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Dear Dr. Wolf,

Thank you for considering a revised version of our manuscript for publication in *Burns*. We also wish to thank the two reviewers for their very helpful and constructive comments and for their very kind editorial suggestions. We addressed all remarks and modified our manuscript, accordingly. All changes are highlighted (yellow).

We are looking forward to hearing from you,

On behalf of all authors,

Yours sincerely,

Astrid Müller

Conflict of interest statement

The authors declare no conflict of interest.

==We wish to thank the two reviewers for their very helpful remarks and kind editorial suggestions.==

Reviewer #1:

I thought the paper is solid and makes contribution to the literature. I make the following suggests for editing the paper.

==RESPONSE: Thank you very much.==

Throughout the paper there are incidents in which a space is missing between two words. That is likely due to errors created when the original document was converted to a pdf format.

==RESPONSE: Indeed, the missing spaces were due to errors when the manuscript was converted to a pdf format. We had uploaded the manuscript several times but this did not help. We now add a comment to the technical support team about the repeated error.==

Introduction
I made some editorial suggestion on how improve the wording of the first paragraph of the introduction.

Skin burns represent a relatively common form of injuries with about one incident per 350 people per year in Germany [1]. Despite significant advances in medical care, surgical management and reconstructive procedures for burn survivors, many victims feel different and are treated differently due to their scares. Besides physical consequences of scars such as itching and pain, burn survivors feel shame about the appearance of their scars and social anxiety [2]. People with visible differences also experience socially stigmatizing behavior such as staring, startled reaction, whispering, teasing, rude comments, intrusive questions, avoiding eye contact, manifestations of pity, etc.

==RESPONSE: We are very thankful for this suggestion. The first paragraph now reads as suggested by the reviewer.==

You may want to cite references for interventions which teach strategies for coping with stigma behavior and treat social anxiety related to visible differences.

Alex Clarke, Andrew R. Thompson, Elizabeth Jenkinson, Nichola Rumsey, Robert Newell (2014). CBT for Appearance Anxiety: Psychosocial Interventions for Anxiety due to Visible Differences. Oxford UK: Wiley Blackwell.

Bessell A, Brough V, Clarke A, Harcourt D, Moss TP, Rumsey N. Evaluation of the effectiveness of Face IT, a computer-based psychosocial intervention for disfigurement-related distress. Psychol Health Med. 2012;5:565-577.

==RESPONSE: We included both references in the Discussion within the paragraph concerning clinical implications (2nd paragraph on page 12).==

Methods

There is no description of the procedure used to ensure accurate translation. Was that described in previously referenced paper (reference 12)?

==RESPONSE: We added the following sentence with regard to the PSQ/SCQ on the top of page 6: "According to Masnari et al. [9, 10], the translation of the questionnaire followed the guidelines for the process of translation of self-reports, including the use of back-translation [9, 10]."==

With regard to the BSHS-B we added on page 6 (3rd paragraph): "The translation and back-translation procedure and the validation of the German version of the BSHS-B were previously described in detail elsewhere [12]."

Did you screen your data for violations of multivariate analysis assumptions? If so, you should mention that.

RESPONSE: Yes, we checked the data for violations (i.e. normality). This is now mentioned in the text on page 8 (last paragraph of Statistical Analyses).

Other than the 7 people that were eliminated due to missing data, how common was missing data among participants retained in the data set? Did the missing data appear to be at random or were participants more likely to skip particular questions?

RESPONSE: We could not find a pattern of missing data with regard to specific items. The missing data appeared to be at random.

I suggest the following edit on page 6, paragraph 2: "Both the PSQ/SCQ and the F-SozUare assess psychosocial aspects of adjustment."

RESPONSE: We thank the reviewer and we edited this phrase on the bottom of page 7.

Your response rate was 146/808 = .18, correct? Is there any evidence of differences between the respondents and non-respondents in regard to demographic data?

RESPONSE: We used data from patients' charts only if the patients gave written informed consent. Demographic data at time of survey were available from only those patients who participated in the survey. Therefore, we cannot provide information about possible differences.

Results

In the CFA in the Lawrence et all paper, based on the modification indices, the residuals of two pairs of items were specified to correlate. In your CFA, items 7 and 12 have low factor loading. You may want to check your modification indices, the fit of your model may improve if you allow the residuals of those items to correlate.

RESPONSE: We made additional analyses as suggested by the reviewer. However, the fit of the 4-factor model did not ameliorate considerably by adding an error covariance between item PSQ7 and PSQ12. The correlation was significant, but it lowered the factor loadings even more.

You might consider calculating factor reliability scores (Raykov, 2004). It is a better measure of reliability than Cronbach's alpha.

RESPONSE: We calculated the factor reliability scores. According to Rykov (2004), they were all reasonable (all <0.70): Social Comfort 0.857, Hostile Behavior 0.726, Absence of Friendly Behavior 0.906, and Staring 0.839.
The information is now added on page 9.

Discussion

Page 9 paragraph 2 at bottom DELETE the word hypertrophic staring.

RESPONSE: We deleted the word "hypertrophic".

