

## Psychiatric–Medical Comorbidity

The Psychiatric–Medical Comorbidity section will focus on the prevalence and impact of psychiatric disorders in patients with chronic medical illness as well as the prevalence and impact of medical disorders in patients with chronic psychiatric illness.

# Depression in burn reconstruction patients: symptom prevalence and association with body image dissatisfaction and physical function<sup>☆</sup>

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## Abstract

**Objective:** This study investigated the prevalence and the clinical correlates of symptoms of depression among burn reconstruction patients.

**Method:** A sample of 224 burn reconstruction patients completed the Beck Depression Inventory (BDI), the SF-36 Health Survey and the Satisfaction with Appearance Scale.

**Results:** The prevalence of at least mild to moderate symptoms of depression ( $BDI \geq 10$ ) was 46%. Female patients were disproportionately represented in this burn reconstruction population (46%) compared to all survivors from the burn center (29%;  $P < .001$ ) and compared to a national sample of burn survivors (27%;  $P < .001$ ). Compared to males, female patients presented for consultation much longer after a burn injury ( $P < .001$ ), tended to have smaller burns ( $P = .06$ ) and were less likely to have facial burns ( $P = .08$ ). Depressive symptoms were largely predicted by body image dissatisfaction ( $\beta = .58$ ;  $P < .001$ ), with additional variance predicted by physical function ( $\beta = -.13$ ;  $P = .07$ ). The effect of patient and burn injury variables on depressive symptoms was mediated by body image dissatisfaction and physical function.

**Conclusion:** The high prevalence of significant symptoms of depression in burn reconstruction patients and their relationship with body image suggest the importance of the routine psychological screening of patients seeking reconstruction services.

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**Keywords:** Burn injury; Reconstruction; Depression; Screening

## 1. Introduction

In the United States, there are almost 50,000 hospitalizations for burn injuries annually [1]. Whereas the overall incidence of burn injuries has declined in recent decades [2], the proportion of patients who survive large burn injuries has increased dramatically due to the development of compre-

hensive burn centers and improvements in treatments [3,4]. Related to this, the number of reconstructive surgeries performed as a result of a burn injury approximately doubled between 1992 and 2004, with more than 35,000 procedures performed nationally [5].

Reconstructive procedures following a burn injury often begin in the first year following the injury and can continue for many years. The primary reason for undergoing reconstructive surgery is to improve function, comfort and appearance [6]. A major burn injury can cause considerable damage to skin integrity and often leads to hypertrophic scarring. Deep burns frequently impair function and can result in damage to or the loss of functionally and cosmetically important body parts [7]. Among survivors of burn injuries, both body image dissatisfaction and functional impairment have been associated with depression 5 years or more after the injury [8,9].

<sup>☆</sup> Data from the National Burn Repository of the American Burn Association were used in this study as comparison sample. However, the conclusions and opinions derived from the National Burn Repository data represent the authors' views and are not necessarily those of the American Burn Association.

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Estimates of the rate of depression among burn survivors vary widely due to the use of different assessment instruments and cutoffs, small sample sizes and variations in burn severity across samples. Three studies have used validated questionnaires to assess symptoms of depression in adult burn survivors  $\geq 12$  months after discharge. Ward et al. [10] reported that 22% of 139 burn survivors had at least mild symptoms of depression [Beck Depression Inventory (BDI)  $\geq 10$ ] [11] 1–8 years after burn injury. Wiechman et al. [12] reported that 34% of 129 survivors scored  $\geq 8$  on the BDI at 12 months and that 45% scored  $\geq 8$  at 2 years after burn injury. Pallua et al. [9] reported a rate of 18% with severe depressive symptoms among 92 survivors on an average of 5.4 years after injury using the Center for Epidemiological Studies Depression Scale (CES-D) [13].

