

Impact of facial burns: relationship between depressive symptoms, self-esteem and scar severity ☆☆☆



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ABSTRACT

Objective: This study assessed the role of self-reported facial scar severity as a possible influencing factor on self-esteem and depressive symptoms in patients with facial burns.

Method: A prospective multicentre cohort study with a 6 months follow-up was conducted including 132 patients with facial burns. Patients completed the Patient and Observer Scar Assessment Scale, the Rosenberg Self-esteem Scale and the Hospital Anxiety and Depression Scale. Structural Equation Modeling was used to assess the relations between depressive symptoms, self-esteem and scar severity.

Results: The model showed that patient-rated facial scar severity was not predictive for self-esteem and depressive symptoms six months post-burn. There was, however, a significant relationship between early depressive symptoms and both patient-rated facial scar severity and subsequent self-esteem. The variables in the model accounted for 37% of the variance in depressive symptoms six months post-burn and the model provided a moderately well-fitting representation of the data.

Conclusion: The study suggests that self-esteem and depressive symptoms were not affected by self-reported facial scar severity but that earlier depressive symptoms were indicative for a more severe self-reported facial scar rating. Therefore, routine psychological screening during hospitalisation is recommended in order to identify patients at risk and to optimise their treatment.

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1. Background

Worldwide, burns and fires account for more than 300,000 deaths and almost 11 million people a year require burn related medical attention [1]. Prevalence rates of head and neck involvement vary internationally between 6% and 60% [2–5] and illustrate that facial burns are common. Despite major improvements in burn care in the 20th century, scar formation remains a problematic consequence of burns and may be a factor that influences psychosocial adjustment, especially in the case of facial scarring [6]. Even minor facial lacerations can have a significant psychological impact [7].

Among other psychological problems, depressive symptoms are commonly reported in the aftermath of a burn injury [8]. In-hospital prevalence rates range between 8% and 61% [9–12], whereas rates one

year post-injury vary between 13% and 34% [10,12]. The impact of depressive symptoms is considerable, illustrated by several studies reporting a negative influence on quality of life [13] and physical functioning [11,14] in burn survivors. Whether facial burns play a specific role in depressive symptoms following burns is still a subject of debate. Studies that investigated facial burns as a predictor of post-burn depressive symptoms reported conflicting findings. One study reported burn visibility as a predictor of depression, but this study was hampered by a small sample size ($n=23$) [15], whereas a path analysis in a larger study ($n=110$) found no evidence for a direct effect of facial burns on depressive symptoms [16]. One study included an indirect effect, that is an interaction between gender and facial or neck burns, and reported that depressive symptoms were more likely in females with facial burns [17]. In a large cross-sectional study, higher correlations between psychosocial variables and depressive symptoms were found compared to demographic or burn variables [e.g., total body surface area (TBSA) burned, number of surgeries, facial scar and burn scar visibility] and depressive symptoms [18]. Of notice, none of these studies used a subjective patient-reported burn severity measure that may have more power to detect a relation with depressive symptoms compared to objective measurements of burn severity, such as percentage

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TBSA burned, number of surgeries or scar visibility. However, in general, little evidence supports a direct impact of facial burns on depressive symptoms.

Up to now, few burn studies have focused on underlying pathways involved in depressive symptoms in patients with facial burns, therefore, the current understanding of eliciting and maintaining factors is limited. One burn study found an indirect relationship in which physical functioning and body image dissatisfaction were shown to be a mediator in the relation between both percentage TBSA burned and the presence of facial burns on depressive symptoms [16]. Another underlying factor that has a strong association with depressive symptoms is low self-esteem [19,20]. Self-esteem refers to an evaluative self-view and is part of the broader self-concept [21] whereas physical appearance is considered a domain-specific part of self-esteem [22]. It is conceivable that a facial burn affects someone's physical appearance that consequently may impact one's self-esteem and associated depression.

Despite the established link between low self-esteem and depression, the causal relationship between both is still a subject of debate. A meta-analysis found stronger evidence for the vulnerability model stating that low self-esteem contributes to the onset and maintenance of depression compared to the scar model suggesting that depression erodes self-esteem [20].

