

Attachment Style and Burn Pain

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Pain management is a challenge when treating patients with burn injuries. Understanding the behavioral and interpersonal aspects of the experience of burn pain may aid in its management. Attachment style—which influences how an individual relates to other people—is one aspect that may affect the experience of burn pain. Past research has shown a relationship between an individual’s attachment style and certain types of pain and disorders. The study builds upon that past work to investigate specifically how attachment style affects the experience of acute burn pain. Participants were at least 18 years old and admitted to an American Burn Association verified burn center with burns encompassing 30% or less TBSA. Participants completed demographic questionnaires and a standardized measure of adult attachment style. Data regarding use of analgesics, daily pain scores, and burn-related information were collected through medical chart review. Participants who reported a secure attachment style required less pain medication and reported less pain compared with participants who reported an insecure attachment style. There was no difference in burn-related variables between participants with secure and insecure attachment styles, suggesting that these differences were not due to burn-related factors. Attachment, therefore, may play a role in an individual’s perception of acute burn pain, which impacts analgesic requirements needed to manage the pain. These results have potential implications for the use of psychosocial interventions to reduce the experience of pain and the amount of pain medication needed to manage acute burn pain.

BURN PAIN

Pain from a burn injury is long-lasting and is described as one of the most painful injuries a person can endure.^{1,2} The nature of burn pain is 2-fold, consisting of pain both from the initial injury and subsequent procedural pain. The procedural pain, which includes debridement, grafting, and wound care, is often more painful than the initial trauma.^{3–5} Although burn-related pain remains undertreated,^{6,7} in the wake of the ongoing opioid crisis, the Centers for Disease Control (CDC) has published guidelines calling for a reduction in opioid use in the treatment of acute and chronic pain.⁸ As a result, new approaches to the management of burn pain have never been more relevant. Focusing on the subjective experiences of burn

pain by individuals may contribute insight into new and better ways to treat burn pain throughout the healing process.

ATTACHMENT

Attachment is defined as an enduring emotional bond that connects one person to another person.^{9–11} Once established, attachment style remains relatively stable across the lifespan.^{12,13} Attachment style is created in infancy through an individual’s interactions with the primary caregivers; as such, attachment style reflects different interpersonal experiences.^{14–16} According to the model created by Bartholomew and Horowitz, there are four different styles of attachment: secure attachment and three insecure attachment styles (preoccupied, fearful, and dismissing).¹⁷ Each attachment style coincides with an individual’s internal working model of self and others.¹⁷ Essentially, an attachment style represents an individual’s expectations and beliefs about themselves, others, and the interaction between the two.^{17,18} For instance, a secure attachment style is associated with positive thoughts of self and positive thoughts of other people, places, and experiences; this attachment style coincides with an internal working model of “positive me, positive you.” An insecure attachment style is associated with an internal working model of “negative me, positive you” (preoccupied), “positive me, negative you” (dismissing), or “negative me, negative you” (fearful).^{17–19} The four attachment styles fit into an overall structure with two dimensions: attachment anxiety (the level of anxiety a person has in relationships) and attachment avoidance (the level of discomfort someone has with closeness). Within this structure, these dimensions are defined as being either high or low.^{15,20,21} Figure 1 demonstrates the

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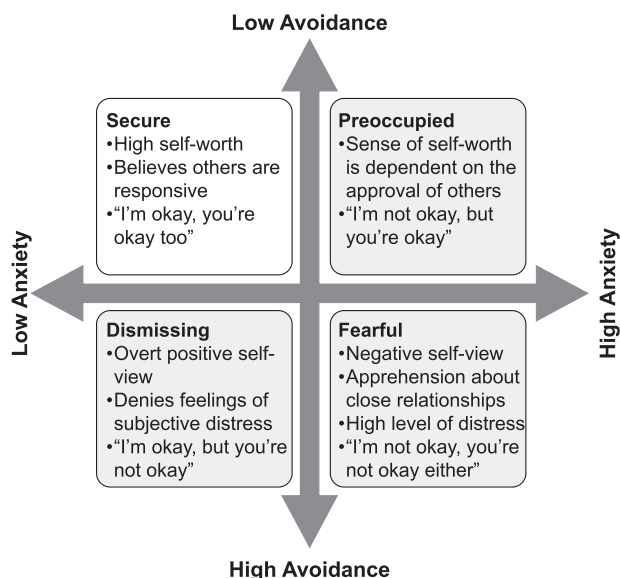


Figure 1. Diagram of the four attachment styles.

theoretical relationship of self and others in relation to the internal working model of self and others.

ATTACHMENT STYLE AND ITS LINK TO PAIN

Pain triggers attachment-related cognitive, behavioral, and emotional mechanisms, which affect the experiences and adjustments to pain.^{15,22} Past research has shown that an individual's attachment style influences how they respond to pain.^{15,23} Attachment style has also been found to be a factor in the development and perception of chronic pain²⁴ and the ability to cope with chronic disease.²⁵ Thus, attachment style may play a role in how burn pain is perceived by individual patients.

