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## Literature Review

# Psychosocial Predictors of Success following Bariatric Surgery

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**Background:** Bariatric surgery is the treatment of choice for morbid obesity, but it does not lead to equal results in every patient. In addition to surgery, a number of non-surgical and psychological factors may influence patients' ability to adjust to the postoperative condition. Understanding the relationship between potential predictive variables and success after bariatric surgery will enable better patient selection, and the development of interventions to improve outcome.

**Methods:** A systematic literature search identified relevant variables, such as demography, preoperative weight, motivation, expectations, eating behavior, psychological functioning, personality, and psychiatric disorders, which may have predictive value for success after bariatric surgery.

**Results:** Greater success following bariatric surgery appears to occur in patients who are young and female, and have a high self-esteem, good mental health, a satisfactory marriage, and high socio-economic status, who are self-critical and cope in a direct and active way, are not too obese, were obese before the age of 18, suffer from and are concerned about their obesity, have realistic expectations and undisturbed eating behaviors. Occasionally, these variables may have poor or no predictive value. Although reliable predictors are lacking, most treatment teams propose their own exclusion criteria.

**Conclusion:** The existing literature about potential predictors of success after bariatric surgery is far from conclusive; it is still uncertain which factors can predict success. Even where psychosocial function-

ing does not predict outcome, it is important to identify patients' characteristics which may be linked to their prognosis and to provide necessary pre- and postoperative psychosocial interventions.

*Key words:* Predictors of success, demographic variables, preoperative weight, motivation, eating behavior, psychological functioning, personality, psychiatric disorders, morbid obesity, bariatric surgery

## Introduction

The prevalence of obesity is increasing globally, in developed as well as in developing countries, at an alarming rate.<sup>1-4</sup> Excess weight is a major risk factor for premature mortality, hypertension, dyslipidemia, cardiovascular disease, type 2 diabetes, osteoarthritis, sleep apnea, gastroesophageal reflux, certain cancers, and other medical conditions.<sup>5,6</sup> Obesity is already associated with greater morbidity and poorer health-related quality of life than smoking, problem drinking or poverty.<sup>7</sup>

Morbid obesity is also associated with debilitating psychosocial consequences, such as depression and low self-esteem.<sup>8-13</sup> Although the existing literature is far from conclusive, morbidly obese patients are described as depressed, anxious, having poor impulse control, low self-esteem, and impaired quality of life. Dieting, rigid control, and disinhibition characterize their eating behavior; this seems to be especially true for morbidly obese patients seek-

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ing surgical treatment for their obesity.<sup>11</sup> Socially, the morbidly obese have to deal with prejudice, social rejection, and discrimination.<sup>10,12,14</sup>

There are a number of factors that can be the basis for obesity, such as nutrition, physical inactivity, heredity, socioeconomic factors, medication, hormonal, biological and somatic factors.<sup>15,16</sup> Because the increase in obesity has been so rapid, it cannot be related purely to genetic change, but rather it is largely related to lifestyle-sedentary and high-calorie fast-food nutritional changes. This leaves a considerable proportion of weight variability open to behavioral modification.<sup>17</sup>

The morbidly obese typically respond poorly to traditional dietary and exercise weight-loss regimens, and when an initial response occurs, it is likely to be poorly maintained.<sup>18</sup> In contrast to conservative treatments, bariatric surgery has provided a means of treating the morbidly obese successfully, with sustained weight loss.<sup>19,20</sup> Weight loss results in amelioration or cure of the co-morbidities. In addition, after bariatric surgery, most patients report improvement in psychosocial functioning and quality of life.<sup>21-24</sup> In recent years, the demand for bariatric surgery had dramatically increased, because its benefits has become widely recognized.<sup>25</sup>

