

Perceived Scar Severity and Social Anxiety Among Burn Patients: The Mediating Roles of Perceived Social Stigma and Body Image Dissatisfaction

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Burn scars affect not only burn patients' physical function but also their psychosocial adjustment. Encountering stigmatizing behaviors from others may increase burn patients' negative evaluation of their appearance—that is, body image dissatisfaction (BID), which raises their anxiety and fear of social interactions. The current study examined the association between perceived scar severity and social anxiety symptoms as mediated by perceived stigmatization and BID. Participants comprised 108 burn survivors of the 2015 Formosa Fun Coast Water Park fire disaster, including 63% females with a mean age of 24.19 years old and a mean total body surface area burned of 50.15%. We conducted a two-wave design at two years (Time 1, T1) and three years (Time 2, T2) after the 2015 fire. Serial mediation analysis was used to determine whether perceived social stigma and BID mediate the association between perceived scar severity and social anxiety symptoms serially. Results show that three years after the 2015 fire, 22.2% of the participants met the DSM-IV criteria for probable social anxiety disorder. After controlling for depressive symptoms at T1, we observed a significant serial mediation effect of T1 perceived scar severity on T2 social anxiety symptoms via T1 perceived social stigma and T1 BID. Note however that the reverse serial mediation effect was nonsignificant. In cross-lagged analysis, we determined that T1 BID was significantly predictive of T2 perceived social stigma; however, T1 perceived social stigma was not significantly predictive of T2 BID. This result contradicts the pathway of the serial mediation model described above. Overall, a relatively high proportion of burn patients reported clinically significant symptoms of social anxiety three years after the 2015 fire. Our findings highlight the importance of body image and social stigma in the postburn adjustment process.

Keywords: burn patients; social anxiety; body image; social stigma; serial mediation

Extended Abstract

Severe burn injury often leads to permanent appearance change (e.g., visible scars). The incidence of pathogenic scars (e.g., hypertrophic scars) has been reported to be 77% in burn patients (Gangemi et al., 2008). Such appearance change affects not only individuals' physical function but also their psychosocial adjustment. Social anxiety disorder (SAD), despite being one of the major psychological sequelae, has not been quantitatively studied in burn survivors or linked to burn scarring.

Visible scarring after burn injury causes difficulty in social participation and reintegration. Martin et al. (2017) revealed that burn survivors experience fear of rejection, self-consciousness, and embarrassment or humiliation in the presence of others. Burn patients, particularly those with visible scars, have also been found to be likely to encounter a variety of stigmatizing behaviors (e.g., staring, startled reaction, or teasing). The severity of burn and scar visibility has also been associated with perceived

social stigmatization (Lawrence, Fauerbach, Heinberg, et al., 2006). Moreover, stigmatizing behaviors from others increase burn patients' anxiety about their appearance changes (i.e., body image dissatisfaction [BID]) (Willemse et al., 2021), which heightens their anxiety and fear of social situations (Ajoudani et al., 2018; Thombs et al., 2008). This process has also been highlighted in the cognitive behavioral model of body image proposed by Cash (2002, 2012).

SAD is characterized by an excessive fear of scrutiny or negative evaluation by others, as proposed in the recent DSM-5 (American Psychiatric Association, 2013). Drawing on the studies referenced above, we speculated that both social stigma and BID are important contributing factors to the development of postburn SAD. We also speculated that they are associated with each other in this development, given the findings of the interplay between the two factors (e.g., Ajoudani et al., 2018; Thombs et al., 2008; Willemse et al., 2021). Burn survivors' body image concerns may be considered to instantiate the element of "mental representation of the self as seen by the audience" in the cognitive behavioral model of SAD proposed by Heimberg et al. (2014). According to this model, BID may cause burn survivors to overestimate others' negative evaluation, which may increase their social anxiety and avoidance of socially evaluative circumstances.

Taking all of the above into consideration, we used a two-wave longitudinal design to examine the association between perceived scar severity and later social anxiety symptoms as mediated by perceived stigmatization and BID serially. There were two primary hypotheses: First, perceived scar severity was hypothesized to predict subsequent social anxiety symptoms in burn patients. Second, perceived social stigma and BID were predicted to serially mediate perceived scar severity and social anxiety symptoms. We examined patients' self-rating of scar severity rather than objective assessments, as the former helps capture their subjective experience toward burn scarring and has been better correlated with social stigma, body esteem, and symptoms of depression (e.g., Lawrence et al., 2004).