According to the vulnerability model, people with low self-esteem are likely to have negative evaluations of the self and might seek negative feedback from others to verify their negative self-concept [19,20]. This self-fulfilling prophecy might be further reinforced by the tendency of people with low self-esteem to be more sensitive to rejection [19]. In this line of reasoning, facial burns may elicit negative reactions from others that reinforces negative self-beliefs and affects self-esteem. These reactions may be perceived more negatively when people evaluate their scars more severely. Therefore, it could be hypothesised that negative interpretations of the facial scars affect self-esteem and subsequently affect post-burn depressive symptoms.

The scar model on the other hand suggests that low self-esteem is a consequence of depression rather than an eliciting factor. In this model, an episode of depression is thought to damage social networks and change how others perceive the individual. Both are important for one's self-esteem [19,20], and consequently might leave permanent scars on one's self-esteem. According to this theory, pre-burn depressive episodes are salient to consider when predicting low self-esteem and post-burn depressive symptoms. Indeed, pre-burn affective problems have been found to influence post-burn depressive symptoms [10,23] and patients with a psychiatric history have a higher risk of post-burn psychiatric problems, including major depression [24]. Although most evidence supports the vulnerability model [20], one does not exclude the other and might actually cause a negative spiral, that is depression contributing to low self-esteem which in turn causes aggravation of depressive symptoms. This raises the question to what extent burn injury factors, such as facial burns, might play a role beyond pre-burn vulnerability factors, a topic that remains an open question [10]. Understanding associations between self-esteem and depressive symptoms in patients with facial burns may be crucial to the identification of patients at risk for depression and may assist clinical practice to improve treatments.

In summary, depressive symptoms are a significant problem in the aftermath of a burn injury, but there is little evidence concerning the role of facial burns in relation to depressive symptoms. There is consistent evidence for pre-existing vulnerability to develop post-burn depressive symptoms in contrast to the current lack of evidence for burn specific factors, such as facial scarring, that might contribute to these symptoms [10]. To our knowledge, previous research has not used a patient-reported facial scar severity measure, which might be more relevant compared to a physical severity measure in relation to self-esteem and depressive symptoms. Therefore, the aim of this study was to investigate the role of self-esteem and self-evaluation of

facial scarring in relation to depressive symptoms. We tested the following hypothesis: self-reported facial scar severity at three months is a predictor for self-esteem at three months and depressive symptoms six months post-burn, with lower self-esteem and higher levels of depressive symptoms in patients with higher self-reported facial scar severity scores, controlled for pre-burn and early post-burn depressive symptoms.

2. Methods

2.1. Participants

This study was conducted as part of a multicentre study. The clinical outcomes were previously published [25] and follow-up treatment was performed according to standard clinical practice. Patients admitted to one of the three Dutch burn centres were enrolled in the study between March 2006 and January 2009. Patients were eligible if they had facial burns (including head, neck, scalp or ears) and were ≥ 18 years. Patients were excluded if they were unable to provide informed consent, for instance due to cognitive impairment or because they had poor Dutch proficiency.

2.2. Procedure

Patient and burn injury characteristics were collected from medical files and participants completed follow-up measures at three weeks (T0), three months (T1) and six months (T2) post-burn. Measurements at T0 included pre-burn depression and depressive symptoms post-burn, whereas measurements at T1 included self-reported facial scar quality and self-esteem. Final measurements at T2 included depressive symptoms only. All patients provided informed consent, and the medical ethical board of the Maasstad Hospital (Rotterdam, the Netherlands) approved the study (TWOR 2005/25).

2.3. Measures

2.3.1. Depressive symptoms

The Hospital Anxiety and Depression Scale (HADS) [26] was used to assess depressive symptoms. This questionnaire consists of two 7-item subscales, one for anxiety (HADS-A) and one for depression (HADS-D). Each item is scored on a 4-point Likert scale with a range from 0 to 3, consequently the sum of scores for depressive symptoms ranged from 0 to 21. A higher score indicates more depressive symptoms. Original cut-off points were 7/8 for 'possible caseness' and 10/11 for 'probable caseness'. Other cut-off points used in burn literature are ≥ 8 to indicate moderate symptomatology of depression and ≥ 11 to indicate high symptomatology of depression [10]. A literature review of the validity of the HADS reported a sensitivity and specificity of approximately 0.80 at a cut-off score of 8+, [27]. The HADS was administered three weeks (T0) and six months (T2) post-burn.

2.3.2. Pre-burn depression

Pre-burn depression was measured three weeks post-burn (T0) by asking if the patient had been suffering from depression before the burn event. The following question was scored yes or no and used in the analyses: "Have you ever suffered from depression?"

