

# Factor structure of the Persian version of general, social, and negative self-consciousness of appearance domains of Derriford Appearance Scale 59: an application in the field of burn injuries

Homayoun  
Sadeghi-Bazargani<sup>1</sup>  
Zahra Zare<sup>2</sup>  
Fatemeh Ranjbar<sup>3</sup>

<sup>1</sup>Road Traffic Injury Research Center, Department of Statistics and Epidemiology, Faculty of Health, Tabriz University of Medical Sciences, Tabriz, Iran; <sup>2</sup>Department of Statistics and Epidemiology, Faculty of Health, Tabriz University of Medical Science, Tabriz, Iran; <sup>3</sup>Research Center of Psychiatry and Behavioral Sciences, Tabriz University of Medical Sciences, Tabriz, Iran

**Background:** The Derriford Appearance Scale 59 (DAS59) is a widely used measure of the spectrum of psychological distress and dysfunction that is characteristic of disfigurement. Also, disfigurement due to burn injury leads to feeling guilty or less socially competent, avoiding social situations, suicide, poor self-esteem, sexual difficulties, and depression. Therefore, the purpose of this study was to translate and culturally adapt three subscales of DAS59 into Persian language and to investigate its factor structure for Iranian burned patients.

**Method:** Translation–back translation of the scale into Persian was done. The internal consistency of the translated scale was evaluated by Cronbach’s alpha. Next, construct validity of the translated instrument was assessed by exploratory factor analysis using principal components and rotation of varimax methods. This research involved a convenience sample of 189 adult burned patients with disfigurement in their face, head, ears, neck, hands, and legs.

**Result:** The Cronbach’s alpha for overall scale, subscales 1, 2, and 3 were 0.93, 0.93, 0.89, and 0.80, respectively. The best solution from the principal components analysis of the 40 items of the DAS59 revealed three factors corresponding to the three subscales with 20 items: factor 1 (general self-consciousness of appearance) consisted of 9 statements accounting for 33.23% of the variance (eigenvalue =9.23); factor 2 (social self-consciousness of appearance) consisted of 7 statements accounting for 22.91% of the variance (eigenvalue =1.53); and factor 3 (negative self-concept) consisted of 4 statements accounting for 14.98% of the variance (eigenvalue =1.13).

**Conclusion:** The factor structure of the three subscales of DAS59 provides a widely acceptable, psychometrically robust, factorial self-report scale to assess distress and dysfunction in problems of appearance among Iranian burned patients, and facilitates further research into the efficacy of treatment approaches for problems of appearance and early investigation of therapeutic outcome.

**Keywords:** burns, disfigurement, validity, psychological scale, appearance, Derriford (DAS59)

Correspondence: Zahra Zare  
Department of Statistics and  
Epidemiology, Faculty of Health,  
Tabriz University of Medical Sciences,  
Golgasht Street, Tabriz 51666147661,  
Iran  
Tel +98 912 412 9019  
Email zare.zahra59@yahoo.com

## Introduction

Disfigured individuals, either facially or physically, face with problems in their daily life compared to attractive people or those without disfigurement, which is assessed based on two overlapping perspectives. The first perspective is “view from the outside” such as impacts of appearance from social perceptions and interactions. Meanwhile, studies have shown that disfigured individuals feel guilty or less socially competent and receive less attention from others. The second perspective is “view from the inside” such as impacts

of appearance from individual perceptions of self-concept, emotional well-being, and quality of life, which lead to a level of anxiety, avoidance from social situation, suicide, poor self-esteem, sexual difficulties, and depression.<sup>1-3</sup>

Here, the concept of the term “disfigurement” refers to “visible difference” or “unusual appearance” due to a mark, rash, scar, or graft on a person’s skin or an asymmetry or paralysis to a person’s face or body.<sup>4</sup>

Body image is a multidimensional concept that is affected by disfigurement or changing appearance.<sup>5</sup>

