

Introduction

- Each year in the US, more than 50,000 individuals are hospitalized following major thermal burn injury (MThBI).¹
- Persistent pain is a common, morbid outcome among MThBI survivors.
- Increasing evidence suggests that the pathophysiology of pain following trauma relates to neuro/stress/immune mechanisms which are also involved in the pathogenesis of posttraumatic stress (PTS) symptoms.
- In this analysis, we assessed whether initial, peritraumatic PTS symptoms predict pain outcomes following MThBI.
- We hypothesized that PTS symptoms in the early aftermath of MThBI would predict pain, and that PTS and pain symptoms at individual follow-up timepoints would be correlated. We also hypothesized that PTS severity would be associated with decreased functional outcomes following MThBI.

Methods

- Patients undergoing a tissue autograft after major thermal burn injury (MThBI) at one of three burn centers were enrolled. (Figure 1).
- Tissue autograft-related pain severity (0-10 NRS) and PTS symptom severity (PSS-I) were evaluated in the immediate aftermath of MThBI and at Week 6, Month 6, and Month 12.
- The relationship between PTS symptoms and tissue autograft-related outcomes was assessed during 2 distinct burn wound healing phases: the inflammatory/proliferative phase (0-6 weeks after injury) and the late proliferative/maturation phases (6 weeks – 12 months after injury).
- Linear regression and mixed modeling was performed adjusting for age, sex, and ethnicity.
- Functional outcomes were assessed with the SF-12 mental and physical health component scores.



Figure 1. TRYUMPH Burn Research Network

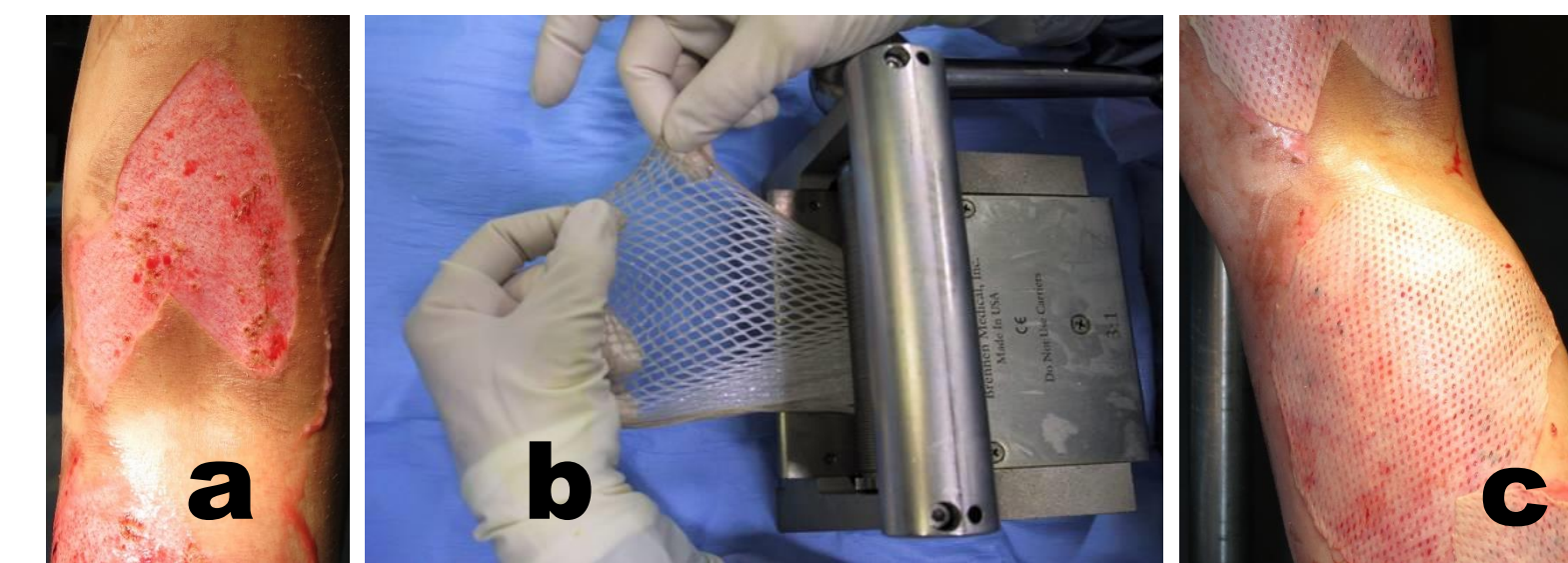


Figure 2: Skin graft procedure for coverage of burn injury site. Figure 2a shows the burn injury site after debridement. Figure 2b shows the process in which harvested skin from a donor site is meshed with a microtome to provide more extensive coverage of the burn injury site. Figure 2c shows an example burn injury site covered with meshed tissue autograft. The study sample included only individuals whose burn injury was severe enough to require a tissue autograft.

