

Predictors of Psychological Distress Among Young Burn Survivors Over Three Years: A Longitudinal Cohort Study from India



Mahesh A¹, Prema Dhanaraj², Sailaja P³

¹Associate professor Department of Plastic surgery Dr B R Ambedkar Medical College and Hospital, Bangalore, India.

² Agni Raksha Trust, Bangalore, India

³ Department of Psychiatry, Dr. B. R. Ambedkar Medical College, Bangalore, India

*Corresponding Author: Dr. Mahesh A

Email: drmaheshms@yahoo.com

ABSTRACT

Purpose: This study investigates long-term psychological distress and its predictors among young burn survivors over a three-year period. **Design:** A longitudinal cohort study with four waves of follow-up interviews conducted between November 2015 and June 2018. **Methods:** A total of 180 burn survivors (mean age = 23 years) were assessed beginning six months post-injury (baseline) and annually for three years. Psychological distress and related constructs were measured using validated tools including the Brief Symptom Rating Scale (BSRS-5), Patient Health Questionnaire (PHQ-2), Startle, Physiological Arousal, Anger, and Numbness Scale (SPAN-4), and Impact of Event Scale (IES-6). Additional variables included demographic data, family functioning, care needs, and life disturbance measures. Statistical analyses included ANOVA, Pearson correlation, stepwise regression, and generalized estimating equations (GEE). **Findings:** SPAN-4 scores explained more than 62% of variance in psychological distress across all time points. Significant predictors included PTSD-like symptoms, depression, family functioning impairment, hypnotics use, adaptation to post-burn life, and IES-6 scores. Follow-up year was not a significant predictor. **Conclusions:** Psychological distress persists up to three years post-burn, with PTSD-like symptoms, depression, and anxiety being the most prominent contributors. Risk factors vary across recovery phases. **Clinical Relevance:** Long-term psychological monitoring and multidisciplinary rehabilitation are essential for burn survivors, with targeted interventions addressing PTSD, depression, and social reintegration.

Keywords: burn injury, psychological distress, PTSD, longitudinal study, India, rehabilitation

INTRODUCTION

Burn injuries represent a major clinical and public health challenge, particularly in developing countries such as India. These injuries not only cause severe physical damage but also trigger complex psychological and physiological responses affecting multiple organ systems. The severity and duration of these responses are often proportional to the extent of the burn.

India faces a high burden of burn injuries, with approximately 200,000 cases annually and nearly 100,000 associated deaths. Contributing factors include illiteracy, poverty, unsafe cooking practices, and traditional clothing. Despite advances in burn care, long-term psychological outcomes remain underexplored, especially among young survivors.

Existing research has largely focused on acute care and physical recovery, with limited attention to long-term psychological consequences. Understanding predictors of psychological distress is essential for developing holistic rehabilitation strategies. This study aims to examine psychological distress and its predictors over a three-year period among young burn survivors.

MATERIALS & METHODS

Study Design and Participants

This longitudinal cohort study included burn survivors treated at Dr. B. R. Ambedkar Medical College and Agni Raksha Trust, Bangalore. Participants were enrolled after stabilization of their physical condition.

Baseline assessment (T0) was conducted six months post-injury, followed by annual follow-ups at one (T1), two (T2), and three years (T3). Only participants completing all four assessments (n = 180) were included in the analysis.

Data Collection

Data were collected through structured telephone interviews after obtaining informed consent.

Measures

- **Psychological Distress:** Brief Symptom Rating Scale (BSRS-5)
- **Depression:** Patient Health Questionnaire (PHQ-2)
- **PTSD Symptoms:** SPAN-4
- **Trauma Impact:** Impact of Event Scale (IES-6)
- **Family Function:** Family APGAR scale

- **Care Needs:** 11-item care needs assessment
 - **Life Disturbance:** 10-item functional impact scale
- All instruments demonstrated acceptable internal consistency (Cronbach's $\alpha = 0.80-0.90$).