You may want to comment on the two items on the Absence of Friendly behavior that had low factor loadings. Perhaps, these items are not good items for measuring absence of friendly behavior in all

context. Smiling at strangers may be common in some cultural context such as small towns and suburbs but less common in cities.

> RESPONSE: We thank the reviewer for this remark and we hope it is okay with him/her that we included this comment in the Discussion on page 10: "As can be seen in Table 2, two items on the PSQ Absence of Friendly Behavior subscale had low factor loadings (<0.50), particularly item 7 (People I don't know say "Hi" to me.) and item 12 (People I don't know smile at me in a friendly way.). At least in the present sample, it appears that both items measured the construct Friendly Behavior insufficiently. We assume that the response to these items may depend from the context. For example, friendly smiling and saying "Hi" may be common in certain circumstances (e.g. suburbs) but less usual in a different context.

You could also consider having a paragraph discussing the clinical implications of the paper. The PSQ and SCQ might be able to be used to screen for people who would benefit from CBT for social anxiety related to appearance. Moreover, in the future it would be helpful to clinicians to develop cut off scores for the PSQ and SCQ.

> RESPONSE: Again, many thanks for the suggestions. We added the following paragraph concerning clinical implications on page 12: "The findings have some clinical implications. For example, the PSQ/SCQ could be used to screen for patients who may benefit from psychotherapy for social anxiety or depression resulting from skin burns. Further studies should investigate the application of the German PSQ/SCQ in individuals with disfigurements that are not related to burn injuries. Moreover, it would be very helpful to clinicians to define cutoff scores for the PSQ and the SCQ. The scales could also be suitable for the validation of interventions which aim at reducing anxiety, depression, and appearance concerns in people with adjustment problems due to visible differences [19, 20]."

Reviewer #2:

The aim of this study is to investigate the validity of the German version of the Perceived Stigmatization Questionnaire / Social Comfort Questionnaire (PSQ/SCQ) among adult burn survivors. The two measures were completed by 139 adult burn survivors. A confirmatory factor analysis indicated a four-factor structure with three PSQ factors (absence of friendly behavior, confused/staring behavior, and hostile behavior) and one SCQ factor. All PSQ/SCQ scales showed good internal consistency indices. Results of correlations analysis with measures of related constructs (perceived social support, HRQOL, anxiety/depression, and percent of total body surface area burned) suggest that the PSQ and SCQ have good convergent and discriminant validity.

Studies on the psychometric properties of translated measures such as this study are important to guarantee the appropriateness of the use of translated measures.
The article is clearly laid out and easily comprehensible.

> RESPONSE: Thank you very much.

Comments

General:
1.
There seems to be a format problem, with the result that some spacing between words are missing throughout the document (e.g., in the abstract, line 5 'scalesand' and line 6 'burn-specifichealth-related'). (This is a common problem when Word documents are opened in older Word versions). Please check the whole document for such errors.

RESPONSE: The missing spaces were due to errors when the manuscript was converted to a pdf format. We had uploaded the manuscript (docx) several times but this did not help. We now add a comment to the technical support team about the error.

Abstract:

3.

Page 2, line 3.

Please add the M and SD of the age of the participants in the abstract

RESPONSE: We now add M and SD of the age of the participants in the abstract.

4.

Page 2, line 9-10

It might be helpful to change the sentence into:

"The four-factor model showed the best fit to the data with three PSQ factors (absence of friendly behavior, confused/staring behavior, and hostile behavior) and one single SCQ factor."

RESPONSE: We are very thankful for this suggestion and we changed the sentence, accordingly.

Also, authors should use Capital/Lower Case letters consistently throughout the paper when referring to scales (e.g., either write "Absence of Friendly Behavior" or "absence of friendly behavior).

RESPONSE: We now use Capital letters throughout the text (i.e. Absence of Friendly Behavior", etc.).

Introduction

5.

Page 3. line 6.

I don't understand what is meant with "hypertrophic staring". As far as I know, I don't think this expression exists. Maybe just 'staring' ?

RESPONSE: We deleted the word "hypertrophic".

6.

Page 3, first line of 2nd paragraph:

Attention to the spacing between the authors (Lawrence, Fauerbach, Heinberg, Doctor, and Thombs)..

also, I suggest you write "assessing" instead of "referring to".

RESPONSE: We made the changes.

7.

Page 3, second-last line.

Since in the Result section you will also report Means of the PSQ Total Score, I would mention here that there is also a PSQ Total score and explain how this total score is calculated.

RESPONSE: We added the following sentence on the top of page 3/4: "The total score is calculated by totaling all 21 items and dividing the sum by 21, scale scores are calculated by adding the items and dividing by the number of items [6]."

Finally, I suggest to add the following sentence:

"Higher scores on the PSQ scales indicate higher levels of perceived stigmatization".

RESPONSE: We added the sentence as suggested by the reviewer.

8.

Page 4, first line

I suggest you rearrange the sentence into " The instrument includes 8 items (e.g., I feel like I fit in with most groups. / I feel comfortable in a crowd.), which are answered on the same 5-point Likert scale as the PSQ.

