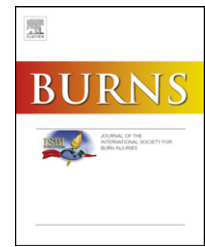


available at www.sciencedirect.comjournal homepage: www.elsevier.com/locate/burns

PTSD in persons with burns: An explorative study examining relationships with attributed responsibility, negative and positive emotional states

N.E.E. Van Loey^{a,*}, M.J.M. van Son^b, P.G.M. van der Heijden^c, I.M. Ellis^b

^a Association of Dutch Burn Centres, Beverwijk, The Netherlands

^b Utrecht University, Department Clinical Psychology, Utrecht, The Netherlands

^c Utrecht University, Department Statistics and Methodology, Utrecht, The Netherlands

ARTICLE INFO

Article history:

Accepted 21 January 2008

Keywords:

Burns
PTSD
Attribution
Emotion
Forgiveness

ABSTRACT

A sample of 90 persons who had been hospitalized for severe burns were interviewed 1–4 years after the incident. Current DSM-IV post-traumatic stress disorder (PTSD) was assessed with the Composite International Diagnostic Interview. Perceived attributed responsibility and related positive and negative emotional states were examined using a semi-structured interview. Findings showed that PTSD was established in 8% of the participants and partial PTSD in 13%. In a homogeneity analysis (HOMALS), PTSD was associated with the attribution of responsibility for the incident to impersonal relationships and with a negative emotional state. The absence of (partial) PTSD was associated with the attribution of responsibility to close relationships, internal and circumstance-related attribution of responsibility and neutral or forgiving feelings. In logit analyses, both emotional state as well as attributed responsibility are significantly related to (partial) PTSD. However, the model including emotional state showed to have the best fit. Although further research is needed, these results may indicate that professionals working in burn care should consider the emotional state in relation to perceived attribution of responsibility when considering PTSD. Promoting forgiveness may be a beneficial strategy in dealing with post-traumatic stress reactions.

© 2008 Elsevier Ltd and ISBI. All rights reserved.

Post-traumatic stress disorder (PTSD), a potential consequence of severe burn, appears to be experienced quite frequently. Earlier reported prevalence rates within this group of patients varied between 15% and 45% at 12 months [1]. This is substantial and is therefore both a health care and social concern. In order to be able to identify persons at risk and to gain more insight into efficacious treatment strategies, it is of particular importance to identify the factors that elicit or maintain the disorder. Evidence shows that early symptoms of post-trauma distress, prior vulnerability and stressor characteristics contribute to or maintain post-traumatic stress reactions among persons who have sustained a burn injury [1].

However, there is growing evidence that other factors, in particular attribution processes [2,3] may play a crucial role in the occurrence of PTSD in traumatized groups.

Over the last decade, evidence has been gathered proving that blaming others for threatening events is associated with poor mental adjustment. Tennen and Affleck [4] reviewed 25 studies including a variety of traumatic events such as rape, illnesses and accidents. They found that the majority of the studies demonstrated an association between blaming others and poor adjustment. Further, studies that investigated PTSD in relation to attribution processes were consistent in their findings that PTSD was related to external attribution of

* Corresponding author. Tel.: +31 251 275 507; fax: +31 251 216 059.

E-mail address: nvanloey@burns.nl (N.E.E. Van Loey).

responsibility for the traumatic event [3,5,6]. This relationship may be explained according to the model proposed by Foa et al. [7], which explains that when an adverse event is perceived as uncontrollable and unpredictable, it may result in PTSD. From this perspective, one may argue that when one perceives others as being responsible for the accident, the feeling of loss of control may be experienced more severely than if the accident was perceived as being the result of one's own behaviour.

Just as there has been increasing attention to PTSD in relation to attribution of responsibility, so too has the interest in emotional states burgeoned in recent years. Most studies focus on anger, a negative emotional state often experienced in the aftermath of a traumatic event. A meta-analysis showed that the association of anger with PTSD is significant [8]. In the motor vehicle accident literature, it was described that anger is predictive of subsequent PTSD [2,9].

Although the association between anger and PTSD is well established, there is much to be explored in relation to attribution processes. It was recognized that attribution processes are related to specific emotional states which is of particular interest to this study. Weiner, an attribution theorist, proposed that individuals search for causality and that causes have the following dimensions: locus of causality, stability and controllability. He further theorized that these causal dimensions play a pivotal role in the emotion process, e.g. external causal attributions for a negative event are related to negative emotions such as anger [10]. A causal influence of attributions on emotions has been confirmed in empirical research [11,12].

