

# 1 Abstract

2 Introduction: Up to 30 % of patients undergoing bariatric surgery are dissatisfied with  
3 treatment outcomes in the long-term. The aim of this study was to examine overall  
4 satisfaction with treatment five years after bariatric surgery and its association with body mass  
5 index (BMI) and health-related quality of life (HRQOL).

6 Methods: Patients were surveyed five years after bariatric surgery; 108 patients had Duodenal  
7 Switch (DS) and 153 patients had Laparoscopic Sleeve Gastrectomy (LSG). The main  
8 outcome was overall treatment satisfaction, assessed by a single question and analyzed by  
9 multiple logistic regression. Estimates for continuous independent variables represent the  
10 odds ratios (OR) for a 2-standard deviation difference.

11 Results: Five years after surgery, 82.4 % of the patients were very satisfied or satisfied,  
12 whereas 17.6 % were unsure or dissatisfied. The following variables assessed at five years  
13 were associated with being dissatisfied/unsure: a higher BMI (OR = 6.1, 95% CI = 2.7–14.0,  
14  $p < 0.001$ ), reduced obesity-specific HRQOL (OR = 3.0, 95% CI = 1.1–7.8,  $p = 0.03$ ), and  
15 reduced mental HRQOL (OR = 0.3, 95% CI = 0.1–0.8,  $p = 0.02$ ). We also found that a higher  
16 proportion of patients who underwent LSG, compared to DS, reported being  
17 dissatisfied/unsure (OR = 3.3, 95% CI = 1.3–8.8,  $p = 0.01$ ).

18 Conclusion: Reduced mental HRQOL and obesity-related HRQOL, as well as higher BMI,  
19 were associated with less satisfaction with overall treatment outcomes five years after  
20 bariatric surgery. Differences in overall treatment satisfaction by type of operation warrant  
21 further investigation.

22 Key words: Overall treatment satisfaction, Bariatric surgery, Health-related quality of life,  
23 Duodenal Switch, Laparoscopic Sleeve Gastrectomy.

## 24 Background

25 Bariatric surgery is considered the most effective treatment for severe obesity in terms of  
26 sustained weight loss, remission of diabetes mellitus, and prevention of obesity-related  
27 diseases [1–4]. Patients who had bariatric surgery have been found to have a significant  
28 improvement in health-related quality of life (HRQOL), with the largest effect occurring the  
29 first two years after surgery, followed by a gradual decline until twelve years after surgery [5–  
30 7]. HRQOL refers to how a persons' health affects quality of life. In treatment for obesity,  
31 both obesity-specific and generic instruments are used to measure HRQOL. Obesity-specific  
32 instruments typically measure how consequences of obesity affects a person's everyday  
33 activities, whereas generic instruments measure how general health (e.g. pain or mental  
34 health) affect a person's daily life [7].

35 Patients' satisfaction with their treatment is an important outcome of the services provided by  
36 health-care systems [8, 9], as a patient's satisfaction may affect his or her daily life. Even  
37 though patients may have remission of diabetes, other consequences of bariatric surgery may  
38 have considerable negative effects on patients' life. A study of patients with gastro-  
39 esophageal reflux disease found that lower satisfaction with treatment was a risk factor for  
40 dropping out of treatment [10]. As a measurable outcome, overall treatment satisfaction refers  
41 to the level of satisfaction patients have with health outcomes after treatment, and has been  
42 defined as: *the individual's rating of important attributes of the process and outcomes of his/her*  
43 *treatment experience* [10]. Treatment satisfaction is a complex measure of the patient's  
44 expectations and preferences as well as the patient's satisfaction with their medical care  
45 beyond the health outcomes of a medical treatment [10], such as the remission of obesity-  
46 related diseases and physical functioning in treatment for obesity.

