

Available online at [www.sciencedirect.com](http://www.sciencedirect.com)

ScienceDirect

journal homepage: [www.elsevier.com/locate/burns](http://www.elsevier.com/locate/burns)

# Insecure adult attachment style is associated with elevated psychological symptoms in early adjustment to severe burn: A cross-sectional study

Rachael Holt<sup>a</sup>, Rachel Kornhaber<sup>b,c</sup>, Julia Kwiet<sup>d,e</sup>, Vanessa Rogers<sup>f,g</sup>, Joanne Shaw<sup>h</sup>, Jeremy Law<sup>a</sup>, Marie-Thérèse Proctor<sup>i</sup>, John Vandervord<sup>d</sup>, Jeffrey Streimer<sup>f,g</sup>, Denis Visentin<sup>b</sup>, Michelle Cleary<sup>b</sup>, Loyola McLean<sup>a,g,j,\*</sup>

<sup>a</sup> Brain and Mind Centre, Faculty of Medicine and Health, The University of Sydney, Australia

<sup>b</sup> College of Health and Medicine, University of Tasmania, Sydney Campus, Australia

<sup>c</sup> National Burns Center, Sheba Medical Center, Israel

<sup>d</sup> Severe Burns Injury Unit (SBIU), Royal North Shore Hospital, St Leonards, Sydney, Australia

<sup>e</sup> Social Work, Royal North Shore Hospital, St Leonards, Sydney, Australia

<sup>f</sup> Discipline of Psychiatry, Sydney Medical School, The University of Sydney, Australia

<sup>g</sup> Consultation-Liaison Psychiatry, Royal North Shore Hospital, St Leonards, Sydney, Australia

<sup>h</sup> School of Psychology, Faculty of Science, The University of Sydney, Australia

<sup>i</sup> Graduate School of Counselling, Excelsia College, Sydney, Australia

<sup>j</sup> Westmead Psychotherapy Program for Complex Traumatic Disorders, Western Sydney Local Health District, Parramatta, Australia

## ARTICLE INFO

### Article history:

Accepted 3 March 2019

### Keywords:

Adult attachment  
Early adjustment  
Psychosocial  
Burn injury  
Cross-sectional study

## ABSTRACT

Research into recovery and adjustment after burn injury has indicated a link between psychopathological symptoms including traumatic stress, distress, depression and anxiety, and worse psychosocial and physical outcomes. The severity of psychological symptoms does not always correlate with that of the burn injury, and symptoms can be ongoing in certain patients for extensive periods, leading to a need for early screening in burns patients for psychological vulnerabilities. One potential factor influencing recovery from the psychological impact of burn injury is adult attachment style, specifically secure and insecure attachment, as this describes how an individual organizes their stress regulation. This cross-sectional study measured: (a) attachment style (via the Relationship Questionnaire [RQ]); (b) negative psychological symptoms (via the Depression Anxiety and Stress Scale [DASS]); and, (c) post-traumatic symptoms (via the Davidson Trauma Scale [DTS]) in a cohort of burns patients ( $n = 104$ , 51 analysed) in a severe burns unit in Australia during the acute phase of their recovery. Secure attachment style was inversely related to psychopathological symptoms. Secure participants scored significantly lower scores on the DASS ( $M = 17.63$ ,  $SD = 17.07$ ) compared to self-rated insecure participants ( $M = 42.38$ ,  $SD = 34.69$ ),  $p < .01$  and on the DTS ( $M = 14.22$ ,  $SD = 15.42$ ) compared to insecure participants ( $M = 40.54$ ,  $SD = 35.72$ ),  $p < .01$ . Similar results were found in analyses controlling for covariates of gender, age and

\* Corresponding author at: Brain and Mind Centre, Faculty of Medicine and Health, The University of Sydney, Australia.  
E-mail address: [Loyola.mclean@sydney.edu.au](mailto:Loyola.mclean@sydney.edu.au) (L. McLean).

<https://doi.org/10.1016/j.burns.2019.03.011>

0305-4179/© 2019 Elsevier Ltd and ISBI. All rights reserved.

burn severity as potential confounders. This research suggests attachment style may play an important role in psychosocial recovery from severe burn injury.

© 2019 Elsevier Ltd and ISBI. All rights reserved.