In contrast to anger, forgiveness seems to facilitate the procession of an aversive event. Forgiveness can be directed to one's self, to others or to situations [13]. Forgiveness has been described as a process of change, in which negative emotions are replaced with positive ones [14] and 'the cessation of emotions (e.g. anger) connected with memories of a hurtful act' [15]. Although forgiveness is a process of change per se and is not defined as a state, the literature consistently indicates that persons who have forgiven experience positive emotions, as well as positive thoughts and behaviours at that time [13,16].

In a theory developed by Thompson et al. [13], it was hypothesized that forgiveness is an adaptation to mistreatment; a person reframes the negative cognitive bond to the outcome and it becomes more positive which may diminish the negative thoughts related to the event. Research has indicated that a self-forgiving attitude is a predictor of less mood disturbances [17]. Further, a forgiving attitude of others has been negatively linked to anger [18]. In relation to PTSD, the sparse evidence available shows that both difficulty in forgiving oneself and others were associated with PTSD [19]. How people cope with the trauma – either by sticking to negative states such as anger, or by granting forgiveness – may potentially play a role in the development and/or maintenance of PTSD.

In summary, the current literature suggests that forgiveness is related to positive adjustment, in contrast to anger that is found to be an obstacle for a psychologically healthy adjustment. Further, external attribution processes are suggested to be associated with maladjustment and with negative

emotional states. The purpose of the current study was to explore the inter-relationships between PTSD, attribution processes, and negative versus positive emotional states in a population of persons with burns 1–4 years after the accident. We believe that this topic is of special interest for persons with burns. Burns are sustained in various ways and often involve other parties. In addition, burns can have a major impact on a person's life in the sense that they can leave lifelong physical scars and, in some cases, functional impairments.

1. Method

1.1. Participants

Participants of this study were adult patients with burns admitted to six burn centers in the Netherlands and Belgium. Participants were excluded if they were older than 70, had poor Dutch proficiency, suffered from acute or chronic psychiatric disorders or the length of hospitalization was less than 72 h.

Part I of this study program comprised a prospective study that measured self-reported symptoms of post-traumatic stress during the first year post-burn on a 2-monthly basis. The impact of event scale (IES) was used to assess these symptoms. The results are described in Van Loey et al. [20].

Part II of the study comprised a cross-sectional study involving a diagnostic interview, 1–4 years after the incident occurred. At that time, 202 participants were potential participants, i.e. they did not indicate their willingness to withdraw from the study or they had indicated that they were willing to participate in follow-up research. These 202 persons were invited to participate in the diagnostic interview.

Ninety of the 202 participants invited (45%), agreed to participate. Of the 90 participants, 62 were men (69%) and 28 were women (31%). Participants ranged in age from 20 to 69 years, $M = 41.8$, $S.D. = 12.1$. Participants were hospitalized on average for 27 days, $S.D. = 30.3$, and the burned body surface area ranged from 1% to 80%, $M = 16.5\%$, $S.D. = 15.6\%$, $Mdn = 12\%$. Thirty-three percent of the respondents sustained the burn at home, 48% at work and 19% elsewhere. Forty participants (45%) were 1–2 years post-burn, 30 participants (33%) were 2–3 years after burn, and 20 participants (22%) were 3–4 years post-burn, $M = 2.2$ years post-burn, $S.D. = 0.8$ years post-burn. The 90 respondents were compared with the 202 who were invited to take part in the interview. Statistically, more men than women refused to participate, $\chi^2 (1, n = 202) = 9.71, p < 0.01$. However, there were no statistically significant differences between both groups on impact of event scores at 12 months post-burn. There were no statistical differences in age, length of hospitalization or total burned surface area between the two groups. Persons who were more likely to be lost to follow-up in part I of the study had a significantly shorter length of stay in hospital [20].

1.2. Procedure

For the purpose of this study, participants who were 1–4 years from injury received an invitation to participate in an interview and an accompanying letter in which the aim,

content, and estimated duration of the interview were explained. They were asked to return the answering form in which they could mark their preference: (1) 'yes, I would like to take part in the telephone interview'; (2) 'no, I do not want to take part in the telephone interview, however I am willing to complete self-report questionnaires by mail'; (3) 'I would like to end my participation'. If they agreed to take part, they were asked to fill their telephone number and a suitable time to be contacted for making an appointment for the interview. Interviews were conducted by telephone by trained advanced psychology students who had received a certified 3-day training at a CIDI-training center. For the present analyses only the PTSD-section of the interview has been considered.