47 Various studies have reported that 70–95% of patients were satisfied with their overall  
48 treatment outcome after bariatric surgery [5, 11–16] during follow-up periods that ranged  
49 from two to 15 years after surgery. The majority of patients who underwent Duodenal Switch  
50 operations were satisfied with treatment outcomes related to weight loss, remission of co-  
51 morbidities, and HRQOL [11, 13]. A prospective cohort study that assessed patients three and  
52 eight years after laparoscopic adjustable gastric banding found their level of satisfaction and  
53 willingness to undergo the procedure again decreased over time [14]; however, the study did  
54 not assess HRQOL. Another prospective study reported the proportion of patients who were  
55 satisfied versus dissatisfied, but did not explore the relation between satisfaction and other  
56 variables [11]. A cross-sectional study on patients 12 years, on average, after gastric bypass  
57 [5] found that patients who were dissatisfied with their surgical procedure had reduced  
58 obesity-specific, physical and mental HRQOL at follow-up. Another cross-sectional study by  
59 Sannen et al. [16] found that 15% of the patients were dissatisfied two years after surgery, and  
60 that the main reasons for dissatisfaction were complications of the surgery, not benefiting  
61 from the procedure, or psychosocial complications. Up to 30% of patients in some studies  
62 have reported they were unsure if they were satisfied or dissatisfied with treatment outcomes  
63 [11–13]. A prospective study by Marceau et al. [13] further showed that dissatisfaction  
64 increased from 6.5% after five years to 30% after 15 years, confirming the importance of long  
65 term follow-up to understand what factors influence patient satisfaction.

66 The aim of the current study was to investigate patient characteristics related to overall  
67 treatment satisfaction five years after bariatric surgery. We hypothesized that overall  
68 treatment satisfaction would be negatively related to factors such as high BMI five years after  
69 surgery, reduced obesity-specific HRQOL, and reduced mental and physical HRQOL.

70

## 71 Methods

### 72 Study population

73 Patients who received bariatric surgery — Duodenal Switch (DS) or Laparoscopic Sleeve  
74 Gastrectomy (LSG) — at the Førde Hospital Trust in Norway were invited to participate in a  
75 prospective study. The original sample of patients was composed of patients with a body mass  
76 index (BMI)  $\geq 40.0$  or 35.0–39.9 kg/m<sup>2</sup> with obesity-related diseases, and included patients  
77 who had a reoperation due to inadequate weight loss. Patients who attended the five-year  
78 follow-up from January 2010 until December 2017 were invited by the outpatient nurse to  
79 participate in this study when they met for the consultation. At the start of the consultation,  
80 patients were given oral information about the study, and those willing to participate gave  
81 written consent. Self-report questionnaires on HRQOL and overall treatment satisfaction, as  
82 well as clinical variables were completed at the five-year follow-up. The pre-operative clinical  
83 variables were derived from the local obesity surgery database.

### 84 Outcome variable

#### 85 Overall treatment satisfaction

86 The patients answered the question: *How satisfied are you, all things considered, with the*  
87 *treatment outcome after bariatric surgery?* The response choices were; *very satisfied,*  
88 *satisfied, unsure, and dissatisfied.* This self-administered single item question on satisfaction  
89 has previously been used in research [17], including among patients undergoing bariatric  
90 surgery [11].

### 91 Independent variables

#### 92 Body mass index (kg/m<sup>2</sup>)

93 Body weight was measured while wearing light clothing without shoes, to the nearest 0.1 kg,  
94 and height was measured to the nearest 0.01 m.

#### 95 Generic HRQOL

96 The Short Form-36 (SF-36), Norwegian version 1.2 [18] is a generic HRQOL-questionnaire  
97 frequently used with various patient populations, including patients with obesity. The  
98 questionnaire measures how physical and mental health affects a person's daily activities and  
99 functioning. The questionnaire consists of eight dimensions of physical and mental  
100 functioning, with a total score ranging from 0 to 100; higher scores indicate better HRQOL.  
101 Responses are further divided in two summary-scores — the Physical Component Score  
102 (PCS) and the Mental Component Score (MCS) — based on factor analysis with oblique  
103 rotation, where a score of 50 approximates the average of the general population.

#### 104 Obesity-specific HRQOL

105 The Obesity-related Problems Scale (OP) is a HRQOL questionnaire measuring how bothered  
106 people with obesity are in eight domains of psychosocial functioning [19]. The questionnaire  
107 measures how obesity affects a person's activities of everyday life, such as participating in  
108 social activities or buying clothes. The total scores ranges from 0 to 100, where lower scores  
109 indicate better functioning.

#### 110 Covariates

111 Age (years), biological sex, type of surgery (DS, LSG), and having a reoperation at baseline  
112 or during follow-up were included as covariates.