## 1. Introduction

Research into psychosocial adjustment following severe burn injury demonstrates that early after injury symptoms of depression, anxiety, stress and trauma are associated with later psychosocial impairment, reduced quality of life and delayed physical recovery [1,2]. Psychological and burn and treatment-related factors interact in determining adjustment/recovery outcomes [3]. Psychosocial factors contribute to delayed recovery via several possible pathways including poor treatment adherence and delayed discharge from hospital [4]. Subsequently, longer-term studies measuring the trajectory of psychosocial recovery after burn injury have identified patients often fall into identifiable subgroups with better or worse outcomes. Mason et al. [5] found patients with severe symptoms of distress at discharge steadily worsened over two years and patients with sub-threshold symptoms also worsened; whereas patients with mild or low distress improved slightly over that same period. Sveen et al. [6] found, using cluster analysis, four distinct trajectories of post-traumatic stress disorder (PTSD) symptoms in a 12-month longitudinal study of burns patients. Sveen et al. [6] described patients with the most severe symptoms showing no improvement, patients with low traumatic symptoms (described as “resilient”) continuing to do well, however identified a group with higher symptoms improving slowly and another group with lower symptoms experiencing a delayed traumatic reaction. Furthermore, Fauerbach et al. [1] found higher psychological distress measured during initial hospitalisation was associated with both physical and psychosocial impairment when measured 6 and 12 months after the injury. In contrast, resilience, defined as the ability to make a “psychosocial comeback in adversity” [7], has been reported to be a vital positive capacity influencing recovery from a severe burn injury [8]. Research to support an understanding of factors associated with or promoting resilience then becomes important in efforts to promote recovery from burn injury.

Screening studies in burns patients have found evidence for a link between early psychological symptoms and longer term psychological and psychosocial outcomes. For example, anxiety measured at two weeks correlated significantly with anxiety at three months [9]. PTSD symptoms measured in hospital were found to be the best predictor of PTSD at six months [2,10]. A further study described a significant relationship between depressive symptoms rated at three weeks after burn injury and both patient-rated scar severity and self-esteem at 3 months [11]. The prevalence of acute stress disorder (ASD) in burns patients has been estimated at between 18–32%, and the prevalence of PTSD 23–33%, with evidence that close to 90% of patients with ASD later meet criteria for PTSD [2]. Given the risk for psychological and traumatic symptoms in burns patients, and the evidence that early symptoms continue to predict later psychopathology,

the need for early identification of patients at risk of impaired adjustment to burn injury is significant in enabling provision of appropriate support and treatment.

A possible factor influencing early distress and psychopathology and promoting or inhibiting resilience in traumatic injury such as severe burn, is attachment style. Models of adult attachment outline the developmental course of attachment patterns, learned interactively with attachment figures such as parents, forming self-protective strategies to regulate stress and cope with stressful life events [12,13]. Secure attachment promotes flexible coping with learnt capacities to self-regulate and the capacity to appropriately seek help and social support as needed [14]. Insecure attachment styles have been linked to illness through: increased vulnerability to unregulated stress; use of external means of stress regulation such as harmful use of smoking or drugs and alcohol; failure to utilize protective behaviours like accessing social support, adherence to treatment and reporting symptoms to treatment providers [14]. In this way secure attachment is a potential mediator of resilience and insecure attachment a potential risk for poorer recovery. Research indicates attachment style is a relatively stable characteristic, and both insecure attachment and a change to insecure attachment after a significant event is linked to higher psychopathological symptoms [15].

Evidence has shown insecure attachment style is associated with poorer psychological and health outcomes [16–19]. This suggests that identifying attachment style and targeting interventions to specific groups based on attachment style may assist with treatment outcomes and improve recovery. Although to date within the burns literature, attachment style has limited evidence as a factor influencing adjustment and psychosocial outcomes in burn injury, there is some evidence that aspects of coping that can be seen as arising from secure or insecure attachment styles may influence psychopathology and trauma in burns patients. For example, avoidant coping, which could be seen as an expression of an insecure avoidant attachment style has been associated with worse outcomes in burns recovery [10].

This study therefore aimed to investigate the effects of attachment style on adjustment to burn injury in the short and medium term, defined as the first three months after injury, as this is the window before chronic PTSD can be diagnosed [20]. This cross-sectional study proposed that hospitalised burns patients having a secure attachment style would report less distress, depression, anxiety and post-traumatic stress symptoms and this effect would remain after covariate adjustment. This was part of a larger mixed methods study that examined measures of attachment, coping style and personality and psychological adjustment outcomes [21]. The covariates of gender, age and Total Burn Surface Area (TBSA) were chosen as these have been considered to be important in burns recovery [1]. The impact of these factors on recovery and their interrelationships are still under investigation. While TBSA has generally not been a consistent predictor, Fauerbach et al.

[1] demonstrated an association between TBSA and slowed physical recovery, and that distress was associated with both slowed physical and psychosocial recovery. Wallis et al. [22], however, found no significant association between distress and severity of burn injury. A number of studies have suggested females can experience increased psychological symptoms compared to males, potentially related to the location and visibility of burn scarring [23,24]. Age has also been investigated as recovery may be compromised in older patients, with some evidence of impact on psychosocial outcomes [25,26].