Methods

Participants

The participants were 108 burn survivors of the 2015 Formosa Fun Coast Water Park fire disaster in Taiwan. Their ages were between 17 and 40 years ($M = 24.19$, $SD = 4.28$), and 63% were female. The mean total body surface area (TBSA) burned was 50.15% ($SD = 19.24$), and 69% of the participants had severe burn injuries ($> 40\%$ TBSA).

Procedures

We conducted a two-wave survey at two years (Time 1, T1) and three years (Time 2, T2) after the 2015 fire. From February 2017 to July 2018, we recruited participants through physician referral at the Burn Center of Linkou Chang Gung Memorial Hospital and through self-referral via website advertisements. All of the participants provided informed consent for participation. Our study was approved by the Institutional Review Board of Chang Gung Medical Foundation (Protocol No. 201509620B0C501).

Measures

The measures used were a) demographic and burn information; b) perceived scar severity: three items adapted from Lawrence et al. (2004); c) depressive symptoms: the Patient Health Questionnaire (PHQ-9; Kroenke et al., 2001); d) social anxiety symptoms: the Short Form Social Interaction Anxiety Scale (SIAS-6) and Social Phobia Scale (SPS-6; Peters et al., 2012), and straightforwardly worded items of the Brief Fear of Negative Evaluation Scale (Leary, 1983), i.e., the BFNE-S (Weeks et al., 2005); e) perceived social stigma: the Perceived Stigmatization Questionnaire (PSQ; Lawrence, Fauerbach, Heinberg, et al., 2006); and f) BID: the Satisfaction with Appearance Scale (SWAP; Lawrence et al., 1998).

Analyses

All of the analyses were carried out with SPSS 25.0. We used the PROCESS macro 3.5 for SPSS (Hayes, 2020) to test whether perceived social stigma and BID mediated

the effect of perceived scar severity on social anxiety serially (Model 6). The indirect effect would be significant if the 95% bootstrap confidence intervals (CI) did not include zero. We calculated the effect size for mediation using completely standardized indirect effects (CSIE; Preacher & Kelly, 2011), with small, medium, and large effect sizes defined as .01, .09, and .25, respectively (Kenny, 2021). An additional cross-lagged analysis was performed using Mplus 8.0 (Muthén & Muthén, 2017). Model fit was tested using scaled χ^2 , comparative fit index (CFI), root-mean-square error of approximation (RMSEA), and standardized root mean square residual (SRMR), with good fit defined as CFI \geq .95, RMSEA \leq .06., and SRMR \leq .08 (Hu & Bentler, 1999). To fully capture the breadth of social anxiety symptoms, we created a social anxiety composite variable by standardizing (i.e., z-scoring) the SIAS-6, SPS-6, and BFNE-S scores and summing them.

Results

Prevalence of probable SAD postburn

Based on the cutoff scores of 7 on the SIAS-6 and 2 on the SPS-6 (Peters et al., 2012), 22.2% of the participants ($n = 24$) met probable DSM-IV SAD three years after the

2015 fire. There was no significant gender difference: men 25.0%, women 20.6%, $\chi^2(1, N = 108) = .28, p = .594$.

