








REVIEW ARTICLE

Post-traumatic growth and its explanatory factors in burn patients: A systematic review

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Abstract

A few studies have examined post-traumatic growth (PTG) after burns, a relatively new area of research. To understand how to promote PTG in burn survivors, we need to know how PTG and coping are presented, how they change over time, and the components that influence development. Based on the criteria of the PRISMA statement, we conducted our initial search on 1 February 2023. This study systematically reviewed relevant studies in five PubMed, Web of Science, Google Scholar, Scopus and Science Direct search databases. The search used the following keywords: Post-traumatic Growth, Psychological Growth, Post-traumatic Growth, Psychological, PTG, Burns and Burn. The two researchers evaluated the quality of the included studies using a 20-item tool called the appraisal tool for cross-sectional studies (AXIS tool). A total of 1396 burn patients participated in 12 studies. Among the studies included in this systematic review, seven were cross-sectional, and five were cohort. The average age of the patients in this study was 35.77 (SD = 10.19). Among the participants, 52.4% were men. The total body surface area (TBSA) percentage in these patients was 32.77 (SD = 16.42). The mean of PTG inventory (PTGI) was 54.08 (SD = 20.46) out of 105, which is a moderate level. Factors such as coping

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strategies, perceived social support, TBSA, religion/spirituality and severity of burn are positive factors for PTG in burn survivors. Also, factors such as depression, post-traumatic stress disorder and physical and mental recovery are negative factors for PTG in burn survivors. These factors can be improved through targeted intervention strategies, including overall function, quality of life, social support, optimism, hope and new opportunities. There is a need for further research in several areas related to growth, intervention and measurement.

KEYWORDS

burns, post-traumatic growth, systematic review, trauma, wounds

Key Messages

- The mean of post-traumatic growth inventory (PTGI) was 54.08 (SD = 20.46) out of 105, which is a moderate level.
- Factors such as coping strategies, perceived social support, total body surface area, religion/spirituality and severity of burn are positive factors for PTG in burn survivors.
- Also, factors such as depression, post-traumatic stress disorder and physical and mental recovery are negative factors for PTG in burn survivors.
- These factors can be improved through targeted intervention strategies, including overall function, quality of life, social support, optimism, hope and new opportunities.
- There is a need for further research in several areas related to growth, intervention and measurement.

1 | INTRODUCTION

Burns can have long-term physical and psychological effects.¹⁻³ Also, burns are a health problem that happens worldwide and have inappropriate effects on society.⁴⁻¹⁰ Burns can be defined as damage to the skin or any organic tissue mainly caused by fire, electricity, radioactive, radiation and chemical substances.¹¹⁻¹⁸ Burn injuries produce some of the most painful patient experiences¹⁹⁻²³ and may result in unpleasant physical and psychological outcomes among patients.²⁴⁻²⁹ Psychosocial research on burns has concentrated on psychopathology and quality of life. Identifying, measuring and treating these impacts cannot be overstated.³⁰⁻³⁵ The results of trauma on our outlook and ability to grow psychologically have long been recognised. Post-traumatic growth (PTG) presents, processes and progresses over time after a burn, and the factors that influence its progression are essential to understand.^{30,36} PTG is a psychological phenomenon characterised by positive psychological change following the experience of highly challenging, stressful or traumatic life events.³⁷⁻⁴⁰ This concept encapsulates the idea that individuals can achieve significant personal development and improvement as a result of their efforts to cope with and

overcome adversity.⁴¹⁻⁴⁴ According to one study, adapting to life after burns involves gaining a new understanding of life, which ties into the PTG domain of a change of philosophy of life.⁴⁵⁻⁴⁸

After a burn, we must understand the presentation, the process, the progression of PTG and the factors influencing it.⁴⁹ Through better understanding, we can deliver and assess programmes to promote growth and advice and support patients' development. So we can help them move beyond their previous psychosocial and physical functioning levels.

This systematic review explores the literature that explicitly describes post-traumatic burn and how it relates to other literature on psychosocial recovery. Specifically, we want to examine and critique the current literature on PTG after burns regarding presentation, predictors and associated factors to synthesise new insights, implications for practice and research topics.