## 2. Methods

### 2.1. Patients, design and procedures

This study was approved by the local ethics committee. Adult inpatients (aged 18 and above) with burns necessitating inpatient care within three months of the burn injury were informed about the study by a multidisciplinary team during their stay on a Severe Burn Injury Unit in Australia. A member from the research team then approached them for written consent. Although the unit admits approximately 200 patients/year, many patients were excluded on the bases outlined below and only a small number of the remaining consented. Reasons for this may have included that this was a preliminary study with minimal local funding and staff, and the ethical approval required a distance between clinical care and research. The initial information for recruitment was reliant on the liaison and good will of the busy clinical staff and the clinical reality was that many patients were seriously unwell and declined to participate, or found completion of questionnaires difficult. After consent, questionnaires were left with participants for completion, a member of the research team was available to assist with questions or concerns. The 5-year period allowed slow accrual of patients in order to obtain an analysable sample and inform future research design and processes. Patients excluded from the study included those cognitively impaired, intellectually disabled, or not proficient in the English language. Patients needed to be delirium-free for greater than seven days or have experienced no delirium after injury. Consenting participants were asked to complete a Relationship Questionnaire (RQ), a Depression, Anxiety and Stress Scale (DASS) and a Davidson Trauma Scale (DTS) within 12 weeks of admission to hospital. Participants also completed other measures of psychopathology, including Type D personality, which have been reported elsewhere [27]. Type-D, “distressed” personality is a coping style defined by the dual propensity to experience greater negative emotions and thoughts while simultaneously inhibiting their social expression [28].

### 2.2. Data collection

#### 2.2.1. Independent variable

The independent variable of attachment style was measured using the Relationship Questionnaire (RQ), a forced-choice self-classification measure examining four various configurations around comfort in relationships and attitudes towards dependence versus independence, with respondents asked to choose

the response option that best describes their “style” in “forming relationships” [29]. The RQ has demonstrated significant associations between attachment and psychological symptoms of depression and anxiety, and has adequate reliability and face and discriminant validity as a questionnaire [30]. The four items have shown convergent and discriminant validity with other measures [31]. While a Likert form of the scale is available, and a dimensional approach can add information, the forced choice version was chosen for this study to assess the security versus insecurity states. This was due to 3 considerations: the measurement consideration that prototypes can add predictive power over a dimensional approach [31]; clinically it can be more useful to consider the major style to plan interventional response—a consideration used by other researchers [32]; the study group here was considered to need a minimising of questionnaire burden. The original RQ research found no particular difference for the categorical and continuous measures [29] and this study with a small sample size planned a binary comparison. Hence given the above considerations, the forced choice form only was used.

In the self-report four statements are included that describe different styles. The secure statement in the RQ emphasises comfort with both emotional closeness and dependence while simultaneously acknowledging the capacity for aloneness and self-acceptance. The statements that identify participants as insecure describe types of discomfort in relationships and with inflexible attitudes to independence versus dependence [29]. The dismissing form of insecurity highlights valuing independence and being comfortable without close relationships. The preoccupied form of insecurity highlights being uncomfortable without close relationships and anxiety that others do not value the respondent as much as they value them; the fearful form of insecurity highlights difficulties in getting close to others due to difficulties in trusting and depending on others [29]. The instructions stated: “Below are descriptions of four styles of forming relationships. Please read them and circle the one that best describes you or is closest to the way you are.”

For analysis the three insecure responses were grouped as ‘insecure’ for comparison with those choosing the secure style.

#### 2.2.2. Dependent variables

Self-rated psychological symptoms were measured using the Depression, Anxiety and Stress Scale (DASS), a questionnaire rating emotional states of depression, anxiety and self-perceived stress [33]. This has been validated among both clinical [34–36] and non-clinical populations [37].

PTSD symptoms were measured using the Davidson Trauma Scale (DTS), where participants rated the severity, and frequency of posttraumatic stress symptoms [38]. The DTS has shown to be a reliable and valid measure within the domain of burns [39], with scores over 40 predictive of a diagnosis of PTSD [40]. Its prior use in a longitudinal study made it the instrument of choice to be able to compare results with published data and to test its utility in a study seeking to establish a longitudinal battery in the local setting.

### 2.3. Data analysis

Cross sectional data from the initial time point (within three months of burn injury) was analysed using chi-square tests of

association for categorical variables, independent samples t-tests for scale measures such as the DASS and DTS (the dependent variables of psychopathology), and analysis of covariance (ANCOVA) was utilised for checking the robustness of the results of attachment measures (a binary independent variable) using gender (categorical), age and TBSA (continuous variables) as covariates. The number of chosen covariates needed to be small given the sample size and these were the major covariates noted in the literature. The level of significance was set at .05. In this instance only complete data was analysed in each analysis and N is reported in each instance.

### 3. Results

Over 200 patients attend the burns unit each year. Over a five-year period of recruitment 104 patients consented to join the study of which 1 formally withdrew. 51 returned the RQ, comprising 37 males and 14 females. The sample's mean age in years was 42.9 (SD = 17.1), with a range of 71, from 18 years to 89 years of age. The mean TBSA was 10.6 % (SD = 10.3), ranging from 1% to 50% (Table 1). There were no statistically significant differences in terms of age or TBSA between the patients who returned the questionnaires and those who did not after original consent (see Table 2). However, males and younger participants were more predominant in the non-returns group. The mean age for non-returns was 36.9 (SD = 15.3) with

mean TBSA 11.8 (11.9). A 3-month cut off was employed for return of questionnaires.