Serial mediation analysis

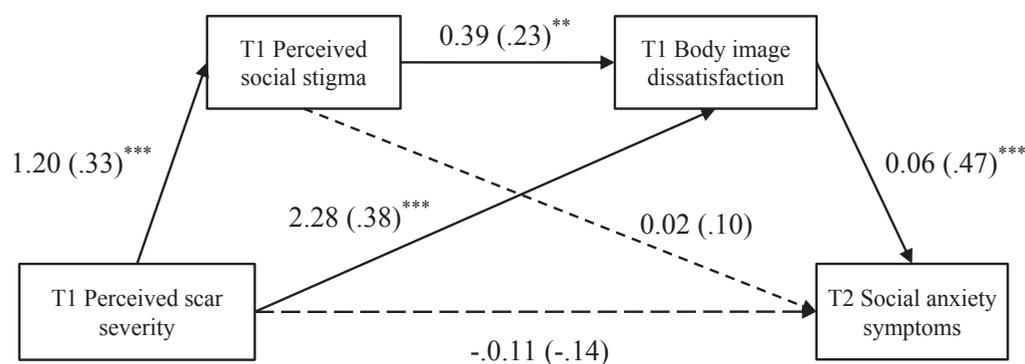
As shown in Figure 1, the serial mediation effect of T1 perceived scar severity on T2 social anxiety symptoms via T1 perceived social stigma and T1 BID was significant ($B = .03, 95\% \text{ CI } [.01, .07], \text{CSIE} = .04$) when T1 depressive symptoms were controlled for. Moreover, the mediating effect of T1 BID (but not T1 perceived social stigma) on the relationship between perceived scar severity and T2 social anxiety symptoms was significant ($B = .14, 95\% \text{ CI } [.07, .23], \text{CSIE} = .18$). To determine the directionality of the mediation, we also tested the reverse serial mediation model. However, the serial mediation effect of T1 perceived scar severity on T2 social anxiety symptoms via T1 BID and T1 perceived social stigma was nonsignificant ($B = .01, 95\% \text{ CI } [-.01, .04], \text{CSIE} = .01$).

Additional analysis

As BID and perceived social stigma were assessed at both T1 and T2, we examined their cross-lagged reciprocal relationship. Overall, the cross-lagged model showed excellent fit: $\chi^2(4) = 1.70, p = .791, \text{CFI} = 1.00, \text{RMSEA} =$

Figure 1

A serial mediation analysis of perceived social stigma and BID prospectively predict social anxiety symptoms

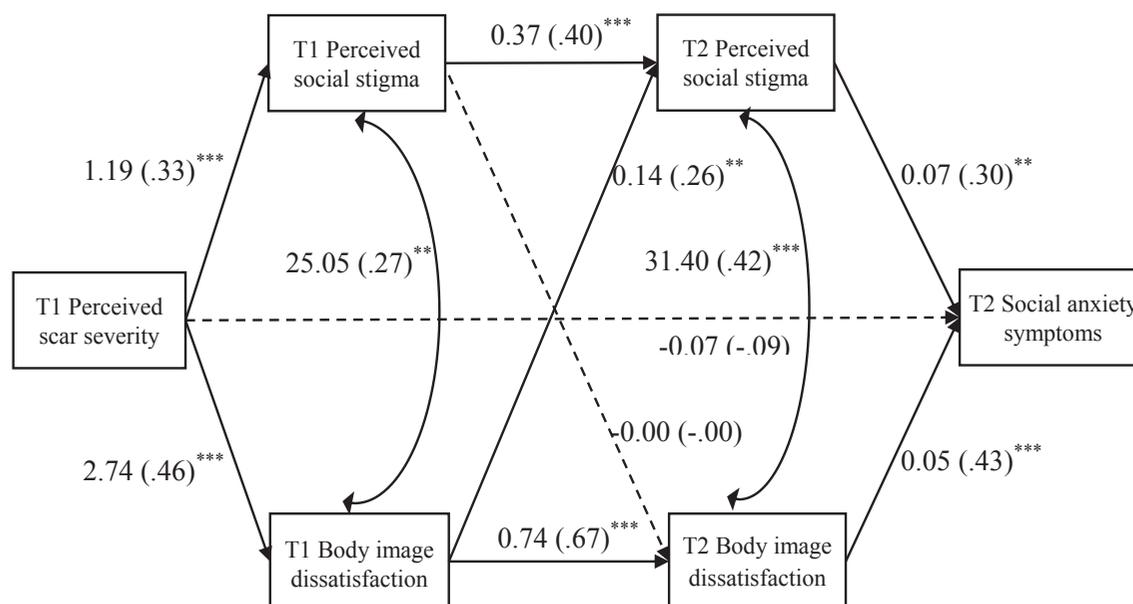


Note. T1 = Time 1 (two years after the 2015 disaster), T2 = Time 2 (three years after the 2015 disaster). Path coefficients were unstandardized estimates with T1 depressive symptoms controlled for (with standardized estimates in parentheses). A solid line denotes a significant relationship ($p < .05$) while a dashed line indicates a nonsignificant relationship.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Figure 2

A cross-lagged analysis of perceived social stigma and BID prospectively predict social anxiety symptoms



Note. T1 = Time 1 (two years after the 2015 disaster), T2 = Time 2 (three years after the 2015 disaster). Path coefficients were unstandardized estimates with T1 depressive symptoms controlled for (with standardized estimates in parentheses). A solid line denotes a significant relationship ($p < .05$) while a dashed line indicates a nonsignificant relationship.