Only one study has reported data on the psychosocial characteristics of burn reconstruction patients. That study found higher, albeit not significantly so, BDI scores among 16 patients who elected to have surgery than among 27 patients who chose not to have surgery [14]. No studies have reported data on the prevalence of symptoms of depression among burn patients seeking reconstructive services or on the relationship between depressive symptoms, body image and physical function in this population. The objectives of this study were: (a) to investigate the prevalence of clinically significant symptoms of depression among burn reconstruction patients; (b) to test the hypothesis that depressive symptoms are predicted by body image dissatisfaction and limitations in physical function; and (c) to test the hypothesis that body image dissatisfaction and physical impairment mediate the relationship between patient and burn injury variables and depression.

## 2. Methods

### 2.1. Patients and study design

This study was approved by the Johns Hopkins Institutional Review Board. Patient data for the study were obtained from a deidentified clinical database of adult patients who were evaluated at the Burn Reconstruction Center of the Johns Hopkins Burn Center from March 1994 to July 2005. All adult patients who are evaluated for reconstructive services in the center are routinely referred for psychological evaluation by an affiliated psychologist. Assessment includes a clinical interview and a series of standardized measures to assess personality characteristics, symptoms of depression, body image dissatisfaction and overall physical and mental health and function. During the study period, 63% of all new burn reconstruction patients completed psychological assessment, 32% were not evaluated due to scheduling difficulties or unavailability of the psychologist and 5% were not evaluated due to patient refusal or inability to be assessed in English. Supplemental funding for this service is provided by a local grant

foundation; thus, no patients were denied psychological assessment for financial or insurance reasons.

The characteristics of patients who sought services at the burn reconstruction center were compared to the characteristics of all patients who were admitted to and discharged alive from the Johns Hopkins Burn Center from 1995 to 2005, and to the characteristics of a national sample extracted from the American Burn Association National Burn Repository (ABA-NBR) for all adult patients who were discharged alive from 46 burn centers across the United States from 1995 to 2005. A more complete description of the ABA-NBR database is provided elsewhere [15].

### 2.2. Measures

#### 2.2.1. BDI

The BDI [11] is a 21-item measure of depressive symptoms. Each item consists of four statements (scored 0–3) indicating increasing symptom severity. Total scores range from 0 to 63. Respondents are instructed to describe the way they have been feeling during the past week. The authors recommend cutoff scores of  $\geq 10$  for at least mild symptoms of depression,  $\geq 19$  for at least moderate symptoms of depression and  $\geq 30$  for severe symptoms of depression [16]. The BDI was administered to all patients included in the present study.

#### 2.2.2. Satisfaction with Appearance Scale (SWAP)

The SWAP [17] is a 14-item scale developed to assess nonweight-related body image dissatisfaction among burn patients. Each item is scored on a 7-point Likert scale (0=*strongly disagree* to 6=*strongly agree*). The SWAP is scored such that higher scores represent greater dissatisfaction. The minimum possible score is 0, and the maximum possible score is 84. Good internal consistency has been reported for total SWAP score among patients with burn injuries (Cronbach's  $\alpha = .87$ ) [17]. The SWAP, which was published in 1998, was introduced into the center for burn reconstruction assessment battery in February 1998.

#### 2.2.3. SF-36 Health Survey

The SF-36 Health Survey [18] is a 36-item multipurpose health survey, which yields an eight-subscale profile of functional health and well-being, as well as empirically derived physical and mental health summary measures. The SF-36 Health Survey is the most widely used and evaluated health outcomes measure and has extensive evidence for its validity and reliability in multiple populations [18,19]. The Physical Composite Scale (PCS) of the SF-36 Health Survey [18] was used to assess patients' physical function. Higher scores on the PCS indicate better physical function. The SF-36 Health Survey was introduced into the assessment package in June 1995.

### 2.3. Statistical analysis

To identify variables that might differentiate patients who seek burn reconstruction services from the general population

Table 1

Patient demographics and burn injury characteristics: comparison of burn reconstruction patients with a national sample of burn inpatients