To assess the data for normalcy and outliers, an initial exploratory analysis was undertaken. Whilst a small number of outliers were detected, they were considered to be extreme and were retained within the following analyses. Checking at the end of the analysis with their exclusion confirmed that their inclusion did not impact on the results.

Of 50 participants who completed both the Depression, Anxiety and Stress Scale (DASS) and the Relationships Questionnaire (RQ), 24 had secure attachment styles as measured by the RQ and 26 had insecure attachment styles (Table 3). Participants who rated themselves as secure had significantly lower scores on the DASS ( $M = 17.6$ ,  $SD = 17.1$ ) compared to participants who rated themselves as insecure ( $M = 42.4$ ,  $SD = 34.7$ ),  $t(37.1) = -3.24$ ,  $p = .003$ .

A test for effect size of the unadjusted difference in means between secure versus insecure attachment style using Cohen's  $d$  indicated a large effect size ( $d = -.89$ ) for psychiatric research (Table 4). Our results suggest, in line with our hypothesis, people with secure attachment style experience lower psychopathological symptoms of depression, anxiety and perceived stress compared to people with insecure attachment styles.

After adjustment for gender, age and TBSA, there was a statistically significant difference in attachment style on the DASS,  $F(1,44) = 7.26$ ,  $p = .01$ ,  $r = .376$ . The only covariate that was

**Table 1 – Demographics for full set of secure and insecure attachment style subgroups.**

Attachment (RQ)	Total n (%)	Female n (%)	Age (years) (n = 50)		TBSA (%) (n = 50)	
			Range	Mean (SD)	Range	Mean (SD)
Total	51	14 (27.5)	18-89	42.9 (17.1)	1-50	10.6 (10.3)
Secure	25 (49.0)	8 (32.0)	18-81	43.6 (16.2)	1-42	7.9 (8.4)
Insecure	26 (51.0)	6 (23.1)	19-89	42.2 (18.2)	1-50	13.2 (11.6)

**Table 2 – Sex, age and burn injury characteristics of consenting patients who returned the RQ questionnaire, compared to patients who did not.**

Total N = 103	Study sample N	Non-returns sample N	$\chi^2$	t	df	p-Value
Male [n (%)]	51	37 (72.5)	52	46 (88.5)	4.167	1 .041*
Age in years [mean (SD)]	50	42.9 (17.1)	49	6.9 (15.3)	1.84	97 .069
%TBSA [mean (SD)]	50	10.6 (10.3)	49	11.8 (11.9)	-.539	97 .591

\* Significant at the .05 level; df = degrees of freedom.

**Table 3 – Comparison of means of DASS and DTS for security vs insecurity.**

	Attachment (RQ)	N	Mean	SD	SE	t	df	p-Value
DASS	Secure	24	17.63	17.07	3.48	-3.60	37.06	.003*
	Insecure	26	42.38	34.69	6.80			
DTS	Secure	23	14.22	15.42	3.22	-3.42	34.89	.002*
	Insecure	26	40.54	35.72	7.00			

NB. Total sample <51 due to incomplete data for these questionnaires.

\* Significant at the .05 level; DASS = depression, anxiety and stress scale; df = degrees of freedom (adjusted); DTS = Davidson Trauma Scale.

**Table 4 – Adjusted and unadjusted means and variability for the DASS for secure vs insecure attachment styles with gender, age and TBSA as covariates.**

	N	Mean (SD)	SE		df	p-Value	Cohen's d	Mean diff	95% CI
Unadjusted				t					
Secure	24	17.63 (17.1)	3.48	-3.24	37.06	.003	-.89	-24.75	[-40.24, -9.27]
Insecure	25	43.92 (34.5)	6.90						
Adjusted				F					
	24	20.93	5.15	7.26	1	.01			
	25	40.75	5.05						
Gender				.003	1	.953			
Age				1.30	1	.260			
TBSA				13.05	1	.001			

NB. Total sample N < 51 due to missing data.

SD = standard deviation; SE = standard error; DASS = Depression, Anxiety and Stress Scale; df = degrees of freedom (adjusted).

significant was TBSA,  $F(1,44) = 13.05, p = .001$  (Table 4). The difference in attachment style on psychopathological symptoms is robust after analysing a model that included covariates of gender, age and TBSA, although analysis confirms the importance of TBSA in this sample.

Of 49 participants who filled out both the DTS and the RQ, 23 had secure attachment styles and 26 had insecure attachment styles. Secure participants had significantly lower scores on the DTS ( $M = 14.22, SD = 15.42$ ) compared to insecure participants ( $M = 40.54, SD = 35.72$ ),  $t(34.89) = -3.42, p = .002$ . (see Table 3). Effect size estimation on the unadjusted difference in means using Cohen's d indicated a very large effect size ( $d = -.94$ ) (Table 5). This suggests, in line with our hypothesis, people with secure attachment style experience lower post-traumatic symptoms compared to people with insecure attachment styles in the initial post-burn adjustment period.