Statistical Analysis

Data were analysed using:

- ANOVA for longitudinal comparisons
- Pearson correlation for associations
- Stepwise regression for predictor identification
- Generalized estimating equations (GEE) for longitudinal modelling.

RESULTS

Participant Characteristics

Of the 180 participants:

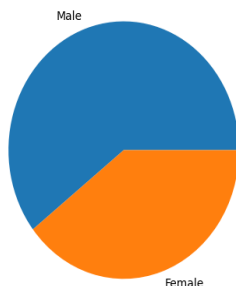
- 109 were male and 71 female
- Mean age was 23 years
- 30% had burns covering 40–59% of body surface area
- Mean hospital stay was approximately 58 days .

1.TABLE

Participant Characteristics (N = 180)

Variable	Value
Mean age	23 years
Gender	109 male (60.6%), 71 female (39.4%)
Burn area (40–59%)	~30%
Mean hospital stay	57.78 days
Pain prevalence	78.3%
Itch prevalence	87.2%

1.FIGURE: Gender Ratio



Trends Over Time

Psychological distress (BSRS-5) showed a gradual decline from T0 to T3. However, some variables such as PTSD symptoms (SPAN-4) and service satisfaction

showed fluctuations, including rebound effects at later stages.

Predictors of Psychological Distress

- SPAN-4 consistently explained >62% of variance in distress
- Additional predictors varied by time point:
 - **T0:** Family function impairment, adaptation difficulties
 - **T1:** Depression (PHQ-2), recovery status
 - **T2:** Hypnotics use, depression
 - **T3:** Social/interpersonal problems

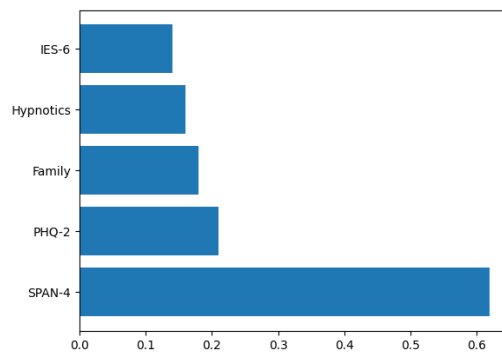
Changes in Psychological Measures Over Time

2.TABLE

Mean Scores Across Four Time Points

Variable	T0	T1	T2	T3	Significance
BSRS-5	5.52	4.55	3.84	3.62	↓ Significant
SPAN-4	2.96	2.56	1.84	2.22	↓ with rebound
PHQ-2	1.49	0.87	0.71	0.67	↓ Significant
IES-6	5.33	4.86	4.31	4.42	NS
Family APGAR	7.54	7.79	7.97	7.98	NS
Hypnotics use	0.34	0.24	0.11	0.18	↓ with rebound
Social problems	2.94	2.04	1.96	1.79	↓ Significant

2.FIGURE:Forest Plot



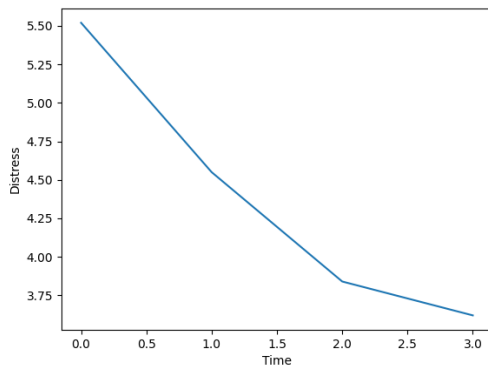
Predictors of Psychological Distress

3.TABLE

Stepwise Regression Summary

Time Point	Key Predictors	Variance Explained
T0	SPAN-4, Family impairment, Adaptation	70% +
T1	SPAN-4, PHQ-2, Recovery	+11% additional
T2	SPAN-4, Hypnotics, PHQ-2	~72%
T3	SPAN-4, PHQ-2, Social problems	~74%