Attachment style influences other factors known to affect pain, such as sleep^{26,27} and posttraumatic stress.²⁸ Patients with a secure attachment style who suffer from persistent pain report less pain and catastrophizing.^{29,30} When compared to patients with insecure attachment styles, patients with secure attachment styles are more likely to view pain as a challenge rather than an insurmountable threat.^{29,31} Patients with a secure attachment style are also more likely to respond to pain in an appropriate and expected manner, whereas patients with an insecure attachment style are more likely to be either stoic (avoidant) or over-exaggerated (anxious).^{20,32} Insecure attachment is a risk factor for maladaptive outcomes, including adjustment to pain, and is associated with more catastrophizing in response to experimental pain.^{33,34} Importantly, while limited research has addressed the influence of attachment style in burn-injured patients, recent research provides evidence that attachment style influences psychological symptoms and the severity of trauma following severe burn injuries.³⁵

Pain is a subjective experience that is impacted by several factors including an individual's perceptions, processing of sensory information, association and comparison with previous experiences, as well as cultural and societal norms.

Accordingly, the complex experience of pain is difficult to measure by reliable, objective means. Standard measures of pain involve various self-report questionnaires and pain scales. In this study, we assessed pain severity using the Pain Intensity Rating Scale (PIRS). In addition, previous reports of pain severity in an inpatient burn population have been correlated to the amount of pain medication administered over time.³⁶ Therefore, the daily use of analgesic medications was also recorded as an indirect measure of pain.

The purpose of the current study is to build upon these past findings; specifically, to investigate how adult attachment style affects the experience of acute burn pain. Particularly, our hypothesis was that individuals with a secure attachment style would experience less pain than those with insecure attachment styles. This was accomplished by assessing pain severity, which was measured using self-reported pain scores, and by recording the use of analgesic medications as an indirect measure of pain. The average daily self-reported pain scores and analgesic requirements were compared across attachment styles. Values for the overall hospitalization were compared as well as the first and last day to assess changes over time. Initial analyses compared the four attachment styles identified by the Relationship Questionnaire (RQ).¹⁷ Because combining the three insecure attachment styles into one group for comparison is more clinically relevant than identifying each specific insecure subtype individually, subsequent analyses compared the secure attachment style to the three insecure (fearful, preoccupied, and dismissing) attachment styles combined. Similar analyses were previously used to establish significant differences between secure and insecure attachment styles in relation to depression, anxiety, and stress as well as differences on the Davidson Trauma Scale.³⁵ Patients suffering from burn injuries represent a unique population that allows for the prospective study of psychosocial factors during the acute pain experience, making this population ideal for understanding how attachment style contributes to the experience of acute pain. To the authors' knowledge, this is the first study looking at the relationship of attachment style and acute pain within an in-patient burn population.

METHODS

Procedures

This study was conducted under a protocol reviewed and approved by an accredited Institutional Review Board (protocol #H-13-015). Acute burn survivors (n = 375) were screened for possible study inclusion upon admission to a single burn center, and patients who met the inclusion criteria (n = 155) were approached for consent when alert and oriented (Figure 2). Of these, 142 patients consented to participate and 1 was subsequently removed due to ineligibility of the legally authorized representative. In total, 141 participants had complete data for analysis. Following patient consent and enrollment into the study, the research staff administered the demographic questionnaires and attachment measure in a private space. An independent data analyst pulled the participant's electronic medical record (EMR), dating back to the time the patient had been admitted to the unit, to gather data on the amount of pain medications required,

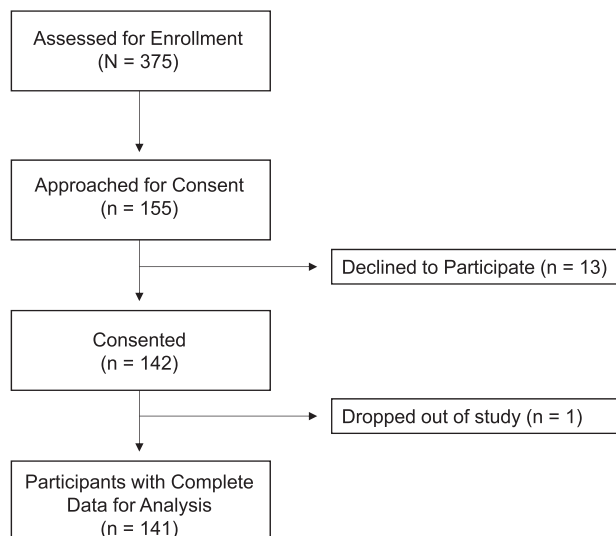


Figure 2. Participant flow diagram.

pain scores, and burn-related information to include TBSA, number of surgeries, number of procedures, and number of days in the hospital.

Sample

The participants in this study were patients with burn injuries admitted to a single burn center from spring 2013 to spring 2015. The participants were initial burn admissions with burns covering equal to or less than 30% TBSA, were English-speaking, and at least 18 years old. Of the 141 participants who consented and enrolled in the study, 78% were male, 45% self-identified as Hispanic, 85% self-identified as Caucasian, 56% were between 18 and 39 years old, 13.5% were serving in the military, 49% had some college or higher education, and 49% were married or cohabiting (Table 1).