2 | AIM

Given the critical importance of understanding how to facilitate PTG in burn survivors, this study aimed to assess the PTG and its explanatory factors in burn

patients. By examining the interplay between PTG and coping mechanisms, employing a systematic approach, and focusing on explanatory factors, this research contributes to the expanding body of knowledge in this burgeoning field.

2.1 | Research questions

1. What is the mean score of PTG in burn patients?
2. What are the explanatory factors for PTG in burn patients?

3 | METHODS

3.1 | Study registration and reporting

The systematic review followed the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) checklist.⁵⁰ Moreover, the current study was not included in the Prospective Register of Systematic Reviews (PROSPERO).

3.2 | Search strategy

This study is a systematic review of the available evidence on the factors associated with PTG in burn patients; based on the criteria of the PRISMA statement, we conducted our initial search in February 2023. This study systematically reviewed relevant studies in five PubMed, Web of Science, Google Scholar, Scopus and Science Direct search databases. The search used the following keywords: Post-traumatic Growth, Psychological Growth, Post-traumatic Growth, Psychological, PTG, Burns and Burn. MeSH or Indexed terms related to burn and post-traumatic growth were combined using the Boolean operators 'OR' and 'AND'.

Indexed terms: ((Posttraumatic growth[Title/Abstract]) OR (Psychological Growth[Title/Abstract]) OR (Post-traumatic growth[Title/Abstract]) OR (PTG[Title/Abstract])) AND (burn[Title/Abstract]) OR (burns[Title/Abstract]).

MeSH terms: (((('Burns'[Mesh]) AND 'Survivors/psychology'[Mesh]) OR ('Trauma and Stressor Related Disorders/psychology'[Mesh]) OR 'Trauma and Stressor Related Disorders/rehabilitation'[Mesh])) OR 'Post-traumatic Growth, Psychological'[Mesh].

Also, to obtain relevant articles, reference lists and citations in each article were reviewed, and references of previous studies were used to find the findings of the studies related to the research. No restrictions were placed for the

articles' publication year; the last searches were updated on 1 February 2023. The data of the identified studies were transferred to Endnote software, and the studies reported the factors associated with PTG in burn patients.

3.3 | Inclusion and exclusion criteria

The studies were selected based on the following inclusion criteria: 1—observational studies (cohort and cross-sectional studies); 2—adults and children with burn injury; 3—studies whose full text was available; 4—articles that provided sufficient data, including demographic information and Predictive factors of PTG; 5—articles that were in English. Qualitative studies, case reports, experimental studies, conference proceedings, reviews and letters to the editor were excluded from this review.

3.4 | Study selection

Two researchers were separately extracting relevant studies from databases. The selection of studies was carried out according to PRISMA guidelines and blinded. At first, studies repeated in different databases were excluded from this study. If the information is repeated, we select the last article with the maximum information. Then, the initial selection and review of the articles were carried out according to the titles and abstracts and were removed based on the inclusion and exclusion criteria of unrelated articles. Then, their full text was evaluated based on inclusion and exclusion criteria, and at this stage, unrelated studies were excluded. We contacted the authors whenever necessary to get additional information by email. To avoid bias, three researchers reviewed the sources and extracted data. The initial review of the articles was done independently, with the title and authors removed in a blinded manner by two researchers. In cases where there was a difference of opinion between two researchers, the article was reviewed by a third party, and the third researcher's opinion was confirmed.

3.5 | Data extraction and quality assessment

The research team extracted the following information from the included studies: the name of the first author, year of publication, location, study design, sample size, participant characteristics, clinical characteristics, outcome measures and findings (Table 1). The two researchers evaluated the quality of the included studies using a 20-item tool called the appraisal tool for cross-

TABLE 1 Basic characteristics of the included studies in this systematic review.

