

# Measuring Outcomes in Aesthetic Surgery: A Comprehensive Review of the Literature

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Outcomes research examines the end results of medical interventions, taking into account patients' experiences, preferences, and values. The purpose of assessing outcomes is to provide evidence on which to base clinical decisions. The assessment of outcomes in aesthetic surgery is especially pertinent because patient satisfaction is the predominant factor in determining success. In cosmetic surgery, various scales have been used to assess outcomes. Unfortunately, none of these methods has achieved widespread use. The adoption of broadly accepted, relevant scales to measure outcomes would be advantageous, because this would allow the comparison of techniques, quantification of positive effects, and identification of patients unlikely to benefit from surgery. The purpose of this study was to critically review the present literature to identify the appropriate instruments to assess outcomes in aesthetic surgery. After a comprehensive review of aesthetic surgery outcome instruments, the authors identified body-image and quality-of-life measures to be of the greatest value in determining aesthetic surgery outcomes. These conclusions were based on a critical evaluation of the feasibility, validity, reliability, and sensitivity to change of these measures. The Multidimensional Body-States Relations Questionnaire (MBSRQ), a psychological assessment of body image, was selected as a potential candidate for further study. Two additional body-image assessment instruments, the Facial Appearance Sorting Test (FAST) and the Breast Chest Ratings Scale (BCRS), may be useful in the assessment of rhinoplasty and breast surgery, respectively. The Derriford Scale (DAS59), an instrument that assesses appearance-related quality of life, was also selected. In addition, the authors recommend the use of a generic, utility-based quality-of-life instrument, such as the Health Utilities Index (HUI) or the EuroQol (EQ-5D). (*Plast. Reconstr. Surg.* 111: 469, 2003.)

In the United States alone, 1.3 million cosmetic surgery procedures were performed in the year 2000, representing a 198 percent increase from 1992.<sup>1</sup> Despite representing one of

the fastest-growing fields of plastic surgery, the effects of aesthetic surgery on patients are still not well understood.

Outcomes research studies the effects of medical interventions, taking into account patients' experiences, preferences, and values.<sup>2</sup> The purpose of assessing outcomes is to provide evidence on which to base clinical decisions. The assessment of outcomes in aesthetic surgery is especially pertinent because patient satisfaction is the predominant factor in determining success.

In cosmetic surgery, various instruments have been used to assess outcomes. Unfortunately, none of these methods has achieved widespread use. The standardization of outcome assessment in aesthetic surgery would be extremely advantageous. Previous comparisons between aesthetic surgical procedures have relied largely on subjective comparisons of selected photographic images, which are considered unreliable. Commonly adopted outcome measurement scales could form the basis on which to compare surgical results. The effects of aesthetic interventions on patients could be ascertained and quantified. In addition, it may be possible to identify patients unlikely to benefit from surgery.

However, assessing aesthetic surgery outcomes has been difficult. The nature of aesthetic surgery, the creation of beauty, is subjective and eludes clear definition. For example, neoclassical Greek canons attempted to standardize measurements of facial beauty. Contemporary comparisons with these measurements have not shown a correlation to present

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ideals.<sup>3</sup> Farkas and Kolar<sup>4</sup> attempted to compare faces of various degrees of attractiveness but could not find significant anthropometric measurements to account for their differences.

Traditional assessments of surgical success have examined mortality, morbidity, and physiologic function. Unfortunately, these concepts are not applicable to aesthetic surgery. Although morbidity may be an important factor in determining the overall safety of surgery,<sup>5-7</sup> its usefulness is limited when attempting to assess meaningful aesthetic outcomes.

Despite these difficulties, many previous assessments of the various dimensions of aesthetic surgery outcomes have been made. Some authors have attempted to directly measure the effects of aesthetic surgery through anthropometric assessments.<sup>8-10</sup> Subjective assessments of outcome by patients and surgeons have been made.<sup>11-14</sup> Quality-of-life outcomes have been measured in aesthetic surgery populations.<sup>15-18</sup> In addition, previous studies have used psychological assessments of psychiatric disorders, self-esteem, and body image.<sup>19-22</sup>

Given the multitude of methods that have been used to assess aesthetic surgery outcomes, we sought to conduct a comprehensive and critical review of the literature. The psychological assessment of aesthetic surgery patients has been reviewed previously.<sup>23-26</sup> However, the specific purpose of this review was to identify outcome scales for a systematic evaluation of their validities and reliabilities. Through this evaluation, we hope to establish the optimal instruments to assess aesthetic surgery outcomes.