#### 113 Statistics

114 Categorical variables are presented as frequencies (n) and percentages (%) and continuous  
115 variables as means and standard deviations (SD). We performed univariate and multivariable

116 regression analyses on the variables age, biological sex, type of surgery, and fifth year scores  
117 for BMI, obesity-specific HRQOL (OP-scale), generic HRQOL (PCS and MCS), and whether  
118 the patient had a reoperation at baseline or during the follow-up. These variables were  
119 regressed on overall treatment satisfaction five years postoperatively (dichotomized into very  
120 satisfied/satisfied and dissatisfied/unsure). The outcome measures were dichotomized due to  
121 the limited number of patients who reported being dissatisfied. We present the odds ratios  
122 (OR) with 95% confidence intervals (95% CI). The variables educational level and  
123 marital/cohabitation status were found to be unrelated to the outcome in the initial unadjusted  
124 analysis (data not shown), so they were not included in the multivariable model. Analyses  
125 were performed using IBM SPSS Statistics 24 [20]. A two-tailed p-value < 0.05 indicated  
126 statistical significance.

## 127 Ethics

128 The Regional Committee for Medical and Health Research Ethics approved the study (REK  
129 2009-2174), and the patients signed an informed consent form to participate.

## 130 Results

131 During the study's enrollment period, 485 patients had undergone bariatric surgery five years  
132 prior, and of these, 355 patients attended the five-year follow-up. Of the 355 patients  
133 attending the follow-up, 261 (74%) consented to participate in this study, and are included in  
134 the analyses (DS n =108, LSG n=153). The included patients did not differ significantly from  
135 the total population who had bariatric surgery with respect to pre-operative characteristics  
136 (BMI, type of surgery, biological sex, marital/cohabitant status and educational level).  
137 However the patients included in this study were slightly older (mean difference 2.4 years,  
138 95% CI 0.4 – 4.4, p = 0.02). The included patients did not differ from the rest of patients  
139 attending the five-year follow-up regarding BMI at five years (mean difference -1.4, 95% CI -

140 2.8 – 0.02,  $p = 0.053$ ). We did not contact the patients who did not attend the five-year  
141 follow-up. Due to inadequate weight loss from previous surgery, 17 of the 261 patients had DS  
142 or LSG as their baseline operation. Furthermore, 25 of the 261 patients (9.6%) had a  
143 reoperation within five years after surgery; 17 (68%) were due to complications, and eight  
144 (32%) were due to regaining weight. The patients who had a DS operation were slightly older,  
145 had a lower BMI at five years and had larger change in BMI, than those who had a LSG  
146 operation. A higher proportion of patients in the LSG group had university-college education  
147 or higher (data not shown). Table 1 presents the demographic characteristics of the included  
148 patients.

149 ***Insert table 1 here***

150 Table 2 shows patient characteristics stratified by treatment satisfaction categories. Patients  
151 who reported being *dissatisfied* or *unsure* about their treatment outcome had a higher BMI at  
152 five years and a smaller change in BMI than patients who reported being *satisfied* or *very*  
153 *satisfied*. Furthermore, patients who were *dissatisfied* or *unsure* had a lower PCS and MCS  
154 and a higher score on the OP than patients who were *satisfied* or *very satisfied*. A higher  
155 proportion of patients reporting dissatisfaction had been treated with LSG as compared with  
156 DS, and more often had a reoperation at baseline or during the follow-up.

157 ***Insert table 2 here***

158 Table 3 presents the results of the univariate and multivariable logistic regression analyses of  
159 treatment satisfaction dichotomized into very satisfied/satisfied and dissatisfied/unsure. The  
160 univariate analysis showed that a low MCS and PCS, a high OP score, and a high BMI at five  
161 years were strongly associated with being dissatisfied/unsure. Moreover, patients who had a  
162 LSG operation were significantly more likely to be dissatisfied/unsure with treatment than  
163 patients who had a DS operation.

164 In the multivariable analyses a higher BMI, higher OP scores and a lower MCS were  
165 associated with dissatisfied/unsure, similar to the univariate analyses. However, the  
166 association between the PCS and treatment satisfaction was no longer significant after  
167 multivariable adjustment. Age, biological sex or having had reoperation at baseline or during  
168 the follow-up were not associated with being dissatisfied/unsure.

169 *Insert table 3 here*

## 170 Discussion

### 171 *Overall treatment satisfaction*

172 The analysis of overall treatment satisfaction revealed 82% of the patients were very satisfied  
173 or satisfied five years after bariatric surgery. This finding is similar in earlier long-term  
174 studies, which reported a high degree of satisfaction among patients after bariatric surgery,  
175 with 70 – 95 % being satisfied with the treatment outcome [5, 12]. However, treatment  
176 satisfaction has been shown in other studies to decrease over time [13, 14].