	Reconstruction patients ( <i>N</i> =224)	National Burn Repository sample ( <i>N</i> =31,147)	Significance ( <i>P</i> )	Johns Hopkins Burn Center sample ( <i>N</i> =2657)	Significance ( <i>P</i> )
Gender [ <i>n</i> (%)]					
Female	102 (45.5)	8251 (26.5)	<.001	782 (29.4)	<.001
Male	122 (54.5)	22896 (73.5)		1875 (70.6)	
Facial burns <sup>a,b</sup> [ <i>n</i> (%)]	96 (45.3)	14156 (45.4)	.44	930 (35.0)	.03
Age at the time of burn [mean (S.D.)]	33.1 (17.8)	42.2 (16.4)	<.001	44.7 (17.3)	<.001
Time since burn injury (years) [mean (S.D.)]	7.3 (12.2)	–	–	–	–
TBSA [mean (S.D.)]	21.8 (20.2)	10.7 (11.8)	<.001	10.5 (16.7)	<.001

<sup>a</sup> Due to missing data, percentages calculated for reconstruction patients are based on fewer than 224 patients.

<sup>b</sup> Data from the National Burn Repository and the Johns Hopkins Burn Center include any burns on the head.

of patients with serious burn injuries, the demographic and burn injury characteristics of burn reconstruction patients were compared to the characteristics of samples of hospitalized burn patients who were discharged alive from the Johns Hopkins Burn Center and from ABA-NBR burn centers. Differences between the groups were tested using chi-square tests for categorical variables and *t* tests for continuous variables. Statistical significance was based on two-sided tests, with a *P*<.05 significance level. Because the proportion of female patients was substantially higher among burn reconstruction patients than among patients with burn injuries in the general population, similar comparisons were carried out between male and female patients in the burn reconstruction sample. BDI scores were compared between male and female patients, and analysis of covariance was used to compare mean BDI scores adjusted for time since the burn injury, total body surface area (TBSA) and the presence of facial burns. These analyses were conducted using SPSS version 13.0 (SPSS, Chicago, IL).

Path analysis was used to analyze the relationships between demographic and burn injury characteristics, body image dissatisfaction, physical function and symptoms of depression. The initial model was specified to reflect prior research among burn patients showing that (a) body image dissatisfaction is related to female gender, extent of burn injury as measured by the percentage of TBSA burned, and the presence of facial burns [8,20]; and that (b) physical function is associated with current age and TBSA [21]. Thus, the initial model was specified to test the following hypotheses: (a) symptoms of depression are predicted by

body image dissatisfaction and physical function [8,9]; (b) physical function mediates the relationship between age and the percentage of TBSA burned, and symptoms of depression; and (c) body image dissatisfaction mediates the relationship between each of the variables female gender, the percentage of TBSA burned and the presence of facial burns, and symptoms of depression.

All path model estimations were generated with EQS 6.1 [22] using maximum likelihood estimation. Model fit was assessed with chi-square statistics and three model fit indices: the Tucker–Lewis Index (TLI) [23], also known as the non-normed fit index (NNFI) [24]; the comparative fit index (CFI) [25]; and the root mean square error of approximation (RMSEA) [26]. These indices are used to evaluate the degree to which a variable covariance matrix estimated from the model is an adequate representation of the sample covariance matrix. Rough guidelines suggest that models with TLI/NNFI and CFI between 0.80 and 0.90 fit moderately well, with >0.90 indicating a well-fitting model [26,27]. RMSEA values of <0.05 are considered to be representative of good-fitting models, and values between 0.05 and 0.08 represent moderate fit [27].

### 3. Results

#### 3.1. Patient characteristics

A total of 224 patients were included in the study. As shown in Table 1, 46% of patients from the burn reconstruction center sample were female, compared to

Table 2

Characteristics of male and female burn reconstruction patients

	Male patients ( <i>n</i> =122)	Female patients ( <i>n</i> =102)	Significance ( <i>P</i> )
Facial burns <sup>a</sup> [ <i>n</i> (%)]	58 (50.9)	38 (38.8)	.08
Burned when aged <18 years [ <i>n</i> (%)]	15 (12.6)	29 (29.6)	<.01
Burned at least 20 years prior to clinic visit [ <i>n</i> (%)]	10 (8.5)	25 (25.5)	<.001
Burned when aged <18 years, at least 20 years prior [ <i>n</i> (%)]	8 (6.8)	23 (23.5)	<.001
Age at the time of burn [mean (S.D.)]	37.2 (16.5)	28.1 (18.1)	<.001
Time since burn injury (years) [mean (S.D.)]	4.7 (9.0)	10.5 (14.6)	<.001
% TBSA burned [mean (S.D.)]	24.1 (22.0)	18.7 (17.3)	.06

<sup>a</sup> Due to missing data, percentages are based on fewer than 224 patients.