However, bariatric surgery does not lead to equal results in every patient; some patients, after initial success, regain their weight or have a poor quality of life.<sup>26-28</sup> As times goes by, patients may be able to eat more, may start experimenting, and some patients report a feeling of loss of control over eating as early as 6 months postoperatively, when "grazing" can become a common behavior.<sup>29</sup> In spite of this, most patients are satisfied with the weight loss and other long-term results of bariatric surgery.<sup>30</sup>

Bariatric surgery is a forced behavior modification and, in addition to surgery, a number of non-surgical and psychological factors have been shown to play a role in its long-term results.<sup>27</sup> The interest in the examination of these potential predictors of success after bariatric surgery lies in the identification of variables that predict the ability or the inadequacy of patients to adjust to the new condition determined by surgery. A better understanding of the relationship of these variables to weight loss and other parameters of success following bariatric surgery will not only enable better patient selection, but also the development of interventions to improve

outcome.<sup>31,32</sup> However, until now, evidence concerning the influence of psychosocial variables on the results of bariatric surgery is ambiguous.

Many attempts have been made to evaluate patients' personality characteristics, preoperative psychological and psychiatric status, eating patterns, BMI, age, gender and socioeconomic status, in order to find indices of success.<sup>33</sup> However, various studies failed to find any relationship or provide conflicting results, and, as a result, objective psychosocial criteria that reliably predict whether a given patient will have an acceptable outcome are lacking.<sup>23,34</sup> Poor results may be caused by methodological weaknesses of studies, such as using general measures of psychopathology instead of measures specific to adherence to a post-surgery regimen, using a variety of instruments, different definitions of success, different operative techniques, small patient groups, and varying follow-up periods. There is a general lack of large-scale, prospective, controlled research. As a consequence, each treatment team generally proposes its own exclusion criteria for patient selection.

## Methods

The present literature review was designed to understand the potential predictors of success following bariatric surgery. Studied characteristics are not only psychological variables, such as personality, psychological functioning and psychiatric disorders, but also demographic variables, preoperative weight, motivation, expectations and eating behavior. The question addressed is which variables predict success after bariatric surgery.

The above question was investigated by a systematic review of the current literature. Mainly PubMed was searched using the keywords *morbid obesity*, *bariatric surgery*, *predictors*, *weight loss*, and *quality of life*. In addition, the online articles of *OBESITY SURGERY* were searched. Further articles, missed by the initial search, were identified from the inspection of the reference lists of relevant articles. In evaluating the potential predictors, studies involving all types of bariatric surgery were considered.

## Published Results

### Demographic Variables

Age, gender and socio-economic status are some demographic variables that have been correlated with success after bariatric surgery. As to age, although older patients also have clinically significant weight loss, younger patients have typically been found to be more successful following bariatric surgery, perhaps because of less co-morbidities and better mobility.<sup>28,35,36</sup> Some authors even suggest that surgical intervention should be offered to a greater number of adolescents to minimize physical and psychological co-morbidity.<sup>36</sup>

Also, the age when a patient becomes obese seems to be a predictor. Patients who were obese before the age of 18, have shown more postoperative weight loss than patients who became obese in adulthood.<sup>37</sup> However, some studies have found no relationship between age and postoperative weight loss,<sup>38</sup> nor between the onset of obesity and weight loss.<sup>39</sup> On the one hand, very promising long-term outcomes are found for adolescent patients from age 13 to 17 years, and these results exceed those for adult patients;<sup>36</sup> on the other hand, bariatric surgery also seems to be an effective treatment for selected patients who are  $\geq 55$  years of age, with achieved weight loss that is comparable to that of younger patients.<sup>40,41</sup> Thus, some authors suggest that age by itself should not be an exclusion criterion for bariatric surgery.<sup>40,41</sup>

Although most studies did not find any correlations between gender and weight loss,<sup>42,43</sup> some found that female patients lost a little more weight than males.<sup>28,44</sup> As to socioeconomic status, low income seems to be related to more complications and poor success after bariatric surgery.<sup>45</sup> This connection may be related to the poor possibilities patients with low socioeconomic status have concerning healthy food and adequate physical exercise.<sup>46</sup> Other studies, however, did not find any relationship between socioeconomic status and poor success, and suggest that low income patients should not be excluded from bariatric surgery.<sup>43,47</sup>