Then I would suggest to add the following sentence:

"Higher scores on this scales indicate higher level of feeling social comfort"

RESPONSE: Please see our response to comment #7. We made the changes and add now information on how to calculate the scores. The paragraph reads now (page 3/4): "The total score is calculated by totaling all 21 items and dividing the sum by 21, scale scores are calculated by adding the items and dividing by the number of items [6]. Higher scores on the PSQ scales indicate higher levels of perceived stigmatization. The one-dimensional SCQ measures how comfortable a person feels around others. The instrument includes 8 items (e.g., I feel like I fit in with most groups. / I feel comfortable in a crowd.), which are answered on the same 5-point Likert scale as the PSQ. Items 2, 3, and 7 are reverse coded [6]. The SCQ score is calculated by adding all items and dividing by 8. Higher scores on this scale indicate higher level of feeling social comfort."

9.

Page 4, line 15

"the primary objectives.. were.. (use plural, since you have 2 objectives).

RESPONSE: We made the change.

10.

Page 4, line 18

use "proxy variable" instead of just "proxy"

RESPONSE: We now use "proxy variable".

11.

page 4, last line

Maybe you should add "being in a couple relationship at the time of the survey" or "currently living in a partnership" to make it clear that the relationship status was not assessed as "before or after the burn injury".

RESPONSE: We made the change.

Material and Methods

12.

Page 5. Procedure.

Please specify the inclusion criteria. Were all patients that were treated between 2006 and 2012 included in this study? Or were there any specific inclusion criteria (e.g., age?) or exclusion criteria?

RESPONSE: All patients treated between 2006 and 2012 at the burn unit of the Department of Plastic, Hand and Reconstructive Surgery of the Hannover Medical School were identified via electronic chart files and invited to participate in the study. Exclusion criteria were dementia or intellectual disability. We clarify this now on page 5 (Procedure) and on page 8 (Description of the sample).

13.

Page 5. Assessment:

I suggest you start with the second paragraph ("Information on TBSA burned was taken from……" where you end with "filled out a questionnaire package that included the following self-rating instruments"..

And then start with the PSQ/SCQ, followed by the F-SozU and so on..
> RESPONSE: We made the changes.

14.
I would suggest you explain that you have used a German translation of the PSQ/SCQ, that has been used in a previous study before (→ add reference of that study). And that the translation procedure followed common guidelines (e.g., the use of independent back-translation, and approval by the original author)
> RESPONSE: We now explain that we used a German translation of the PSQ/SCQ that has been translated by following common guidelines and we references to pervious studies (page 5/6).

If you have added the information on the direction of the scale (higher score = higher perceived stigmatization) on page 3 (with the description of the questionnaire), there is no need to repeat it here.
> RESPONSE: We deleted the information given that we had included it in the Introduction.

15.
Page 6, first paragraph.
Could you please provide a little more information on the three main domains of the Burn Specific Health Scale-Brief? What do these 3 scales assess? And what do higher scores in these scales indicate?
> RESPONSE: We rewrote the paragraph concerning the BSHS-B. It reads now (page 6): Burn-specific health-related quality of life was determined using a German version [12] of the Burn Specific Health Scale-Brief (BSHS-B) [14]. The BSHS-B consists of nine subscales. For the present study, we used the three main BSHS-B components that were based on a second-order factor analysis previously published by Willebrand and Kildal [14]: Affect and Relationship (subscales Interpersonal Relationships, Affect, and Sexuality; 14 items, α=0.94), Function (subscales Simple Abilities and Hand Function; 8 items, α=0.91), and Skin Involvement (subscales Heat Sensitivity, Treatment Regimens, and Body Image; 14 items, present sample: α=0.95). The translation procedure and the validation of the German version of the BSHS-B were previously described in detail elsewhere [12].

16.
Page 7, line 18
Please add "current" partnership status (see Comment 15)
> RESPONSE: We added "current".

Results
17.
Page 8, first paragraph
Could you provide more information to interpret the response rate? (e.g., how many patients could not be contacted because of a change of address? Do you have any information that could explain the low response rate?) Do you have any data on possible differences between responders and non-responders? (e.g., time after accident, TBSA, age, gender)?
> RESPONSE: If unopened questionnaire packages were returned by mail, we made enquiries at the registration offices about the patients' whereabouts and whether they were still alive in order to detect patients who moved or passed away since their last admission to the burn unit (please see Procedere, page 5). Therefore, current addresses were available from all patients. Nevertheless, 545 patients did not respond. We now describe the patient flow in more detail on page 8 (Description of the sample). It reads now: "Between 2006 and 2012, 870 patients were treated at the burn unit. Sixty-two patients were already deceased according to the files. Of the remaining 808 patients, 51 deceased according to information

from relatives or from the registration office, 12 met exclusion criteria according to information from relatives (i.e. dementia, intellectual disability), and 54 refused to participate in the study. From 545 patients we did not receive any response. The final sample consisted of 146 patients [12]."
We used data from patients' charts only if the patients gave written informed consent. Demographic data at time of survey were available from only those patients who participated in the survey. Therefore, we cannot provide information about possible differences.