#### MATERIALS AND METHODS

An OVID software literature search (Ovid Technologies, New York, N.Y.) was conducted using the terms cosmetic surgery and aesthetic surgery as text words (which includes title words, abstract words, and subject headings). Terms were combined by use of the Boolean operation "OR." Limits were placed on the search, identifying citations concerning human subjects and written in the English language. We used the MEDLINE database between 1966 and June of 2001, which identified 584 publications. The Healthstar database between 1975 and June of 2001 yielded 589 publications. The CINAHL database from 1982 to June of 2001 identified 140 publications. The Cochrane database of systematic reviews was also used, but this did not yield any publica-

tions. Additional studies were collected from the references cited in these articles.

The terms measure and instrument are used interchangeably in this study to denote any tools used to capture information on patient outcome. A scale is defined as a tool that assigns a numerical score to reflect a health state. Scaling refers to the process used to assign numerical weights to responses of a questionnaire to give an overall score to reflect the health state in question.<sup>27,28</sup>

All studies were examined for the presence of outcomes instruments. If no instruments were used in the study, the study was excluded from further evaluation. In many instances, a full evaluation of an instrument required the original references detailing the development of the scale. If no publications detailing the characteristics of the scale could be found, it was excluded from this review. When necessary, the originator of the instrument was contacted to obtain a copy for evaluation. From this literature search, 61 relevant studies and reviews were identified.

The resulting articles were reviewed, and the measurement scales found were evaluated, where applicable, for validity, reliability, and sensitivity to change.<sup>29,30</sup> The authors used the following questions in a systematic manner, similar to that of McDowell and Newell,<sup>31</sup> to evaluate the usefulness of outcome instruments: (1) How feasible is the scale to administer? (2) Does the scale demonstrate appropriate validity with respect to aesthetic surgery? (3) Has the scale been shown to display acceptable reliability? (4) Has the scale been tested on surgical subjects, and if so, what is the scale's ability to detect changes resulting from surgery?

#### *Validity*

The term validity encompasses many related concepts. Face validity asks experts of an appropriate nature whether the measurement scale used seems likely to obtain accurate results. Content validity refers to whether the content of a scale encompasses the condition purported to be measured. Predictive validity describes whether a measure is supported by evidence linking it to the outcome of interest. Convergent-discriminant validity refers to whether the measures agree with (are "convergent" with) other similar measures and disagree with (are "discriminant" from) measures of states that theoretically should not be re-

lated to them. We made an attempt to evaluate each aspect of validity whenever possible.

### *Reliability*

Similarly, there are multiple concepts within the term reliability. Reliability gives an index of whether a scale yields the same results when subjected to repeated measurements under different conditions. Internal consistency represents the correlation between items in the measure, which is usually expressed as the Cronbach  $\alpha$ .

Stability examines the reproducibility of a measure. This can be assessed in a variety of ways. Interobserver reliability measures the degree of agreement between different observers. Intraobserver reliability examines the agreement between observations made by the same evaluator on two different occasions. Test-retest reliability examines the agreement between observations on the same patient on two occasions separated by a time interval.

Although opinions vary, accepted values for internal consistency usually exceed 0.7 but should be no greater than 0.9 to avoid redundancy, whereas stability measures should be greater than 0.5.<sup>29</sup> All aspects of reliability, when available for evaluation, were examined for each outcome measure.

## RESULTS

Overall, we identified 43 publications in our literature search that used identifiable instruments to assess cosmetic surgery outcomes. From these publications, 53 identifiable instruments were found. These assessment tools were observed to fall into four categories: satisfaction, objective, psychological, and quality-of-life assessments. The properties of instruments that displayed acceptable validity and reliability are presented in Table I.

### *Satisfaction Assessments*

Satisfaction assessments included scales that assessed the satisfaction of the surgeon, independent observers, or the patient with surgery. Six identifiable outcome measures were found in this category (Table II).

Traditional satisfaction assessments have used the comparison of preoperative and postoperative photographs. Either the surgeon or an independent observer is asked to subjectively grade the result of surgery. Unfortu-

nately, the usefulness of photographs in outcome assessment is limited, because there are no validated and reliable means to quantify results to make meaningful comparisons. In addition, few of these comparisons have been made in a controlled or randomized manner. Ivy et al.<sup>32</sup> conducted face lifts using one technique on one side of the face and a different method on the contralateral side. Independent observers compared photographic results. Owlsley<sup>33</sup> conducted a prospective assessment of the correction of platysmal bands based on randomly selected standardized photographs.