### Preoperative Weight

Preoperative weight, BMI and percent of excess weight appear to be consistent predictors of post-surgical weight loss.<sup>48</sup> Even though it has been

found that heavier patients lose greater absolute amounts of weight,<sup>49</sup> they tend to remain obese, and experience more co-morbidities, because they lose a smaller percentage of their excess weight compared to patients who were less obese initially.<sup>50</sup> Patients who are less obese before surgery appear to be generally more successful in losing excess weight following bariatric surgery.<sup>28,42</sup> Other authors have noted that preoperative weight may predict the amount of weight loss but not postoperative psychological success.<sup>51</sup> Some studies, however, report that super-obese patients achieve positive effects after bariatric surgery.<sup>43,52</sup>

### Motivation and Expectations

Health complications of overweight are strong motivators to lose weight. When they reduce quality of life seriously, patients can be motivated to undergo surgery, life-long diet and follow-up because of factors related to physical and psychological health rather than esthetic considerations.<sup>53</sup> Some studies indicate that patients who suffer more from physical or psychological problems lose more weight.<sup>23,49</sup> Others, however, suggest that physical impairment is a predictor of poorer weight loss,<sup>24</sup> but also, by reduction of co-morbidities, of more gain in quality of life.

It appears that the expectations that patients have regarding the operation influence short-term and long-term consequences. Two aspects are important in this: first, expectations concerning their own share in the results; second, the degree of reality of these expectations. Patients with satisfactory weight loss expected more often an extension of their behavior, such as going out, bicycling, swimming, and going on holidays; whereas patients with insufficient weight loss had esthetic expectations. An explanation for this may be that the former implicates physical activity and responsibility of the patients in the results, whereas the latter reflects a passive attitude.<sup>55</sup> Where patients expect the operation to be the treatment for all problems of life, this is a relative contra-indication to bariatric surgery. These patients tend to attribute their problems solely to their overweight and expect total change by the operation, often accompanied by irrational expectations concerning weight loss. On the other hand, realistic expectations and strong motivation to change should be considered as predictors of suc-

cess after bariatric surgery.<sup>56</sup> However, some studies suggest that motivation to undergo bariatric surgery does not correspond with weight loss.<sup>57</sup>

## Eating Behavior

Morbidly obese patients often have disturbed eating habits, such as binge eating disorder, night eating syndrome and frequent snacking or grazing, although there is some discussion concerning its prevalence. There are studies concluding that a lot of patients presenting for bariatric surgery have binge-eating disorder,<sup>58</sup> and some authors suggest that half, or even more, of these patients have periods of binge-eating.<sup>17,59</sup>

In addition, there are conflicting reports concerning the importance of these eating habits for weight loss and weight loss maintenance in patients undergoing bariatric surgery. Some studies have shown that eating disturbances are linked to poorer outcome and weight loss.<sup>12,60,61</sup> This may be because of the re-emergence of binge eating or grazing and weight regain, later during follow-up.<sup>29,39,60</sup> These findings suggest that patients with a preoperative binge-eating problem, cannot cope with the altered eating behavior caused by the operation in the long term; after initial rapid weight loss, maladaptation to a new eating pattern may result in poor weight maintenance. As a consequence, some authors suggest that patients with significant binge-eating should not be treated surgically until the eating behavior has been normalized with specific therapy.<sup>39</sup> Others conclude that binge-eating does not inevitably lead to a poor weight loss, but that successful weight loss in binge-eaters does not always imply a good outcome. Since binge eating may continue after surgery, it is associated with a higher vomiting frequency and is therefore a strong predictor of failure.<sup>39</sup> On the other hand, other studies suggest that bariatric surgery may be viewed as an intervention that reduces binge eating symptoms and improves most psychological functioning, and, therefore, that binge eating is not a negative indicator for surgery.<sup>28,59,62</sup> Although some studies report a difference in weight loss, binge-eaters who show a significantly smaller percentage of excess weight loss at follow-up than non-bingers, still lose significant amounts of weight, which leads to numerous positive psychosocial and life changes.<sup>63</sup> As a consequence, these authors suggest that there is no reason to

exclude patients with binge eating behavior from bariatric surgery or to give additional preoperative psychosocial care to these patients.<sup>64</sup>