Sarah Grogan defines body image as “a person’s perceptions, thoughts, and feelings about his or her body.” In addition, she defines the construct of body image disturbance relatively simply as “a person’s negative thoughts and feelings about his or her body.”<sup>6</sup>

On the other hand, researchers have identified four components of attitudinal body image: 1) overall satisfaction–dissatisfaction with one’s appearance; 2) emotions about one’s appearance, including anxiety and discomfort; 3) investment in one’s appearance, erroneous thoughts or beliefs about one’s body, and body image schemas; and 4) avoidance of situations or objects because of their elicitation of body image concerns.<sup>7</sup>

Congenital defects, traumatic events, and disease processes are the three common causes of disfigurement.<sup>3</sup>

Burn injuries are among the most devastating of all injuries and a major global public health problem. Approximately 90% of burn injuries occur in low- to middle-income countries.<sup>8</sup> Specifically, burn injury has been considered a major health problem in Iran.<sup>9</sup>

Major burns, defined by the American Burn Association, in terms of percentage of total body surface area (TBSA) burned, location, or secondary complications,<sup>10</sup> may result in pain, shock, sepsis, etc.<sup>11</sup>

Burn injury is often a devastating event with long-term physical, psychological, social, and economic impacts of burn injuries as well as burn-related disabilities and disfigurements. Therefore, long-term significant psychological distress was diagnosed among approximately one-third of burned patients.<sup>12-15</sup>

Burned patients experience issues with social interaction and social life as well as psychological problems due to scarring and changed appearance. These complications may be related to demographic and individual variables (eg, age, sex, socioeconomic status), burn site, skin color, time to heal, and burn severity.<sup>16</sup>

Moreover, decreased quality of life and delayed reintegration into society resulting from post-burn scar are the greatest unmet challenges in burn rehabilitation.<sup>17</sup>

One of the greatest barriers to function and the most visible stigma of injury is the development of scarring after burn injury due to advances in critical care and surgical management over the past several decades.

A great concern for patients and a challenging problem for clinicians is the hypertrophic scarring after surgical procedures and trauma, especially, burns, which was defined by Peacock as scars raised above the skin level but within the confines of the original lesion.<sup>18</sup> It leads to esthetical defects, dissatisfaction with appearance, and functional disability, which in turn lead to decreased quality of life, decreased ability to live independently, and delayed reintegration into society.<sup>17</sup>

Hypertrophic scar is the most common cicatrix formed after a burn, the prevalence of which is reportedly as high as 70%.<sup>19</sup>

According to a systematic review study, the prevalence of hypertrophic scarring in the studies ranged from 32% to 72%.<sup>16</sup>

According to another study, the prevalence of at least mild to moderate symptoms of depression was 46%. There was a significant correlation between depressive symptoms and body image dissatisfaction in burn reconstruction patients. Compared with other traumatic injury group, rate of clinically significant symptoms of depression in the burn reconstruction sample is high.

Considerable amount of recent empirical documentation have demonstrated the role of body image in the short-term and long-term adjustment in adult as well as in child survivors. The single most important predictor of long-term psychosocial functioning is body image.<sup>20</sup>

Many variables influence an individual’s adaptation to disfigurement after burn injury. For instance, burn survivors with residual scarring or disfigurement have negative adjustment if appearance was important for them even before burning.<sup>20</sup>

Body image dissatisfaction was affected by female gender, placing a great importance on physical appearance, the presence of facial burns, and the percentage of TBSA burned directly.<sup>20,21</sup>

Findings from a study demonstrated that body image with physical appearance plays a central role in social interactions and selection of partners. Judgements based on appearance affected social interaction and selection of partner.<sup>22</sup>

In a study that investigated romantic experiences of adolescents with a visible difference, those participants that were concerned with their appearance reported fear of negative evaluation.<sup>23</sup>

The fear was based on their own perceptions rather than the reality of their appearance.