3.FIGURE :Line Chart(Distress with Time)



GEE Findings

Significant predictors included:

- SPAN-4 (PTSD symptoms)
- IES-6 (trauma impact)
- Family functioning impairment
- Hypnotics use
- Adaptation to post-burn life
- PHQ-2 (depression)

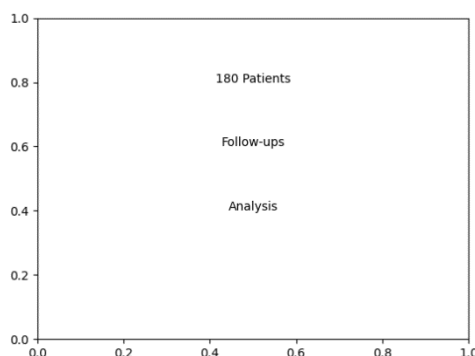
Follow-up time itself was not a significant predictor.

4. TABLE

Significant Predictors of Psychological Distress

Predictor	Significance
SPAN-4	p < .01
IES-6	p < .01
PHQ-2	p < .01
Family impairment	p < .01
Hypnotics use	p < .01
Adaptation difficulty	p < .01
Follow-up year	Not significant

4. FIGURE : Structural Model



DISCUSSION

This study demonstrates that psychological distress persists long after physical recovery in burn survivors. PTSD-like symptoms, depression, and anxiety are the most prominent contributors.

In the early phase (first six months), family functioning and adaptation to post-injury life play critical roles. This aligns with ecological developmental theories emphasizing the importance of family systems in recovery.

Depression emerges as a stronger predictor after one year, possibly linked to “anniversary reactions” and ongoing adjustment challenges. Sleep disturbances and hypnotics use further contribute to distress during intermediate phases.

By the third year, social reintegration becomes a key concern, with interpersonal difficulties significantly impacting psychological well-being.

Importantly, different predictors dominate at different recovery stages, highlighting the need for phase-specific interventions

The findings of this study extend beyond descriptive observations and align with established trauma frameworks. The persistence of psychological distress up to three years post-injury supports core principles of **trauma theory**, which posit that traumatic events disrupt cognitive, emotional, and physiological regulation over prolonged periods.

The strong predictive role of PTSD-like symptoms (SPAN-4) across all time points reinforces the centrality of trauma re-experiencing, hyperarousal, and emotional numbing in shaping long-term distress trajectories. However, the gradual reduction in distress scores also suggests the operation of **resilience mechanisms**, wherein individuals adapt to adversity over time through psychological and social resources.

Importantly, the improvement in adaptation and recovery scores across follow-ups indicates potential elements of **post-traumatic growth (PTG)**. Survivors may gradually reconstruct meaning, improve coping capacity, and re-engage socially despite initial disruption. However, the coexistence of distress and adaptation highlights that resilience and psychological suffering are not mutually exclusive but dynamically intertwined.

The findings are consistent with longitudinal studies conducted after the Taiwan Formosa water park explosion, which demonstrated that PTSD symptoms remained the strongest predictor of psychological distress up to three years post-disaster. Similar to the present study:

- PTSD symptoms showed persistent influence across all time points
- Depression became more prominent after the first year
- Recovery and adaptation influenced mid-phase outcomes

However, the current study differs in its **socioeconomic and cultural context**, where family systems play a more dominant role in early recovery. Unlike Taiwan’s highly structured healthcare system, Indian survivors rely more heavily on informal

family support, amplifying the impact of family functioning impairment observed at baseline [30]

Studies from Western countries [31] indicate:

- Higher early psychological intervention access
- Stronger institutional rehabilitation systems
- Earlier decline in PTSD symptoms

In contrast, this study demonstrates:

- Prolonged persistence of distress
- Greater influence of social and familial variables
- Delayed emergence of social reintegration challenges

This suggests that **resource limitations and sociocultural factors** significantly shape recovery trajectories in low- and middle-income countries.