After adjustment for gender, age and TBSA, there was a statistically significant difference in attachment style on the DTS,  $F(1,43) = 8.87, p = .005, r = .414$ . The only covariate that was significant was TBSA,  $F(1,43) = 11.69, p = .001$  (Table 5), confirming the importance of this covariate for post-traumatic symptoms in this sample. A correlation between the RQ, DTS and DASS (Table 6) demonstrated moderate inverse relationships between RQ and both DASS ( $r = -.461, p = .001$ ) and DTS ( $r = -.431, p = .002$ ), with a strong positive correlation between DASS and DTS ( $r = .881, p < .001$ ).

#### 4. Discussion

This research study presents a cross-sectional quantitative analysis of early adjustment to burns injury. Our hypothesis proposed that there would be an inverse relationship between a secure adult attachment style and psychopathology after severe burn injury, suggesting a potential protective relationship between secure attachment and coping with trauma. Our results supported this hypothesis, with patients employing a secure attachment style showing lower overall negative affect, as measured by the DASS, and lower post-traumatic symptoms on the DTS. This relationship was robust for a covariate analysis including gender, age and TBSA. These results provide early evidence that a patient's attachment style influences their experience of distress and psychological adjustment to trauma during recovery from a burn injury.

Other authors have demonstrated a link between attachment and recovery from other traumas such as cardiovascular surgery [16] and physical functioning with cancer [17]. The current study suggests further research into attachment style and psychosocial outcomes in severe burn injury is likely to be fruitful, in that, if replicated, it may identify those burn patients at risk of more distress or less efficient coping strategies. An early analysis of several interviews from the larger study suggested a contribution of attachment security to early

**Table 5 – Adjusted and unadjusted means and variability for the DTS with secure vs insecure attachment styles with gender, age and TBSA as covariates.**

	N	Mean (SD)	SE		df	p-Value	Cohen's d	Mean diff	95% CI
Unadjusted				t					
Secure	23	14.22 (15.42)	3.22	-3.42	34.89	.002	-.94	-26.32	[-41.97, -10.67]
Insecure	25	42.16 (35.72)	7.09						
Adjusted				F					
	23	17.05	5.35	8.87	1	.005			
	25	39.55	5.12						
Gender				.504	1	.482			
Age				.532	1	.470			
TBSA				11.69	1	.001			

NB. Total sample N < 51 due to missing data.

SD = standard deviation; SE = standard error; DTS = Davidson Trauma Scale; df = degrees of freedom (adjusted).

**Table 6 – Correlations matrix between RQ (secure), DASS and DTS<sup>a</sup>.**

		RQ (secure)	DASS
DASS		-.461**	
	p-Value	.001	
DTS		-.431**	.881**
	p-Value	.002	<.001

RQ=Relationship Questionnaire; DTS=Davidson Trauma Scale; DASS=Depression Anxiety and Stress Scale;  
 \*\* Pearson correlation (2-tailed) is significant at the .01 level.  
<sup>a</sup> N = 49 and DASS and DTS scores are total scores.

adjustment and further flagged that a spiritual attachment may be of benefit [21]. Further work may also help clinicians and possibly families and carers find ways to foster more adaptive coping and a more comfortable recovery journey, and find ways to engage with and optimise an individual's coping style. For example, those who dislike dependence could be engaged cognitively around the need for temporary greater dependence in the service of longer-term independence, and their discomfort both validated and eased perhaps with humour [41] or strategies like target-setting that engage their sense of mastery. Those who are more overtly anxious and more dependent could be both appropriately reassured and slowly engaged to step up their independence as recovery proceeded. Assessing the utility of these approaches requires further study.

Covariate analysis indicated a significant contribution of TBSA to psychological symptoms and post-traumatic stress after burn injury, but not age or gender in our study sample. Previous research has been mixed with these variables. Larger burn size has been found to be associated with physical rather than psychosocial impairment 12 month following a burn injury [1]. A study of patients five years after burn found those with higher TBSA also had greater physical limitations, and this along with visible location of burns - for example on the face or hands - resulted in higher depression symptoms [42]. Higher distress in burns patients has been associated with burns sustained to face, neck and hands, as well as older age [5]. In a population of severely burned patients (TBSA > 70%), facial burns undergoing grafting and age were associated with poorer mental component scores on a measure of quality of life at least two years after burn injury [43]. Older age, being female and full-thickness burns have been linked to poorer physical and psychosocial health, using the same measure in a sample of patients with moderate-severe burns at 12 months after burn [26]. A study of the effect of aging on quality of life found that increased age predicted poorer physical function and some aspects of mental component such as vitality and role emotional (using the Short Form-36 Medical Outcomes Survey), however also noted increased resilience in recovery with older age [25].