1.3. Measures

1.3.1. Composite International Diagnostic Interview

The CIDI is a fully structured interview under the auspices of the WHO with good reliability and validity [21]. We used version 2.1 that maps the symptoms prevalent during the past 12 months according to DSM-IV criteria [22] in persons who sustained a burn 1-4 years earlier. Participants were diagnosed with PTSD if they met all the criteria. They were diagnosed with partial post-traumatic stress if they met at least two out of three of the following criteria: criterion B (intrusion), C (avoidance) and D (arousal). Individuals meeting none or only one criterion were diagnosed as non-PTSD.

1.3.2. Attributed responsibility

For the purpose of the cross-sectional part of the study, based on the procedure put forward by Hickling et al. [6], we developed a semi-structured interview in order to assess the participant's perceptions of responsibility with regards to who or what caused the burn. Participants were asked to respond to the question 'who do you believe was responsible'. Responsibility could be attributed to self, others or circumstance-related/nobody. Subsequently, participants were asked 'can you indicate how much responsibility, from 100% to 0%, you had for the incident and how much responsibility, from 100% to 0% someone else had for the incident'. The semi-structured interview assessing attributed responsibility was carried out after the post-traumatic stress section of the interview.

Participants were labeled as self-responsible (i.e. internal attribution) when the difference in percentage attributed responsibility to themselves minus the percentage attributed to others was positive. Likewise, participants were labeled as other-responsible (i.e. external personal attribution) when the difference between the two percentages was negative. Nobody-responsible (i.e. external situational attribution) was labeled when 0% responsibility was attributed to neither themselves nor others.

1.3.3. Emotional state

As part of the semi-structured interview, the following question was put to the interviewee: 'how do you feel, at this moment, about the person who was responsible for the incident' or, in case nobody was responsible, 'how do you feel,

at this moment, about the situation/circumstances related to the incident'. Three options were offered: (1) have forgiven, (2) emotionally neutral and (3) frustrated/angry. 'Have forgiven' typically points to a positive emotional state associated with the accident, 1-4 years post-burn. It may, nevertheless, be the result of a process of change indicating a transition towards a positive emotional state. 'Emotionally neutral' refers to absence of positive or negative emotions. 'Frustrated/angry' refers to a pervasive negative state. To be sure that we captured other negative states next to anger, we decided to combine anger and frustration.

1.4. Statistical analyses

Data were analysed using cross-tabs, homogeneity analyses (HOMALS; Mealman, Heiser and SPSS Inc., 1999) and logit analyses. The dependent variable, symptoms of PTSD was measured 1-4 years after burn. First, cross-tabs were presented in order to give insight in the univariate relationships between the variables being studied. Second, HOMALS was performed in order to facilitate the interpretation of the two-way cross-tabs. Third, a logit analysis sought to determine which of the variables would best predict PTSD. Given the relatively small sample size, it was felt that both the categories PTSD and partial PTSD should be merged into one category, i.e. (partial) PTSD in order to maximize the effects.

2. Results

2.1. Description of variables measured 1-4 years post-burn

2.1.1. Post-traumatic stress disorder

Eight percent ($n = 7$) met the full criteria for PTSD and 13% ($n = 12$) met the criteria for partial PTSD. The majority of participants, 79% ($n = 71$), met none or only one symptom. χ^2 -analyses indicated no statistically significant difference in terms of post-traumatic stress reactions between participants who sustained the burn 1-2, 2-3, or 3-4 years ago, χ^2 (4, $n = 87$) = 4.22, ns.

2.1.2. Attribution of responsibility

Two participants did not indicate responsibility for the accident and five participants were excluded from the analyses because they attributed an equal percentage of responsibility to themselves and others. The percentages varied between 10-10 and 50-50 constituting a heterogeneous group, which is difficult to interpret. Forty-five percent of the group being studied attributed responsibility to someone else: 16% attributed responsibility to an impersonal relationship or stranger, 23% to a work associate, mostly the employer, and 6% to a relative or friend. Thirty percent attributed responsibility to themselves and 25% to nobody.