Burn injuries represent a major but under-recognized contributor to global mental health burden, particularly in low- and middle-income countries.

This study highlights that:

- Psychological consequences extend far beyond acute care
- Long-term psychiatric morbidity remains inadequately addressed
- Social determinants (family, poverty, rehabilitation access) strongly influence outcomes

From a global health perspective, these findings support the need for:

- Integration of mental health into burn care protocols
- Long-term surveillance systems for burn survivors

Scalable, culturally adaptable rehabilitation models
Burn injuries represent one of the most traumatic and life-altering experiences an individual can endure, affecting millions of people worldwide each year and creating profound challenges that extend far beyond physical healing [1]. These statistics, however, fail to capture the profound psychological and social challenges that accompany burn recovery, challenges that often persist long after the physical wounds have healed.

The psychological impact of burn injuries is multifaceted and often severe. Post-traumatic stress disorder (PTSD) affects approximately 30 % of burn survivors, with symptoms including intrusive memories, nightmares, hypervigilance, and avoidance behaviors that can persist for years [5,6]. This emotional distress is not limited to patients; caregivers experience a significant psychological burden, with 23.2 % showing PTSD symptoms acutely and 22.8–29 % experiencing depression a year post-injury, creating complex dynamics where both parties struggle to support each other [12]. Parents of burned children struggle most with witnessing their child's pain [13]. Social reintegration plays a pivotal role in psychosocial healing, challenges include stigmatization and unwanted

attention [15,16]. These challenges worsen even more for disadvantaged communities and minorities [19].

Effective recovery after a prolonged stay in a burn intensive care unit (BICU) requires a comprehensive approach, as these stays can be significantly extended for various reasons. Taylor et al [21] estimated the length of stay (LOS) for burn patients, highlighting the prolonged nature of these hospitalizations. Recovery strategies must address multiple dimensions including immediate trauma management, physical rehabilitation, social reintegration, and family adaptation [2,22]. Evidence-based interventions that have demonstrated efficacy include cognitive-behavioral therapy (CBT) [8], peer support programs [23]. These interventions have been found to be key and will be discussed in detail in further sections.

This narrative review provides a framework for understanding the psychosocial concerns of burn survivors and their families, exploring adaptation challenges and resilience factors. It reviews evidence-based assessments and interventions across the care continuum, emphasizing culturally sensitive, trauma-informed care that recognizes each survivor's unique needs and strengths.

Unlike systematic reviews, narrative reviews are not bound by formal methodological frameworks, and a dedicated Methods section is not mandatory [27]. However, to maintain scholarly rigour, narrative reviews should aim to synthesize relevant literature in a comprehensive, transparent and objective manner. While there are no universally acknowledged guidelines for narrative reviews [27], their strength lies in offering broad literature coverage and the flexibility to address evolving knowledge and conceptual developments within a field. The search strategy included medical subheadings (MeSH) and keywords combined with Boolean terms AND/OR including burns OR burn survivors AND psychosocial functioning OR return to work OR post-traumatic stress disorder OR caregivers OR caregiver burden OR quality of life OR psychosocial intervention OR body image OR social integration OR psychological resilience OR pain management OR social isolation.

Policy-Level Implications

The results have significant implications for healthcare policy:

1. **Integration of Mental Health into Burn Care**
 - Psychological screening (PTSD, depression) should be mandatory
 - Routine use of brief tools (SPAN-4, PHQ-2) in follow-ups
2. **Long-Term Rehabilitation Policy**
 - Extend follow-up care beyond physical recovery (minimum 3 years)

○ Establish structured post-discharge mental health programs

3. Strengthening Family-Based Care Systems

- Train caregivers in psychological support
- Provide family counselling services

4. Resource Allocation

- Increase funding for burn rehabilitation centres
- Support NGO-government partnerships (e.g., Agni Raksha model)