Table 3  
Rates of clinically significant symptoms of depression and mean BDI scores for total sample and by gender

Symptoms of depression	Total sample (N=224)	Male patients (n=122)	Female patients (n=102)	Significance (P)
At least mild (BDI ≥ 10) [n (%)]	103 (46.0)	58 (47.5)	45 (44.1)	.61
Moderate to severe (BDI ≥ 19) [n (%)]	42 (18.8)	22 (18.0)	20 (19.6)	.76
Mean total BDI score [mean (S.D.)]	10.8 (9.4)	10.5 (8.7)	11.1 (10.2)	.65
Adjusted mean total BDI score <sup>a</sup> [mean (S.D.)]	–	9.8 (9.3)	12.2 (9.4)	.09

<sup>a</sup> Adjusted for time postburn, the presence of facial burns, and the percentage of TBSA burned, using analysis of covariance.

only 27% of survivors from burn centers nationally ( $P < .001$ ) and 29% of survivors from the Johns Hopkins Burn Center ( $P < .001$ ). The mean age was 33.1 years, and the average time since the burn injury was 7.3 years. The mean percentage of TBSA burned among burn reconstruction patients (21.8%) was approximately double that of burn survivors from the ABA-NBR database (11.2%;  $P < .001$ ) and from the Johns Hopkins Burn Center (10.5%;  $P < .001$ ). The proportion of burn reconstruction patients with facial burns was only slightly less than that in the sample of burn survivors. The Johns Hopkins Burn Center and ABA-NBR databases, however, do not provide data specific for facial burns but rather list burns on the entire head. Thus, the figures presented in Table 1 likely overestimate the proportion of patients with facial burns in these groups.

Male and female patients who were evaluated in the reconstruction center differed in important ways (Table 2). Compared to only 7% of male patients, almost 25% of female patients sought services for a burn injury that had occurred at least 20 years ago when they were children. Furthermore, the time since the burn injury was more than double for female patients compared to that for male patients (10.5 years vs. 4.7 years;  $P < .001$ ). In addition, male burn reconstruction patients were more likely to have facial burns ( $P = .08$ ) and tended to have a larger percentage of TBSA burned (24.1% vs. 18.7%;  $P = .06$ ) relative to female patients.

### 3.2. Prevalence of symptoms of depression

The percentages of patients classified as having at least mild symptoms of depression ( $BDI \geq 10$ ) and moderate to severe symptoms of depression ( $BDI \geq 19$ ) based on published cutoffs are presented in Table 3. Almost half of male and female patients scored  $\geq 10$  on the BDI, reflecting at least mild symptoms of depression. Prevalence rates and mean BDI scores were similar for male and female patients. Female patients, however, tended to have higher mean BDI scores after adjusting for differences between males and females in the time since the burn injury, the percentage of TBSA burned and the proportion with facial burns ( $P < .09$ ).

### 3.3. Path analysis

Path analysis included data from only 110 of 230 patients included in the study. This is chiefly because the SWAP was introduced into the assessment battery midway through the study and, therefore, was only completed by approximately half of the patients. Fig. 1 presents the hypothesized path model. Age and the percentage of TBSA burned were included in the model as direct predictors of physical function. Female gender, the presence of facial burns and the percentage of TBSA burned predicted body image dissatisfaction. Physical function and body image dissatisfaction were hypothesized to mediate the relationship between these variables and symptoms of depression.

Results indicated that the hypothesized model fit the data adequately [ $\chi^2(14, N=112)=20.7, P = .11; CFI=0.93; TLI/NNFI=0.90; RMSEA=0.07$ ]. As shown in Fig. 1, body image dissatisfaction and physical function accounted for 36% of the variance in depressive symptoms. Most of the variance in symptoms of depression was associated with body image dissatisfaction ( $P < .001$ ). Physical function also predicted symptoms of depression, but was not statistically significant ( $P = .07$ ), possibly due to poor statistical power related to the relatively small number of patients included in the path analysis. All hypothesized predictors of physical function and body image dissatisfaction were significant.