2.1.3. Emotional state

Ten participants had missing values on emotional state. Thirty-three percent felt that they had forgiven, 40% felt emotionally neutral and, 27% felt frustrated or angry.

2.2. Post-traumatic stress disorder and univariate associations with attributed responsibility and emotional state

The relationship between (partial) PTSD and attributed responsibility measured 1–4 years after burn is shown in Table 1. As can be seen, about half of the participants who attributed responsibility to others, either to an impersonal relationship or to a work associate, met the criteria for (partial) PTSD. Significantly fewer persons who attributed responsibility to either themselves (13%) or circumstances (5%) showed PTSD symptoms, $\chi^2 = 18.2$, d.f. = 4, $p < 0.001$. As also shown in Table 1, approximately two out of three respondents who expressed anger or frustration reported symptoms of PTSD. Only a minority of participants with a positive emotional state showed symptoms of PTSD, $\chi^2 = 21.6$, d.f. = 2, $p < 0.001$. Table 2 presents the relationship between attribution of responsibility and emotional state. Attributed responsibility to an impersonal relationship and a work associate was most frequently related to anger and frustration. In contrast, attributed responsibility to oneself, relative or friend and nobody was most frequently related to forgiveness and a neutral emotional state.

2.3. Inter-relations between post-traumatic stress, attributed responsibility and emotional states in a homogeneity analysis

In order to facilitate the interpretation of the two-way cross-tabs, we performed a homogeneity analysis. From Fig. 1 it is seen that the two categories of PTSD are located on dimension 1. Dimension 2 displays subgroups within the category 'no PTSD' in which the categories of the other variables, attributed responsibility and emotional states, respectively, can be found. Fig. 1 shows that participants without post-traumatic stress symptoms fell into two groups. One group of participants who attributed responsibility to themselves or relatives/

friends, associated with forgiveness. The second comprised participants who attributed responsibility to nobody and reported feeling emotionally neutral. The partial and full syndrome was associated with attributed responsibility to impersonal relationships or work associates and anger/frustration.

2.4. Inter-relations between post-traumatic stress, attributed responsibility and emotional states: a logit model

A final analysis, using a logit model, sought to determine which of the variables outlined above would be most strongly associated with (partial) PTSD. Table 3 presents the main effects of the logit model. A large likelihood ratio does not fit the data well and should be rejected as an inadequate representation of the relationship among the variables. We first entered gender and TBSA as control variables in Model 1. As can be seen from Table 3, the fit of the model 2a including only attribution (31.2–21.5, d.f. = 4, $p = 0.05$) showed a marginally significant improvement compared to model 1. Model 2b including only emotional state (31.2–20.3, d.f. = 2, $p < 0.01$) significantly improved compared with model 1. In model 3 both attribution and emotional state are included. The difference between models 2b and 3 is not statistically significant. Thus, even though attribution of responsibility plays a significant role in model 2a, the logit model revealed that attribution did not yield additional information given the presence of emotional state in the model. From Table 4 it is seen that the estimates of attribution of responsibility in model 2a decrease compared to model 3 and become non-significant. The conclusion is that the emotional state is of significant importance in the relationship between attribution of responsibility and PTSD. Further, from the parameter estimates presented in Table 4, it is concluded that gender and TBSA are related to (partial) PTSD in model 1 but this relationship becomes non-significant in the other models.

Table 1 – Frequency and percentage of categories among attributed responsibility and emotional state classified along occurrence of (partial) PTSD 1–4 years after the burn accident

	PTSD		
	No PTSD	(partial) PTSD	Total
Attribution			
Impersonal relation	6 (46%)	7 (54%)	13 (100%)
Work associate	10 (53%)	9 (47%)	19 (100%)
Relative/friend	4 (100%)	0	4 (100%)
Self	20 (87%)	3 (13%)	23 (100%)
Nobody	20 (95%)	1 (5%)	21 (100%)
Emotional state			
Anger/frustration	9 (39%)	14 (61%)	23 (100%)
Neutral	24 (86%)	4 (14%)	32 (100%)
Forgiven	24 (92%)	2 (8%)	26 (100%)

Note: no PTSD, not diagnosed with post-traumatic stress disorder; (partial) PTSD, diagnosed with either partial post-traumatic stress disorder or the full syndrome. χ^2 (attribution, $n = 80$) = 18.5, d.f. = 4, $p = 0.001$; χ^2 (emotional state, $n = 78$) = 21.6, d.f. = 2, $p < 0.001$.