Measures

Relationship Questionnaire Adult attachment was measured with the RQ.¹⁷ The RQ is a self-report categorical measure of adult attachment. This measure includes a series of four statements that represent secure attachment and three insecure attachment styles known as fearful, preoccupied, and dismissing. Participants were instructed to review the following four statements and select the one that best describes how they would react to that situation (note: the name of the attachment style is not listed on the measure)¹⁷:

- It is easy for me to become emotionally close to others. I am comfortable depending on them and having them depend on me. I don't worry about being alone or having others not accept me. (Secure Attachment Style)*
- I am uncomfortable getting close to others. I want emotionally close relationships, but I find it difficult to trust others completely, or to depend on them. I worry that I will be hurt if I allow myself to become too close to others. (Fearful Attachment Style)*
- I want to be completely emotionally intimate with others, but I often find that others are reluctant to get as close as I would like. I am uncomfortable being without close*

relationships, but I sometimes worry that others don't value me as much as I value them. (Preoccupied Attachment Style)

- I am comfortable without close emotional relationships. It is very important to me to feel independent and self-sufficient, and I prefer not to depend on others or have others depend on me. (Dismissing Attachment Style)*

Test-retest reliabilities of the RQ subscales ranged from .49 to .71, as reported by Scharfe and Bartholomew.³⁷ This measure has been found to have good reliability and validity^{18,38} and has been validated in 62 cultures, suggesting that people worldwide fall into one of the four attachment patterns.²⁵

Pain Intensity Rating Scale Subjective pain experience was measured using the PIRS.³⁹ The PIRS is a verbal measure of pain required to assess pain in patients who are alert and oriented.⁴⁰ Another name for the PIRS is the Numerical Pain Rating Scale or Numerical Rating Scale (NRS). In a study comparing the four commonly used measures of pain: Verbal Rating Scale, Visual Analogue Scale, Faces Pain Scale-Revised, and the NRS, the authors found the NRS to be the most responsive and able to detect gender differences in pain intensity.⁴¹ The PIRS assesses pain through the self-report of pain on a numeric scale of 0 to 10, with 0 designated as "no pain," and 10 designated as "worst possible pain." Test-retest reliability of the PIRS has previously been shown to be excellent as indicated by an intraclass correlation coefficient of .95,⁴² and highly correlated to visual analog scales (VAS).⁴³ In accordance with the standard of care, trained nursing staff assessed pain using the PIRS upon admission and at least every 4 hours thereafter. After the initial day of inpatient care, assessments are recorded at approximately the same times every day. As per protocol, pain is also reassessed within 1 hour of the administration of any pain medication, whether the pain medicine is administered orally (PO), intramuscularly (IM), or intravenously (IV). This information is recorded as part of the standard of care into the patient's EMR. A query was entered for this information and an independent data analyst pulled this information directly from the EMR following patient consent. The verbal pain score (VPS) was derived from the PIRS and was computed for each day the participant was in the hospital. All scores for each day were averaged to create a daily average score to account for deviations based on pain breakthroughs and the amount of medication received. Pain scores for the first full day of inpatient care and the last day prior to discharge were compared between attachment style groups. The individual daily scores were then averaged to create an overall VPS for the hospital stay.

Pain Medication Usage As per the standard of care, all medications administered are entered into the EMR with time, dose, and route of delivery. Data on all opioids, nonopioids, and pharmacological adjuncts required for pain control from the time of admission were pulled from the EMR by an independent data analyst (complete list available upon request). The opioids used were converted to intravenous morphine equivalent daily dose (MEDD) using an online conversion calculator for opioids (available at <http://www.globalrph.com/>).⁴⁴ The MEDD was computed for each participant for each day in the hospital. MEDD administration for the first

Table 1. Demographics

	N	Valid %
Gender		
Male	110	78
Female	31	22
Ethnicity		
Hispanic	64	45.4
Non-Hispanic	77	54.6
Race		
Caucasian	120	85.1
African-American	12	8.5
American Indian	5	3.5
Other	4	2.8
Age (yr)		
18 to 29	55	39
30 to 39	24	17
40 to 49	20	14.2
50 to 59	21	14.9
60 to older	21	14.9
Occupation		
Military	19	13.5
Nonmilitary	122	86.5
Education		
Some high school	22	15.6
High school diploma/GED	50	35.5
Some college/Associate's degree	51	36.2
College or Graduate degree	18	12.8
Marital status		
Single/never married	43	30.5
Married	53	37.6
Cohabiting	16	11.4
Separated or divorced	26	18.4
Widowed	3	2.1
Attachment styles		
Secure	66	46.8
Preoccupied	12	8.5
Fearful	27	19.1
Dismissing	36	25.5

full day of inpatient care and the last day prior to discharge were compared between attachment style groups. The daily scores for each participant were then averaged to create an overall MEDD for the hospital stay. The major categories of medications administered have been reported elsewhere.³⁶

Statistical Analysis

Data analyses were conducted using SPSS version 27 (SPSS, Inc., Chicago, IL). Descriptive statistics to include frequencies, means, and SDs were conducted for all variables of interest. Analysis of variance (ANOVA) was conducted using the four attachment styles as categorical variables based on responses to the RQ and the two continuous pain variables (reported pain score and MEDD administration). Fisher's least significant difference (LSD) method was used as the post hoc adjustment method for comparing the categorical attachment styles (secure, fearful, preoccupied, and dismissing) across the two continuous pain variables. Attachment style was then dichotomized by combining the participants in the

fearful, preoccupied, and dismissing attachment groups into one general "insecure" attachment style group. *t*-Tests were used to examine the dichotomized "secure" and "insecure" attachment styles across the two continuous pain variables. *t*-Tests were also used to determine if the differences found were related to other patient-related burn characteristics such as TBSA, number of surgeries and procedures, and number of days in the hospital.

RESULTS

Attachment Style

On the measure of attachment (RQ), 46.8% of our sample were classified as secure and 53.2% were classified as insecure. The three insecure categories further breakdown to: 19.1% as fearful, 8.5% as preoccupied, and 25.5% as dismissing.