After testing the hypothesized model, we explored whether age, female gender, the percentage of TBSA burned or the presence of facial burns had direct effects on symptoms of depression, but none of these links was significant. Thus, the model provides evidence that relationships between patient demographic and burn injury characteristics and depression are mediated by body image dissatisfaction and physical function. Standardized regression weights with

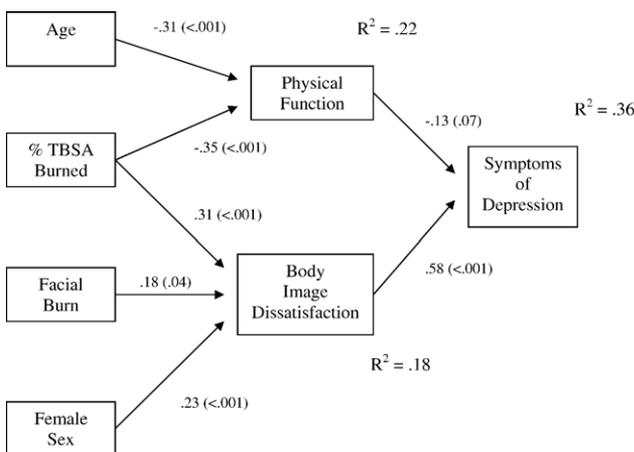


Fig. 1. Path model specification with parameter estimates.  $\chi^2(14, N = 112) = 20.7, P = .11; CFI = .93; TLI/NNFI = .90; RMSEA = .07$ . Numbers printed next to single-headed arrows correspond to standardized regression weights with  $P$  values in parentheses.

$P$  and  $R^2$  values (percentage of variance explained in each dependent variable) are presented in Fig. 1.

#### 4. Discussion

The major finding of this study was that at least mild symptoms of depression were present in 46% of patients who sought consultation in a burn reconstruction clinic. This rate is substantially higher than the 18% and 34% reported in two long-term studies of burn patients that used standard cutoffs of the BDI [10] or the CES-D [9], respectively, and is similar to the 45% reported at 2 years postburn in another study. The latter study, however, used a nonstandard BDI cutoff of 8, which likely inflated the symptom rate [12]. The rate of clinically significant symptoms of depression in the burn reconstruction sample is also higher than the rates reported in other traumatic injury groups, including 14–42% in traumatic brain injury [28], 15–30% in spinal cord injury [29,30] and 29–42% after traumatic limb loss [31].

Almost half of the patients in the burn reconstruction sample were female compared to <30% in a national sample of patients admitted to burn centers and in a sample of patients from the burn center where the reconstruction clinic in this study was located. Female patients tended to present for consultation much longer after the burn injury, tended to have smaller burns and were less likely to have facial burns than males. The rate of depressive symptoms and mean BDI scores did not differ significantly between male and female patients. After adjusting for time postburn, the percentage of TBSA burned and the presence of facial burns, however, female patients had somewhat higher adjusted mean BDI scores than male patients with comparable burn injuries. This suggests that similar injuries may cause more psychological distress in female patients than in male patients, which in turn could account for the disproportional number of female patients who sought reconstructive services. This hypothesis is consistent with findings that issues related to appearance and attractiveness are more important among female burn survivors than among male burn survivors and that body image esteem is lower among female burn survivors [20].

Indeed, female gender, mediated by body image dissatisfaction, was significantly associated with symptoms of depression in the path model. A substantial proportion of variance in depressive symptoms was explained by body image dissatisfaction, with physical function also accounting for a proportion of the variance. This is not surprising given that the principal reason for seeking reconstructive surgery after a burn injury is to improve appearance, comfort and function [6].