It has been confirmed that concerns about appearance are common in the general population.<sup>24</sup> Also, a clear association has been found between body sites and mean scores of participants reporting concern with features at those body sites.<sup>25</sup>

Consequently, it is necessary to consider the psychological aftermaths of burn scars along with the medical issues.

Thus far, several psychometric scales have been developed in order to measure the effects of disfigurement or body image dissatisfaction caused by diseases or trauma, but only four patient-reported outcome measurements have been developed specifically for burned patients: Burn Specific Health Scale, Satisfaction with Appearance, Social Comfort Questionnaire, and Perceived Stigmatization Questionnaire.<sup>16</sup>

Burn Specific Health Scale-Brief version was validated for Iranian burn survival. This questionnaire was designed to assess the level of functioning and health-related quality of life in adult burn survivors, but it has only 3 items about body image.<sup>26</sup>

On the other hand, more focused and appropriate measures of the effects of living an aesthetic problem of appearance, such as the Appearance Schemas Inventory,<sup>27</sup> the Body Image Avoidance Questionnaire,<sup>28</sup> and the Body Dysmorphic Disorder Examination,<sup>29</sup> suffer from low content validity, restricted range of applicability, impracticability, or limited psychometric development.<sup>24,30</sup>

None of these measures were designed specifically to assess the spectrum of symptomatology that is relevant to the wide range of difficulties experienced by patients living with appearance issues.<sup>24</sup>

These findings highlighted the need to develop or validate relevant psychological scales and instruments that would measure the specific emotional and behavioral problems of disfigurement in native-speaking people with burn injury, especially in low- to middle-income countries including Iran where psychological care is not adequately and systematically provided for traumatized patients.

The Derriford Appearance Scale (DAS59) is a 59-item factorial scale measuring appearance-related distress, social anxiety, and avoidance, standardized on both general and hospital populations whose lives are dominated by their body-image disturbance and self-consciousness of appearance and those for whom appearance is of no concern. On the other hand, DAS59 is applicable to people concerned about their appearance and to those who are not, or people with visible difference to others and those whose difference is only apparent to themselves.

The factors are shown to be clinically meaningful and identified as General Self-Consciousness of Appearance, Social Self-Consciousness of Appearance, Sexual and Bodily

Self-Consciousness of Appearance, Negative Self-Concept, and Facial Self-Consciousness of Appearance.<sup>24,30</sup>

To determine a valid scale, the authors selected three domains of scale, the General Self-Consciousness of Appearance, Social Self-Consciousness of Appearance, and Negative Self-Concept, which include 40 items.

The purpose of this study was to translate and culturally adapt the three subscales of DAS59 into Persian language and to investigate their factor structure for Iranian burned patients.

## Methods

### Participants, setting, and sampling

This research involved a convenience sample of 189 burned adult patients ( $\geq 16$  years of age) with disfigurement in the face, head, ears, neck, hands, and legs. The research was performed over 12 months in three hospitals in Tehran, Tabriz, and Kermanshah provinces of Iran. The sample comprised either former burned patients who were referred to hospitals for cosmetic surgeries or individuals burned recently who were receiving ongoing care from hospitals.

### Selection of Derriford Appearance Scale 59

The 59-item Derriford Appearance Scale (DAS59) was developed by Tony Carr et al. The scale was initially developed from a cross-sectional design using clinical and nonclinical populations with problems of appearance and a pre-post intervention design using plastic surgery patients.

The DAS59 was developed to measure the spectrum of characteristic of disfigurement, deformities, and aesthetic problems of appearance, such as psychological distress and dysfunction.<sup>30</sup>

### The scale development process: translation and back-translation

The translation process was performed according to the translation and cultural adaptation group.<sup>31</sup> The original English version was translated (forward translation) into Persian separately by three self-governing official translators. Then, one researcher who mastered both languages reviewed the translations in terms of their inconsistencies with the original version. Minor revisions were suggested in some areas and, finally, one Persian version of the scale was created. Subsequently, it was translated back from Persian to English by another official translator. The back-translated version and the original version were compared in order to be similar in structure and meaning. The authors compared the original version with the back-translated version (harmonization). An expert panel consisting of epidemiologists and a psychologist was asked with the questionnaire's conceptual equivalence.