Attachment and Pain Measures

We initially analyzed the average MEDD administration using an ANOVA with RQ as the independent variable and the average MEDD administration, as the dependent variable (Figure 3A). The results of the ANOVA were statistically significant, $F(3,135) = 3.53, P = .02$. The LSD analyses indicated statistically significant differences between the participants with secure and fearful attachment styles ($P = .005$) and between the participants with secure and preoccupied attachment styles ($P = .04$). There were no significant differences between the secure and dismissing attachment styles ($P = .17$), nor were there significant differences between fearful and preoccupied ($P = .97$), fearful and dismissing ($P = .15$), or preoccupied and dismissing attachment styles ($P = .29$). We also compared the secure attachment style with the three insecure attachment styles (fearful, preoccupied, and dismissing) combined. Participants with a secure attachment style required significantly lower MEDD administration than participants with an insecure attachment style, $t(137) = -2.85, P = .005$, with an average daily administration (reported as mean and SD) of 33.18 ± 21.74 MEDD for participants with a secure attachment style and 44.66 ± 25.35 MEDD for participants with an insecure attachment style (Figure 3B).

The study team created the average VPSs using the PIRS. These VPSs were initially analyzed using an ANOVA with the four attachment styles as identified by the RQ as the independent variable. There was no significant effect when looking at average VPS as the dependent variable across all four attachment styles, $F(3,137) = 1.54, P = .21$ (Figure 4A); however, when comparing the dichotomous variable of secure attachment style with insecure attachment style (fearful, preoccupied, and dismissing combined), the VPS was significantly lower for participants with a secure attachment style compared with participants with an insecure attachment style, $t(139) = -2.07, P = .04$ (Figure 4B). Participants with a secure attachment style reported average pain scores of 3.66 ± 1.36 on a scale of 1 to 10, and participants with an insecure attachment style reported higher scores, averaging at 4.17 ± 1.58 .

Burn-Related Characteristics

We conducted a series of *t*-tests to ensure that the differences seen in pain measurements between secure and insecure

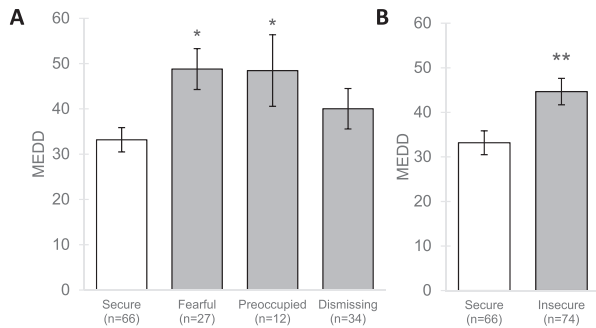


Figure 3. Mean (\pm SEM) opioid administration converted to morphine equivalent daily dose (MEDD), across the four attachment categories (A) and for secure vs insecure (fearful, dismissing, and preoccupied combined) attachment styles (B). * $P < .05$; ** $P < .01$.

attachment styles were not a result of specific burn-related characteristics nor the patient-related characteristics of height and weight. The burn-related characteristics assessed in this study included TBSA, number of surgeries, number of procedures, number of ICU days, and number of hospital days. Results suggested that differences in MEDD administration and VPS were not due to differences in burn-related characteristics, nor body size as indicated by height and weight. There were no statistically significant differences between secure and insecure attachment style on TBSA [$t(139) = 1.05, P = .29$]; number of surgeries [$t(138) = 0.31, P = .76$]; number of procedures [$t(138) = 0.52, P = .60$]; ICU days [$t(138) = -0.14, P = .89$]; or hospital days [$t(138) = 0.77, P = .44$], nor were there statistically significant differences between height [$t(135) = 0.30, P = .76$] and weight [$t(125) = 0.02, P = .99$] (Table 2).

Pain Measures on First Full Day and Last Full Day Before Discharge

To determine if the differences between the secure and insecure attachment styles started upon admission and if they endured through discharge, total administration of pain medications and VPS were calculated on the first full day after admission and the day before discharge. For this post hoc analysis, we compared the pain measures on the first full day as an inpatient to the pain measures on the last full day of hospitalization prior to discharge. On both the first full day and the last full day of hospitalization, participants who were identified as having an insecure attachment style required higher MEDD administration than participants who were identified as having a secure attachment style [$t(138) = -2.35, P = .02$; $t(138) = -2.66, P = .0009$] (Figure 5A).

Participants with insecure attachment styles tended to report higher VPS for the first full day of hospitalization and the last full day before discharge, but this difference was not statistically significant [$t(139) = -1.30, P = .20$; $t(139) = -1.54, P = .13$] (Figure 5B).