Patients with other pre-surgical eating disturbances may regain weight following surgery, because these eating disturbances also tend to persist or re-emerge after operation and are linked to poorer outcomes.<sup>27,60</sup> Patients who gain weight after bariatric surgery show disturbed eating behavior, such as frequent snacking and frequent use of soft or liquid high-caloric food.<sup>29,65</sup> Other studies, however, have observed post-operative cessation of disturbed eating behaviors,<sup>9</sup> or do not find any relationship between preoperative eating pathology and weight loss after surgery.<sup>59</sup> Some of these studies, however, conclude that although bariatric surgery is successful in short-term weight loss, it is not in changing eating behavior or psychiatric status.<sup>66</sup> Interestingly, a link has been shown between binge eating and other psychiatric disorders, including depression, anxiety, substance abuse or dependency, and personality disorders.<sup>67</sup>

In addition, there are studies reporting poor results after restrictive operations in 'sweet eaters'.<sup>65</sup> Although bingeing is difficult after these procedures, high-caloric fluids and snack foods can easily be eaten. As a consequence, it was suggested to select these patients for gastric bypass operation and non-sweet eaters for restrictive procedures.<sup>65</sup> However, others suggest that preference for sweet foods does not correspond to postoperative weight loss.<sup>42,43,68</sup>

## Psychosocial Functioning and Personality

Personality appears to have substantial influence on health behavior.<sup>69</sup> Some authors suggest that the personality of morbidly obese patients differs from that of persons from the normal population,<sup>70</sup> or from morbidly obese individuals that do not seek treatment.<sup>53</sup> However, others suggest that there is no such thing as an obese personality.<sup>71</sup> Many studies focus on the influence of psychosocial functioning and personality on the results of bariatric surgery. Studied variables are, among others, self-esteem, rigidity, self-criticism, history of sexual abuse, marital satisfaction, and coping. However, results are conflicting, and, in general, no substantial psychosocial variables having predictive value have been found.<sup>26,27</sup>

Summarized, patients with high self-esteem have more weight loss,<sup>72</sup> just like patients with low rigid-

ity (who may be able to change their eating habits more easily),<sup>55</sup> who are self-critical (they may be more critical concerning their eating behavior),<sup>55</sup> and patients who cope in a direct and active way (they maintain their weight loss for a longer period).<sup>73</sup> There are studies, however, which indicate that self-esteem is negatively related to weight loss; perhaps patients with poor self-esteem suffer most from their overweight and, therefore, are highly motivated to stick to medical and dietary instructions.<sup>23</sup> Some authors have studied the relation between marital satisfaction and weight loss and suggest a significant positive relation.<sup>51</sup> Others conclude that if marriages were solid before surgery, couples were more likely to weather the changes that occurred after surgery. However, the converse is also true: dysfunctional marriages have greater difficulty adapting to patients' positive changes after surgery.<sup>74</sup> Some studies conclude that, in traditional medical weight loss programs, females with a history of sexual abuse lose less weight than those without such a history;<sup>75</sup> however, following bariatric operations, there seems to be no significant differences in weight loss.<sup>76,77</sup>

