according to chapter IV of the ICD-10 (endocrine, nutritional, and metabolic diseases), obesity is a disease (E 66). A WHO classification is commonly used to distinguish overweight from obesity, which differentiates between:

- Underweight (body mass index [BMI] below 18.5 kg/m²)
- Normal weight (BMI 18.5 to below 25)
- Overweight (BMI 25 to below 30)
- Obesity grade 1 (BMI 30 to below 35)
- Grade 2 (BMI 35 to below 40)
- Grade 3 (BMI 40 and higher).

In the United States, the prevalence of obesity (BMI ≥ 30 kg/m²) rose from 23% in 1990 to 31% in 2000; the prevalence of grade 3 obesity (BMI ≥ 40 kg/m²) rose from 3% to 5% (1). Grade 3 obesity (BMI ≥ 40 kg/m²) affects more than 4 million people in the US. The prevalence in Germany is lower: in 1998 and 2003, health surveys showed a prevalence of obesity of 20%, but in Germany the proportion of obese people has increased over the past 20 years too (2). Grade 3 affects 1 to 2% of the population, which translates into some 800 000 Germans (3, 4).

There are sufficient indications that conservative measures to reduce weight have a low success rate in the long term, or none at all, in patients with grade 3 obesity (5, e1). The National Institutes of Health (NIH) in 1991 therefore accepted bariatric surgery as the method of choice for grade 3 obesity. In the US alone, some 103 000 bariatric surgery procedures were performed in 2003 (2). In Germany, no such statistical data have been collected. According to the guidelines of the Deutsche Adipositas Gesellschaft (the German obesity society) (3) the indication for surgical intervention exists in patients with grade 3 obesity or with grade 2 obesity in whom conservative therapy has failed and who have...
serious comorbidities, such as type 2 diabetes. All larger prospective studies (n>20 000) have shown that mortality almost doubles when the BMI is higher than 35 kg/m² (6, e2). Life expectancy with obesity is substantially shorter especially in young obese people. In grade 3 obesity, a reduction by 20 years is assumed (7). Obesity in general and grade 3 obesity in particular are not regarded as diseases that require obligatory treatment under German law. In Germany, bariatric surgery is an elective procedure, and health insurers may grant permission on application. In the context of the application procedure – including the recommendations of the medical services of the health insurance companies – statements are usually obtained from mental health professionals. A study from Stuttgart reported that the insurers rejected the application for cost coverage for bariatric surgery in 2003 in 68% of patients in spite of a medical report recommending the intervention. Many of the somatic variables of the patients whose costs were covered and those whose costs were not did not differ (8).

On the background of a multifactorial etiology of obesity, multidisciplinary evaluation for bariatric surgery makes sense. This includes the evaluation of psychosocial and psychosomatic contexts. In the clinical assessment and healthcare provision, recommendations are often made that are empirically unfounded and that do not do justice to the individual. This is due to different prevailing models of the link between psychological factors and obesity or bariatric surgery. Ignorance about the empirical findings and lacking consensus on psychosomatic links of obesity and bariatric surgery may be the reasons behind a deficient clinical practice in terms of assessment and care provision. The authors have compiled this review on the basis of their own scientific and clinical experience, a selective literature review, and two of their own systematic reviews (19, 20).

**Assessing the success of bariatric surgical procedures**

Among the bariatric procedures, three treatment approaches can be distinguished:
- restrictive procedures, the best known of which is gastric banding (e4) (diagram 1)
- combined procedures (gastric bypass) (e5, e6, e7)
- malabsorption techniques (biliopancreatic diversion with or without switch).

Thus far it is not known which procedure is most suitable for which patients (9, e8). Worldwide, combined procedures such as gastric bypass are used more than twice as often as restrictive methods. Especially the gastric band is applied increasingly less often (10). In Germany, laparoscopically performed gastric bypass has overtaken gastric banding as the method of choice (presentation by R Weiner, 22 annual meeting of the German obesity society, Cologne 2006).

Not least the Swedish Obese Subjects (SOS) study showed that combined techniques are superior to merely restrictive methods, at least in terms of weight loss. The 10 year follow-up assessment showed a weight loss of 14% for the gastric band, 16% for gastroplasty, and 25% for gastric bypass. Compared with a conservatively treated control group, the incidence of cardiovascular risk factors – including hypertension, hypertriglyceridemia, diabetes – fell notably in the group who had had surgery. Mortality was lowered by 24.6%.