Discussion
18.
Page 10, end of second paragraph
"hypertrophic staring" → See Comment Nr. 5

     RESPONSE: We deleted the word "hypertrophic".

19.
Page 10, end of second paragraph
The authors suggest that perceived stigmatizing behaviors are particularly linked to anxiety, whereas perceived lack of friendly social interactions are linked to depression.
→ I think it is important to note that the cross-sectional design of this study prevents any conclusions about causal relations.

     RESPONSE: We agree with the reviewer and we are now more tentative in interpreting the results. Furthermore, we added a sentence about the cross-sectional design. It reads now (page 11, 2nd paragraph): "This pattern of results indicates that perceived stigmatizing behaviors (staring, rude comments, or teasing, etc.) may be linked to anxiety; whereas perceived lack of friendly social interactions may be linked to depression. However, the cross-sectional design of this study prevents any conclusions about causal relations."

20.
Table 5
We suggest to change the wording of the headings from "With/Without couple relationship" ..
Suggestion: "Currently in a couple relationship" "Currently not in a couple relationship"

     RESPONSE: We made the changes in Table 5 as suggested by the reviewer.

- We validated the German version of the PSQ/SCQ in adult burn victims
- Methods: confirmatory factor analysis and correlation analyses
- The results indicate a four-factor structure and good psychometric properties

Short title: Perceived Stigmatization Social Comfort

Validation of the German versions of the Perceived Stigmatization Questionnaire and the Social Comfort Questionnaire in adult burn survivors

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ABSTRACT

Objective: To investigate the factor structure, reliability, and validity of the German version of the Perceived Stigmatization Questionnaire/Social Comfort Questionnaire (PSQ/SCQ) in burn victims. Methods: The PSQ/SCQ was answered by 139 adult burn survivors (age M=49.69, SD=15.16 years). Factor structure was examined using a confirmatory factor analysis (CFA). Validity was investigated through correlations between the PSQ/SCQ scales and questionnaires assessing perceived social support, burn-specific health-related quality of life, symptoms of anxiety/depression, and percent of total body surface area (TBSA) burned. Additionally, the link between perceived stigmatization/social comfort and current partnership status was investigated. Results: The four-factor model showed the best fit to the data with three PSQ factors (Absence of Friendly Behavior, Confused/Staring Behavior, and Hostile Behavior) and one single SCQ factor. All PSQ/SCQ scales showed good internal consistency. Higher PSQ/lower SCQ means were related to less perceived social support, less burn-specific quality of life, and more symptoms of anxiety/depression. With the exception of a positive correlation with the PSQ subscale Confused Behavior and Staring, no other significant correlations were found between the PSQ/SCQ subscales and TBSA burned. While PSQ/SCQ scores were not linked to age or gender, less perceived social stigmatization/more social comfort was reported by participants who were currently living with a partner. Conclusions: The results indicate a four-factor structure and a good validity of the PSQ/SCQ which is in line with prior research. Further studies should investigate the application of the PSQ/SCQ in individuals with appearance distinctions that are not related to burn injuries.

Keywords: Perceived stigmatization, social comfort, burn-specific health related quality of life, anxiety, depression, validity

Introduction

Skin burns represent a relatively common form of injuries with about one incident per 350 people per year in Germany [1]. Despite significant advances in medical care, surgical management and reconstructive procedures for burn survivors, many victims feel different and are treated differently due to their scares. Besides physical consequences of scars such as itching and pain, burn survivors feel shame about the appearance of their scars and social anxiety [2]. People with visible differences also experience socially stigmatizing behavior such as staring, startled reaction, whispering, teasing, rude comments, intrusive questions, avoiding eye contact, manifestations of pity, etc. [3]. The perception of burn-related stigmatization and reduced social comfort is likely to contribute to worse psychological outcomes after burn injuries including anxiety, depression and reduced health-related quality of life (HRQoL) [1, 3-5]. Therefore, it is important to gain information on perceived stigmatization and social comfort after burn injury, as this may expand the knowledge about social experiences among burn survivors, offer the chance for specific interventions and facilitate reducing long term mental burden.

Lawrence, Fauerbach, Heinberg, Doctor and Thombs [6] developed two questionnaires assessing social experiences of people with appearance distinctions, the Perceived Stigmatization Questionnaire (PSQ) and the Social Comfort Questionnaire (SCQ), and validated these questionnaires in an US sample of 361 adult burn survivors. The PSQ assesses how a person perceives others' behaviors directed towards him or her. The scale consists of 21 items answered on a 5-point Likert scale (frequencies: 1=never to 5=always) loading on the following three factors: Confused Behavior and Staring (8 items, e.g., People avoid looking at me./People seem embarrassed by my look.), Absence of Friendly Behavior (8 reversed coded items; e.g. People are relaxed around me./People treat me with respect.), and Hostile Behavior (5 items, e.g. People call me names./People laugh at me.). The total score is calculated by totaling all 21 items and dividing the sum by 21, scale scores are calculated by

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adding the items and dividing by the number of items [6]. Higher scores on the PSQ scales indicate higher levels of perceived stigmatization. The one-dimensional SCQ measures how comfortable a person feels around others. The instrument includes 8 items (e.g., I feel like I fit in with most groups. / I feel comfortable in a crowd.), which are answered on the same 5-point Likert scale as the PSQ. Items 2, 3, and 7 are reverse coded [6]. The SCQ score is calculated by adding all items and dividing by 8. Higher scores on this scale indicate higher level of feeling social comfort.