First author	Location	Study design	Sample size (N)	M/F ratio (%)	Age (mean \pm SD)	TBSA (mean \pm SD)	Time since burn	Outcome measures	PTG (mean \pm SD)	Factors predicting PTG		AXIS or JBI source
										Positive	Negative	
Rosenbach and Renneberg ⁵⁹	Germany	Cross-sectional study	149	57/43	44.0 (14.40)	32.2 (18.10)	4 years	PTGI	NR	<ul style="list-style-type: none"> Appreciation of life Enhancement of relationships with others Greater sense of personal strength Coping strategies Perceived social support 	<ul style="list-style-type: none"> Depression Physical and mental recovery 	High
Baillie et al. ⁵⁴	UK	Cross-sectional study	74	42/58	45.7 (17.11)	9.4 (NR)	69 weeks (range: 4–624 weeks)	PTGI	32.82 (NR)	<ul style="list-style-type: none"> Location of the burn on the body TBSA Active coping Perceived social support 	<ul style="list-style-type: none"> Depression Physical and mental recovery 	High
Martin et al. ⁵⁷	Australia	Cohort study	73	69/31	43.0 (14.00)	18.5 (20.10)	Non-acute: >6 months Acute group: <6 months	PTGI	NR	<ul style="list-style-type: none"> TBSA Stress Coping styles 	<ul style="list-style-type: none"> Depression Physical and mental recovery 	Include
Royse and Badger ⁶⁰	USA	Cross-sectional study	92	53/47	47 (NR)	46.0 (SD NR)	26.8 (SD NR) months	PTGI-SF	35.8 (11.4)	<ul style="list-style-type: none"> TBSA Religion/spirituality 	<ul style="list-style-type: none"> Depression Physical and mental recovery 	High
Ajoudani et al. ⁵³	Iran	Cross-sectional study	102	40/60	27.5 (8.14)	32.9 (6.1)	Inclusion criteria >1 year post-burn	PTGI	78.13 (NR)	<ul style="list-style-type: none"> TBSA Education level Perceived social support Spirituality 	<ul style="list-style-type: none"> Depression Physical and mental recovery 	High
Hwang and Lim ⁵⁵	Korea	Cross-sectional study	179	78/22	45.8 (12.89)	19.3 (17.17)	Acute phase: 64 days Rehabilitation phase: 685 days	PTGI	Acute group: 44.13 (15.01) Rehabilitation group: 40.32 (15.71)	<ul style="list-style-type: none"> Social support 	<ul style="list-style-type: none"> Depression 	High

TABLE 1 (Continued)

First author	Location	Study design	Sample size (N)	M/F ratio (%)	Age (mean \pm SD)	TBSA (mean \pm SD)	Time since burn	Outcome measures	PTG (mean \pm SD)	Factors predicting PTG		AXIS or JBI source
										Positive	Negative	
Su and Chow ⁶²	Taiwan	Cohort study	125	37.6/62.4	22.4 (4.1)	51.62 (19.16)	36.79 (0.88) months	PTGI-X	70.24 (26.89)	<ul style="list-style-type: none"> Perceived social support Approach coping 	<ul style="list-style-type: none"> PTSD Depression 	Include
Su et al. ⁶³	Taiwan	Cohort study	116	37.6/62.4	22.3 (4.2)	49.5 (19.6)	2 years	PTGI-X	NR	<ul style="list-style-type: none"> Deliberate rumination Trauma disclosure 		Include
Martin et al. ⁵⁸	Australia	Cohort study	36	64/36	43.0 (15.26)	11.5 (11.35)	233 days	PTGI	NR	<ul style="list-style-type: none"> Approach coping Positive reframing Acceptance Religion 		Include
Li et al. ⁵⁶	China	Cross-sectional study	130	72.3/27.7	39.59 (13.16)	39.2 (NR)	NR	PTGI	58.11 (9.60)	<ul style="list-style-type: none"> Social support Cognitive reappraisal 		High
Su and Liang ⁶¹	Taiwan	Cohort study	99	37.6/62.4	22.1 (4.14)	50.32 (19.82)	5.01 (0.06) years	PTGI-X	73.97 (30.03)	<ul style="list-style-type: none"> Approach coping 		Include
Park and Lee ³⁶	Korea	Cross-sectional study	221	40.7/59.3	26.86 (4.68)	NR	NR	PTGI	36.86 (31.16)	<ul style="list-style-type: none"> Positive interpersonal and family relationships Treatment in progress Severity of burn 		High