In the meantime, initial meta-analyses have been published that confirm the positive long term effects of surgical therapies with regard to weight and physical comorbidities (12, 13). However, surgical measures are not without risk – the postoperative mortality within the first 30 days is currently 1% (13), and only 80% of patients (e9, e10, e11) benefit in the sense of a significant reduction in weight. In up to 20%, the weight loss is unsatisfactory, or the patients regain weight substantially after the initial weight loss.

Restrictive surgical procedures are minor interventions compared with the combination methods or malabsorption techniques. The question about long term complications, however, cannot be answered in the light of the currently available evidence. Substitution of proteins, vitamins, trace elements, and minerals is necessary even in some patients who have had restrictive procedures, but in those in whom combined procedures or malabsorption techniques were used, this is compulsory for the rest of the patients’ lives.

**Mental comorbidities**

Most studies in the general population (14, 15, e35) indicate a higher lifetime prevalence of eating disorders, anxiety disorders, and especially affective disorders in obese people compared with normal-weight people. This difference is especially pronounced in obese
people who are participating in weight reduction programs, compared with those of a normal weight (16, e12, e13, e14). Studies of the mental comorbidities of people with grade 3 obesity (16, 17, 18, e12, e15, e16, e17, e18, e19) indicate a substantially higher prevalence of mental disorders than in people with a normal weight, especially in women. Affective disorders, anxiety disorders, eating disorders, and personality disorders are particularly prominent (16, e12).

Course of psychological variables and their influence on quality of life

The authors performed two systematic reviews of all studies conducted between 1980 and 2003, which investigated psychological and psychosocial variables after bariatric surgery. The inclusion criteria included a minimum follow-up duration of 1 year (19, 20). 29 and 40 studies were included. We selected controlled and uncontrolled studies with more than 10 patients, which had been conducted prospectively or retrospectively. Most studies showed a clear improvement of participants' mental health and psychosocial variables, such as social relations, sickness absence reports, and fitness to work. Mental comorbidities, especially depressive disorders and anxiety disorders, decreased after the intervention.

Improvements were also noted in participants' feelings of self worth and social interactions, including partner relationships and sexuality. The return to work was 16% to 36% depending on the study. From these findings, a positive influence on the subjects' quality of life is obvious, and this was confirmed by studies directly measuring quality of life (21).

But there are indications that psychosocial variables may improve only temporarily in many patients, and that some patients reach their original level 2 to 3 years after the intervention (17). The reason for this may be mainly that most adult people have stable personality traits, which slowly return to their original state after positive as well as negative life events (e20).
Empirical evidence for this is lacking, however, and longer, prospective studies are needed. The recommendation is to follow the patients at least 5 years postoperatively (e21). Bariatric procedures and weight loss cannot solve psychosocial problems. A history of sexual abuse can cause fears relating to the weight loss, and an unstable relationship can fall apart because one partner changes.

The prevalence of binge eating disorder in bariatric surgery patients is 15 to 30% (22). This is defined as the regular occurrence of eating binges – similar to bulimia nervosa – with a feeling of loss of control over one’s eating behavior but without compensatory behaviors such as vomiting. Obese people with a binge eating disorder have comorbidities with other mental disorders – especially affective disorders and personality disorders (23, e22, e23) – more often than obese people without eating disorders. Most studies show a postoperative decrease in eating disorders and problematic attitudes towards eating, weight, and body shape. Especially binge eating episodes usually decrease; some authors have even talked about the patients being cured, at least temporarily, after bariatric surgery. The negative perception of weight and body shape also decreases notably, early on after the operation, when patients are still clearly overweight (24). Some patients, however, express dissatisfaction with their shape, owing to the loose skin that often develops after weight loss (e24). A small proportion of patients relapse into eating binges after surgery. The amounts of food consumed during such binges are mostly smaller than before the operation, for obvious reasons. Which patients relapse and in which patients the binges will not reoccur remains unclear.

### BOX 1

#### Recommendations for the psychological evaluation

- **Psychological status**
  - psychopathological findings
  - mental disorders including eating disorders
  - history of inpatient psychiatric or psychosomatic treatment
  - outpatient treatments, psychotherapy, psychotropic medication
  - currently in therapy?