2.3.3. Scar quality

The Patient and Observer Scar Assessment Scale (POSAS) was used to assess scar quality of facial burn scars. The scale has been found reliable and valid [28] and enables both patient and observer to assess the same scar on six different scar-characteristics. The observer assesses the scar on vascularity, pigmentation, thickness, relief, pliability and surface area. The patient assesses the scar on pain, pruritus, colour, thickness, surface roughness and pliability. Both use a numerically

10-point scale in which 1 represents a scar comparable with 'normal skin' while 10 represents the 'worst scar imaginable'. Consequently, the total score of each assessor ranged from 6 to 60. Both the observer and the patient independently assessed the same scar, which was the scar judged by the patient as being the most severe [29]. The POSAS data were collected three months (T1) post-burn.

2.3.4. Self-esteem

The Rosenberg Self-Esteem Scale (RSES) [30] was used to assess the patients' self-esteem. This reliable, mean Cronbach's α of .81 across 53 nations, and validated [31] questionnaire involves 10 items and is scored on a 4-point Likert scale, with responses ranging from *strongly agree* to *strongly disagree*. Five statements are positively, and five are negatively worded. Scores of the negatively worded statements are reversed. The sum of scores ranged from 10 to 40. A higher score indicates a higher self-esteem and RSES data were collected three months (T1) post-burn.

2.4. Data analysis

Patient-reported scar severity scores were described as mean item scores (i.e. sum score of the POSAS divided by the number of items assessed). Differences between participants with mild depressive symptoms and participants with moderate or severe depressive symptoms six months post-burn were assessed using two-tailed independent *t*-tests. Structural Equation Modeling (SEM) was performed using Mplus Version 6.1 [32]. SEM was used to assess the relations between self-reported facial scar severity (T1), self-esteem (T1) and depressive symptoms six months post-burn (T2) in patients with facial burns. Gender, history of depression (T0) and depressive symptoms three weeks post-burn (T0) were also included in the model. A robust maximum likelihood (MLR) estimator was used because some of the variables were non-normally distributed. Full information maximum likelihood estimation was used, indicating that all participants remain in the analysis even those with missing observations on one or more of the questionnaires, that is the POSAS, the RSES or the HADS-D. Model fit was assessed with chi-square statistics and three model fit indices: the Tucker–Lewis Index (TLI) [33], the comparative fit index (CFI) [34] and the root mean square error of approximation (RMSEA) [35]. Rule of thumb cut-off criteria were used to assess the goodness of fit of the model. A well fitted model was predefined as a model with a TLI and CFI > .90 in addition of a RMSEA < .05, whereas a moderately fitted model was predefined as a model with a TLI and CFI between .80 and .90 in addition of a RMSEA between .05 and .08. We used the R^2 statistic to provide information on the proportion of variance explained by the model.

3. Results

The patient- and burn-characteristics of the included ($n=132$) participants are summarised in Table 1. The participants had a mean age of 40.2 years (SD 14.0; range 18–66), and 83% were male. The participants suffered from minor to moderate burns, mean percentage

Table 1
Patient- and burn-characteristics of included patients ($n=132$)

| | |
|--|-----------------------|
| Gender; male (%) | 109 (82.6) |
| Age; mean (SD; range) | 40.2 (14.0; 18–66) |
| Inhalation injury (%) | 32 (24.2) |
| Surgery (%) | 59 (44.7) |
| Facial surgery (%) | 15 (11.4) |
| %TBSA burned; mean (SD; IQR) | 12.2 (11.5; 4.6–15.8) |
| % facial TBSA burned; mean (SD; IQR) ^a | 3.3 (2.1; 2–4) |
| %TBSA full thickness burned; mean (SD; IQR) ^a | 2.9 (5.5; 0–4) |

IQR: Interquartile Range.

^a 1 missing.

Table 2

Descriptive statistics for patient-rated facial scar severity scores, self-esteem and depression

| | Mean | SD | IQR | Range | n |
|--|------|-----|---------|-------|-----|
| Depressive symptoms three weeks post-burn | 4.0 | 3.9 | 1–6 | 0–19 | 115 |
| Mean patient-rated facial scar severity three months post-burn | 2.1 | 1.5 | 1.2–2.3 | 1–7.5 | 110 |
| Self-esteem three months post-burn | 32.7 | 5.5 | 29–37 | 19–40 | 105 |
| Depressive symptoms six months post-burn | 3.1 | 3.7 | 0–5 | 0–15 | 95 |

SD: Standard Deviation.