Initially, perceived stigmatization and social comfort were considered as two distinct constructs [7]. Later on, Lawrence, Rosenberg, Rimmer, Thombs and Fauerbach [8] suggested that both constructs may belong to one overarching construct. This assumption was based on a study in pediatric and adult burn survivors who had answered the PSQ and the SCQ, where both instruments were strongly related. Using confirmatory factor analysis (CFA), the authors tested different models and concluded that the best fitting model was the four-factor model with the three aforementioned PSQ scales plus the single SCQ factor. All scales were correlated and loaded on one second order factor.

The PSQ/SCQ was previously translated into German by a group from the University Children's Hospital Zurich, Switzerland, and used to determine stigmatization in children and adolescents with facial differences [9, 10]. To date, we are not aware about a study that validated the German version in adult burn victims. Therefore, the primary objectives of the present study were to 1) investigate the factor structure and internal consistency of the PSQ/SCQ, and 2) to establish the association between PSQ/SCQ scores and perceived social support, burn-related quality of life, symptoms of anxiety and depression, as well as with a proxy variable for scar severity (i.e. percent of total body surface area burned, TBSA burned) and with sociodemographic variables. We expected to replicate the four-factor structure of the PSQ/SCQ suggested by Lawrence et al. [8]. Furthermore, we assumed that a higher level of perceived stigmatization as measured with the PSQ scales and a lower level of social comfort

as measured with the SCQ will be correlated with less perceived social support, less burn-specific quality of life, and more symptoms of anxiety and depression. In addition, we expected to find a positive correlation between perceived stigmatization and TBSA burned. Finally, we hypothesized that being in a couple relationship at the time of the survey will be related to lower perceived stigmatization and more social comfort, given that intimacy and support from a partner in developing coping strategies may be linked to individual well-being [11].

Material and Methods

Procedure

The procedure of the present study was already described in more detail elsewhere [12]. Patients treated between 2006 and 2012 at the burn unit of the Department of Plastic, Hand and Reconstructive Surgery of the Hannover Medical School were identified via electronic chart files and invited to participate in the study. Exclusion criteria were dementia or intellectual disability. Patient information, informed consent forms and questionnaires were sent to the identified patients. If unopened questionnaire packages were returned by mail, we made enquiries at the registration offices about the patients' whereabouts and whether they were still alive in order to detect patients who moved or passed away since their last admission to the burn unit. Participation in the study was completely voluntarily. The protocol was approved by the Institutional Ethics Committee.

Assessment

All participants provided sociodemographic information and filled-out a questionnaire package that included the following self-rating instruments.

We used a German translation [9, 10] of the PSQ/SCQ [6] that was kindly provided by Dr. Ornella Masnari and Dr. Clemens Schiestl from the University Children's Hospital

Zurich, Switzerland. According to Masnari et al. [9, 10], the translation of the questionnaire followed the guidelines for the process of translation of self-reports, including the use of back-translation [9, 10].

Perceived social support was measured using the 7-item version of the *Social Support Questionnaire* (F-SozU) [13]. Higher scores indicate the perception of more social support. Cronbach's α in the present sample was 0.91.

Burn-specific health-related quality of life was determined using a German version [12] of the *Burn Specific Health Scale-Brief* (BSHS-B) [14]. The BSHS-B consists of nine subscales. For the present study, we used the three main BSHS-B components that were based on a second-order factor analysis previousely published by Willebrand and Kildal [14]: Affect and Relationship (subscales Interpersonal Relationships, Affect, and Sexuality; 14 items, $\alpha=0.94$), Function (subscales Simple Abilities and Hand Function; 8 items, $\alpha=0.91$), and Skin Involvement (subscales Heat Sensitivity, Treatment Regimens, and Body Image; 14 items, present sample: $\alpha=0.95$). The translation and back-translation procedure and the validation of the German version of the BSHS-B were previously described in detail elsewhere [12].

The presence of anxiety and depression was assessed with the *Hospital Anxiety and Depression Scale* [15]. This instrument is considered to be unbiased by somatic conditions given that it does not consist of items referring to symptoms that may have a physical cause (e.g. injury). The HADS contains two 7-item subscales, one for anxiety (present sample: $\alpha=0.89$) and one for depressive (present sample: $\alpha=0.94$) symptoms.

Information on TBSA burned was taken from patients' electronic chart files.

Statistical Analyses

Statistical analyses were performed using Mplus 7.3 and IBM SPSS Statistics version 21, as appropriate. A maximum of 10% missing data per person on the PSQ/SCQ was allowed,

responses of 7 persons with more missing data were removed. The remaining missing responses were imputed separately per scale, using a regression based multiple imputation implemented in SPSS21. Missing data on other questionnaires and TBSA missing data were not imputed.