Barton<sup>34</sup> devised a grading system to assess the improvement of the nasolabial fold with rhytidectomy. However, reliability data are unavailable for this measure.

Facial halves comparison was proposed by Hamra<sup>35</sup> to evaluate rhytidectomy results. Two halves of the face, one preoperative and the other postoperative, are combined into one photograph. Evaluation is subjective, without a numerical assessment.

Strasser<sup>12</sup> developed a scale that subjectively assesses malposition, distortion, asymmetry, contour deformity, and scar (MDACS scale). Each variable is evaluated on a scale of 0 (perfect) to 15 (worst). This scale displays appropriate face and content validity. Reliability was not assessed for this instrument.

Patient satisfaction has been examined by investigators to assess rhinoplasty,<sup>36,37</sup> rhytidectomy,<sup>6</sup> reduction mammoplasty,<sup>38-40</sup> and augmentation mammoplasty.<sup>41-43</sup> Reich<sup>44</sup> evaluated satisfaction in a variety of cosmetic surgical patients. The examination of resident-performed aesthetic surgery of various procedures has also been done.<sup>13,14</sup> The instruments used to assess satisfaction in all of these studies varied, because most of these satisfaction measures were developed by the researchers themselves. None of these instruments seem to have undergone tests of validity and reliability.

### *Objective Assessments*

Objective assessments were arbitrarily assigned to instruments that could directly quantify the physical changes resulting from cosmetic surgery. Only five identifiable methods of outcome assessment were found in this category, as indicated in Table III. Of these, only one method has been used to assess surgical

TABLE I  
Summary of Selected Instruments

Name	Authors	Numerical Characteristics*	No. of Items†	Applications of Method	Method of Administration (time)	Reliability: Thoroughness‡	Reliability: Results§	Validity: Thoroughness	Validity: Results	Sensitivity to Change
Facial Appearance Sorting Test (FAST)	Copas and Robin, 1989 <sup>30</sup>	Interval	18	Psychological, body image;	Self-administered (5 min)	+++	+++	+	++	+++
Multidimensional Body-Self Relations Questionnaire (MBSRQ)	Cash, 2000 <sup>47</sup>	Interval	69	Psychological, body image; general	Self-administered (10 min)	+++	+++	+++	+++	0
Derriford Appearance Scale (DAS59)	Harris and Carr, 2001 <sup>65</sup>	Interval	59	QoL; general	Self-administered (10 min)	+++	+++	+++	+++	+++
Breast Chest Ratings Scale (BCRS)	Thompson and Tantleff, 1992 <sup>51</sup>	Interval	10	Psychological, body image; breast surgery	Self-administered (5 min)	++	++	+	++	++
Short Form 36 (SF-36)	Ware, 1993 <sup>37</sup>	Interval	36	QoL; general	Self-administered (10 min)	+++	+++	+++	++	+
Body Dysmorphic Disorder Examination Self-Report (BDDE-SR)	Rosen and Reiter, 1996 <sup>48</sup>	Interval	32	Psychological, body image; general	Self-administered (10 min)	+++	+++	++	+	0
EuroQoL (EQ-5D)	EuroQoL Group, 1990 <sup>58</sup>	Interval	6	QoL; general	Self-administered (5 min)	+++	+++	+++	+++	++

\* Numerical characteristics: interval (continuous number), ordinal (ranking of criteria, e.g., first, second, etc.) or nominal (classification of subjects by number, e.g. 1 = male, 2 = female).

† No. of items: number of responses required in instrument.

‡ Thoroughness: 0, no reported evidence of reliability or validity; +, very basic information only; ++, several types of test, or several studies have reported reliability/validity; +++, all major forms of reliability/validity testing reported.

§ Results: 0, no numerical results reported; ?, results unpredictable; +, weak reliability/validity; ++, adequate reliability/validity; +++, excellent reliability/validity.

|| Sensitivity to change: 0, no results reported; +, weak sensitivity to change; ++, adequate sensitivity to change; +++, excellent sensitivity to change.

¶ QoL, quality of life.