Our study sample included patients with burn sizes <10%, whereas previous studies finding an association with age have examined patients with TBSA > 10% [26] or >70% [43] and so our results may not be generalizable to groups with larger levels of TBSA. These studies also considered psychosocial and physical outcomes greater than 12 months after burn injury, unlike our study which focused on psychological symptoms in

the acute recovery phase after the burn. The latter short-term focus of our study was intentional, but clearly data is needed to comment on attachment and outcomes at the end of that first crucial year of recovery. From a patient's point of view however, it is best to ease distress and post-traumatic symptoms early and so early identification of risk factors may aid more comfortable and effective recovery.

Correlational analysis of the measures used indicated significant correlations between the three measures, between attachment style, the summative measure of depression, anxiety and stress and posttraumatic symptoms. However it may be useful to consider the experience from a person-centred approach whereby stressful events such as a burn injury cause us to manage that stress in ways that are familiar to us. Attachment speaks to the ways we are comfortable in coping and whether we can comfortably accept help from others and then smoothly move back to independence when ready. Attachment style is developed from childhood through interaction with caregivers and serves as a relatively stable mechanism of self-regulation and coping through the lifespan [12,13,44]. Therefore it is promising to consider the role that pre-injury attachment style plays in influencing coping and adjustment after burn injury, leading to differences in after injury psychopathology but also to less efficient coping styles such as wishful thinking, using alcohol and drugs and not engaging social support described previously in burns patients [45].

#### 4.1. Strengths and limitations

The sample recruited were a small number of the patients passing through the unit and may have been impacted on by selection bias. Future studies will aim to decrease patient load and increase comfort for the patient, and be part of treatment culture shifts that emphasises psychosocial care as a core part of burns recovery and outcome tracking. Although the RQ has demonstrated continuity over time in a normative population [46], the issue that the traumatic injury itself may have altered attachment style indicates that future research could examine the longitudinal course of attachment style over a long course of rehabilitation and recovery. Given however the importance of responding to patient's needs for psychosocial engagement while in hospital, the current attachment style at admission may be an important clinical factor.

The current study had a very small sample of female burns patients, which may have inhibited the ability to see an impact of gender on the results. A larger sample size including more females, and with a larger population of burns >10% may have found different results. Also, results at 12 months or later may also show some differences not identified within the acute recovery stage. Examining the contribution of location of burn was outside the scope of this paper, but could potentially be an important covariate to consider in further reports.

Analysis of longitudinal data, tracking psychopathological and trauma symptoms as well as coping strategies over a longer period of burn recovery would provide stronger evidence for the role of attachment style in adjustment to burn injury and return to psychosocial function.

Selection bias may well have been a factor in our cohort, as the study was likely to attract more secure and more psychologically

resilient participants, and hence reported results may underestimate the between-group differences. A small number of outliers were noted in our results. One possible explanation for this was self-report bias, where participants might rate themselves as secure on the RQ when in fact they would actually be insecure as determined by a more in-depth measurement such as the Adult Attachment Interview (AAI) [13].

Self-report bias from questionnaires could be addressed and potentially reduced with clinician-administered measures, interview assessments and/or information from treating mental health providers. Future studies should also allow for more continuous self-report measures of attachment. Another possibility that could be considered is that although historically secure, the trauma may have disorganized the participants' coping, yielding higher psychopathology scores. Interviews with participants and family may identify historical coping patterns from those after injury. These are matters for further research and consideration. This study also considered only a small subset of likely covariates. Any future study should consider inclusion of other covariates including length of stay and additional demographic variables.

A further potential limitation of this study is the inclusion of patients from only one burns centre in Australia. Multisite collaborative projects could potentially incorporate a wider and more representative sample of burns patients. There remains the overarching possibility that trauma could have shifted the respondents' sense of their attachment style as trauma can disrupt our normal coping. Again, longitudinal research would be helpful in examining the issue of stability of the style during adjustment to burns.

## 5. Conclusion

Secure attachment style was inversely related to psychopathological symptoms and this result remained robust after adjusting for gender, age and extent of burn. This research suggests attachment style may play an important role in psychosocial recovery from severe burn injury. This study suggests a potential utility in further examining the link between attachment style and long-term adjustment to burn injury. The notion of continuity of security both in hospital and on discharge is relevant. Recovery from a severe burn injury may take years and hence there is a possibility that attachment styles may change over that period of rehabilitation. Security might well be tested and perhaps insecurity transformed as a result of post-traumatic growth.

Further work would offer the potential opportunity to improve the recovery journey and outcomes for patients who due to their insecure attachment style are at demonstrated risk of worse psychological early adjustment and theoretically at risk of less efficient coping, less optimal use of supports and less engagement with treatments. Research examining different treatments and approaches needed for the different kinds of insecurity is warranted for both early interventions and interventions to improve longer term outcomes. Further studies are required to examine these clinical possibilities in association with more detailed and longitudinal studies.