The findings of this study suggest that it is important to screen for depression among patients who seek burn reconstruction. Screening for depression does not routinely occur in medical settings [32], and there is no literature to

suggest that clinics caring for burn survivors are an exception. In the absence of formal screening, however, physicians and other medical professionals do not reliably detect depression in medically ill and injured patients [33]. Identification of burn reconstruction patients with elevated symptoms of depression would provide an opportunity to treat a burdensome health condition. There are no published studies on the treatment of depression after burn injury. Nonetheless, numerous studies have shown that depression in acutely injured and medically ill patients can be successfully treated with both psychopharmacological and behavioral therapies [32,34–39]. In addition, screening for depression in burn reconstruction clinics could improve ongoing burn care and recovery. There is evidence that patients with elevated symptoms of depression may be more likely to choose reconstructive surgery after burn injury [14], consistent with evidence from nonburn reconstruction samples [40,41]. A number of studies have also reported that depression is related to the degree of satisfaction with surgical procedures [42,43]. Thus, preoperative psychological distress in potential burn reconstruction patients may have important implications for presurgical decision making and postsurgery outcome.

There are limitations that should be taken into consideration in interpreting the results from this study. The sample was drawn from the clinical population of one burn center, and the degree to which this sample is representative of other burn reconstruction populations is unknown. Approximately two thirds of patients seen clinically underwent psychological evaluations that were included in this report. The primary reason for patients not having been evaluated was scheduling conflict or unavailability of the psychologist. Less than 5% of patients did not undergo assessment due to sample biasing factors, such as refusal or English language difficulties. Thus, although we do not have data to assess for potential differences between the patients who were assessed and those who were not, it is reasonable to believe that this sample was fairly representative of patients who sought treatment for burn reconstruction. Typically, studies of burn patients postdischarge have recruitment rates much lower than that in this study [44]. In addition, the study was cross-sectional; thus, it is impossible to verify the proposed direction of the relationship between body image dissatisfaction, physical function and symptoms of depression. Furthermore, it is not known to what extent symptoms of depression predated the burn injury. It is possible, for instance, that preexisting symptoms of depression could have impacted both body image and physical recovery from burn injury or could have predicted current symptoms of depression independent of body image and physical function [45]. Finally, we did not have access to patient reconstruction histories, such as the number of surgeries (if any) at other reconstruction centers prior to scheduling an appointment, and did not know whether a patient chose to have surgery after the initial evaluation. Thus, we do not know whether surgery affected depressive symptoms or body image

satisfaction, or whether depressive symptoms were related to satisfaction with surgical outcomes. Similarly, we do not know how many patients sought treatment for depression or have outcome data related to the course of treated or untreated depression. Questions related to these issues should be addressed in future research.

In summary, this study reported rates of depressive symptoms among burn reconstruction patients. The very high rate of mild to moderate depressive symptoms found in this clinical sample provides a strong rationale for a systematic screening for depression among burn reconstruction patients. Screening has been found to be most effective if it is minimally burdensome for patients and medical staff, and if there is a provision for referral for the evaluation and management of depression [46]. A reasonable method would be to screen initially with one of several short screening tools (one to three items) that have been validated in primary care settings [47,48], followed by a more thorough screening tool such as the BDI or the Patient Health Questionnaire [49], and referral to an affiliated mental health professional for patients with significant symptoms of depression.