TABLE II  
Subjective Outcome Measures

Instrument	Purpose	Studies Describing Instrument	Studies Using Instrument
Patient photographs	General assessment	Many studies	Many studies
Independent observer assessment	General assessment	Many studies	Many studies
Patient satisfaction questionnaires	Satisfaction assessment	Many studies	Many studies
Nasolabial fold scale	Face lift assessment	Barton, 1992 <sup>34</sup>	Barton, 1992 <sup>34</sup>
Facial halves comparisons	Face lift assessment	Hamra, 1995 <sup>11</sup> ; 1996 <sup>35</sup>	Hamra, 1995 <sup>11</sup> ; 1996 <sup>35</sup>
Malposition, distortion, asymmetry, contour deformity, and scar grading scale (MDACS)	General assessment	Strasser, 1999 <sup>12</sup>	None

TABLE III  
Objective Outcome Measures

Instrument	Purpose	Studies Describing Instrument	Studies Using Instrument
Computer-assisted photographic analysis of rhytidectomy	Face lift assessment	Tapia et al., 1999 <sup>8</sup>	Tapia et al., 1999 <sup>8</sup>
Nasolabial fold analysis	Facial soft-tissue analysis	Yousif et al., 1994 <sup>9</sup>	None
Anthropometric soft-tissue analysis	Facial soft-tissue analysis	Pitanguy et al., 1998 <sup>10</sup>	None
Three-dimensional digitization of nasal landmarks	Facial soft-tissue analysis	Mishima et al., 1996 <sup>45</sup>	None
Structured light scanning of facial surface	Facial soft-tissue analysis	Bhatia et al., 1994 <sup>46</sup>	None

subjects. This was done by Tapia et al.,<sup>8</sup> who demonstrated differences in cervicomentalar angle and eyebrow position after rhytidectomy in a computer-assisted analysis of preoperative and postoperative patient photographs.

Similar methods have been attempted by Pitanguy et al.<sup>10</sup> to model soft-tissue changes with aging and by Yousif et al.<sup>9</sup> to examine aging changes of the nasolabial fold. Mishima et al.<sup>45</sup> used computer-assisted, three-dimensional anthropometric measurements to analyze the nasal form. A method of three-dimensional facial surface scanning was able to detect changes after subcutaneous fluid injection.<sup>46</sup> Our examination of validity of all the instruments in this category revealed that although they are specific and accurate because of their objective nature, it has not been proved whether these measurements correlate with beneficial patient outcomes. None of the outcome assessments in this category has undergone tests of reliability.

#### *Psychological Assessments*

The majority of outcomes measures that have been used in cosmetic surgery are psychological in nature (Table IV). Thirty-four instruments were identified in this category. On ex-

amination, we found that many of these scales were developed for the assessment of psychopathologic states. As a result, many of the scales displayed low face and content validity with respect to measuring aesthetic surgery outcomes.

Scales that warranted further evaluation included the Multidimensional Body-States Relations Questionnaire (MBSRQ<sup>47</sup>), the Body Dysmorphic Disorder Examination-Self Report (BDDE-SR<sup>48</sup>), the Rosenberg Self-Esteem Scale (RSE<sup>49</sup>), the Facial Appearance Sorting Test (FAST<sup>50</sup>), and the Breast Chest Ratings Scale (BCRS<sup>51</sup>).

The BDDE-SR is a well-developed self-report questionnaire developed for the diagnosis of body dysmorphic disorder. The RSE was developed to study self-esteem in adolescents. Unfortunately, our examination of the BDDE-SR and RSE revealed low content, face, and predictive validities with respect to aesthetic surgery.

The MBSRQ is a well-validated scale that assesses body-image attitudes.<sup>52</sup> Internal consistency is 0.88, and 1-month stability is 0.91. Norms for the general population have been established. This instrument has been used to assess cosmetic surgery patients in a retrospective manner.<sup>25,26,53</sup> No prospective studies have