## Conflict of interest

None declared.

## REFERENCES

- [1] Fauerbach JA, Lezotte D, Hills RA, Cromes GF, Kowalske K, De Lateur BJ, et al. Burden of burn: a norm-based inquiry into the influence of burn size and distress on recovery of physical and psychosocial function. *J Burn Care Rehabil* 2005;26:21-32.
- [2] Fauerbach JA, Pruzinsky T, Saxe GN. Psychological health and function after burn injury: setting research priorities. *J Burn Care Res* 2007;28:587-92.
- [3] Gilboa D. Long-term psychosocial adjustment after burn injury. *Burns* 2001;27:335-41.
- [4] Wisely J, Wilson E, Duncan R, Tarrier N. Pre-existing psychiatric disorders, psychological reactions to stress and the recovery of burn survivors. *Burns* 2010;36:183-91.
- [5] Mason ST, Corry N, Gould NF, Amoyal N, Gabriel V, Wiechman-Askay S, et al. Growth curve trajectories of distress in burn patients. *J Burn Care Res* 2010;31:64-72.
- [6] Sveen J, Ekselius L, Gerdin B, Willebrand M. A prospective longitudinal study of posttraumatic stress disorder symptom trajectories after burn injury. *J Trauma* 2011;71:1808-15.
- [7] Kadner KD. Resilience. Responding to adversity. *J Psychosoc Nurs Ment Health Serv* 1989;27:20-5.
- [8] Kornhaber R, Bridgman H, McLean L, Vandervord J. The role of resilience in the recovery of the burn-injured patient: an integrative review. *Chronic Wound Care Manage Res* 2016;3:41-50.
- [9] Tedstone JE, Tarrier N, Faragher EB. An investigation of the factors associated with an increased risk of psychological morbidity in burn injured patients. *Burns* 1998;24:407-15.
- [10] Lawrence JW, Fauerbach JA. Personality, coping, chronic stress, social support and PTSD symptoms among adult burn survivors: a path analysis. *J Burn Care Res* 2003;24:63-72.
- [11] Hoogewerf CJ, van Baar ME, Middelkoop E, van Loey NE. Impact of facial burns: relationship between depressive symptoms, self-esteem and scar severity. *Gen Hosp Psychiatry* 2014;36:271-6.
- [12] Crittenden PM. A dynamic-maturational model of attachment. *Aust N Z J Fam Ther* 2006;27:105-15.
- [13] Hesse E. The adult attachment interview: protocol, method of analysis, and empirical studies. In: Cassidy J, Shaver PR, editors. *Handbook of attachment: theory, research, and clinical applications*. 2nd ed. New York: Guilford Press; 2008. p. 552-98.
- [14] Maunder RG, Hunter JJ. Attachment and psychosomatic medicine: developmental contributions to stress and disease. *Psychosom Med* 2001;63:556-67.
- [15] Scharfe E, Cole V. Stability and change of attachment representations during emerging adulthood: an examination of mediators and moderators of change. *Pers Relat* 2006;13:363-74.
- [16] Kidd T, Poole L, Leigh E, Ronaldson A, Jahangiri M, Steptoe A. Attachment anxiety predicts IL-6 and length of hospital stay in coronary artery bypass graft surgery (CABG) patients. *J Psychosom Res* 2014;77:155-7.
- [17] Hinnen C, Pool G, Holwerda N, Sprangers M, Sanderman R, Hagedoorn M. Lower levels of trust in one's physician is associated with more distress over time in more anxiously attached individuals with cancer. *Gen Hosp Psychiatry* 2014;4:382-7.
- [18] Ciechanowski P, Russo J, Katon W, Von Korff M, Simon G, Lin E, et al. The association of patient relationship style and