5. Community Reintegration Programs

- Vocational rehabilitation
- Anti-stigma campaigns
- Social support networks

Clinical Implications

- Long-term psychological monitoring (up to 3 years) is essential
- Early interventions should focus on family support and adaptation
- Mid-phase care should address depression and sleep disturbances
- Late-phase rehabilitation should emphasize social reintegration
- Multidisciplinary approaches including CBT, family therapy, and community support are critical

Rehabilitation Framework (Phase-Wise Model)

Phase 1: Acute Recovery (0–6 Months)

Key Issues:

- PTSD symptoms
- Family dependence
- Adjustment difficulties

Interventions:

- Psychological first aid
- Family counselling
- Early CBT-based stabilization techniques

Phase 2: Intermediate Recovery (6–24 Months)

Key Issues:

- Depression emergence
- Sleep disturbances (hypnotics use)
- Functional limitations

Interventions:

- Structured CBT protocols
- Sleep hygiene and behavioural therapy
- Occupational rehabilitation

Phase 3: Long-Term Reintegration (24–36 Months)

Key Issues:

- Social interaction problems
- Identity and body image concerns
- Community reintegration

Interventions:

- Social skills training
- Group therapy
- Peer support programs

Integration with Psychiatric Rehabilitation Systems

The findings support embedding burn care within broader psychiatric rehabilitation frameworks:

- **Multidisciplinary teams:** plastic surgeons, psychiatrists, psychologists, social workers
- **Continuum of care:** hospital → community → vocational systems
- **Digital mental health integration:** tele-counselling for long-term follow-up

This approach ensures that recovery is not limited to survival but extends to **functional and psychosocial restoration**.

Evidence-Based Intervention Models

Cognitive Behavioural Therapy (CBT) Protocols

CBT should be tailored for burn survivors to address:

- Trauma processing (exposure-based techniques)
- Cognitive restructuring (body image, self-worth)
- Anxiety and avoidance behaviours

CBT is particularly effective during:

- Early PTSD phase
- Mid-phase depression

Family-Based Rehabilitation Model

Given the strong influence of family functioning:

Core Components:

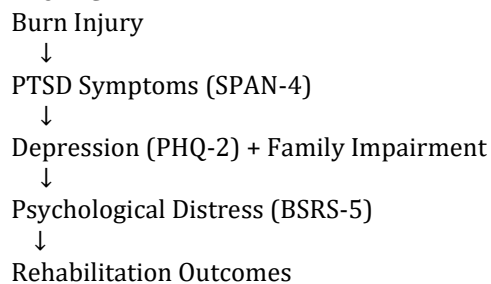
- Family psychoeducation
- Communication skills training
- Caregiver burden management

Expected Outcomes:

- Reduced psychological distress
- Improved adherence to rehabilitation
- Enhanced social reintegration

This study advances the understanding of long-term psychological outcomes in burn survivors by demonstrating that recovery is a **dynamic, multidimensional process influenced by trauma, resilience, and social context**. The findings underscore the urgent need for **integrated, phase-specific psychiatric rehabilitation models** that extend beyond hospital care and address the evolving needs of survivors within their sociocultural environment

FLOW CHART:



Moderators:

- Resilience
- Family Support
- Adaptation

Interventions:

- CBT
- Family-based rehab
- Social reintegration

Highlights

- First Indian longitudinal burn psychiatry study
- PTSD strongest predictor
- Phase-specific rehabilitation needed

Limitations

- Inclusion limited to participants completing all follow-ups
- Potential selection bias

Findings may not be generalizable to all burn populations

Ethical Considerations

Ethical clearance was obtained.
No conflict of interest declared.
No funding was received

CONCLUSION

Psychological distress among young burn survivors is a prolonged and multifactorial phenomenon. PTSD-like symptoms, depression, and anxiety remain central across the recovery trajectory. The influence of risk factors varies over time, emphasizing the need for dynamic, stage-specific rehabilitation strategies.

Holistic, culturally sensitive, and multidisciplinary care is essential to optimize long-term outcomes and improve quality of life.

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