TABLE IV  
Psychological Outcome Measures

Instrument	Purpose	Studies Describing Instrument	Studies Using Instrument
Body Dysmorphic Disorder Examination-Self Report (BDDE-SR)	Body dysmorphic disorder diagnosis	Rosen and Reiter, 1996 <sup>48</sup>	Glatt et al., 1999 <sup>19</sup> ; Sarwer et al., 1998 <sup>20,53,116</sup> ; Pertschuk et al., 1998 <sup>117</sup>
Body Attitude Scale	Body image assessment	Kurtz and Hirst, 1970 <sup>87</sup>	Shiple et al., 1977 <sup>118</sup>
Body Cathexis scale	Body image assessment	Secord and Jourard, 1953 <sup>88</sup>	Marcus, 1984 <sup>21</sup>
Body-Image Inventory (BII)	Body image assessment	Berscheid et al., 1973 <sup>89</sup>	Ozgun et al., 1998 <sup>119</sup>
Breast Chest Ratings Scale (BCRS)	Body image assessment	Thompson and Tantleff, 1992 <sup>51</sup>	Glatt et al., 1999 <sup>19</sup>
Facial Appearance Sorting Test (FAST)	Body image assessment	Copas and Robin, 1989 <sup>50</sup>	Robin et al., 1988 <sup>54</sup>
Multidimensional Body-Self Relations Questionnaire (MBSRQ)	Body image assessment	Cash, 2000 <sup>47</sup>	Sarwer et al., 1998 <sup>20,53,116</sup> ; Pertschuk et al., 1998 <sup>117</sup>
Repertory Grid	Body image assessment	Norris and Makhoulf-Norris, 1976 <sup>90</sup>	Robin et al., 1988 <sup>54</sup>
Semantic Differential Test	Body image assessment	Osgood et al., 1957 <sup>91</sup>	Burk et al., 1985 <sup>80</sup>
Beck Depression Inventory	Depression assessment	Beck et al., 1990 <sup>92</sup>	Goin et al., 1980 <sup>120</sup>
Center for Epidemiologic Studies Depression Scale (CED-S)	Depression assessment	Radloff, 1977 <sup>93</sup>	Rankin et al., 1998 <sup>18</sup>
Hamilton Depression Scale	Depression assessment	Hamilton, 1967 <sup>94</sup>	Goin et al., 1980 <sup>120</sup>
California Psychological Inventory (CPI)	General psychiatric assessment	Gough, 1969 <sup>95</sup>	Shiple et al., 1977 <sup>118</sup>
Rorschach	General psychiatric assessment	Bohm, 1958 <sup>96</sup>	Baker et al., 1974 <sup>121</sup>
Brief Symptom Inventory	General psychiatric assessment	Derogatis et al., 1982 <sup>97</sup>	Behmand et al., 2000 <sup>61</sup> ; Goin and Rees, 1991 <sup>79</sup>
Minnesota Multiphasic Personality Index (MMPI)	General psychiatric assessment	Hathaway and McKinley, 1970 <sup>98</sup>	Goin et al., 1980 <sup>120</sup> ; Baker et al., 1974 <sup>121</sup> ; Wright and Wright, 1975 <sup>22</sup>
Psychiatric interview	General psychiatric assessment	Not applicable	Ohlsen et al., 1979 <sup>42</sup> ; Goin et al., 1977 <sup>122</sup> ; Baker et al., 1974 <sup>121</sup>
Fundamental Interpersonal Relations Orientations-Behavior (FIRO-B)	Interpersonal relations assessment	Schutz, 1958 <sup>99</sup>	Goin et al., 1980 <sup>120</sup> ; Baker et al., 1974 <sup>121</sup>
Symptom Sign Inventory	Personality disorder assessment	Foulds, 1965 <sup>100</sup>	Hay and Heather, 1973 <sup>123</sup>
General Health Questionnaire (GHQ)	Psychological well-being assessment	Goldberg and Hillier, 1979 <sup>101</sup>	Klassen et al., 1996 <sup>17,60</sup>
Life Satisfaction Index (LSI)	Psychological well-being assessment	Neugarten and Havighurst, 1961 <sup>102</sup>	Ozgun et al., 1998 <sup>119</sup>
Tennessee Self Concept Scale	Psychological well-being assessment	Fitts, 1965 <sup>103</sup>	Burk et al., 1986 <sup>80</sup>
Ways of Coping Scale	Psychological well-being assessment	Folkman and Lazarus, 1988 <sup>104</sup>	Rankin et al., 1998 <sup>18</sup>
Crown Crisp Experimental Index (CCEI)	Psychoneurotic profile assessment	Crown and Crisp, 1979 <sup>105</sup>	Ferreira, 2000 <sup>124</sup> ; Slator and Harris, 1992 <sup>125</sup> ; Hollyman et al., 1986 <sup>126</sup>
Rust Inventory of Schizotypal Cognitions	Schizophrenia diagnosis	Rust, 1989 <sup>106</sup>	Slator and Harris, 1992 <sup>125</sup>
Rosenberg's Self-Esteem Scale (RSE)	Self-esteem assessment	Rosenberg, 1965 <sup>107</sup>	Klassen et al., 1996 <sup>17,60</sup>
Self-Esteem Inventory (SEI)	Self-esteem assessment	Coopersmith, 1986 <sup>108</sup>	Ozgun et al., 1998 <sup>119</sup>
Ziller Social Self-Esteem Test	Self-esteem assessment	Ziller et al., 1969 <sup>109</sup>	Shiple et al., 1977 <sup>118</sup>
Personal Resources Questionnaire (PRQ-85)	Social support assessment	Weinert, 1987 <sup>110</sup>	Rankin et al., 1998 <sup>18</sup>
Edward Personal Preference Schedule (EPPS)	Personality assessment	Edwards and Abbott, 1973 <sup>111</sup>	Baker et al., 1974 <sup>121</sup>
Selective Vocabulary Test	Personality assessment	Slater, 1944 <sup>112</sup>	Robin et al., 1988 <sup>54</sup>
Thematic Apperception Test (TAT)	Interpersonal relations assessment	Murray, 1943 <sup>113</sup>	Baker et al., 1974 <sup>91</sup>
Social Interaction Self-Statement Test (SIST)	Interpersonal relations assessment	Glass et al., 1982 <sup>114</sup>	Meningaud et al., 2001 <sup>63</sup>
Montgomery and Asberg Depression Rating Scale (MADRS)	Depression assessment	Montgomery and Asberg, 1979 <sup>115</sup>	Meningaud et al., 2001 <sup>63</sup>