Abbreviations: NR, not reported; PTG, post-traumatic growth; PTGI, post-traumatic growth inventory; PTGI-SF, posttraumatic growth inventory-short form; PTSD, post-traumatic stress disorder; TBSA, total burn surface area.

sectional studies (AXIS tool).⁵¹ This tool utilises a 2-point Likert scale (yes/no) to assess the reporting quality (seven items), study design (seven items) and potential biases (six items). The studies' quality is classified into three levels, determined by the percentage of accurate responses: high (70%–100%), fair (60%–69.9%) and low (0%–59.9%).⁵¹ Also, evaluating the methodological rigour of cohort research employed the Joanna Briggs Institute's (JBI) critical evaluation checklist. The tool comprises 11 questions regarding the study design, with the option to answer 'yes', indicating higher quality; 'no', indicating poor quality; or 'unclear'. The questions address the selection bias, validity, and reliability of methods used to measure exposure and outcomes, confounding, length of study, reverse causality, appropriateness of statistical analysis and adjustment for key confounders. Appraisal using this tool allowed authors to either 'include' or 'exclude' studies based on overall quality. A study with ≥ 3 'no' or 'unclear' quality categories was excluded from the analysis.⁵² Two independent researchers extracted and evaluated the quality of the study data.

4 | RESULTS

4.1 | Study selection

As shown in Figure 1, 948 studies were obtained after a systematic search in electronic databases. Among the

studies, 420 studies were eliminated because of repetition. Four hundred fifteen studies were excluded due to their lack of alignment with the current research, and 55 studies were excluded because they were case reports, editorial letters, conference papers, dissertations, reviews and similar types of publications. Of the remaining studies, 28 were eliminated due to inappropriate design and outcomes, and 12 were eliminated due to lack of information. Finally, 12 studies^{36,53–63} were included in this systematic review.

4.2 | Study characteristics

As mentioned in Table 1, 1396 burn patients participated in 12 studies.^{36,53–63} Among the studies included in this systematic review, seven studies^{36,53–56,59,60} were cross-sectional, and five studies^{9,10,14–16} were cohort. The average age of the patients in this study was 35.77 (SD = 10.19). Among the participants, 52.4% were men. TBSA percentage in these patients was 32.77 (SD = 16.42). The studies included in this systematic review were conducted in Taiwan ($n = 3$),^{61–63} Korea ($n = 2$),^{36,55} Australia ($n = 2$),^{57,58} China ($n = 1$),⁵⁶ Iran ($n = 1$),⁵³ the United States ($n = 1$),⁶⁰ the United Kingdom ($n = 1$)⁵⁴ and Germany ($n = 1$).⁵⁹ In the included studies, eight studies^{36,53–59} used the PTG inventory (PTGI), three studies^{61–63} used the PTGI-X and one study⁶⁰ used the PTGI short form to assess PTG.