Finally, according to their recommendations, minor changes were made and pilot testing was performed.

The authors translated this scale to elementary reading level in order to be applicable and understandable for patients of different education levels.

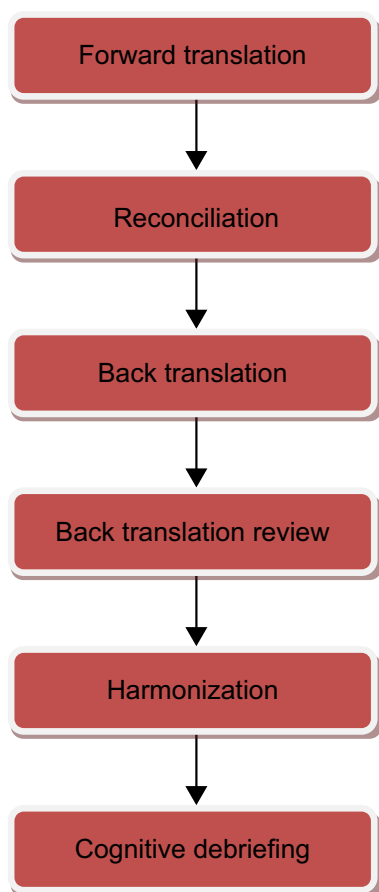
A trained interviewer read out the questions to illiterate patients, exactly like the translated scale without any interpretation to prevent from influencing the patients' answers. Stages of translation process are shown in Figure 1.

## Ethical considerations

Approval for the study was obtained from the ethics committee of Tabriz University of Medical Science. Verbal informed consent was obtained from all of the participants. The ethics committee did not require that written informed consent be obtained because this was a questionnaire based study and some patients were illiterate.

## Data analysis

Stata (version 13) was used in the analysis of factor structure of DAS59. Statistical methods were used according to the objective as follows.



**Figure 1** Stages of the translation process.

## Assessment of internal consistency

To determine the instrument's internal consistency, Cronbach's alpha was determined.

## Assessment of construct validity

To determine the construct validity of DAS59, exploratory factor analysis using principal components and the rotation of varimax methods was conducted. The questionnaire was distributed among 189 burned victims in Tabriz, Tehran, and Kermanshah. Selection of the number of factors to be rotated was based on conjunctive criteria requiring the eigenvalue of the factor to be greater than 1 and the use of the scree test. A uniqueness score below 0.7 was considered as the criterion for selecting items having adequate communality.

## Results

### Socio-demographic characteristics

In this study, 189 burned patients (105 men, 55.56%) with an average age of 32 (SD=9.37) ranging from 16 to 60 years were recruited. Most participants were educated at the high school level (from 7 to 12 years of education), while 10 (5.32%) participants were illiterate, and 39 (20.74%) had received college education. Majority of patients (77.78%) lived in urban areas. Of all participants, 121 (64.02%) were married. The median TBSA of burning was 20%, with a range of 10%–37%.

### Internal consistency

The Cronbach's alpha for overall scale, subscales 1, 2, and 3 were 0.93, 0.93, 0.89, and 0.80, respectively.

### Factor structure

Exploratory factor analysis was used according to different factors frequently. Ultimately, the 3-factor model was the best result of a simple pattern of loadings based on eigenvalues >1, as well as a total of 71% of variance was explained by the 3-factors model. The Kaiser–Meyer–Olkin index was 0.88.

The best solution from the principal components analysis of the 40 items of the DAS59 revealed three factors corresponding to the three subscales with 20 items remaining.

Factor 1 (General Self-Consciousness of Appearance) consisted of 9 statements accounting for 33.23% of the variance (eigenvalue =9.23). Factor 2 (Social Self-Consciousness of Appearance) consisted of 7 statements accounting for 22.91% of the variance (eigenvalue =1.53). Factor 3 (Negative Self Concept) consisted of 4 statements accounting for 14.98% of the variance (eigenvalue =1.13).