been performed using the MBSRQ; thus, we were unable to evaluate the sensitivity to change for this instrument.

The FAST scale asks patients to sort 18 drawings of facial profiles according to attractiveness. Patients are then asked to rank themselves with respect to these drawings. The test

displayed good validity and excellent reliability for rhinoplasty and seems to be sensitive to change.<sup>54</sup>

In the BCRS,<sup>51</sup> subjects are asked to choose their ideal chest and breast sizes from five male and five female schematic figures that range from small to large. Validity is good for breast

surgery, and test-retest reliabilities are available for this measure, ranging from 0.69 to 0.85.

### Quality-of-Life Assessments

Quality of life is defined as a multidomain construct that includes physical, social, psychological, emotional, or spiritual domains to arrive at an assessment of a patient's state of being.<sup>55</sup> Eight scales were identified in this category (Table V). Three types of quality-of-life instruments can be distinguished: general, condition-specific, and symptom-specific.

General scales included the Health Measurement Questionnaire (HMQ-2<sup>56</sup>), Short Form 36 (SF-36<sup>57</sup>), and EuroQol (EQ-5D<sup>58</sup>). Unfortunately, the valuation system of the HMQ-2 is currently considered obsolete<sup>59</sup>; therefore, its validity for evaluating general quality of life is questionable.

The validity and reliability of the SF-36 in evaluating general quality of life is well established.<sup>57</sup> The SF-36 seems to be sensitive to change in the breast-reduction population.<sup>16,17,60,61</sup> However, in procedures that are predominantly cosmetic in nature, such as rhinoplasty and nonreduction breast surgery, the SF-36 seems to be unable to detect significant changes.<sup>17</sup>

The EQ-5D is a reliable and well-validated general quality-of-life assessment instrument that has been used to assess a sample of cosmetic surgery patients.<sup>62</sup> In this study, the EQ-5D seemed to be sensitive to change, albeit less sensitive than the SF-36. Meningaud et al.<sup>63</sup> studied preoperative cosmetic surgery patients

and found significant differences between these patients and matched controls.

The Derriford Scale (DAS59<sup>64,65</sup>) is a condition-specific quality-of-life measure developed for assessing concern about physical appearance. The scale is based on an autobiographical study of 54 postoperative reconstructive and cosmetic surgery patients. Our examination of the scale revealed good content, face, and predictive validity. The measure displayed high internal consistency (0.98), and test-retest reliabilities (0.75 to 0.86) were acceptable.<sup>66</sup>

Additional condition-specific outcome instruments have been developed by Alsarraf<sup>67</sup> for rhinoplasty, face lift, blepharoplasty, and skin rejuvenation. However, no evaluation of validity or reliability is available for these instruments.