Table 1. Characteristics of study participants (n=96)

Age, mean (SD), y	38 (13)
Males, n (%)	72 (75)
Income level n (%)	
\$0-19,999	13 (17)
\$20,000-39,999	24 (31)
\$40,000-59,999	17 (22)
\$60,000 or higher	24 (31)
Burn Total Body Surface Area (%), (SD)	5 (3)
Length of Hospital Stay in days (SD)	10 (3)

y, year; NRS, numeric rating scale; SD, standard deviation

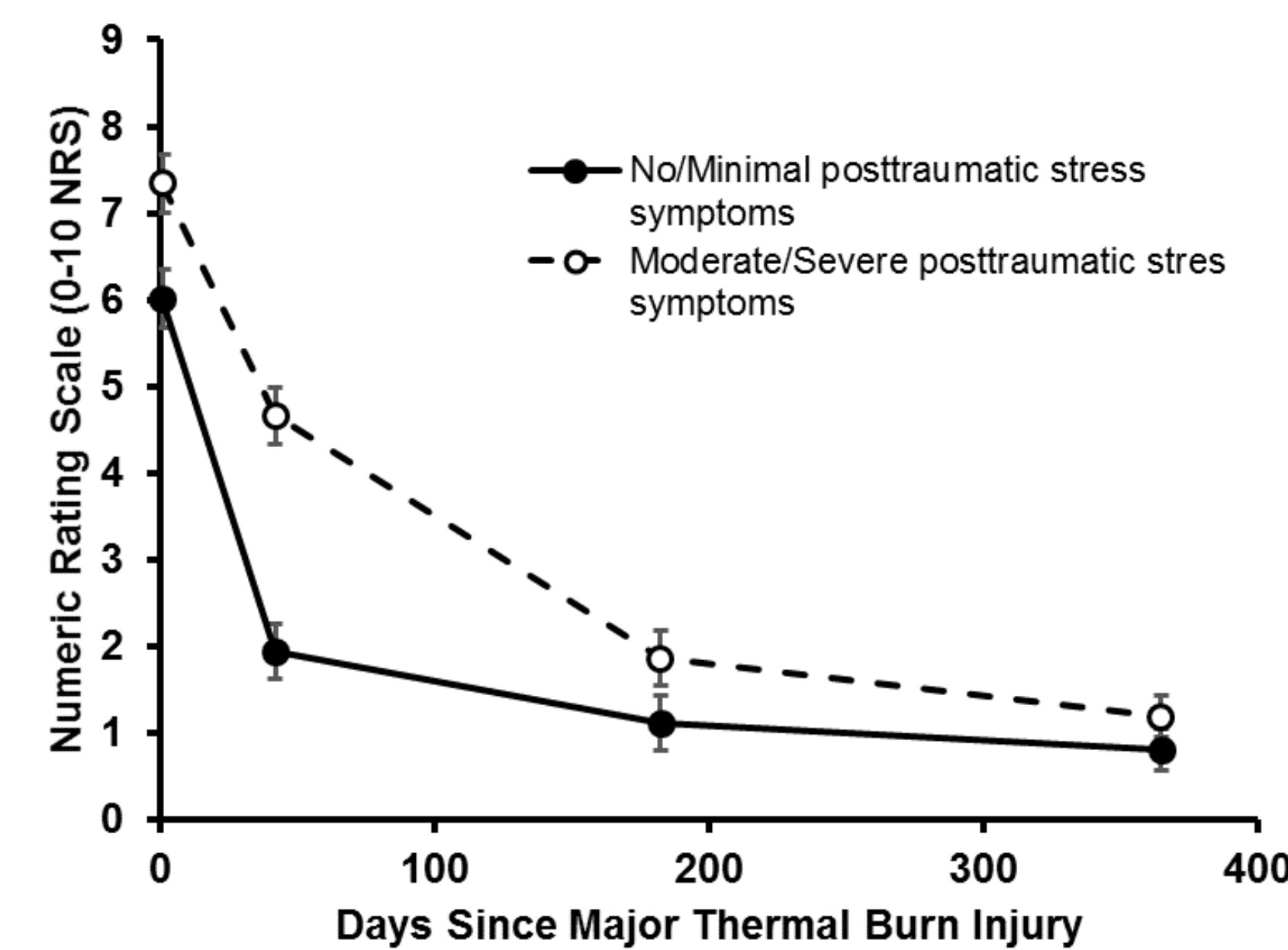


Figure 3. Influence of initial posttraumatic stress symptoms on graft site pain severity following MThBI. Pain severity (0-10 NRS) is reported at follow-up time points in participants with no/minimal posttraumatic stress symptoms (closed circles, solid line) and in individuals with moderate/severe posttraumatic stress symptoms (open circles/dashed line). Results show that MThBI survivors with moderate/severe posttraumatic stress symptoms have greater pain severity. Error bars represent standard error of the mean.

Table 2: Correlation between PTS and pain symptoms after MThBI.