To examine the factor structure, a confirmatory factor analysis (CFA) was conducted on the PSQ/SCQ responses. Due to the categorical nature of the responses, a Weighted Least Squares Means and Variances Adjusted estimation method (WLSMV option, MPLUS 7.3) was used for estimating the CFA model parameters. In line with the study of Lawrence et al. [8], four different models were examined: a one-factor model, functioning as a baseline for relative model fit, a two-factor model, with the PSQ items loading on a Perceived Stigmatization factor and the SCQ items on a Social Comfort factor, a three-factor model in which the Stigmatization factor was split into a Negative Social Behavior factor (Hostile Behavior, Confused Behavior and Staring) and a Positive Behavior factor (Friendly Behavior), and finally a four-factor model in which the Negative Social Behavior factor was split into a factor comprising Hostile Behavior and a factor comprising Confused Behavior and Staring.

Model fit was assessed by multiple criteria: comparative fit index (CFI) for fit relative to a null model, complemented with the Root Mean Square Error of Approximation (RMSEA) for overall fit. The criteria for good model fit were defined according to Hu and Bentler [16] as CFI>0.95 (0.90 is acceptable), and RMSEA>0.06 (0.09 is acceptable). Relative fit of the 3 CFA's was determined using the Satorra-Bentler Chi² difference test [17] and the difference in CFI, for which a difference exceeding 0.01 is considered significant.

Both the PSQ/SCQ and the F-SozU assess psychosocial aspects of adjustment. Therefore, construct validity was determined assessing the relationship between these questionnaires. Since we assumed an association between less perceived stigmatization/higher social comfort and better burn-specific HRQoL, and mental health, the relationships of the

PSQ/SCQ with the BSHS-B, and the HADS were analysed to define convergent validity. In addition, the TBSA was used to measure convergent validity given that patients with different levels of burn severity were theoretically expected to also be different with regard to perceived stigmatization after burn. Relationships between variables were determined calculating two-tailed Spearman's rank-order correlations. In addition, we examined the influence of age, gender, current partnership status and time since injury on the PSQ/SCQ subscales. Before calculating group differences (e.g. men vs. women, currently living with vs. without a partner), the data were checked for normality. For continuous variables, we performed *t*-tests or nonparametric tests (i.e. Mann-Whitney *U* tests) when the assumption for normality was violated. Categorical variables were compared by using $\chi2$-tests. The significance level for all tests was set at $\alpha=0.05$.

Results

Description of the sample

Between 2006 and 2012, 870 patients were treated at the burn unit. Sixty-two patients were already deceased according to the files. Of the remaining 808 patients, 51 deceased according to information from relatives or from the registration office, 12 met exclusion criteria according to information from relatives (i.e. dementia, intellectual disability), and 54 refused to participate in the study. From 545 patients we did not receive any response. The final sample consisted of 146 patients [12]. Seven of the 146 individuals had more than 10% missing data in the PSQ/SCQ resulting in a final sample size of 139 burn survivors with valid PSQ/SCQ data. The group included 90 men (64.7%) and 49 women (35.3%), had a mean age of 49.69 years (*SD*=15.16, *range* 18-84) and participated in the survey on average 46.98 months (*SD*=26.41, range 11-98) after burn. Information about TBSA burned was available from 125 patients. They had sustained burns with an on average TBSA of 12.9% (*SD*=10.291,

range 1-40). The majority of the sample reported having a partnership (51.1% married, 12.9% living with a partner); 8.6% were divorced, 4.3% were widowed, and 1.4% were separated. Inability to work was present in 22.5% of the sample.

Factor structure

The results of the CFAs are presented in Table 1. In line with Lawrence et al. [8], the four-factor model showed the best fit to the data. The fit of a three-factor model was reasonable, but according to the chi-square difference test and the difference in CFI-value, the four-factor model fitted our data significantly better. The factor loadings for the final four-factor solution are provided in Table 2 and the correlations between the PSQ and SCQ factors are listed in Table 3. All correlations were significant at p=0.001.

(Please insert Table 1-3 about here)

The PSQ/SCQ subscales showed good internal consistencies with the following Cronbach's α coefficients: PSQ total 0.86, PSQ Confused Behavior and Staring 0.90, PSQ Absence of Friendly Behavior 0.84, PSQ Hostile Behavior 0.71, and SCQ 0.85. We also calculated factor reliability scores [18] which were all reasonable (all >0.70: PSQ Confused Behavior and Staring 0.84, PSQ Absence of Friendly Behavior 0.91, PSQ Hostile Behavior 0.73, and SCQ 0.86.

Relationship of the PSQ/SCQ with perceived social support, quality of life, mental health and TBSA burned

Table 4 presents the Spearman rank correlation coefficients between the PSQ/SCQ and the other questionnaires, and the TBSA burned in this study. Whereas PSQ subscales showed negative correlations with perceived social support and burn-specific health-related quality of

life, the SCQ was positively associated with these variables. Furthermore, higher PSQ and lower SCQ scores were correlated with higher HADS scores. The TBSA had a moderate positive correlation with the PSQ Confused Behavior and Staring subscale.