In conclusion, some studies suggest that psychosocial and personality problems have no predictive value for weight loss.<sup>54,78</sup> Others agree, but suggest that these conditions do predict improvement in health-related quality of life.<sup>24</sup> On the other hand, it has been concluded that psychosocially stressed patients experience the same positive physical and psychological well-being after surgery as patients under little stress, whereas stressed patients who do not undergo surgery show the worst outcome.<sup>79</sup> Likewise, findings that most or all psychopathology decreases or disappears with successful weight loss after bariatric surgery suggest that psychological disturbances are the consequences, not causes, of morbid obesity. Thus, it seems that the pathogenesis of morbid obesity has no psychological base and that psychological variables have little or no predictive power.<sup>23</sup> Psychosocial stress in morbidly obese subjects is not a contraindication for bariatric surgery, provided that adequate pre- and postoperative counseling is available.<sup>53</sup>

## Psychiatric Disorders

Psychiatric disorders are often considered as contraindications for bariatric surgery, mostly affective

and personality disorders. Patients with psychiatric disorders are thought to have greater risk for somatic and psychological complications after bariatric surgery. However, again various studies provide conflicting results and no clear predictors. Some studies suggest that the prevalence of psychiatric disorders in the morbidly obese is not substantially different from the normal population.<sup>74</sup> Others report that morbidly obese patients who seek bariatric surgery show more psychopathology, such as mood and anxiety disorders, bulimia, substance abuse and personality disorders.<sup>48</sup>

Many studies have found poor weight loss after bariatric surgery in the presence of preoperative personality disorders and suggest that patients with a personality disorder have difficulties adapting to the strong demands of controlled eating behavior imposed on them by the surgical operation.<sup>70</sup> Other psychiatric disorders also have been found to be predictive of poor weight loss, mainly because of poor tolerance to food limitations, poorly controlled eating behavior, eating disorders, and poor compliance with postoperative diet.<sup>80</sup> The absence of psychiatric problems and personality disorders was not only associated with greater weight loss, but also with a positive psychosocial outcome following surgery.<sup>56</sup>

Some studies suggest that a history of psychiatric inpatient admissions is a predictor of poor satisfaction with the results of surgery, as well as medical and psychological complications, but not weight loss. Interestingly, prior outpatient treatment for emotional problems was not significantly related to outcome, suggesting that emotional problems *per se* are not predictive of outcome.<sup>49,81</sup> In accordance with the above findings, many studies advise preoperative psychiatric screening to identify and exclude patients who are at risk due to psychiatric disorders.<sup>27,82</sup> However, because of lack of clarity, most treatment teams propose their own psychiatric exclusion criteria.

However, there are many studies that could not find any relation between the presence or absence of preoperative psychiatric disturbances and the loss of weight after bariatric surgery, even after 6 years, suggesting that neither psychiatric status, nor personality disturbances affect weight loss outcome after bariatric surgery.<sup>38,50</sup> Thus, many authors do not contraindicate obesity surgery based on psychiatric disorders, provided that there is adequate pre- and postoperative psychiatric support.<sup>48,83</sup> In addi-

tion, some workers suggest that, because candidates for bariatric surgery frequently show high levels of psychopathology, if subjects were excluded because of a history of psychiatric illness, few patients would be eligible for surgery.<sup>48</sup> There are even some studies that suggest that a history of having received treatment for a psychiatric disorder or substance abuse may be prognostic of favorable outcome; perhaps having participated in successful treatment may have assisted individuals in the development of skills for lifestyle change.<sup>84</sup>

Concerning specific psychopathology, like depression, there are conflicting results. In most studies depressive disorders seem to be a predictor of poor weight loss.<sup>85</sup> Others agree that depression may be a negative predictor for weight loss, but not to the extent that it is a measure by which successes and failures differ.<sup>72</sup> However, there are also studies suggesting a positive relation between the extent of preoperative depression and weight loss.<sup>35</sup> Still others conclude that the presence of significant depression before surgery does not predict outcome on any variables following surgery; as a group, preoperatively depressed patients show dramatic weight loss, as well as improvements in psychosocial functioning and quality of life. Thus, they suggest that a depressive disorder is not a contraindication to bariatric surgery.<sup>14</sup> An interesting notion in this respect is that the majority of patients seem to be depressed because of their weight and related limitations; when they take an active role in changing their life via surgery, depression shows a sharp decrease, even while the weight remains high.