### DISCUSSION

The goals of aesthetic surgery are to reshape normal structures and restore youthful appearance to improve patient appearance and self-image. Although the technical aspects of aesthetic surgery are important, we believe that patient satisfaction is the factor that dictates the success of the procedure. Technically perfect results may be considered a failure if the patient is not satisfied. A further understanding of patient satisfaction may be obtained from examining the appropriate aspects of aesthetic surgery outcomes.

To measure aesthetic surgery outcomes, the appropriate tools are needed. Proper outcomes assessment necessitates the availability

TABLE V  
Quality-of-Life Outcome Measures

Instrument	Purpose	Studies Describing Instrument	Studies Using Instrument
Health Measurement Questionnaire (HMQ)	Generic Qol* assessment	Gudex and Kind, 1988 <sup>56</sup>	Rankin et al., 1998 <sup>18</sup> ; Cole et al., 1994 <sup>15</sup>
Short Form 36 (SF-36)	Generic Qol assessment	Ware, 1993 <sup>57</sup>	Klassen et al., 1999 <sup>62</sup> ; Shakespeare and Cole, 1997 <sup>16</sup> ; Klassen et al., 1996 <sup>17,60</sup>
EuroQol (EQ-5D)	Generic Qol assessment	The EuroQol Group, 1990 <sup>58</sup>	Meningaud et al., 2001 <sup>63</sup> ; Klassen et al., 1999 <sup>62</sup>
Derriford Scale (DAS59)	Aesthetic surgery-specific Qol assessment	Harris and Carr, 2001 <sup>65</sup>	Harris and Carr, 2001 <sup>65</sup> ; Klassen et al., 1998 <sup>64</sup>
Rhinoplasty Outcomes Evaluation (ROE)	Aesthetic surgery-specific Qol assessment	Alsarraf, 2000 <sup>67</sup>	None
Facelift Outcomes Evaluation (FOE)	Aesthetic surgery-specific Qol assessment	Alsarraf, 2000 <sup>67</sup>	None
Blepharoplasty Outcomes Evaluation (BOE)	Aesthetic surgery-specific Qol assessment	Alsarraf, 2000 <sup>67</sup>	None
Skin Rejuvenation Outcomes Evaluation (SROE)	Aesthetic surgery-specific Qol assessment	Alsarraf, 2000 <sup>67</sup>	None

\* Qol, quality of life.

of instruments that are practical, valid, reliable, and sensitive to change. After critically reviewing the scales available for use, we have found that quality-of-life and body-image measures best satisfy these requirements.

No appropriate instruments to directly evaluate patient satisfaction in aesthetic surgery were found. Typically, the reviewed instruments used ordinal or visual analogue scales to rate satisfaction from poor to excellent. Responses to such surveys are subjective and difficult to interpret, because they are a complex function of expectations that may vary greatly among patients with comparable care.<sup>68</sup> Although validated and reliable satisfaction instruments have been developed in other fields, such as primary care,<sup>69–71</sup> palliative care,<sup>72</sup> psychiatry,<sup>73</sup> and public health,<sup>74</sup> inspection of these satisfaction instruments has shown limited application to aesthetic surgery. Notably, these instruments encompass domains such as physician-patient relationships and patient access to care, which are important features of patient satisfaction but less important aspects of aesthetic surgical outcomes.

In addition, many factors unrelated to surgery may cloud the perception of patient satisfaction. For example, Reich<sup>36</sup> found the basis of dissatisfaction in a sample of aesthetic surgery patients to be predominantly the result of unfavorable interpersonal relationships during the preoperative, operative, and postoperative phases. Furthermore, an individual's ability to manage his or her own medical condition may also influence patient satisfaction.<sup>75</sup> Moreover, there is a high likelihood of bias from patients reporting their satisfaction to their surgeons.

Lowery et al.<sup>76</sup> examined the reliability of ordinal scales and visual analogue scales in the aesthetic evaluation of breast reconstruction. Even in this setting of overt visual differences, their results suggested poor reliability with these instruments. More explicit rating criteria improved reliability. Specific and well-designed instruments seem better suited to measure satisfaction with different aspects of the health intervention.<sup>77</sup> In this regard, it may be possible to develop appropriate satisfaction outcome assessments, but at the present time, no available tools seem applicable to aesthetic surgery. We propose that quality-of-life and body-image measures are probably the most important components of patient satisfaction and, therefore, are the most appropriate means of

addressing the issue of measuring patient satisfaction in cosmetic surgery.