DISCUSSION

Previous research has shown that attachment style affects individual perceptions of pain.^{22,24,29,30} The key findings of the current study are consistent with, and extend upon, this past

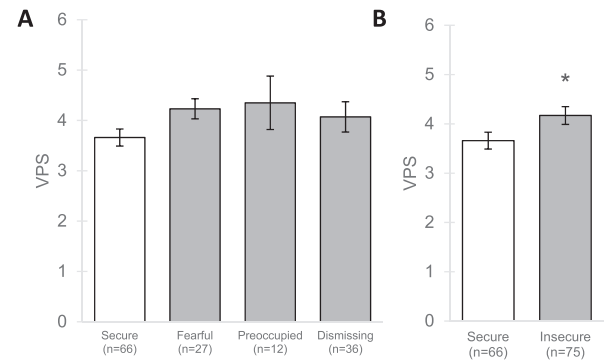


Figure 4. Mean (\pm SEM) self-reported daily average of verbal pain scores (VPSs), across the four attachment categories (A) and for secure vs insecure (fearful, dismissing, and preoccupied combined) attachment styles (B). * $P < .05$.

research. We hypothesized that the group of individuals who were identified by the RQ as having a secure attachment style would report a lower average pain intensity and require less pain medication when compared with the group of individuals who were identified as having an insecure attachment style. The results of the study largely supported these hypotheses, in that the group of participants with secure attachment styles rated pain significantly lower on the PIRS and required significantly lower MEDD administration on average during their hospitalization than the group of participants with insecure attachment styles. There were no significant differences in burn-related characteristics such as TBSA, number of surgeries, number of procedures, number of ICU days, or number of hospital days between the attachment styles. Nor were there any differences in the patient characteristics of height and weight between attachment styles. Thus, the results of this study suggest that there is a protective influence of secure attachment on the experience of acute burn pain. Individuals with attachment insecurities may have higher pain scores and greater MEDD requirements due to dysfunctional affect regulation and a problematic adjustment to acute pain. Accordingly, the ability to regulate affective responses and adjust to the presence of acute pain in individuals with secure attachment styles may have a buffering effect on the experience of pain.

Medication administration and pain scores were compared between attachment styles for the first whole day of inpatient care and the final day before discharge. While there were no significant differences in pain scores between the two groups, results indicated that the insecure attachment group had higher MEDD administration on both the first and last day of care compared with the secure attachment group. A key factor for this finding is that there were no significant differences in the burn characteristics of individuals identified as having a secure attachment style or an insecure attachment style (Table 2). Since there were no significant differences in the severity of burns that may have led to an increased need for MEDD administration for the management of burn-related pain, it is possible the patient's perceptions of pain may have been influenced by their attachment style.

These results are consistent with past research, which has shown psychosocial factors such as attachment insecurity

Table 2. Burn characteristics in participants with secure and insecure attachment styles

Characteristic	Secure	Insecure
Height (cm) (mean ± SD)	172.92 ± 9.11	172.47 ± 8.51
Weight (kg) (mean ± SD)	85.25 ± 19.27	84.55 ± 19.00
TBSA (%) (mean ± SD)	8.64 ± 7.55	7.38 ± 6.68
Number of surgeries (mean ± SD)	0.97 ± 0.81	0.93 ± 0.58
Number of procedures (mean ± SD)	20.71 ± 15.20	19.55 ± 10.95
ICU days (mean ± SD)	1.68 ± 3.41	1.75 ± 2.65
Hospital days (mean ± SD)	10.97 ± 7.80	10.12 ± 5.14

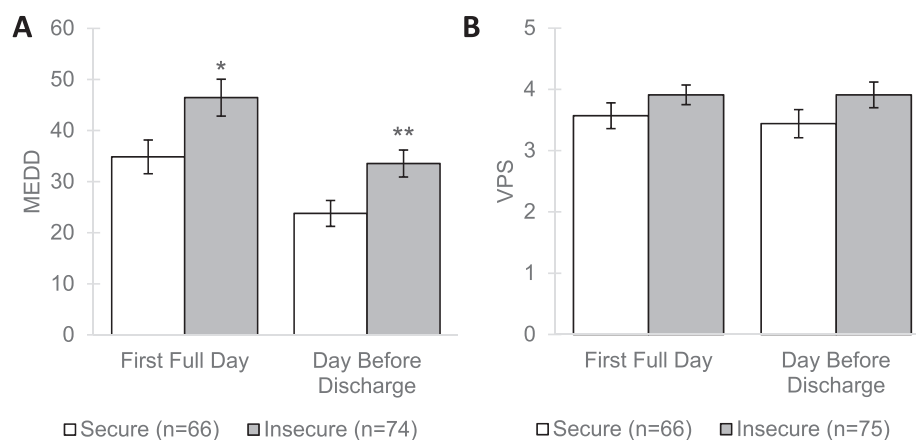


Figure 5. Values represent (A) opioid administration converted to the mean (± SEM) morphine equivalent daily dose (MEDD), and (B) the mean (± SEM) self-reported daily average of verbal pain scores (VPSs) for secure and insecure (fearful, dismissing, and preoccupied combined) attachment styles between the day of admittance and the day of discharge. * $P < .05$; ** $P < .01$.

to have a negative impact on an individual's perception of pain.^{45,46} Similarly, the results of the current study are consistent with findings in the chronic pain literature, which has reported that individuals with chronic pain who exhibit an insecure attachment style have greater MEDD administration and are more likely to self-report the experience of chronic pain than individuals who exhibit a secure attachment style.^{23,33,45,46}

Along with past research, our results suggest that people who exhibit a secure attachment style appear to have a different perception of pain, and, as a result, may be able to better manage the negative effects of acute burn pain. Patients with different attachment styles may ultimately require different treatments in an in-patient hospital setting. Past research has established a clear relationship between psychological state and the subjective experience of pain.^{6,47} Individuals with insecure attachment styles may have increased symptom reporting, lower self-efficacy, and increased pain catastrophizing, which can lead to exaggerated pain behaviors, intended to solicit assistance or to provoke an empathic response from healthcare providers.^{29,48} Caring for an individual with an insecure attachment style may become overwhelming or even be seen as burdensome by healthcare providers, whose services are often already stressed.^{49,50} Healthcare providers may believe that the patient is exhibiting drug-seeking behaviors if that individual is already at their maximum dosage of pain medication yet still only reporting minor relief of symptoms. As a result, patients with insecure attachment styles may experience inadequate

pain management, which correlates to a decline in psychological state⁵¹ and diminished ability to adjust and cope with an injury.⁵²

