotion regulation strategies. This finding supports the proposition that beliefs about thinking may shape the manner in which

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individuals regulate trauma-related emotions. Metacognitive beliefs include beliefs about the usefulness of worry, the uncontrollability and danger of thoughts, cognitive confidence, the need to control thinking, and cognitive self-consciousness. These beliefs can influence whether individuals are able to disengage from unhelpful cognitive processing and adopt more constructive approaches to emotional experiences. The significant indirect pathway suggests that the association between metacognitive beliefs and PTSD symptoms is partly explained by differences in the use of adaptive cognitive emotion regulation strategies.

This finding is strongly aligned with the metacognitive model of PTSD. Fergus and Bardeen demonstrated that metacognitive beliefs contribute to post-traumatic stress beyond trauma-specific cognitive content, indicating that beliefs about cognition itself represent an important psychological mechanism (Fergus & Bardeen, 2017). A systematic review by Brown et al. similarly supported the relevance of the metacognitive model to PTSD and emphasized the role of dysfunctional metacognitive beliefs in maintaining trauma-related distress (Brown et al., 2022). More recently, Nordahl et al. found significant associations between cognitions, metacognitive beliefs, and PTSD, further demonstrating that maladaptive beliefs regarding cognitive processes are closely connected with post-traumatic psychopathology (Nordahl et al., 2024). The current results extend this literature by suggesting that one pathway through which metacognitive beliefs may be related to PTSD is through adaptive cognitive emotion regulation.

The finding is also consistent with intervention research. Hett et al. showed that metacognitive cognitive-bias modification can influence the development of adaptive metacognitive beliefs and PTSD symptoms, suggesting that metacognition is modifiable and potentially relevant to symptom change (Hett et al., 2022). If dysfunctional metacognitive beliefs interfere with the ability to use adaptive cognitive regulation strategies, then interventions that modify such beliefs may indirectly facilitate more effective acceptance, planning, positive reappraisal, and perspective-taking. This mechanism is also compatible with the broader evidence that emotion-regulation difficulties and PTSD symptoms are dynamically related during treatment (Meuleman et al., 2024). The current findings therefore support an integrated model in which metacognitive beliefs and emotion regulation should not be treated as independent domains but as interrelated processes contributing to post-traumatic adjustment.

The significance of adaptive cognitive emotion regulation is further supported by research on trauma-focused treatment and cognitive coping. Kovacevic et al. showed that cognitive emotion regulation strategies are associated with symptom improvement during intensive cognitive processing therapy for PTSD (Kovacevic et al., 2025). Sinnott et al. likewise found that cognitive coping can reduce post-traumatic stress symptoms, although its effects may depend on the presence of other processes such as self-blame (Sinnott et al., 2022). Together, these studies suggest that adaptive cognitive strategies can function as meaningful mechanisms of recovery. The present study adds to this evidence by indicating that metacognitive beliefs may influence post-traumatic stress partly through their relationship with adaptive regulation.

This finding is especially relevant for burn survivors, given the prolonged emotional challenges associated with recovery. The rehabilitation process often includes repeated exposure to pain, changes in physical functioning, social reactions, and uncertainty about recovery. Jawad et al. showed that restoration of functional independence after major burns can be prolonged and variable (Jawad et al., 2024), while Kornhaber et al. emphasized that pain remains a substantial component of the lived experience of adult burn survivors during rehabilitation and recovery (Kornhaber et al., 2025). In such circumstances, adaptive cognitive regulation may be particularly important because survivors repeatedly need to reinterpret distressing experiences, maintain goal-directed coping, and place trauma-related difficulties in a broader perspective.

The present results are also compatible with burn-specific evidence regarding emotion regulation. Li et al. found that emotion regulation strategies were associated with post-traumatic growth among burn survivors and operated alongside social support as an important psychological factor (Li et al., 2023). Chen et al. more directly demonstrated that cognitive emotion regulation mediates the relationship between illness perception and PTSD among adults with burn injuries (Chen et al., 2025). These findings support the broader proposition that cognitive emotion regulation plays an intermediary role between trauma-related cognitions and post-traumatic outcomes. The present study extends this line of research by showing that adaptive regulation may specifically mediate the relationship between metacognitive beliefs and post-traumatic stress symptoms.