The structure of extracted factors from correlation between the factor loadings and questions using the principal components method and varimax rotation is shown in Table 1.

## Discussion

This study describes the factor structure of DAS59 to assess the difficulties experienced by the Iranian burned patients through living with a problem in appearance. The high level of internal consistency (Cronbach  $\alpha=0.93$ ) suggests that the item sampling from the original scale effectively represented the item set and those 20 items that remained after the principal components analysis reflect the main factor of self-consciousness of appearance underlying the original scale.

The factor structure had acceptable eigenvalues (9.23–1.13), and also the scale and subscales showed good homogeneity (Cronbach alphas 0.93–0.80). The exploratory factor analysis recognized three subscales that can be used to differentiate between various manifestations of disfigurement due to burn injury. These findings reinforce the work of Tony Carr et al who viewed complications caused by disfigurement as multidimensional. Although DAS59 had been developed to measure psychological distress and dysfunction due to disfigurement, deformities, and aesthetic problems of appearance, the subscale development undertaken suggests that the concept of the feeling of having disfigured appearance

can, in fact, be expanded to include feelings of depression and anxiety.<sup>30</sup>

This phenomenon was observed in this study, and we validated the factor structure of Persian version of three subscales of this scale just for burned victims with disfigurement. In exploratory factor analysis, this study's subscales were similar from the original instrument.

The findings of this study suggest that the DAS59 may be a valuable instrument for research on social-behavioral burn.

These results from a sample of burned patients from various regions of Iran provisionally confirm the selection of 20 items and indicate a meaningful factorial structure.

According to the studies, dysfunction and distress arising from a problem of appearance is independent from the degree of visible disagreement, therefore, the sample of this study consisted of patients with burn scars in face, head, neck, ears, hands, and legs.

According to the statements of psychologists and sociologists, appearance nowadays is not only a biologic phenomenon but also a social phenomenon. In addition, evaluation of an individual's appearance is affected by the cultural norms which are present in the society.

Appearance is central to social experience and social interaction for Iranian people, who are renowned for placing a high value on appearance, and individuals are judged based on their appearance.

**Table 1** Factor loading of 20 items

Item	Factor 1 <sup>a</sup>	Factor 2 <sup>b</sup>	Factor 3 <sup>c</sup>	Uniqueness
Avoiding school/college/work	<b>0.6338</b>			0.5539
Avoiding pubs/restaurants	<b>0.6446</b>			0.5540
Feel unattractive	<b>0.7290</b>	0.3479		0.2735
Feel unlovable	<b>0.6574</b>	0.3691	0.3228	0.3275
Feel isolated	<b>0.7567</b>	0.3028		0.2637
Feel embarrassed	<b>0.8548</b>	0.3071		0.1467
Feel inferior	<b>0.6847</b>	0.4047		0.3161
Feel rejected	<b>0.7373</b>	0.3530		0.3198
Feel useless	<b>0.6328</b>	0.3865		0.4129
Distress when others stare	0.3150	<b>0.6953</b>		0.3947
Distress when others make remarks		<b>0.7806</b>		0.3663
Distress when others ask about the "feature"		<b>0.7967</b>		0.2818
Distress when seen in a particular view		<b>0.6911</b>		0.4648
Distress when "feature" seen in a mirror/window	0.4636	<b>0.5474</b>	0.3269	0.3785
Distress when meeting strangers		<b>0.6151</b>		0.5235
Distress when not being able to go to social events		<b>0.5600</b>		0.5119
How confident do you feel?			<b>0.5488</b>	0.5848
How secure do you feel?			<b>0.6321</b>	0.5572
How cheerful do you feel?			<b>0.7485</b>	0.3814
How normal do you feel?			<b>0.6333</b>	0.4961

**Notes:** Blanks represent absolute loading <0.3. <sup>a</sup>General self-consciousness of appearance. <sup>b</sup>Social self-consciousness of appearance. <sup>c</sup>Negative self-concept. Uniqueness = 1–communality. The values for the items included in each of the factors are shown in bold underneath the heading for that factor.