This line of research has potential implications for the use of psychosocial interventions to 1) reduce the experience of pain, 2) reduce the amount of pain medication needed to manage acute burn pain, and 3) assist with pain management when a patient's pain is not sufficiently managed with medication alone. For burn patients specifically, good pain management should include the use of pharmacological and nonpharmacological treatment modalities to be able to meet the multifaceted needs of this patient population. Psychological treatments and interventions are best used in combination with the medication management of burn pain. For example, hypnosis used in an intensive care setting has been found to reduce burn patient anxiety and exposure to pain, decrease general anesthesia requirements, and reduce the length of the required hospital stay.⁵³ Many burn patients experience a trauma associated with either the nature of the injury or the care and management of the burn injury itself (eg, debridement, shower). This type of trauma may activate attachment behaviors in patients, which can also impact their individual pain experience if patients push caregivers away.^{49,54}

A patient-centered approach—with a goal of learning to self-manage pain rather than focus on being pain free—may best meet the needs of burn patients. For acute burn injuries, the expectation of becoming pain free is unrealistic due to the nature of the injury and to the multiple procedures and therapies

necessary for treatment. Empowering patients and validating subjective pain experiences and associated emotions through a safe and secure relationship with a therapist may facilitate the development of a new secure attachment relationship. A goal of the new attachment relationship would be to help the patient construct a new way of understanding the world and their pain experiences. As a result, the new attachment relationship may allow patients to integrate experiences that they were unable to integrate with an insecure attachment style,⁵⁴ and develop better coping skills to manage their perceived pain. Psychological interventions such as Cognitive Behavior Therapy, Mindfulness therapy, Hypnotherapy, and Visualization and Guided imagery^{55,56} would be important assets for the management of pain by providing patients with skills to manage acute pain at any time as well as for the management of acute burn pain for individuals with insecure attachment styles.

Through the development of a positive therapeutic relationship, a psychologist or mental health provider would act as a liaison for the patient with the burn treatment team to further enhance the patient–provider relationship. The goal of this enhanced relationship would be to increase collaboration and communication to work more effectively as a cohesive team of medical and mental healthcare providers with patients. This relationship may prove especially important for patients with an insecure attachment style. Individuals with an insecure attachment style may have negative perceptions of others and may believe that people are likely to ignore their attempts to gain support.⁵⁷ These patients are more likely to report more somatic symptoms and may be less apt to form a trusting relationship with an individual provider or to seek support.⁵⁸ Thus, tailoring the intervention to improve engagement of patients with insecure attachment styles is vital to the success in treating these patients. A better understanding of the developmental framework of attachment by healthcare providers may also help to decrease frustrations and burnout for providers with difficult patient–provider relationships.

Limitations

A limitation of this study is that the RQ is a categorical measure and requires participants to select from only one of four possible attachment statements. This limits the number of types of attachment categories a patient may experience. Therefore, this measure cannot fully characterize individuals who may fall into two or more of the attachment categories. In addition, the sample for the current study only consisted of patients with 30% TBSA or below. As a result, this is a limitation because the study does not capture the pain experience of patients with larger burns where longer hospital stays were required. Additionally, some participants completed the assessments independently, while others required assistance, as is unavoidable in burn-injured patients. These participants had the survey items read aloud to them, which may have skewed responding toward more secure attachment styles. Another concern is that averaging the mean daily pain scores may be too vague to capture the subjective experience. For instance, if a person has a VPS of 8 and a VPS of 2 their average pain score is the same as someone who has 5 over and over. The VPS of 8 may suggest the patient had a lot of pain and then was given morphine, which subsequently reduced their pain to a VPS of 2; whereas the patient with a constant VPS of

5 might only be given NSAIDs. This results in two different pain experiences leading to two different treatment options which is unable to be discerned from this study. Further study is required on the acute pain experience over time and related treatments. Finally, another limitation of the study is that the sample included only English-speaking patients. While the RQ is a measure that has been validated across many different cultures, as mentioned in the methods sections, and could be used for non-English-speaking patients, this study was limited to English-speaking patients due to a lack of availability of qualified staff to assist with translating and interpreting for non-English-speaking patients. Future research is needed to determine how our findings generalize to non-English-speaking populations and would benefit from the use of certified interpreters and certified translations of the survey instruments. This would allow researchers to examine the impact of ethnicity on pain perception as well as attachment style. Further longitudinal studies and multisite studies are needed to address these limitations.

CONCLUSIONS

This study built upon past research that has shown attachment style to be a factor in the perception of chronic pain.^{22,23,29–31,46} The results of the current study, in conjunction with the chronic pain literature, suggest that attachment may have an impact on the experience of pain and, therefore, may be an important psychosocial factor to consider in the management of acute burn pain. Understanding the relationship between burn pain and attachment style may enhance care by increasing collaborations and support within healthcare mental health treatment provider teams in developing strategies for pain management. The benefit would be to reduce the development of psychological factors associated with pain as well as provide additional treatment options through nonpharmacological pain management interventions utilized in tandem with current pain management best practices.