IQR: InterQuartile Range.

TBSA burned was 12.2 (SD 11.5; range 1–65) and mean percentage facial TBSA burned was 3.3 (SD 2.1).

The descriptive statistics of the different questionnaires are summarised in Table 2. Participants' mean score for depressive symptoms three weeks post-burn (T0) was 4.0 (SD 3.9; range 0–19; $n=115$) and mean patient-reported scar assessment (T1) was 2.1 (SD 1.5; range 1–7.5; $n=110$). Participants' mean self-esteem (T1) score was 32.7 (SD 5.5; range 19–40; $n=105$) and mean score for depressive symptoms six months post-burn (T2) was 3.1 (SD 3.7; range 0–15; $n=95$). Prevalence rates for at least moderate depressive symptoms (HADS-D ≥ 8) 3 weeks (T0) and 6 months (T2) post-burn were 17.4% (20/115) and 17.9% (17/95), respectively.

Analyses comparing participants with mild depressive symptoms to participants with moderate to severe depressive symptoms six months post-burn (T2) are presented in Table 3. Analyses showed significantly higher mean depressive symptoms three weeks post-burn (T0) and lower mean self-esteem (T1) scores in the moderate to severe depressive symptoms subgroup. In addition, the mean patient-rated scar severity (T1) showed a trend to be higher in that group, although this difference did not reach statistical significance.

Fig. 1 shows the path model. The model tested the plausibility of a possible role of both self-esteem (T1) and patient-rated facial scar severity (T1) on depressive symptoms six months post-burn (T2). The model included also gender, history of depression (T0) and depressive symptoms three weeks post-burn (T0).

Patient-rated facial scar severity (T1) showed not to be statistically significantly related to self-esteem (T1) and depressive symptoms assessed at six months post-burn (T2). In contrast, there was a significant relation between patient-rated facial scar severity (T1) and depressive symptoms assessed at three weeks post-burn (T0) ($P<.001$). This path indicated that patients with more depressive symptoms rated their facial scars more severely.

Furthermore, the relations between depressive symptoms and self-esteem were statistically significant. The significant paths from earlier depressive symptoms to self-esteem indicated that patients with a history of depression (T0) or higher depressive symptoms

Table 3

Descriptive statistics and comparison of patient-rated scar severity scores, self-esteem and depressive symptoms three weeks post-burn by depressive symptoms six months post-burn (mild vs moderate and severe)

| | Mild depressive symptoms (HADS-D<8) ($n=78$) | Moderate to severe depressive symptoms (HADS-D ≥ 8) ($n=17$) | <i>P</i> |
|---|--|--|----------|
| Depressive symptoms three weeks post-burn; mean (SD; n) | 3.4 (3.6; 74) | 7.0 (4.0; 16) | .001 |
| Mean patient-rated facial scar severity; mean (SD; n) | 2.0 (1.3; 71) | 2.9 (2.1; 15) | .11 |
| Self-esteem; mean (SD; n) | 33.7 (4.9; 78) | 26.2 (5.7; 16) | <.001 |

SD: Standard Deviation.