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### References

- [1] Esselman PC, Thombs BD, Magyar-Russell G, Fauerbach JA. Burn rehabilitation: state of the science. *Am J Phys Med Rehabil* 2006;85:383–413.
- [2] Brigham PA, McLoughlin E. Burn incidence and medical care use in the United States: estimates, trends, and data sources. *J Burn Care Rehabil* 1996;17:95–107.
- [3] Thomas S, Barrow RE, Herndon DN. History of the treatment of burns. In: Herndon DN Editor. *Total burn care*. 2nd ed. New York: WB Saunders; 2002. p. 1–10.
- [4] Rashid A, Khanna A, Gowar JP, Bull JP. Revised estimates of mortality from burns in the last 20 years at the Birmingham Burns Centre. *Burns* 2001;27:723–30.
- [5] Pruzinsky T, Sarwer DB, Cash TF, et al. Multiple perspectives on the psychology of plastic surgery. In: Sarwer DB, Pruzinsky T, Cash TF, et al, editors. *Psychological aspects of reconstructive and cosmetic plastic surgery: clinical, empirical, and ethical perspectives*. Philadelphia: Lippincott Williams and Wilkins; 2006. p. 3–11.
- [6] Barret JP. Burns reconstruction. *BMJ* 2004;329:274–6.
- [7] Fauerbach JA, Spence RJ, Patterson DR. Adult burn injury. In: Sarwer DB, Pruzinsky T, Cash TF, et al, editors. *Psychological aspects of reconstructive and cosmetic plastic surgery: clinical, empirical, and ethical perspectives*. Philadelphia: Lippincott Williams and Wilkins; 2006. p. 105–24.
- [8] Lawrence JW, Fauerbach JA, Heinberg L, Doctor M. Visible vs. hidden scars and their relation to body esteem. *J Burn Care Rehabil* 2004;25:25–32.
- [9] Pallua N, Kunsebeck HW, Noah EM. Psychosocial adjustments 5 years after burn injury. *Burns* 2003;29:143–52.
- [10] Ward HW, Moss RL, Darko DF, et al. Prevalence of postburn depression following burn injury. *J Burn Care Rehabil* 1987;8:294–8.
- [11] Beck AT, Steer RA. *Manual for the revised Beck Depression Inventory*. Psychological Corporation.
- [12] Wiechman SA, Ptacek JT, Patterson DR, et al. Rates, trends, and severity of depression after burn injuries. *J Burn Care Rehabil* 2001;22:417–24.
- [13] Radloff LS. The CES-D Scale: a self-report depression scale for research in the general population. *Appl Psychol Meas* 1977;1:385–401.
- [14] Heinberg LJ, Fauerbach JA, Spence RJ, Hackerman F. Psychologic factors involved in the decision to undergo reconstructive surgery after burn injury. *J Burn Care Rehabil* 1997;18:374–80.
- [15] National Burn Repository: 2005 report. American Burn Association.
- [16] Beck AT, Steer RA, Garbin MG. Psychometric properties of the Beck Depression Inventory: twenty-five years of evaluation. *Clin Psychol Rev* 1988;8:77–100.
- [17] Lawrence JW, Heinberg LJ, Roca R, et al. Development and validation of the Satisfaction with Appearance Scale: assessing body image among burn-injured patients. *Psychol Assess* 1998;10:64–70.
- [18] Ware JE, Snow KK, Kosinski M, Gandek B. *SF-36 Health Survey manual and interpretation guide*. Boston: Health Institute; 1993.
- [19] Garratt A, Schmidt L, Mackintosh A, Fitzpatrick R. Quality of life measurement: bibliographic study of patient assessed health outcome measures. *BMJ* 2002;324:1417.
- [20] Lawrence JW, Fauerbach JA, Thombs BD. A test of the moderating role of importance of appearance in the relationship between perceived scar severity and body-esteem among adult burn survivors. *Body Image* 2006;3:101–11.
- [21] Fauerbach JA, Lezotte D, Hills RA, et al. Burden of burn: a norm-based inquiry into the influence of burn size and distress on recovery of physical and psychosocial function. *J Burn Care Rehabil* 2005;26:21–32.
- [22] Bentler PM, Wu EJC. *EQS structural equations program manual*. Encino, CA: Multivariate Software; 2003.
- [23] Tucker LR, Lewis C. A reliability coefficient for maximum likelihood factor analysis. *Psychometrika* 1973;38:1–10.
- [24] Bentler PM, Bonett DG. Significance tests and goodness of fit in the analysis of covariance structures. *Psychol Bull* 1980;88:588–606.
- [25] Bentler PM. Comparative fit indexes in structural models. *Psychol Bull* 1990;107:238–46.
- [26] Steiger JH. Structural model evaluation and modification: an interval estimation approach. *Multivariate Behav Res* 1990;25:173–80.
- [27] Browne MW, Cudeck R. Alternative ways of assessing fit. In: Bollen KA, Long JS, editors. *Testing structural equation models*. Newbury Park (CA): Sage; 1993. p. 136–62.
- [28] Moldover JE, Goldberg KB, Prout MF. Depression after traumatic brain injury: a review of evidence for clinical heterogeneity. *Neuropsychol Rev* 2004;14:143–54.
- [29] Dryden DM, Saunders LD, Rowe BH, et al. Depression following traumatic spinal cord injury. *Neuroepidemiology* 2005;25:55–61.
- [30] Bombardier CH, Richards JS, Krause JS, Tulskey D, Tate DG. Symptoms of major depression in people with spinal cord injury: implications for screening. *Arch Phys Med Rehabil* 2004;85:1749–56.
- [31] Damall BD, Ephraim P, Wegener ST, et al. Depressive symptoms and mental health service utilization among persons with limb loss: results of a national survey. *Arch Phys Med Rehabil* 2005;86:650–8.
- [32] Evans DL, Charney DS, Lewis L, et al. Mood disorders in the medically ill: scientific review and recommendations. *Biol Psychiatry* 2005;58:175–89.