(Please insert Table 4 about here)

Influence of age, gender, time since injury, and current partnership status

Gender, age, and time since injury were not related to PSQ/SCQ scores (results not reported). As can be seen in Table 5, patients currently living with a partner (*n*=89) perceived less stigmatization and more social comfort than those living alone (*n*=50).

(Please insert Table 5 about here)

Discussion

The main finding of the present study is that the four-factor model of the PSQ/SCQ as suggested by Lawrence et al. [8] could be confirmed in a German sample of adult burn survivors, which is in accordance with our first hypothesis. As can be seen in Table 2, two items on the PSQ Absence of Friendly Behavior subscale had low factor loadings (<0.50), particularly item 7 (People I don't know say "Hi" to me.) and item 12 (People I don't know smile at me in a friendly way.). At least in the present sample, it appears that both items measured the construct Friendly Behavior insufficiently. We assume that the response to these items may depend from the context. For example, friendly smiling and saying "Hi" may be common in certain circumstances (e.g. suburbs) but less usual in a different context.

All subscales showed good internal consistency coefficients and the factor reliability scores of the PSQ/SCQ were reasonable. Furthermore, we found significant correlations between the PSQ factors and the SCQ factor. In line with earlier findings [7], the SCQ had a

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high positive correlation with social support as measured with the FSozU, and an inverse relationship with perceived stigmatization. These results highlight the construct validity of the translated German version of the PSQ/SCQ.

With respect to convergent validity, the association between higher PSQ/lower SCQ scores and less burn-related quality of life, and more symptoms of anxiety and depression were consistent with our assumptions. Relatively high correlations were found between the PSQ Confused Behavior and Staring scale and all three BSHS-B domains indicating a strong link between the perception of confusion and staring by other people and burn-specific health-related quality of life. Additionally, it is not surprising that the SCQ showed a relatively strong positive correlation with the BSHS-B domain Affect and Relationship, given that both variables refer to social aspects. With regard to the association between the PSQ/SCQ and mental health it appears that the PSQ Confused Behavior and Staring, and PSQ Hostile Behavior scales were stronger related to anxiety than to depression, whereas for the PSQ Absence of Friendly Behavior scale the opposite was observed. This pattern of results indicates that perceived stigmatizing behaviors (staring, rude comments, or teasing, etc.) may be linked to anxiety; whereas perceived lack of friendly social interactions may be linked to depression. However, the cross-sectional design of our study prevents any conclusions about causal relations.

With the exception of the PSQ Confused Behavior and Staring scale, no other significant correlations were found between PSQ/SCQ subscales and TBSA burned, which we found surprising. There is conflicting information in the literature about the relationship between perceived stigmatization and objectively measured scar severity and visibility [3]. However, our result partly replicate the findings of Lawrence et al. [7] who also reported a weak link between PSQ/SCQ and objective measures of burn severity.

Perceived stigmatization and social comfort were not influenced by the age and gender of the participants or by time since injury. In contrast, less perceived social stigmatization and more social comfort was found in participants who were currently involved in a couple relationship. However, causality cannot be assumed between these variables due to the cross-sectional study design. Unfortunately, no information was available about the characteristics and quality of current partnership or about possible changes in partnership status since injury. Future studies should address the question of whether characteristics and quality of the couple relationship influence perceived stigmatization and social comfort after burn injury, and vice versa.

The findings have some clinical implications. For example, the PSQ/SCQ could be used to screen for patients who may benefit from psychotherapy for social anxiety or depression resulting from skin burns. Further studies should investigate the application of the German PSQ/SCQ in individuals with disfigurements that are not related to burn injuries. Moreover, it would be very helpful to clinicians to define cutoff scores for the PSQ and the SCQ. The scales could also be suitable for the validation of interventions which aim at reducing anxiety, depression, and appearance concerns in people with adjustment problems due to visible differences [19, 20].

There are some shortcomings that have to be taken into account when interpreting the results. Although we made an effort to include patients who moved away via registration offices, the sample size remained relatively low. Furthermore, our results are limited to adult burn survivors. It remains unclear whether the PSQ/SCQ is also applicable in people with scars or other visible appearance problems that are not caused by burn injuries. Another concern pertains to the fact that the PSQ/SCQ measures frequencies of perceived behaviors but not the extent to which the person suffers from stigmatization. A higher level of suffering might increase the correlations of the PSQ/SCQ with the HADS and the BSHS-B. People may experience the same frequency of stigmatizing behaviors but differ in how much they are

afflicted by the perception of stigmatization. The proposed discrepancy between the perception of stigmatizing behavior and the extent to which a person suffers from stigmatization may influence the level of post-burn mental-health problems (i.e. anxiety, depression, reduced quality of life) caused by stigmatization. Also, prior research demonstrated that burn survivors with pre-burn mental burden had an increased risk for post-burn psychiatric disorders [4]. Since there was no information available on possible symptoms of anxiety or depression prior to burn injury, we were not able to adjust the results for possible pre-burn psychiatric complaints.