- **Eating and drinking behavior**
  - objective and subjective binge eating episodes
  - loss of control over eating
  - grazing (continuous unplanned ingestion of food over the day)
  - night eating
  - amounts of fluids ingested, preferred drinks
  - compensatory behaviors (vomiting, laxatives, diuretics)
  - restrictive eating behavior (constant attempt to diet)
  - attitudes towards weight and shape and judging these
  - portion sizes, selection of foods
  - in case of residual uncertainty, maybe self-monitoring of eating behavior over 1–2 weeks

- **Weight history**
  - self report about development of obesity (weight autobiography)
  - overweight/obesity as a child
  - familial tendency (overweight/obesity in first-degree relatives)
  - life events linked to weight gain
  - previous weight loss attempts and their success

- **Stress, coping skills**
  - psychosocial stressors
  - life changes to be expected in the 12 months after surgery
  - eating as only coping strategy
  - possible positive aspects of obesity (such as protection)
  - experiences of sexual or physical abuse

- **Level of Intelligence, cognitive functioning**
  - neuropsychological tests if required

- **Social support**
  - acceptance and help by partner, family, and friends
  - possible negative consequences? (For example, attractiveness as a problem for the spouse)
  - practical help
  - moral support
  - openness towards others, concealment (for fear of discrimination or failure, for example)

- **Motivation, compliance**
  - extent of motivation (for example, from 0 to 10)
  - main reasons for operation (health, mobility, attractiveness ...)
  - intrinsic (self) or extrinsic (for example, relatives) motivation
  - earlier compliance with medical recommendations

- **Appraisal of the surgical process**
  - type of procedure
  - way of functioning
  - limitations
  - complications
  - information and understanding of postoperative changes in food ingestion
  - contact with people who have had surgery, self help groups

- **Expectations**
  - weight loss as only problem solver (“quick fix”)
  - realistic expectations of the extent of weight loss (normal weight is rarely achieved)
The adequate distinction between normal and pathological eating behavior after bariatric surgery is problematic. Many patients vomit frequently or regurgitate, but in most of them this is associated with the initially difficult switch to other foodstuffs, the ingestion of smaller amounts, and the required extensive chewing than with a conscious effort to reduce weight (24). Some patients are continuously ingesting small amounts of food, unplanned, which is known as nibbling, grazing, or frequent snacking. Repeated chewing and spitting out of foods has also been described. However, there is no unified definition of these terms, and it remains to be seen whether this behavior is pathological.

Patients often develop intense fears of re-gaining weight after their weight plateaus. The consequence is often an intentionally restrictive eating pattern, which may result in further eating binges in patients with this vulnerability. Case reports have even reported the development of anorexia nervosa. Organic complications – for example a late pouch dilatation through eating binges and frequent vomiting – need to be borne in mind. The surgical team should consider a patient’s repeatedly expressed desire for adjustment of a gastric band and possibly involve a health care professional.

**Psychosocial predictors of weight gain or weight loss**

A psychosocial assessment is important not least because mental comorbidity is high in this group, as shown above. With regard to the prognostic estimates and postoperative weight gain or loss and the patient’s psychological wellbeing, the question that keeps coming up is that of psychosocial predictors. The data are, however, inconsistent, and only few psychosocial variables have been found to be robust predictors of weight loss. It is more the severity of a preoperative mental disorder, rather than its presence, that appears to be of predictive value. In patients with emotional-unstable personality disorders and patients with other serious mental disorders (i.e. borderline personality disorder) who have already been psychiatric inpatient repeatedly, what is often observed is not only an unsatisfactory weight loss but also an insufficient improvement in their psychological state (20). These patient groups have to be identified and treated accordingly before the operation. Postoperatively, they will require intense psychotherapeutic or pharmacotherapeutic care.

The main question is often whether an eating disorder such as binge eating disorder or so-called sweet eating are a contraindication for bariatric surgery, or whether they need to be treated before the intervention. The data are quite clear: binge eating before the operation is not a stable predictor for weight loss, independent of the surgical technique (24, 25). Patients who re-develop binge eating after the procedure seem to lose less weight – or gain more weight after a honeymoon period of 1 to 2 years – than patients who have never had eating binges or do not relapse postoperatively. There are also indications that a higher rate of medical complications can be expected in these patients (25).