3. Discussion

This study is one of the few reporting on prevalence rates of PTSD in the longer term after a burn incident and, to our knowledge, the first study reporting on the inter-relationship between PTSD, attribution of responsibility, and emotional state in a group of traumatized persons.

The results confirm that chronic post-traumatic stress reactions among persons who sustained burns are of clinical importance. Twenty-three percent of the participants met either all DSM-IV criteria for PTSD (8%) or met those of partial PTSD (13%) 1–4 years after burn. Differences in prevalence rates could not be found with respect to the time elapsed since the accident, varying between 1 and 4 years. The prevalence rate of 8% full-blown PTSD approached the rate of 11% found in a study among road accident victims 3 years after the incident [9]. Thus it may be a realistic indication of the extent to which people who were involved suffer from long-term PTSD. On the other hand, the rate of 8% is rather low when compared with the rate of 20% found in other burn studies measured approximately 1 year after burn [23,24]. The

Table 2 – Frequency and percentage of categories among attributed responsibility and emotional state

Attribution	Emotional state			Total
	Forgiven	Neutral	Anger/frustration	
Impersonal relation	1 (7.7%)	3 (23.1%)	9 (69.2%)	13 (100%)
Work associate	3 (15.8%)	6 (31.6%)	10 (52.6%)	19 (100%)
Relative/friend	3 (75%)	1 (25%)	0	4 (100%)
Self	17 (68%)	5 (20%)	3 (12%)	25 (100%)
Nobody	4 (26.7%)	11 (73.3%)	0	15 (100%)

Note: $\chi^2 (n = 76) = 41.6$; d.f. = 8; $p < .001$.

exclusion of persons with pre-burn psychiatric problems in this study is most likely the cause for this effect.

Further, this study explored inter-relations between attribution processes and emotional states after controlling for the effect of gender and TBSA. Our results were consistent with earlier findings that acknowledged the relationship between female gender and PTSD [25], external attribution of responsibility and PTSD [5,6] and with studies that demonstrated a relationship between anger and PTSD [2,26]. In line with most other burn-related studies, a strong relationship between PTSD and TBSA could not be established [1].

A major finding in our study, however, encompasses the surplus value of examining emotional state in addition to attributed responsibility. The emotional state is suggested to be of greater importance to PTSD than attribution of responsibility. Although this study does not directly answer which factors lead to anger or to forgiveness, it reveals that if one judges someone else to be responsible, this cognition is not automatically associated with anger and PTSD. Of interest

is the difference in emotional state. Anger was most likely reported when responsibility was attributed to an impersonal relationship, to a smaller extent to work-associated relations, and not when it was attributed to a relative or friend. This latter group was more likely to express forgiveness.

Although it was recognized that forgiveness of strangers is different from forgiving highly committed relationships [16], this study may provide insight in aspects that are important in the forgiving processes. As earlier described, perceived stability and controllability were theorized as important properties of causal attributions [10]. In line with this theory, Tennen and Affleck [4] advanced the argument that when the other person is known well, victim and perpetrator share common information about the perpetrator’s stability and consistency of behaviour. Consequently, the situation may be evaluated as an unfortunate mishap rather than a stable factor. Moreover, in close relationships one may have the feeling of being able to influence the behaviour of the other person, which may augment the feeling of control.

Another explanation is related to the behaviour of the offender. If the offender knows the victim personally, he or she may be more likely to recognize his or her suffering and apologize. This may induce empathy for the offender and facilitate forgiveness [27]. If the offender is a stranger, this person will be less likely to recognize suffering and consequently, absence of an apology or absence of expressed guilt may prevent empathy and forgiveness in the victim. Especially in cases that lead to litigation, recognized as a predictor of PTSD [2], the offender may try to deny or minimize his role, just as the victim may for obvious reasons, stress the role of the offender.