- outcomes in collaborative care treatment for depression in patients with diabetes. *Med Care* 2006;44:283–91.
- [19] Halpern J, Maunder RG, Schwartz B, Gurevich M. Attachment insecurity, responses to critical incident distress, and current emotional symptoms in ambulance workers. *Stress Health* 2012;28:51–60.
- [20] American Psychiatric Association. *Diagnostic and statistical manual of mental disorders: DSM-IV-TR*. Washington DC: American Psychiatric Association; 2000.
- [21] McLean L, Proctor M-T, Rogers V, Shaw J, Kwiet J, Streimer J, Vandervord J, Kowlovska K. Secure attachment to god and a secure/comfortable attachment organization may both promote healthy recovery from severe burns injury. *Spirituality in the 21st century: conversations.. Oxford UK: Inter-Disciplinary Press; 2013. p. 147–70.*
- [22] Wallis H, Renneberg B, Ripper S, Germann G, Wind G, Jester A. Emotional distress and psychosocial resources in patients recovering from severe burn injury. *J Burn Care Res* 2006;27:734–41.
- [23] Klinge K, Chamberlain DJ, Redden M, King L. Psychological adjustments made by postburn injury patients: an integrative literature review. *J Adv Nurs* 2009;65:2274–92.
- [24] Van Loey NE, Van Son MJ. Psychopathology and psychological problems in patients with burn scars. *Am J Clin Dermatol* 2003;4:245–72.
- [25] Edgar DW, Homer L, Phillips M, Gurfinkel R, Rea S, Wood FM. The influence of advancing age on quality of life and rate of recovery after treatment for burn. *Burns* 2013;39:1067–72.
- [26] Wasiak J, Lee S, Paul E, Mahar P, Pfitzer B, Spinks A, et al. Predictors of health status and health-related quality of life 12 months after severe burn. *Burns* 2014;40:568–74.
- [27] Mujezinovic A, Kwiet J, Kornhaber R, Holt R, Streimer J, Vandervord J, et al. Type-D personality and elevated psychological symptoms in early adjustment of severe burn injury patients. *Issues Ment Health Nurs* 2018;39:337–43.
- [28] Denollet J, Sys SU, Stroobant N, Rombouts H, Gillebert TC, Brutsaert DL. Personality as independent predictor of long-term mortality in patients with coronary heart disease. *Lancet* 1996;347:417–21.
- [29] Bartholomew K, Horowitz LM. Attachment styles among young adults: a test of a four-category model. *J Pers Soc Psychol* 1991;61:226–44.
- [30] Ravitz P, Maunder R, Hunter J, Sthankiya B, Lancee W. Adult attachment measures: a 25-year review. *J Psychosom Res* 2010;69:419–32.
- [31] Griffin DW, Bartholomew K. Models of the self and other: fundamental dimensions underlying measures of adult attachment. *J Pers Soc Psychol* 1994;67:430–45.
- [32] Ciechanowski P, Russo J, Katon W, Von Korff M, Ludman E, Lin E, et al. Influence of patient attachment style on self-care and outcomes in diabetes. *Psychosom Med* 2004;66:720–8.
- [33] Lovibond S, Lovibond P. *Manual for the depression anxiety stress scales*. Sydney: The Psychology Foundation of Australia Inc.; 1995.
- [34] Tran TD, Tran T, Fisher J. Validation of the depression anxiety stress scales (DASS) 21 as a screening instrument for depression and anxiety in a rural community-based cohort of northern Vietnamese women. *BMC Psychiatry* 2013;13:24.
- [35] Ng F, Trauer T, Dodd S, Callaly T, Campbell S, Berk M. The validity of the 21-item version of the Depression Anxiety Stress Scales as a routine clinical outcome measure. *Acta Neuropsychiatr* 2007;19:304–10.
- [36] Brown TA, Chorpita BF, Korotitsch W, Barlow DH. Psychometric properties of the depression anxiety stress scales (DASS) in clinical samples. *Behav Res Ther* 1997;35:79–89.
- [37] Crawford JR, Henry JD. The depression anxiety stress scales (DASS): normative data and latent structure in a large non-clinical sample. *Br J Clin Psychol* 2003;42:111–31.
- [38] Davidson JR, Book S, Colket J, Tupler L, Roth S, David D, et al. Assessment of a new self-rating scale for post-traumatic stress disorder. *Psychol Med* 1997;27:153–60.
- [39] Mason ST, Lauterbach D, McKibben J, Lawrence J, Fauerbach JA. Confirmatory factor analysis and invariance of the Davidson Trauma Scale (DTS) in a longitudinal sample of burn patients. *Psychol Trauma Theor Res Pract Policy* 2013;5:10.
- [40] Fauerbach JA, Richter L, Lawrence JW. Regulating acute posttrauma distress. *J Burn Care Res* 2002;23:249–57.
- [41] Kornhaber R, Wilson A, Abu-Qamar MZ, McLean L. Coming to terms with it all: adult burn survivors' 'lived experience' of acknowledgement and acceptance during rehabilitation. *Burns* 2014;40:589–97.
- [42] Pallua N, Künsebeck H, Noah E. Psychosocial adjustments 5 years after burn injury. *Burns* 2003;29:143–52.
- [43] Xie B, Xiao S-C, Zhu S-H, Xia Z-F. Evaluation of long term health-related quality of life in extensive burns: a 12-year experience in a burn center. *Burns* 2012;38:348–55.
- [44] Myors KA, Cleary M, Johnson M, Schmied V. 'Modelling a Secure-Base' for women with complex needs: attachment-based interventions used by perinatal and infant mental health clinicians. *Issues Ment Health Nurs* 2017;1–7.
- [45] Kildal M, Willebrand M, Andersson G, Gerdin B, Ekselius L. Coping strategies, injury characteristics and long-term outcome after burn injury. *Injury* 2005;36:511–8.
- [46] Scharfe E, Bartholomew K. Reliability and stability of adult attachment patterns. *Pers Relat* 1994;1:23–43.