Taken together, the results suggest that the German version of the PSQ/SCQ has good psychometric properties and can be applied in burn-specific clinical care, research, and cross-cultural investigations. Further research should address the question of whether the German PSQ/SCQ is also suitable for the assessment of psychosocial aspects of adjustment problems of individuals with appearance distinctions that are not related to burn injuries.

Conflict of interest statement

The authors declare no conflict of interest.

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Table 1: Fit indices of confirmatory factor analysis models for the Perceived Stigmatization Questionnaire (PSQ) and the Social Comfort Questionnaire (SCQ)

	Chi²	df	RMSEA	CFI	Model comparison	df-difference	Chi²-difference
1-factor	1506.02	140	0.15	0.75			
2-factor	1348.84	141	0.14	0.78	1 vs 2	1	101.05*
3-factor	803.91	143	0.09	0.90	2 vs 3	2	155.84**
4-factor	728.22	146	0.08	0.92	3 vs 4	3	44.28**

* $p < 0.05$, ** $p < 0.01$

Table 2: Factor loadings of the Perceived Stigmatization Questionnaire (PSQ) and the

Social Comfort Questionnaire (SCQ)

	SCQ	PSQ Hostile Behavior	PSQ Confused Behavior and Staring	PSQ Absence of Friendly Behavior
SCQ01	0.81			
SCQ02	-0.74			
SCQ03	-0.76			
SCQ04	0.74			
SCQ05	0.76			
SCQ06	0.67			
SCQ07	-0.75			
SCQ08	0.79			
PSQ02		0.56		
PSQ18		0.83		
PSQ16		0.81		
PSQ08		0.70		
PSQ03			0.80	
PSQ04			0.84	
PSQ06			0.86	
PSQ10			0.73	
PSQ13			0.92	
PSQ14			0.83	
PSQ19			0.86	
PSQ21			0.88	
PSQ09				0.76
PSQ17				0.84
PSQ07				0.37
PSQ01				0.78
PSQ20				0.82
PSQ12				0.42
PSQ15				0.86
PSQ05				0.86

Table 3: Intercorrelations between the Perceived Stigmatization Questionnaire (PSQ) subscales and the Social Comfort Questionnaire (SCQ), (n=139)

	Mean (SD)	PSQ Confused Behavior and Staring	PSQ Hostile Behavior	SCQ
PSQ Absence of Friendly Behavior	2.29 (0.73)	0.21*	0.29**	-0.30***
PSQ Confused Behavior and Staring	1.62 (0.76)	-	0.49***	-0.57***
PSQ Hostile Behavior	1.29 (0.45)		-	-0.53***
SCQ	3.97 (0.78)			-

Note. * $p<0.05$, ** $p<0.01$, *** $p<0.001$

Table 4: PSQ/SCQ subscale correlations with Social Support Questionnaire (F-SozU), Burn Specific Health Scale (BSHS) domains, Hospital Anxiety and Depression Scale (HADS) subscales, and total body surface area (TBSA) burned (n=138)

	PSQ total	PSQ Absence of Friendly Behavior	PSQ Confused Behavior and Staring	PSQ Hostile Behavior	SCQ
F-SozU	-0.42***	-0.28**	-0.42***	-0.40***	0.53***
BSHS Affect and Relationship	-0.47***	-0.20*	-0.61***	-0.41***	0.57***
BSHS Function	-0.39***	-0.19*	-0.45***	-0.17*	0.25**
BSHS Skin Involvement	-0.40***	-0.16	-0.53***	-0.23**	0.46***
HADS Anxiety	0.41***	0.18*	0.51***	0.46***	-0.57***
HADS Depression	0.41***	0.29***	0.37***	0.29**	-0.46***
TBSA[a]	0.21*	0.05	0.35***	0.08	-0.14

Note. * $p<0.05$, ** $p<0.01$, *** $p<0.001$. [a] n=125 due to missing TBSA data

Table 5: Perceived Stigmatization Questionnaire (PSQ) subscales and the Social Comfort

Questionnaire (SCQ) in relation to ==current== partnership status

	==Currently in a couple relationship== n=89		==Currently not in a couple relationship== n=50		Group comparison
	Mean (SD)	Range	Mean (SD)	Range	
PSQ total	1.68 (0.42)	1.00-2.71	1.99 (0.55)	1.10-3.38	U=1465.50 p= .001
PSQ Absence of Friendly Behavior	2.29 (0.75)	1.00-5.00	2.30 (0.71)	1.00-5.00	U=1995.50 p= .312
PSQ Confused Behavior and Staring	1.41 (0.62)	1.00-3.88	1.98 (0.83)	1.00-4.38	U=1187.00 p< .001
PSQ Hostile Behavior	1.16 (0.29)	1.00-2.80	1.52 (0.58)	1.00-3.60	U=1401.50 p< .001
SCQ	4.16 (0.67)	2.00-5.00	3.65 (0.86)	1.63-5.00	U=1389.50 p< .001