Sweet eating is often seen as a negative predictor for a purely restrictive surgical technique. This assumption is based in 2 studies reported by Sugarman et al. that date back to 1987 and 1992 (26, 27). Later studies did not confirm these findings (28, 29). The study reported by Kim et al. (9) did not find a difference in weight loss after gastric banding between sweet eaters and non-sweet eaters. Contrary to the re-emergence of binge eating, a postoperative preference for sweet foods is not a reliable predictor for weight gain/loss.
**Conclusions for clinical practice**

Mental disorders seem to have a lesser negative influence on postoperative developments than previously assumed – with regard to weight as well as the mental disorder itself. Blithely excluding patients because of their mental disorder should therefore be avoided. Empirical studies do allow the conclusion, however, that severe and unstable mental disorders need to be identified and treated preoperatively, before surgery can be recommended.

In order to maintain high quality standards in the preoperative and postoperative care of patients who are having bariatric surgery, a multidisciplinary team and long term data collection beyond the time of initial weight loss are needed.

**Psychosocial assessment**

The role of the health care professional is in the evaluation before and follow-up care after the operation, but not merely in a gatekeeper function. For many patients, their psychosocial evaluation is their first contact with health care professionals and represents one of the most feared portions of their preoperative evaluation. It is thus to be expected that patients understate the extent of their psychosocial impairment so as not to be denied surgery. It is thus even more important to build a relationship of trust and put false expectations or fears in proportion. This is important in order to encourage patients to seek a therapist's help if needed after the operation. Especially in obese patients with notable mental comorbidity, health care professionals should assume an important task within the multidisciplinary team.

Although research does not provide consistent guidelines for the psychosocial evaluation, the following recommendations are in accordance with the literature (box 1) (17, e24, e30, e31, e32, e33). An important aim of the preoperative psychosocial evaluation, in addition to an extensive psychosocial and biographical history, is to elicit patients' motives, how much they know about the planned procedure, and their expectations of the surgery, for example as "problem solver", "quick fix".

In the evaluation, possible social support should be addressed, the fear of the surgery should be reduced, and a basis for postoperative compliance should be established. In agreement with the surgical team, the evaluation can also provide information and education where there are gaps in the patient's knowledge. Box 1 illustrates how the psychosocial evaluation is conducted at the psychosomatic departments of the University Hospitals in Erlangen and Bochum. After the first appointment in the surgery clinic, all patients are assessed in the psychosomatic department. The psychosocial evaluation is summarized for the surgical team and contains information and recommendations.

<table>
<thead>
<tr>
<th>Recommendation of therapy before operation or contraindication</th>
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<tbody>
<tr>
<td><strong>Severe untreated and unstable mental disorder</strong></td>
</tr>
<tr>
<td>- drug dependence</td>
</tr>
<tr>
<td>- schizophrenic disorder</td>
</tr>
<tr>
<td>- severe depressive disorder</td>
</tr>
<tr>
<td>- suicidality</td>
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<tr>
<td>- borderline personality disorder</td>
</tr>
<tr>
<td>- posttraumatic stress disorder</td>
</tr>
<tr>
<td>- bulimia nervosa</td>
</tr>
<tr>
<td>- several prior psychiatric inpatient stays</td>
</tr>
<tr>
<td><strong>Low intelligence level without social support</strong></td>
</tr>
<tr>
<td><strong>Unstable social situation</strong></td>
</tr>
<tr>
<td>- no social support</td>
</tr>
<tr>
<td>- homelessness</td>
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</tbody>
</table>
Possible suggestions are summarized in box 2. A diagnosis of a mental disorder does not per se mean exclusion from bariatric surgery. The indication for preoperative psychotherapy and/or pharmacotherapy should be considered – for example, for a diagnosis of bulimia nervosa or an impulse control disorder. Psychosocial problems that may require intervention before the operation are shown in box 3.

Ultimately, recommendations can be made on an individual basis only. The importance of the psychosocial evaluation and postoperative care should not be underestimated, in order to identify patients who develop psychological problems after the operation as early as possible and offer help (e34). But this can be done only through close cooperation with the surgical team and should thus be the domain of specialized centers of competence. Bariatric surgery should be performed only at centers that conduct a large number of operations, offer surgical and medical pre- and aftercare as well as intensive pre- and postsurgical psychosomatic treatment.

Conflict of Interest Statement
The authors declare that no conflict of interest exists according to the Guidelines of the International Committee of Medical Journal Editors.

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REFERENCES
For e-references please refer to the additional references listed below.


ADDITIONAL REFERENCES


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