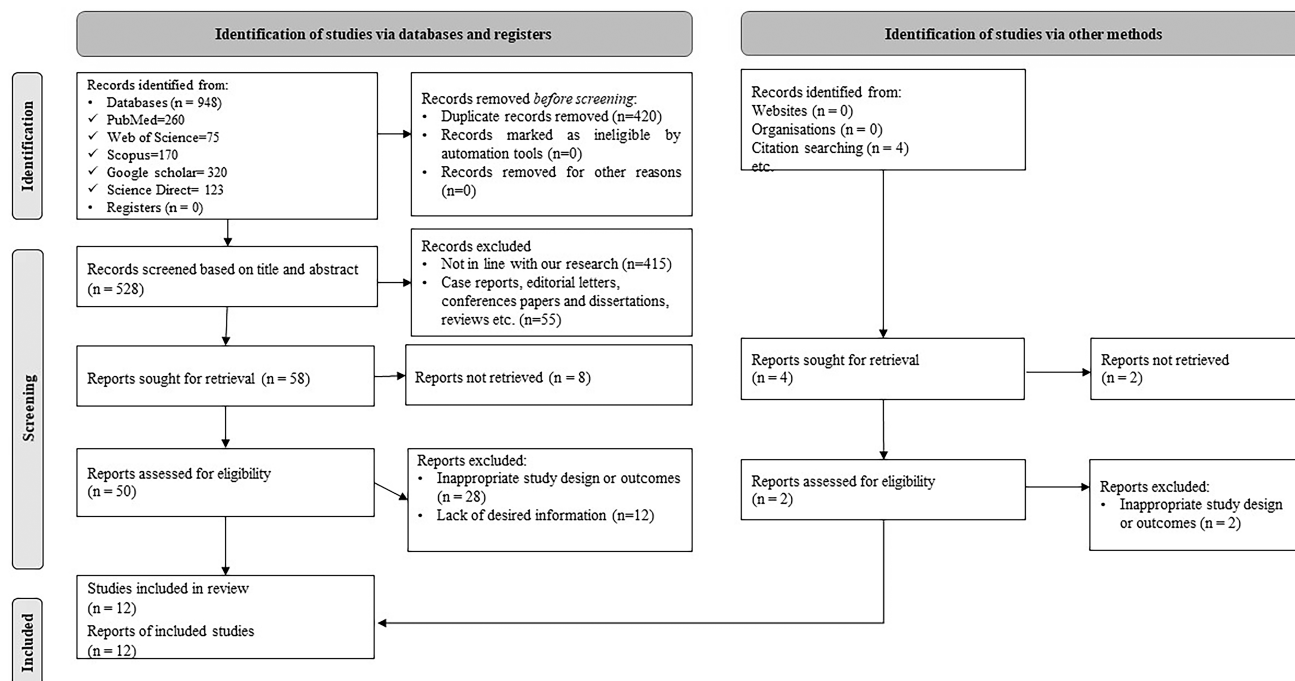


FIGURE 1 Flow diagram of the study selection process.

4.3 | Methodological quality of included study

All cross-sectional studies had high quality. Also, all cohort studies had high quality and were included (Table 1).

4.4 | PTG in burn survivors

As mentioned in Table 1, eight studies^{36,53–56,60–62} reported PTG; according to the PTGI, the mean was 54.08 (SD = 20.46) out of 105, which is a moderate level.

4.5 | Factors associated with PTG in burn survivors

As shown in Table 1, factors positively associated with PTG in burn survivors include coping strategies (active coping, instrumental/action, re-evaluation/adjustment, avoidance, emotional support seeking, emotion focus and approach coping) ($n = 6$),^{54,57–59,61,62} perceived social support ($n = 6$),^{53–56,59,62} total body surface area (TBSA) ($n = 4$),^{53,54,57,60} religion/spirituality ($n = 3$),^{53,58,60} enhancement of relationship with other ($n = 2$),^{36,59} appreciation of life ($n = 1$),⁵⁹ a greater sense of personal strength ($n = 1$),⁵⁹ location of burn on the body ($n = 1$),⁵⁴ higher stress ($n = 1$),⁵⁷ higher educational level ($n = 1$),⁵³ deliberate rumination ($n = 1$),⁶³ trauma disclosure ($n = 1$),⁶³ positive reframing ($n = 1$),⁵⁸ acceptance ($n = 1$),⁵⁸ cognitive appraisal ($n = 1$),⁵⁶ treatment progress ($n = 1$)³⁶ and severity of burn ($n = 1$).³⁶ Additionally, factors that prevented PTG in burn survivors include depression ($n = 3$),^{55,57,62} post-traumatic stress disorder (PTSD) ($n = 1$)⁶² and physical and mental recovery ($n = 1$).⁵⁷

5 | DISCUSSION

This systematic review showed that the level of PTG in burn patients is moderate. The variations in levels of PTG observed across various studies can be attributed to a range of factors unique to each survey. These factors include coping strategies, perceived social support, TBSA, religion/spirituality, enhancement of relationship with others, appreciation of life, a greater sense of personal strength, location of burn on the body, stress, educational level, deliberate rumination, trauma disclosure, acceptance, cognitive appraisal, treatment progress, severity of burn, depression, PTSD, physical and mental recovery.