Some authors studied the relation between other forms of psychopathology and weight loss, such as anxiety<sup>51</sup> and schizoid disorders.<sup>37</sup> They concluded that higher levels of anxiety were a positive predictor of weight loss,<sup>51</sup> but that schizoid disturbances predicted poor weight loss, perhaps because of typical apathetic characteristics in schizoid patients.<sup>37</sup> Others conclude that, although specific psychopathological conditions may pose irreconcilable psychological barriers to patients' adaptation, severe non-psychotic depressions, anxiety conditions, posttraumatic shock disorder, body image and eating disorders, common in presenting surgical candidates, do not necessarily preclude bariatric surgery success.<sup>86</sup>

## **Discussion and Conclusion**

Psychosocial factors have been observed in many patients who obtained a poor weight outcome. In many cases of noncompliance, the presence of psychological distress or of environmental stressors emerged, which interfered with the adaptability of the patients. As a consequence, there is a tendency in clinical practice to screen out patients with significant psychological or psychiatric disturbances. However, there is no consensus that these disturbances are negative indicators for surgery, especially if adequate management is provided.<sup>79,83</sup>

There are many plausible explanations for the conflicting results that are found. One is that psychological and psychiatric contraindications for bariatric operations may be biased by unproven theories, rather than based on solid evidence. In addition, some of the studies on pre-surgical variables associated with post-surgical weight loss are based on single reports, have small sample sizes, have relatively short follow-up, use unvalidated or only general instruments, or have other methodological problems. As such, it is unclear whether differences between studies reflect actual differences or methodological differences.<sup>49</sup> Another explanation is the notion that distress in the morbidly obese can be hypothesized as involving two dimensions: first, distress as a reaction to the experience of obesity, and second, distress involving psychopathology or psychiatric symptoms. Distress over obesity, in the form of milder symptoms of anxiety, worry, or depression, may be a positive predictor of surgical outcome.<sup>49</sup> However, psychopathology, to the extent that treatment is required, may be a negative predictor of surgical outcome. Perhaps, not mere presence or absence of psychological problems is predictive of the results of bariatric surgery, but rather the extent of these problems.

An explanation for the findings that psychological or psychosocial variables are not predictors of success after bariatric surgery may be that even patients with accentuated psychological or relational and environmental difficulties seem to be able to succeed in coping with them, and to achieve a good weight outcome, with good effects on the psychic side too.<sup>56</sup> An alternative, partial explanation is that in some studies sound data regarding more severe

forms of psychopathology are lacking, because most surgical groups have screened-out actively psychotic patients.<sup>87</sup> Another explanation may be that in most studies success is defined as weight loss, whereas outcome from bariatric surgery should include the impact on the patient's medical co-morbidities, physical and psychological health, and quality of life.<sup>24,88,89</sup>

In conclusion, presence of psychological disorders cannot be taken as an absolute criterion for exclusion of candidates for obesity surgery. However, it would be important to identify those aspects of a patient's psychological make-up, personality and eating behaviors that are relevant to their adjustment after surgery and which would be expected to improve or worsen their prognosis. Accurate pre-surgical education and postoperative psychological support are likely to increase the patient's compliance and, by that, the percentage of successful cases.<sup>56</sup> In addition to medical-somatic factors (such as endocrine influences and changes in metabolism), surgical-technical factors (such as size of pouch and stoma), co-morbidities, and surgeon experience, the ability of patients to adjust their eating behavior and their compliance to adequate dietary rules will determine long-term results.<sup>65,85,87</sup> These are affected by psychological and social variables.<sup>27</sup> In an interactive way, biological, social and psychological factors help determine which patients will have long-term successful results.<sup>78</sup> More research is needed to facilitate optimal patient selection, especially prospective research with long-term follow-up, in which success is not only defined as weight loss, but also as reduction in co-morbidities and improvement in quality of life.

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