The relationship between interpersonal obstacles and a negative emotional state could also explain why external

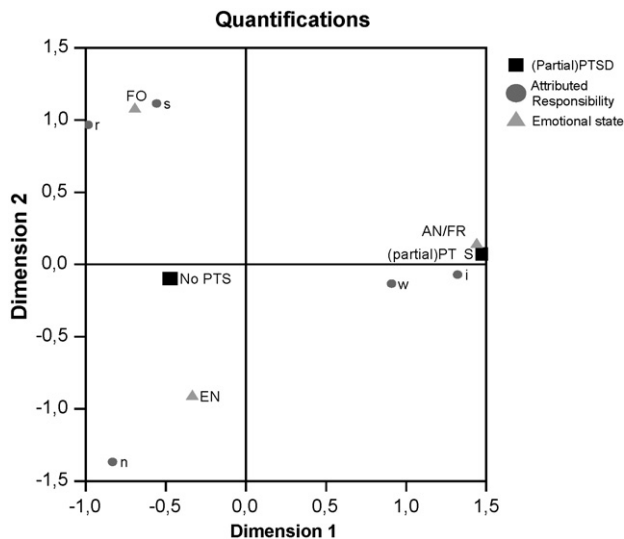


Fig. 1 – HOMALS showing the inter-relationships between post-traumatic stress disorder, attributed responsibility and emotional state. Note: n = 75. No PTSD = not diagnosed with post-traumatic stress disorder; (partial) PTSD = diagnosed with either partial post-traumatic stress disorder or the full syndrome; attributed responsibility: i = impersonal relationship, w = work associates, s = self, r = relative/friend, n = nobody; emotions: FO = forgiven, EN = emotionally neutral, FR/AN = frustrated, angry.

Table 3 – Logit analyses comparing models with the best fit

Model	Likelihood ratio	d.f.	Sign
Model 1: model including only control variables gender and TBSA	31.2	26	0.22
Model 2a: model 1 + attribution	21.5	22	0.49
Model 2b: model 1 + emotion	20.3	24	0.68
Model 3: model 1 + attribution + emotion	15.9	20	0.72

Note: d.f. = degrees of freedom.

Table 4 – Logit analysis showing parameter estimates within the three models

	Estimate	S.E.	Significance	95% CI
Model 1				
No PTSD	0.91	0.68	0.18	-0.43-2.25
No PTSD × male	1.17	0.60	0.05	-0.01-2.35
No PTSD × TBSA	-0.01	0.03	0.86	-0.06-0.05
PTSD × TBSA	0.04	0.02	0.01	0.01-0.08
Model 2a				
No PTSD	1.63	1.23	.19	-0.78-4.03
No PTSD × male	1.56	.72	.03	0.14-2.97
No PTSD × TBSA	-.002	.03	.96	-0.07-0.06
PTSD × TBSA	.02	.02	.35	-0.02-0.05
No PTSD × IR	-1.96	1.41	.16	-4.73-0.80
No PTSD × WA	-2.44	1.22	.045	-4.83-0.06
No PTSD × self	-.46	1.24	.71	-2.90-1.97
Model 2b				
No PTSD	-1.56	1.12	.16	-3.76-0.63
No PTSD × male	1.21	.71	.087	-0.18-2.60
No PTSD × TBSA	.01	.04	.75	-0.06-0.08
PTSD × TBSA	-.003	.02	.89	-0.04-0.04
No PTSD × forgiveness	3.27	1.07	.002	1.16-5.37
No PTSD × neutral	2.18	0.94	.02	0.34-4.03
Model 3				
No PTSD	-0.28	1.64	0.87	-3.48-2.93
No PTSD × male	1.35	0.78	0.08	-0.18-2.87
No PTSD × TBSA	0.01	0.04	0.77	-0.06-0.09
PTSD × TBSA	-0.01	0.02	0.59	-0.06-0.03
No PTSD × forgiveness	2.57	1.13	0.02	0.35-4.79
No PTSD × neutral	1.71	1.02	0.09	-0.28-3.70
No PTSD × IR	-1.78	1.45	0.22	-4.63-1.07
No PTSD × WA	-1.97	1.31	0.13	-4.54-0.60
No PTSD × self	-0.69	1.39	0.62	-3.41-2.03

Note: S.E., standard error; CI, confidence interval; IR, impersonal relationship, WA, work associate.

personal attribution differs from external situational attribution with respect to PTSD, as one may assume that in both the events, perceived level of control and predictability is low. Possibly, the absence of a third party in the case of situational attribution prevents a negative emotional state. On the one hand, an existential crisis of confidence in fellow man may be averted. On the other hand, the acceptance that the incident is circumstance-related may diminish the threat of the situation and subsequently becomes associated with a neutral emotional state.