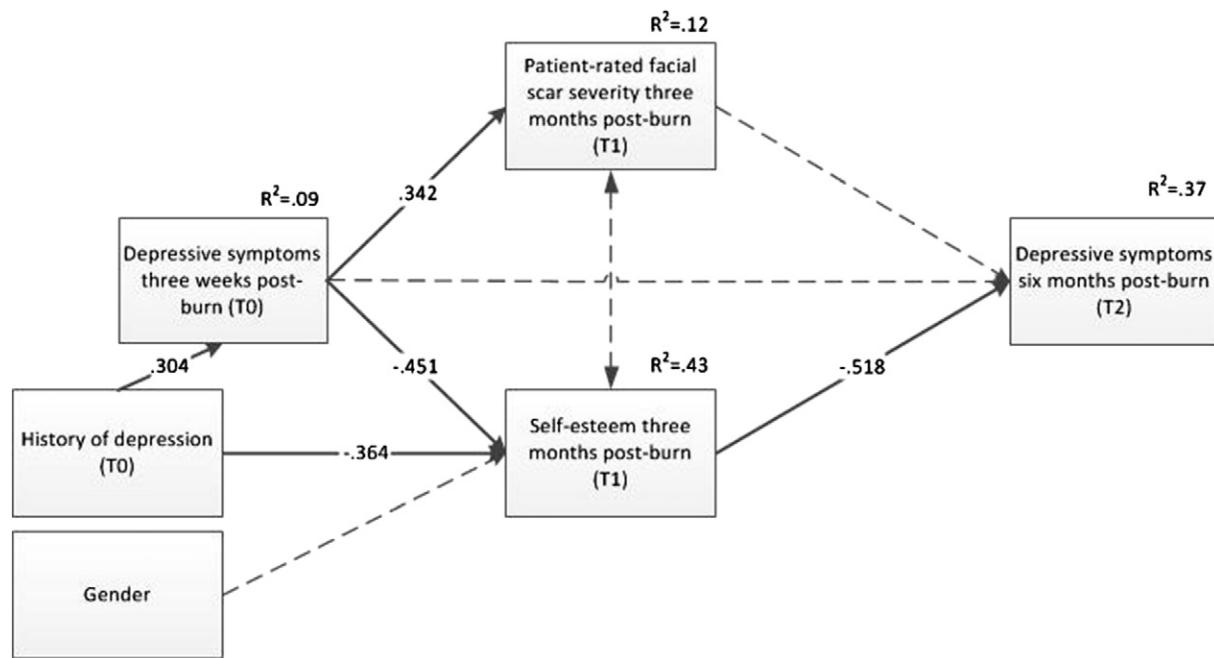


Fig. 1. Path model with parameter estimates. Numbers printed in lines correspond to standardised significant regression weights. The dashed regression lines are non-significant ($P > .05$).

three weeks post-burn (T0) had lower self-esteem (T1) (both $P < .001$). The significant path from self-esteem (T1) to depressive symptoms six months post-burn (T2) ($P < .001$) indicated that patients with lower self-esteem had more depressive symptoms six months post-burn. These findings indicated a possible mediating role of self-esteem between earlier depressive symptoms, both pre-existing and three weeks post-burn (T0), and depressive symptoms six months post-burn (T2). Paths from gender and patient-rated facial scar severity (T1) to self-esteem (T1) were not significant. In the same model, the relation between depressive symptoms three weeks post-burn (T0) and depressive symptoms six months post-burn (T2) was assessed. The finding that the direct path between both was not significant ($P = .351$), strengthens the evidence for a mediating role of self-esteem. In order to confirm whether self-esteem was an actual mediator in this relation, an indirect effect was added to the original model. This model showed that self-esteem (T1) acts as a mediator between depressive symptoms three weeks post-burn (T0) and depressive symptoms six months post-burn (T2) ($P < .001$).

The model provided a moderately well-fitting representation of the data ($\chi^2 = 7.65$, $df = 5$, $P = .18$; CFI = 0.97; TLI = 0.91; RMSEA = 0.07). Together, the variables in the model accounted for 12% of the variance in perceived facial scar severity (T1), 43% of the variance in self-esteem (T1) and 37% of the variance in depressive symptoms six months post-burn (T2).

4. Discussion

To our knowledge, the current study is the first that assessed the possible role of patient-rated facial scar severity in relation to self-esteem and depressive symptoms in people with facial burns. The results showed no relation between patient-rated facial scar severity and both self-esteem and later depressive symptoms in patients with facial burns. This finding contrasted with our hypothesis that was based on the reasoning that people with more severe facial scarring may encounter more negative feedback from others, which might elicit or reinforce negative self-beliefs, lower self-esteem and subsequently more depressive symptoms. The use of a patient-reported scar severity measure appeared not to contribute to different

findings as compared to previous studies that used objective burn severity measures in relation to depressive symptoms [16,18].

Interestingly, depressive symptoms three weeks post-burn predicted patient-rated scar severity (T1) suggesting that post-burn depressive symptoms influence how people evaluate their facial scars. In addition, depressive symptoms three weeks post-burn were related to pre-burn history of depression and could also be influenced by the traumatic experience of a burn event. A cross-sectional study reported similar findings in 113 burn patients admitted to a burn centre that were divided into two groups based on the cut-off point of the Korean Center for Epidemiologic Studies Depression Scale (Korean CES-D) [36]. In that study, patients with severe depressive symptoms (CES-D ≥ 25) reported significant higher total mean patient scar assessment scores (measured with the POSAS) compared to patients with less severe or no depressive symptoms (CES-D < 25). It is possible, however, that these patients may have had a lower self-esteem prior to the burn event that may have affected depressive symptoms. The lack of this information prevents causal conclusions regarding these relationships. Nevertheless, the results of our study indicated that early depressive symptoms influenced scar assessment, whereas perceived scar severity did not influence depressive symptoms three months later.