	Correlation between initial PTS symptoms and MThBI pain over time		Cross-sectional correlation between PTS symptoms and MThBI pain at each timepoint	
	R value	p-value	R value	p-value
Day 1	0.23	0.30	0.23	0.30
Week 6	0.24	0.24	0.22	0.03
Month 6	0.06	0.06	0.24	0.32
Month 12	0.10	0.10	0.31	0.04

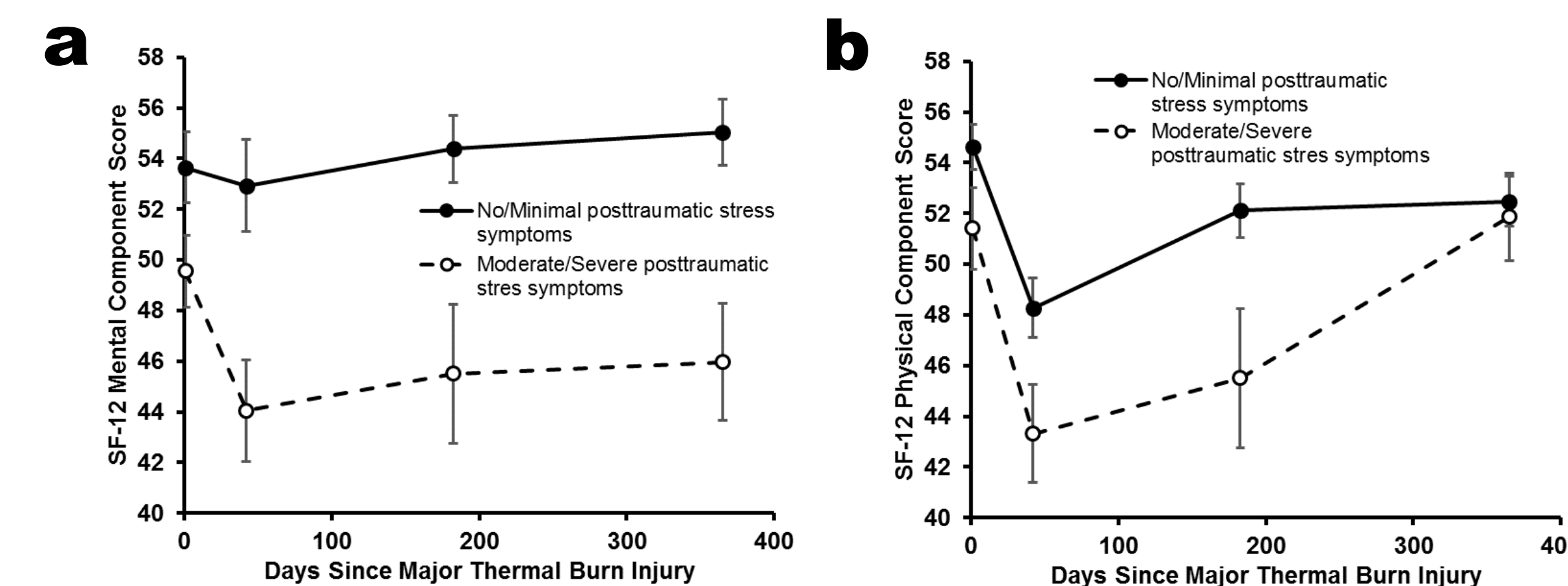


Figure 4. Functional outcomes based on severity of initial, peritraumatic posttraumatic stress (PTS) symptoms. Figure 4a shows that individuals with moderate/severe PTS symptoms on enrollment experienced a greater decline in mental health. Figure 4b shows that moderate/severe PTS symptoms in the early aftermath of MThBI results in a greater decrement of physical health at 6 week and 6 months.

Results

- Participant characteristics are shown in Table 1. All participants received tissue autograft for MThBI (Figure 2).
- Follow-up of enrolled patients (n=96) at six weeks, six months, and one year was 91 (96%), 82 (89%), 78 (88%), respectively.
- MThBI survivors with moderate and severe PTS symptoms experience greater pain severity following MThBI (Figure 1).
- After adjusting for age, sex, ethnicity, in linear mixed models initial PTS symptom severity demonstrated an association of immediate posttraumatic stress symptom severity (PSSI) and both pain ($\beta=.03$, $p=0.03$) and itch ($\beta=0.06$, $p<0.0001$) over time.
- Correlations between initial PTS symptoms and pain outcomes, and between PTS and pain symptoms are shown in Table 2.
- Figure 4 shows functional outcomes among MThBI survivors who experiences no/mild PTS symptoms versus those with moderate/severe PTS symptoms.

Conclusions

- These data support the hypothesis that PTS symptoms in the early aftermath of MThBI predict persistent pain severity, and that PTS and pain MThBI are associated over time.
- Initial PTS symptoms result in greater decline in mental and physical function following MThBI
- These data suggest that PTS and pain outcomes after MThBI share overlapping mechanisms.
- Further studies are needed to determine the shared vs. distinct pathogenic mechanisms contributing to these outcomes.

References

1. Laborde P. Burn epidemiology: the patient, the nation, the statistics, and the data resources. *Crit Care Nurse Clin North Am.* 2004 Mar; 16:13-25.

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