We believe that this study could provide a foundation for further research and may offer new perspectives for post-trauma treatment by focussing on forgiveness in a subgroup of persons having sustained burns. Like other research reports suggest, we think that forgiveness may be important for a person's well-being and that promoting forgiveness may be of relevance in cognitive psychotherapy [28]. Although somewhat speculative at this point, it may not be inconceivable that interventions that focus on reframing hurtful acts of others, by considering perceived aspects of causal attributions such as stability and controllability as a starting point, may help the victim in overcoming negative affect and stress reactions. Likewise, promoting self-forgiveness may help persons deal with their own mistakes. Further, it may also be important from a therapeutic point of view to try to reduce adverse emotions by means of early interventions during hospitalization that increase empathy for the offender. Along with an

increase of empathy, persons may become more likely to forgive their offender, which may facilitate the integration of the event. Also, trying to stimulate the responsible party, e.g. the employer, to behave in a way that recognizes suffering or stimulating the communication with the patient or patient's family may be the first step for a person to begin to forgive.

This study suffers from shortcomings that bear comment. Most of them center on methodological issues. In the first place, more women were willing to participate which may have influenced the PTSD prevalence rates. It is well documented that woman run a higher risk for development of PTSD [25]. Otherwise, this study may under-represent persons with minor burn sequelae due to a significant loss of persons with a short stay in hospital. Second, we used a cross-sectional design. Needless to say this study would be strengthened by assessing the study parameters at a separate and earlier occasion, prior to the assessment of PTSD symptomatology. Third, the study may also be criticized for being too constrained by considerations of particular emotions, thereby dismissing other emotions. We agree that the field of emotion is complex and much broader than what we have examined. However, the investigation of a complete range of emotions was not our goal. Rather, this explorative study focussed on identifying categories of potentially useful emotions in which persons can recognize themselves in the aftermath of a burn accident. Therefore, we selected global concepts that would capture negative,

neutral and positive states. Nevertheless, none of the interviewees reported that they did not recognize themselves in the proposed emotions and could not answer the question for that reason. Fourth, one may raise the argument that forgiveness cannot be conceptualized as an emotional state. Nevertheless, the available literature on forgiveness emphasizes the positive emotions, thoughts and behaviour associated with forgiveness and thus must reflect a positive emotional state at the time of measurement. It may be interesting to further investigate the typical nature of emotions that are captured by forgiveness. Finally, the relatively small sample size has limited statistical power and prevented us to perform more complicated analyses in which, e.g. time post-burn and other potential influencing variables were included. In addition, the response rate of 45% is relatively low, although the statistical significant differences with the original cohort were small. However, it may be interesting to examine these relationships in a larger prospective design.

The limitations of this study notwithstanding, we believe the concepts under study deserve further research attention in accident-related victims. From a therapeutic perspective, this study suggests that focussing on forgiveness in relation to intra- or inter-personal attribution processes of the accident may have positive implications for PTSD. It is not inconceivable that, for a subgroup of persons with burns, working towards forgiveness would result in a healthier mental state. The emerging field of positive psychology and its health implications have largely been overlooked by now. This study subscribes its potential in dealing successfully with stress experienced by persons who sustained a severe burn.

Acknowledgments

This study was supported financially by the Dutch Burns Foundation (Grant 01.05). We would like to thank Ms. I. Lemmens, Ms. C. Koele and Ms. S. van der Voort for their contribution in data collection.

Conflict of interest

The authors do not have any financial and personal relationships with other people or organizations that could inappropriately have influenced the current manuscript.