The items of the POSAS direct the patients to assess the physical aspects of their scar. This study showed that the scar assessment appeared to be influenced by mental aspects, that is depressive symptoms. It is likely that also other psychological and emotional perceptions had an influence on the scar assessment, as indicated by the literature. For instance, a qualitative study reported that respondents showed negative emotions with their scar's appearance due to their perceived stigma and psychological associations [37]. Another study showed that patients with congenital and acquired facial disfigurements had higher fear of negative appearance evaluations compared to a reference group without facial disfigurements. In addition, patients were more satisfied with their facial appearance when they had high self-esteem and low fear of negative appearance evaluations [38]. In a study that investigated romantic experiences of adolescents with a visible difference, those participants that were concerned with their appearance reported fear of negative evaluation. More interestingly, their fear appeared to be based on

their perceptions rather than reality, as none of their past or current partners had ever made negative comments about their visible difference [39]. A recent study indicated that the patient's scar assessment and self-esteem were related and that a discrepancy between a patient's and a professional's scar assessment could be an indication for psychological difficulties [40]. These findings indicate that a patient reported scar assessment is influenced by several factors that should be taken into account when interpreting patient reported scar assessments.

Furthermore, this study showed that self-esteem acts as a mediator between early and late depressive symptoms, illustrating the central role of self-esteem in the maintenance of depressive symptoms. Self-esteem appeared to be affected by both pre-burn and early post-burn depressive symptoms but not by facial scar severity. The superior relationship of pre- and post-burn vulnerability characteristics relative to a burn severity characteristic is in accordance with prior studies [16,18]. In particular the role of pre-burn history of depression as a vulnerability factor for depression is in line with previous research that found a higher risk of depressive symptoms in burn patients with pre-existing vulnerability, i.e. pre-burn affective problems [10,23] or a psychiatric history [24]. Furthermore, gender did not statistically significantly influence self-esteem in this study and seems to contrast an earlier study that found a gender effect [17]. In that study, depression was significantly higher in females with head or neck burns compared to males. Although general literature hypothesises that females would experience a higher effect on self-esteem from scarring, this study did not reveal such a difference in gender response. Possibly, the underrepresentation of females in this study may affect the statistical power to uncover such an effect.

This study suffers from some limitations that should be noted. First, the results of this study may not generalise to the general burn population since the study population consisted of people with facial burns. Although debated, it is conceivable that visible scars have a different impact on burn victims compared to hidden scars. Second, the study population comprised more males (83%), somewhat exceeding the percentage of males with facial burns in burn centre admissions (72%) [3]. Third, participants in our study had on average minor facial scarring: they had lower mean scar severity scores (2.1) compared to an extensive Dutch observational study (4.9) [41]. Although minor facial lacerations may also have significant psychological impact [7], they may not generalise to disfiguring facial scars. Finally, the measurements of history of depression and depressive symptoms relied on subjective patient-reported questionnaires and do not represent a diagnosis of depression.

Despite these limitations, the relatively large and unique data set and the use of a patient-reported scar severity measure enabled us to uncover underlying pathways involved in depressive symptoms in patients with facial burns.

5. Conclusion and clinical implications

In conclusion, the model indicated a central role regarding self-esteem in relation to depressive symptoms that may result from previous vulnerability. The model did not support the possible role of self-reported facial scar severity as an influencing factor on both self-esteem and depressive symptoms but found evidence for an effect of depressive symptoms on scar perceptions. Our study suggests that both early depressive symptoms and lower self-esteem might be indicative for late depressive symptoms in patients with facial burns, regardless of the patients' perceived facial scar severity. Therefore, routine psychological screening during hospitalisation on depressive symptoms and self-esteem is recommended in order to identify patients at risk and to optimise their treatment. Additionally, it is important to consider the influence of early depressive symptoms on scar evaluation when using a patient-reported scar outcome.

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