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REFERENCES

1. Sharar SR, Patterson DR. Burn pain. In: Fishman SM, Ballantyne JC, Rathmell JP, editors. *Bonica's management of pain*. Philadelphia: Lippincott Williams & Wilkins; 2010. p. 757–66.
2. Wiechman SA, Sharar SR. Burn pain. In: Ballantyne JC, Fishman SM, Rathmell JP, editors. *Bonica's management of pain*. Philadelphia (PA): Lippincott Williams & Wilkins; 2018. p. 897–908.
3. Patterson DR, Ptacek JT. Baseline pain as a moderator of hypnotic analgesia for burn injury treatment. *J Consult Clin Psychol* 1997;65:60–7.
4. Montgomery RK. Pain management in burn injury. *Crit Care Nurs Clin North* 2004;16:39–49.
5. Wang C. Management of burns and anesthetic implications. In: Scher, C. editors. *Anesthesia for Trauma*. 2014; New York (NY): Springer.
6. Askay SW, Patterson DR. What are the psychiatric sequelae of burn pain? *Curr Pain Headache Rep* 2008;12:94–7.
7. Voss JK, Lozenski J, Hansen JK et al. Sedation and analgesia for adult outpatient burn dressing change: a survey of American Burn Association Centers. *J Burn Care Res* 2020;41:322–7.