The fourth finding was that maladaptive cognitive emotion regulation strategies did not significantly mediate the relationship between metacognitive beliefs and post-

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traumatic stress symptoms. At first glance, this result may appear unexpected because metacognitive theories emphasize repetitive negative thinking, worry, rumination, and threat monitoring as mechanisms maintaining psychological distress. However, the finding may reflect the multidimensional nature of maladaptive regulation. Different maladaptive strategies may have heterogeneous associations with metacognitive beliefs and PTSD. For example, rumination and catastrophizing may be more directly related to post-traumatic stress than self-blame or other-blame, and aggregation across strategies may reduce the strength of the overall mediation effect. The distinction between different ruminative styles documented by Mertens et al. supports this interpretation (Mertens et al., 2025).

The result is also consistent with evidence indicating that relationships among metacognition, event centrality, and trauma outcomes are interactive and conditional. Clauss et al. found that event centrality and maladaptive metacognitive beliefs interact in predicting both post-traumatic stress symptoms and post-traumatic growth (Clauss et al., 2021). This suggests that maladaptive cognitive processes may exert their influence in combination with other trauma-related factors rather than acting as a simple mediator. Similarly, the structural model proposed by Mazloom et al. demonstrated interconnected relationships among metacognition, emotional schemas, emotion regulation, and post-traumatic stress symptoms (Mazloom et al., 2016). Thus, the absence of a significant indirect effect through maladaptive regulation in the present study may indicate that this pathway is more complex, potentially involving reciprocal or moderated effects that were not represented in the current model.

Taken together, the findings support a differentiated account of psychological adjustment after burn injury. Event centrality appears to be an important trauma-related construct, but its influence on post-traumatic stress symptoms may not be explained primarily through broad adaptive or maladaptive cognitive emotion regulation categories. In contrast, metacognitive beliefs appear more closely connected with adaptive regulatory processes, suggesting that beliefs about one's own cognition may affect post-traumatic stress partly by facilitating or restricting constructive emotion-regulation strategies. The acceptable overall fit of the model supports the utility of integrating autobiographical, metacognitive, and emotion-regulatory variables within a single explanatory framework, while the nonsignificant pathways highlight the importance of avoiding overly uniform assumptions about the mechanisms underlying PTSD.

One limitation of the present study is its correlational and cross-sectional design, which prevents causal conclusions regarding the direction of relationships among event centrality, metacognitive beliefs, cognitive emotion regulation strategies, and post-traumatic stress symptoms. The use of self-report instruments may also have increased the possibility of common-method variance, recall bias, and socially desirable responding. In addition, the use of composite adaptive and maladaptive regulation scores may have concealed the distinct effects of specific strategies such as rumination, catastrophizing, positive reappraisal, or acceptance. The sample was drawn from burn survivors in selected Iranian cities and clinical settings, which may limit the generalizability of the results to individuals with different burn severities, cultural backgrounds, socioeconomic conditions, or treatment experiences. Moreover, although most model fit indices were acceptable, the TLI was below the conventional recommended threshold, suggesting that the model should be interpreted with some caution.

Future research should employ longitudinal and prospective designs to examine how event centrality, metacognitive beliefs, cognitive emotion regulation, and PTSD symptoms influence one another across different phases of burn recovery. Future studies could also test each cognitive emotion regulation strategy separately rather than combining them into broad adaptive and maladaptive categories, which may clarify whether specific processes such as rumination, catastrophizing, positive reappraisal, or planning account for stronger indirect effects. It would also be useful to examine alternative models incorporating moderators such as burn severity, pain intensity, perceived social support, body-image disturbance, time since injury, functional impairment, or demographic characteristics. Experimental and intervention studies could further determine whether changes in metacognitive beliefs produce subsequent improvements in emotion regulation and post-traumatic stress symptoms. Replication in larger and more diverse samples would also strengthen the external validity of the proposed model.

From a practical perspective, psychological assessment should be integrated into burn rehabilitation and should include screening not only for post-traumatic stress symptoms but also for dysfunctional metacognitive beliefs and patterns of cognitive emotion regulation. Interventions may benefit from helping patients identify beliefs about the

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uncontrollability or danger of their thoughts, reducing excessive monitoring of trauma-related cognition, and strengthening adaptive strategies such as positive reappraisal, planning, acceptance, and putting stressful experiences into perspective. Clinicians should also avoid assuming that high event centrality is necessarily mediated by maladaptive emotional processing, because a traumatic event can remain highly important to personal identity for multiple reasons. A mechanism-focused approach that distinguishes event-related identity processes from metacognitive and emotion-regulatory processes may therefore improve the precision of psychological interventions for individuals recovering from burn injuries.

Authors' Contributions

All authors significantly contributed to this study.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

In this study, to observe ethical considerations, participants were informed about the goals and importance of the research before the start of the interview and participated in the research with informed consent.

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