REFERENCES

- [1] Van Loey NEE, Van Son MJM. Psychopathology and psychological problems in patients with burn scars: epidemiology and management. *Am J Clin Dermatol* 2003;4:245-72.
- [2] Ehlers A, Mayou RA, Bryant B. Psychological predictors of chronic posttraumatic stress disorder after motor vehicle accidents. *J Abnorm Psychol* 1998;107:508-19.
- [3] Lambert JF, Difede J, Contrada RJ. The relationship of attribution of responsibility to acute stress disorder among hospitalized burn patients. *J Nerv Ment Dis* 2004;192:304-12.
- [4] Tennen H, Affleck G. Blaming others for threatening events. *Psychol Bull* 1990;108:209-32.
- [5] Delahanty DL, Herberman HB, Craig KJ, Hayward MC, Fullerton CS, Ursano RJ, et al. Acute and chronic distress and posttraumatic stress disorder as a function of responsibility for serious motor vehicle accidents. *J Consult Clin Psychol* 1997;65:560-7.
- [6] Hickling EJ, Blanchard EB, Buckley TC, Taylor AE. Effects of attribution of responsibility for motor vehicle accidents on severity of PTSD symptoms, ways of coping, and recovery over six months. *J Trauma Stress* 1999;12:345-53.
- [7] Foa EB, Zinbarg R, Rothbaum BO. Uncontrollability and unpredictability in post-traumatic stress disorder: an animal model. *Psychol Bull* 1992;112:218-38.
- [8] Orth U, Wieland E. Anger, hostility, and posttraumatic stress disorder in trauma-exposed adults: a meta-analysis. *J Consult Clin Psychol* 2006;74:698-706.
- [9] Mayou RA, Ehlers A, Bryant B. Posttraumatic stress disorder after motor vehicle accidents: 3-year follow-up of a prospective longitudinal study. *Behav Res Ther* 2002;40:665-75.
- [10] Weiner B. An attributional theory of motivation and emotion. New York: Springer-Verlag; 1986.
- [11] McAuley E, Shaffer S. Affective responses to externally and personally controllable attributions. *Basic Appl Soc Psychol* 1993;14:475-85.
- [12] Neumann R. The causal influences of attributions on emotions: a procedural priming approach. *Psychol Sci* 2000;11:179-82.
- [13] Thompson LY, Snyder CR, Hoffman L, Michael ST, Rasmussen HN, Billings LS, et al. Dispositional forgiveness of self, others, and situations. *J Pers* 2005;73:313-59.
- [14] McCullough ME, Worthington Jr EL, Rachal KC. Interpersonal forgiving in close relationships. *J Pers Soc Psychol* 1997;73:321-36.
- [15] Clark AJ. Forgiveness: a neurological model. *Med Hypotheses* 2005;65:649-54.
- [16] Worthington Jr EL, Witvliet CV, Pietrini P, Miller AJ. Forgiveness, health, and well-being: a review of evidence for emotional versus decisional forgiveness, dispositional forgiveness, and reduced unforgiveness. *J Behav Med* 2007;30:291-302.
- [17] Romero C, Friedman LC, Kalidas M, Elledge R, Chang J, Liscum KR. Self-forgiveness, spirituality, and psychological adjustment in women with breast cancer. *J Behav Med* 2006;29:29-36.
- [18] Konstam V, Chernoff M, Deveney S. Towards forgiveness: the role of shame, guilt, anger and empathy. *Couns Values* 2001;46:26-39.
- [19] Witvliet CV, Phipps KA, Feldman ME, Beckham JC. Posttraumatic mental and physical health correlates of forgiveness and religious coping in military veterans. *J Trauma Stress* 2004;17:269-73.
- [20] Van Loey NEE, Maas CJM, Faber AW, Taal LA. Predictors of chronic post-traumatic stress symptoms following burn injury: results of a longitudinal study. *J Trauma Stress* 2003;16:361-9.
- [21] Andrews G, Peters L. The psychometric properties of the composite International Diagnostic Interview. *Soc Psychiatry Psychiatry Epidemiol* 1998;33:80-8.
- [22] APA. Diagnostic and statistical manual of mental disorders, 4th ed., Washington, DC: APA; 1994.
- [23] Fauerbach JA, Lawrence J, Haythornthwaite J, Richter D, McGuire M, Schmidt C, et al. Preburn psychiatric history affects posttrauma morbidity. *Psychosomatics* 1997;38:374-85.

-
- [24] Madianos MG, Papaghelis M, Ioannovich J, Dafni R. Psychiatric disorders in burn patients: a follow-up study. *Psychother Psychosom* 2001;70:30-7.
- [25] Olf M, Langeland W, Draijer N, Gersons BP. Gender differences in posttraumatic stress disorder. *Psychol Bull* 2007;133:183-204.
- [26] Novaco RW, Chemtob CM. Anger and combat-related post-traumatic stress disorder. *J Trauma Stress* 2002;15:123-32.
- [27] McCullough ME, Rachal KC, Sandage SJ, Worthington Jr EL, Brown SW, Hight TL. Interpersonal forgiving in close relationships. II. Theoretical elaboration and measurement. *J Pers Soc Psychol* 1998;75: 1586-603.
- [28] Bono G, McCullough ME. Positive responses to benefit and harm: bringing forgiveness and gratitude into cognitive psychotherapy. *J Cogn Psychother Int Q* 2006.