* $p < .05$. ** $p < .01$. *** $p < .001$.

.00, and SRMR = .01. As shown in Figure 2, T1 BID was significantly predictive of T2 perceived social stigma ($p = .006$), but T1 perceived social stigma failed to predict T2 BID ($p = .989$). It is also worth noting that T2 perceived social stigma ($p = .001$) and T2 BID ($p < .001$) were both significantly predictive of T2 social anxiety symptoms.

Conclusions and Implications

This study found that 22.2% of the participants had probable DSM-IV SAD, thus showing that a relatively high proportion of burn patients experienced clinically significant symptoms of social anxiety three years after the 2015 fire. Rimmer et al. (2014) found that 20% of the adolescent burn patients in their study had probable SAD two years after burn, which is fairly close to our finding of 22.2%. However, studies on the prevalence of SAD in burn patients have varied by method and follow-up time point. Studies using diagnostic interviews have generally found

lower prevalence rates (e.g., Palmu et al., 2011; Ter Smitten et al., 2011) than those using the cutoff of the self-report measures.

Using a two-wave design, we found a significant serial mediation effect of T1 perceived scar severity on T2 social anxiety symptoms via T1 perceived social stigma and T1 BID when we controlled for depression at T1 (see Figure 1). However, the reverse serial mediation effect was nonsignificant. These results are consistent with the finding of Lawrence et al. (2004) that perceived stigmatization mediated perceived scar severity and body esteem and with the finding of Willemse et al. (2021) that perceived stigmatization mediated burn severity and BID. Our simple mediation analysis revealed that perceived scar severity affected social anxiety symptoms only through BID. Taken altogether, the results suggest that BID may be a direct risk factor for SAD in burn patients.

Our cross-lagged analysis showed that T1 BID was significantly predictive of T2 perceived social stigma, but

not vice versa. This result contradicts the pathway of the serial mediation model described above. There are several possible explanations for the contradictory findings. First, the mean score of BID considerably increased from T1 to T2, but the mean score of perceived social stigma slightly decreased from T1 to T2. This discrepancy suggests that other factors influenced the increase of BID, such as social support (e.g., Ajoudani et al., 2018) and the importance of appearance (Lawrence, Fauerbach, & Thombs, 2006). Second, in the original serial mediation model, perceived scar severity, perceived social stigma, and BID were all measured at T1, thus reflecting a cross-sectional mediation. Cross-sectional mediation analyses may generate a substantial indirect effect despite the true longitudinal indirect effect being zero (Maxwell et al., 2011).

In terms of clinical implications, our findings suggest that BID may play a more prominent role than perceived social stigma in the pathway of perceived scar severity to social anxiety. When addressing social anxiety in burn patients, BID may be a better therapeutic target to prevent SAD compared with scar severity and perceived stigmatization. There have been several effective psychological interventions for BID, which have mostly

been cognitive behavioral interventions (e.g., teaching self-monitoring and cognitive restructuring; Alleva et al., 2015). These may have potential for application in burn populations.

There are several caveats to our study that should be considered. First, the participants were survivors of the 2015 fire and had considerably more severe injuries (mean TBSA = 51.6%) than the general burn population. Second, we used a subjective self-rating of scar severity instead of an objective assessment (e.g., laser Doppler flowmetry). There might have been individual differences in the participants' perception of scar severity. Finally, although a two-wave design was used, the main outcome (i.e., social anxiety symptoms) was assessed only at T2, thus excluding the possibility of controlling for the baseline outcome.

Despite these caveats, our study addressed the research gaps by investigating how scar severity, perceived social stigma, and BID affected symptoms of social anxiety in burn survivors with a two-wave longitudinal design. To conclude, our findings highlight the importance of body image and social stigma in the postburn adjustment process.