- [33] Simon GE, VonKorff M. Recognition, management, and outcomes of depression in primary care. *Arch Fam Med* 1995;4:99–105.
- [34] Kemp BJ, Kahan JS, Krause JS, Adkins RH, Nava G. Treatment of major depression in individuals with spinal cord injury. *J Spinal Cord Med* 2004;27:22–8.
- [35] Fann JR, Uomoto JM, Katon WJ. Sertraline in the treatment of major depression following mild traumatic brain injury. *J Neuropsychiatry Clin Neurosci* 2000;12:226–32.
- [36] Glassman AH, O'Connor CM, Califf RM, et al. Sertraline treatment of major depression in patients with acute MI or unstable angina. *JAMA* 2002;288:701–9.
- [37] Holland JC, Romano SJ, Heiligenstein JH, Tepner RG, Wilson MG. A controlled trial of fluoxetine and desipramine in depressed women with advanced cancer. *Psychooncology* 1998;7:291–300.
- [38] Lustman PJ, Freedland KE, Griffith LS, Clouse RE. Fluoxetine for depression in diabetes: a randomized double-blind placebo-controlled trial. *Diabetes Care* 2000;23:618–23.
- [39] Robinson RG, Schultz SK, Castillo C, et al. Nortriptyline versus fluoxetine in the treatment of depression and in short-term recovery after stroke: a placebo-controlled, double-blind study. *Am J Psychiatry* 2000;157:351–9.
- [40] Roth RS, Lowery JC, Davis J, Wilkins EG. Quality of life and affective distress in women seeking immediate versus delayed breast reconstruction after mastectomy for breast cancer. *Plast Reconstr Surg* 2005;116(4):993–1002.
- [41] Keith DJ, Walker MB, Walker LG, et al. Women who wish breast reconstruction: characteristics, fears, and hopes. *Plast Reconstr Surg* 2003;111:1051–6.
- [42] Honigman RJ, Phillips KA, Castle DJ. A review of psychosocial outcomes for patients seeking cosmetic surgery. *Plast Reconstr Surg* 2004;113:1229–37.
- [43] Meningaud JP, Benadiba L, Servant JM, et al. Depression, anxiety and quality of life among scheduled cosmetic surgery patients: multicentre prospective study. *J Craniomaxillofac Surg* 2001;29:177–80.
- [44] McQuaid D, Barton J, Campbell E. Researchers BEWARE! Attrition and nonparticipation at large. *J Burn Care Rehabil* 2003;24:203–7.
- [45] Fauerbach JA, Lawrence J, Haythornthwaite J, et al. Preburn psychiatric history affects posttrauma morbidity. *Psychosomatics* 1997;38:374–85.
- [46] Gilbody S, House AO, Sheldon TA. Screening and case finding instruments for depression. *Cochrane Database Syst Rev* 2005; CD002792.
- [47] Henkel V, Mergl R, Coyne JC, et al. Screening for depression in primary care: will one or two items suffice? *Eur Arch Psychiatry Clin Neurosci* 2004;254:215–23.
- [48] Kroenke K, Spitzer RL, Williams JB. The Patient Health Questionnaire-2: validity of a two-item depression screener. *Med Care* 2003; 41:1284–92.
- [49] Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med* 2001;16:606–13.