8. Dowell D, Haegerich T, Chou R. CDC guideline for prescribing opioids for chronic pain—United States, 2016. *MMWR Recomm Rep* 2016;65:1–49.
9. Bowlby J. Attachment and loss: retrospect and prospect. *Am J Orthopsychiatry* 1982;52:664–78.
10. Ainsworth MDS, Bell SM, Stayton DF. Infant-mother attachment and social development: socialization as a product of reciprocal responsiveness to signals. In: Richards MPM, editor. *The integration of a child into a social world*. Cambridge (UK): Cambridge University Press; 1974. p. 93–135.
11. McLeod SA. Kolb-learning styles and experiential learning cycle. *Simply Psychology*; 2017, accessed 22 Jan, 2018; available from <https://www.simplypsychology.org/learning-kolb.html>
12. Ainsworth M, Blehar M, Waters E et al. *Patterns of attachment: assessed in the strange situation and at home*. Hillsdale (NJ): Lawrence Erlbaum; 1978.
13. Bowlby J. *The making and breaking of affectional bonds*. London (UK): Tavistock; 1979.
14. Fraley RC, Shaver PR. Attachment theory and its place in contemporary personality theory and research. In: Pervin L, editor. *Handbook of personality: theory and research*. New York (NY): Guilford Press; 2008. p. 518–41.
15. Meredith P, Ownsworth T, Strong J. A review of the evidence linking adult attachment theory and chronic pain: presenting a conceptual model. *Clin Psychol Rev* 2000;28:407–29.
16. Pietromonaco P, Feldman BL. Internal working models: what do we know about knowing about the self in relation to others? *Rev Gen Psychol* 2000;4:155–75.
17. Bartholomew K, Horowitz LM. Attachment styles among young adults: a test of a four-category model. *J Pers Soc Psychol* 1991;61:226–44.
18. Cassidy J. The nature of a child's ties. In: Cassidy J, Shaver PR, editors. *Handbook of attachment: theory, research, and clinical applications*. 3rd ed. New York (NY): Guilford Press; 2016. p. 3–24.
19. Pietromonaco PR, Barrett LF. The internal working models concept: what do we really know about the self in relation to others? *Rev Gen Psychol* 2000;4:155–75.
20. Read DL, Clark GI, Rock AJ et al. Adult attachment and social anxiety: the mediating role of emotion regulation strategies. *PLoS One* 2018;13:e0207514.
21. Gokce A, Harma M. Attachment anxiety benefits from security priming: evidence from working memory performance. *PLoS One* 2018;13:e0193645.
22. Donnelly TJ, Jaaniste T. Attachment and chronic pain in children and adolescents. *Children* 2016;3:21.
23. Davies KA, Macfarlane GJ, McBeth J et al. Insecure attachment style is associated with chronic widespread pain. *Pain* 2009;143:200–5.
24. Forsythe LP, Romano JM, Jensen MP et al. Attachment style is associated with perceived spouse responses and pain-related outcomes. *Rehabil Psychol* 2012;57:290–300.
25. Schmidt S, Nachtigall C, Wuethrich-Martone O et al. Attachment and coping with chronic disease. *J Psychosom Res* 2002;53:763–73.
26. Adams GC, Stoops MA, Skomro RP. Sleep tight: exploring the relationship between sleep and attachment style across the life span. *Sleep Med Rev* 2014;18:495–507.
27. Escolas SM, Hildebrandt EJ, Maiers AJ et al. The effect of attachment style on sleep in post deployed service members. *US Army Med Dep J* 2013; April-June:35–45.
28. Escolas SM, Arata-Maiers R, Hildebrandt EJ et al. The impact of attachment style on posttraumatic stress disorder symptoms in postdeployed service members. *US Army Med Dep J* 2012; July-September:54–61.
29. Meredith P, Strong J, Feeney JA. Adult attachment, anxiety, and pain self-efficacy as predictors of pain intensity and disability. *Pain* 2006;123:146–54.
30. Andrews NE, Meredith PJ, Strong J et al. Adult attachment and approaches to activity engagement in chronic pain. *Pain Res Manag* 2014;19:317–27.
31. Kratz AL, Davies MC, Zautra AJ. Attachment predicts daily catastrophizing and social coping in women with pain. *Health Psychol* 2012;31:278–85.
32. Andrews NE, Meredith PJ, Strong J. Adult attachment and reports of pain in experimentally-induced pain. *Eur J Pain* 2011;15:523–30.
33. Lyons-Ruth K, Jacobvitz D. Attachment disorganization from infancy to adulthood: neurobiological correlates, parenting contexts, and pathways to disorder. In: Cassidy J, Shaver P, editors. *Handbook of attachment: theory, research, and clinical applications*. 3rd ed. New York (NY): Guilford; 2016. p. 667–95.
34. Moss E, Cyr C, Bureau JF et al. Stability of attachment during the preschool period. *Dev Psychol* 2005;41:773–83.
35. Holt R, Kornhaber R, Kwiet J et al. Insecure adult attachment style is associated with elevated psychological symptoms in early adjustment to severe burn: a cross-sectional study. *Burns* 2019;45:1359–66.
36. Leazer ST, Nyland JE, Escolas SM et al. Analgesic use in contemporary burn practice: applications to burn mass casualty incident planning. *Burns* 2020;46:90–6.
37. Scharfe E, Bartholomew K. Reliability and stability of adult attachment patterns. *Pers Relatsh* 1994;1:23–43.
38. Monin JK, Zhou L, Kershaw T. Attachment and psychological health in older couples coping with pain. *GeroPsych* 2014;27:115–27.
39. McCaffery M, Beebe A. *Pain: clinical manual for nursing practice*. Baltimore (MD): Mosby; 1993.
40. Department of the Army, Brooks Army Medical Center. *Medical services, pain assessment and management*. Memorandum No. 40-185; 2012.
41. Ferreira-Valente MA, Pais-Ribeiro JL, Jensen MP. Validity of four pain intensity rating scales. *Pain* 2011;152:2399–404.
42. Alghadir AH, Answer S, Iqbal A et al. Test-retest reliability, validity, and minimum detectable change of visual analog, numerical rating, and verbal rating scales for measurement of osteoarthritic knee pain. *J Pain Res* 2018;11:851–6.
43. Duffy KJ, Flickinger KL, Kristan JT et al. Quantitative sensory testing measures individual pain responses in emergency department patients. *J Pain Res* 2017;10:1241–53.
44. McAuley D. *Advanced opioid converter*. 2011, accessed 12 Feb. 2013; available from <http://www.globalrph.com/opioidconverter2.htm>
45. McWilliams LA, Asmundson GJ. The relationship of adult attachment dimensions to pain-related fear, hypervigilance, and catastrophizing. *Pain* 2007;127:27–34.
46. Andersen TE. Does attachment insecurity affect the outcomes of a multidisciplinary pain management program? The association between attachment insecurity, pain, disability, distress, and the use of opioids. *Soc Sci Med* 2012;74:1461–8.
47. Difede J, Jaffe AB, Musngi G et al. Determinants of pain expression in hospitalized burn patients. *Pain* 1997;72:245–51.
48. Schroeter C, Ehrental J, Giulini M et al. Attachment, symptom severity, and depression in medically unexplained musculoskeletal pain and osteoarthritis: a cross-sectional study. *PLoS One* 2015;10:e0119052.
49. Pfeifer AC, Gómez Penedo JM, Ehrental JC, Neubauer E, Amelung D, Schroeter C, Schiltenwolf M. et al. Impact of attachment behavior on the treatment process of chronic pain patients. *J Pain Res* 2018;11:2653–62.
50. Pfeifer A, Amelung D, Gerigk C et al. Study protocol—efficacy of attachment-based working alliance in multimodal pain treatment. *BMC Psychol* 2016;4. doi:10.1186/s40359-016-0114-7
51. Asmundson GJ, Jacobson SJ, Allardings MD, Norton GR. Social phobia in disabled workers with chronic musculoskeletal pain. *Behav Res Ther* 1996;34:939–43.
52. Patterson DR, Tinenko J, Ptacek JT. Pain during burn hospitalization predicts long-term outcome. *J Burn Care Res* 2006;27:719–26.
53. Mette M, Davadam M, Marin C et al. Impact of pain protocol including hypnosis in major burns. *Burns* 2010;2010:639–46.
54. Peilrot B, Andréll P, Samuelsson A et al. Time to gain trust and change—experiences of attachment and mindfulness-based cognitive therapy among patients with chronic pain and psychiatric co-morbidity. *Int J Qual Stud Health Well-Being* 2014;9:24420.
55. Knoerl R, Lavoie Smith EM, Weisberg J. Chronic pain and cognitive behavioral therapy: an integrative review. *West J Nurs Res* 2016;38:596–628.
56. Shealy N. Guided imagery, mindful meditation, and hypnosis for pain management. In: *Practical pain management*. 2015, accessed 22 Jan. 2018; available from <https://www.practicalpainmanagement.com/treatments/complementary/biobehavioral/guided-imagery-mindful-meditation-hypnosis-pain-management>
57. Pfeifer AC, Meredith P, Schröder-Pfeifer P et al. Effectiveness of an attachment-informed working alliance in interdisciplinary pain therapy. *J Clin Med* 2019;8:364.
58. Ciechanowski P, Sullivan M, Jensen M et al. The relationship of attachment style to depression, catastrophizing and health care utilization in patients with chronic pain. *Pain* 2003;104:627–37.