PTG refers to the positive psychological transformation reported by a patient, which surpasses their pre-trauma level of functioning, beliefs, and values.⁵⁷

Studying the process of PTG in post-burn patients and its associated factors is crucial as it can enhance our understanding of the phenomenon and facilitate the development of supportive interventions and growth promotion programmes to aid the patients. The results of an integrative review study on PTG in burn patients revealed that PTG is characterised by concepts such as personal empowerment, re-evaluation of priorities, spirituality, humanity, improved relationships, compassion and altruism. Coping strategies that were identified included practising gratitude, using humour and making plans. Additionally, the study suggested that the suddenness of the traumatic event and the severity and location of the burn injury may influence the level of PTG experienced by patients.⁶⁴

Coping strategies were identified as one of the positive factors that can influence the level of PTG experienced by post-burn patients. Burn patients may utilise a range of coping strategies, including positive reframing, social support, problem-solving, relaxation techniques, cognitive restructuring, gratitude and exercise, to enhance their PTG.^{65–67} Healthcare providers can aid patients in developing effective coping strategies by offering individualised support, education and resources specific to their individual needs and circumstances.

Social support is another element that is associated with PTG in patients who have suffered burn injuries. Social support can help burn patients feel valued, understood and supported, which can contribute to their recovery and PTG.^{49,53,54} Healthcare professionals' crucial role is to provide social support to burn patients and assist them in overcoming recovery challenges. They can offer personalised support, connect patients with resources, and facilitate PTG and recovery.

Studies have investigated the relationship between PTG in burn patients and the TBSA affected by burn injury.^{53,54,57,60} It has been suggested that patients with more extensive TBSA burns may experience greater levels of PTG, potentially due to the more significant physical and emotional obstacles they encounter during their recovery. However, further research is required to fully comprehend the correlation between TBSA and PTG in burn patients.

Studies have suggested that spirituality could play a role in facilitating PTG in burn patients.^{53,58,60} Engaging in spiritual practices, such as prayer, meditation, and attending religious services, can help burn patients find meaning and purpose in their trauma, which may contribute to greater PTG.^{68,69} Furthermore, spirituality may provide burn patients with comfort and support, which can help them cope with the emotional and physical challenges of their injuries. Nonetheless, further research is necessary to fully comprehend the connection between spirituality and PTG in burn patients.

Burn patients may experience depression, which can impact their recovery and PTG. Some studies have suggested that depression after a burn injury may hinder PTG.^{55,57,62} The relationship between these factors is complex and may depend on factors such as burn injury severity, coping strategies and social support. Further research is necessary to gain a better understanding of the relationship between depression and PTG in burn patients and to develop effective interventions to promote PTG in this population.

6 | LIMITATIONS

The present systematic review had certain limitations typical of this type of research. The included studies had variations in their design and tools used, which made it impossible to conduct a meta-analysis. This lack of meta-analysis may have increased the likelihood of heterogeneous findings and reduced the precision of the results. Nevertheless, the systematic review followed a rigorous methodology for gathering, classifying, and evaluating the studies. Despite an extensive search of multiple databases, there is a possibility that some relevant studies were missed. Additionally, the review only included studies written in English and Persian, which may have resulted in a language bias and missed essential findings in other languages.

6.1 | Implications for healthcare managers and policymakers

Healthcare managers and policymakers are vital in promoting PTG for burn patients by establishing a supportive and empowering environment, facilitating access to mental health services, encouraging collaboration among healthcare providers and prioritising patient-centred care. By implementing these strategies, healthcare managers can aid burn patients' physical recovery while promoting their psychological growth, resilience and overall well-being.

6.2 | Recommendations for future research

Based on the findings of this systematic review, further research is recommended to explore how different factors impact PTG in burn patients. Additionally, experimental studies could be undertaken to examine the effectiveness of various interventions in promoting PTG among these patients.

7 | CONCLUSION

The systematic review revealed that burn patients generally exhibit moderate levels of PTG, but the findings varied across studies, likely due to unique factors specific to each survey. These factors include coping strategies, perceived social support, burn severity measured by the TBSA, religion/spirituality, enhanced relationships with others, appreciation of life, greater personal strength, burn location on the body, stress, educational level, deliberate rumination, trauma disclosure, acceptance, cognitive appraisal, treatment progress, depression, PTSD, and physical and mental recovery.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data sets used during the current study are available from the corresponding author on request.

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