**Table 2** Various scales developed for assessing appearance in general and related scales for burns

References	Scale name	Year	Source language	Number of items	Applied population	Explanation
Carr et al <sup>30</sup>	Derriford Appearance Scale 59	2000	English	59	Clinical and nonclinical people, patients on plastic surgery waiting list	Developed for people with problem of appearance due to trauma, congenital malformation, and disease
Carr et al <sup>25</sup>	Derriford appearance scale 24	2005	English	24	Clinical (outpatients and inpatients) and general population sample	Developed for people with problem of appearance due to trauma, congenital malformation, and disease
Pishnamazi et al <sup>26</sup>	Burn Specific Health Scale – brief	2013	English	40	Burned patients	
Lawrence et al <sup>37</sup>	Satisfaction with appearance	1998	English	14	Burned patients requiring hospitalization	
Lawrence et al <sup>32</sup>	Social Comfort questionnaire	2006	English		Burned patients	
Lawrence et al <sup>32</sup>	Perceived stigmatization questionnaire	2006	English	38	Burned patients	
Frederick et al <sup>36</sup>	Body part satisfaction scale	2014	English		General population	
Rosen et al <sup>28</sup>	Body image avoidance questionnaire	1991	English	19	Female	
Cash et al <sup>35</sup>	Body image Quality of Life Inventory	2002	English	19	Female	
Cash et al <sup>34</sup>	Body Image Disturbance Questionnaire	2004	English	7	General population	
Cash et al <sup>33</sup>	Situational Inventory of Body Image Dysphoria	2002	English	48	General population	
Brown et al <sup>38</sup>	Body Self-Relations Questionnaire	1990	English	54	General population	
Cash et al <sup>27</sup>	Appearance Schemas Inventory	1996	English	14	Female	
Rosen and Reiter <sup>29</sup>	Body Dysmorphic Disorder Examination	1996	English		Body dysmorphic patients, clinical and nonclinical sample	

Consequently, a person with disfigurement may face with problems such as failure to return to work, receiving less respect from others, or not being able to get appropriate job. Nevertheless, they may encounter problems to communicate with their friends, partner, and family. These conditions result in psychological complications for the burned patients.

In Iran, a majority of the studies have been conducted to find out psychological distress and dysfunction among burned patients, but we did not find any studies that had localized a questionnaire in conjunction with Iran's cultural adaptation specifically to disfigured burned patients. Meanwhile, another scale that is under publishing is being developed by our research team for assessing irrational cognitions among burned patients.

Although there are scales that measure psychological problems related to aesthetic problems or body image dissatisfaction, they did not have overall consideration on problems related to appearance.

Table 2 illustrated various scales developed for assessing appearance in general and related scales for burns.

The Derriford Appearance Scale provided an effective measure and description of the difficulties associated with living with a problem of appearance. The scale is highly homogenous and measures an underlying construct that is called “self-consciousness of appearance”.<sup>30</sup> It may help to answer questions of theoretical interest in the psychological aspect of problems related to appearance to investigate psychological interventions such as cognitive behavioral therapies.<sup>24</sup>

## Conclusion

The factor structure of the three subscales of DAS59 provides a widely acceptable, psychometrically robust, factorial self-report scale to assess distress and dysfunction in problems of appearance among Iranian burned patients and facilitates further research into the efficacy of treatment approaches for problems of appearance and early investigation of therapeutic outcome. Although a psychometric scale cannot substitute for a comprehensive clinical assessment, it is to be hoped that routine clinical assessments may also be improved by the inclusion of an effective, psychometric scale such as

the DAS59 which its factor structure has been validated for Iranian burned victims.

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## Disclosure

The authors report no conflicts of interest in this work.

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