Our evaluation of the available objective measurements yielded no useful instruments. The advent of computer systems to analyze and standardize surgical results may prove advantageous in the search to compare the objective results of aesthetic surgery. However, as suggested by Hamra,<sup>78</sup> there is likely to be little consensus between surgeons in the types of measurements that are considered important. Furthermore, these methods are likely to be expensive and laborious, requiring special equipment to implement. In addition, it is unknown whether these measurements correlate with beneficial patient outcomes. In this respect, appropriate outcome measurements may be used to evaluate these future technologies to examine whether they correlate with increased patient quality of life or improved body image.

Initial psychiatric evaluations of the aesthetic surgery patient conceptualized the desire for cosmetic surgery in terms of unconscious motivations, involving the symbolic meaning of body parts and unresolved sexual conflicts.<sup>79</sup> Contemporary opinions have largely refuted these notions, stating that motivation for aesthetic surgery is not derived from psychiatric pathology but rather represents normal patients attempting to remedy an inconsistency between general and specific body-part esteem.<sup>80</sup>

Similarly, our review revealed that the majority of psychological scales used in the evaluation of aesthetic surgery outcomes originate from the evaluation of psychiatric disease states, as has been found by previous studies.<sup>25</sup> Predictably, these instruments showed limited validity with respect to cosmetic surgery. Generally, these measures of psychopathology have shown few differences following surgery. Thus, we have identified self-esteem and body-image measures, such as the MBSRQ, FAST, and BCRS, as the most appropriate psychological instruments to evaluate cosmetic surgery outcomes.

Recently, Borah et al.<sup>81</sup> studied the incidence of psychological complications in plastic surgery practices. Whereas heightened anxiety and depression, as measured by a surgeon-reported questionnaire, were seen in a large proportion of practices, the study indicated the occurrence of these complications to be in the minority of patients. In another study, body

dysmorphic disorder was seen in 7 percent of a female cosmetic surgery patient sample.<sup>53</sup> Therefore, the use of scales intended for psychological disorder states should be questioned in the evaluation of aesthetic surgery outcomes. However, we recognize that these scales may be useful for the identification of the problem patient unlikely to benefit from surgery.

We identified a plastic surgery-specific quality-of-life measure, the DAS59, to be an ideal candidate for future study because of its specific development for use in aesthetic surgery. However, such condition-specific measures as the DAS59, although specifically tailored to the cosmetic surgery patient population, cannot be used to compare different health states. Authors have recommended the use of general quality-of-life measures in conjunction with specific quality-of-life measures, such as the DAS59, to allow the comparison of one health state with another.<sup>82,83</sup> Although the HMQ-2, a general, utility-based measure of quality of life, has been used previously to detect significant changes following aesthetic surgery,<sup>15,17,18</sup> this scale has been largely superseded by newer quality-of-life instruments.

Newer general, utility-based measures include the EQ-5D<sup>58</sup> and the Health Utilities Index (HUI<sup>84</sup>). We identified the EQ-5D as a potential measure for future study. These instruments would also allow for quantification of quality-adjusted life years and a formal cost-utility analysis. Therefore, we recommend the inclusion of a general quality-of-life instrument such as the EQ-5D or the HUI with the administration of a condition-specific instrument, such as the DAS59. However, a known limitation of generic instruments is the decreased sensitivity to detect change in healthy individuals.

The ability to detect significant changes is an important aspect in research design. Ordinal (ranking, e.g., first, second, third) and nominal (classification by number, e.g., 1 = male, 2 = female) instruments used in previous studies have been restricted to nonparametric statistics, which are considered less powerful and less efficient.<sup>85</sup> The use of interval (continuous number) outcome scales, such as those recommended in this study, allows for the use of more powerful parametric statistical methods.<sup>86</sup> Smaller sample sizes may then be sufficient to detect change.

## CONCLUSIONS

We have identified body-image and quality-of-life measures to be of greatest use in determining aesthetic surgery outcomes. We based these conclusions on a critical assessment of the feasibility, validity, reliability, and sensitivity to change of measures identified from a comprehensive literature review.<sup>87-126</sup> The MBSRQ, a psychological assessment of body image, was selected as a potential candidate for further study. Two additional body-image assessment instruments, the FAST and the BCRS, may be useful in the assessment of rhinoplasty and breast surgery, respectively. The DAS59, an instrument that assesses appearance-related quality of life, was also selected. In addition, we recommend the use of a general, utility-based quality-of-life instrument such as the EQ-5D or the HUI.

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