177 Patients with reduced mental HRQOL, reduced obesity-specific HRQOL, and a high BMI at  
178 the five-year follow-up were more likely to report being dissatisfied/unsure about their overall  
179 treatment outcome. In addition, patients who had a LSG operation were significantly more  
180 likely to be dissatisfied/unsure at the five-year follow-up than those who had a DS operation.

### 181 *Health-related quality of life*

182 Our multivariable analysis found that patients who reported being dissatisfied/unsure with  
183 their treatment outcome were more bothered by obesity-specific problems. The association  
184 between obesity-related HRQOL and treatment satisfaction is not surprising, as the OP  
185 measures how bothered a person is by their obesity in relation to psychosocial functioning,  
186 and this relation has also been found by others [5]. Furthermore, we found that patients who



187 reported being dissatisfied/unsure with overall treatment had reduced mental HRQOL, but not  
188 physical HRQOL. These findings stand in contrast to a prospective study by Burton et al.  
189 [14], which found a strong association between the PCS and patients' satisfaction with their  
190 gastric banding procedure in both univariate and multivariable analyses. However, that study  
191 found no such association regarding mental HRQOL. In our study, we used the oblique  
192 method for analyses of MCS and PCS, and one possible explanation for the results of Burton  
193 et al. [14] could be if they used an orthogonal method for the analysis, as this methodology  
194 does not permit a free correlation between physical and mental health [21]. Another study,  
195 which used a cross-sectional design 12 years after gastric bypass [5], found that patients who  
196 reported being satisfied with the treatment procedure had high scores on both mental and  
197 physical HRQOL, as measured with the SF-36.

#### 198 *BMI*

199 We found that patients with a high BMI at the five-year follow-up were less likely to be  
200 satisfied with their treatment outcome. This association remained significant even after  
201 adjusting for HRQOL. A study by da Cruz et al. [22] supports the relation between BMI and  
202 satisfaction, as it found higher satisfaction with surgery among patients with lower BMI five  
203 years after the surgery. Furthermore, Varban et al. [23] found significantly higher satisfaction  
204 with surgery among patients with a BMI less than 30, compared to those with a higher BMI,  
205 one year after bariatric surgery. In a mixed-methods study, Turrentine et al. [24] found that  
206 patients who lost less weight than they expected reported a lower level of satisfaction. As the  
207 previous studies have reported a link between lower BMI and higher satisfaction, we found a  
208 similar association between high BMI and reporting to be dissatisfied/unsure. This finding is  
209 in line with studies using both single-item [12-14] and multi-item measures on treatment  
210 satisfaction [5]. As this association remained significant after adjusting for HRQOL, it

211 appears that weight loss itself is considered an important outcome for many patients  
212 undergoing bariatric surgery.

### 213 *Operation procedure*

214 Patients who had an operation with the LSG procedure were more likely to report being  
215 dissatisfied/unsure at five years than those who had the DS procedure. This finding is  
216 somewhat surprising, knowing that a DS is a more complex procedure with more  
217 complications than a LSG [2], and is also worth noting knowing that DS is a less popular  
218 procedure worldwide [25]. A possible explanation for this is the historical context in which  
219 the patients had the surgery. In our database, the majority of patients who had a DS were  
220 among the first to be offered bariatric surgery in Norway, which may represent a selection  
221 bias in this study. These patients had obesity for a longer period of time than those who had  
222 an operation later in the study, and the fact that these patients finally had a lasting solution  
223 may have affected their satisfaction differently compared to patients who had surgery after  
224 bariatric surgery became a more common treatment.

### 225 **Strengths and limitations**

226 The strengths of our study include the use of well-known and validated tools for measuring  
227 HRQOL, large sample size and long-term (five years) follow-up. The study-data included a  
228 larger proportion of men than women, which is dissimilar to most published studies of  
229 bariatric surgery.

230 This study is one of only a few studies to evaluate patients' satisfaction with treatment  
231 outcomes after bariatric surgery, and one of the few to analyze the relation between overall  
232 treatment satisfaction and patient variables such as HRQOL and BMI.

233 The patients included in this study did not differ from the patients operated during the same  
234 period with respect to pre-operative characteristics such as BMI, type of surgery or biological  
235 sex. However, as the patients not attending the five-year follow-up were not contacted, we  
236 have no information as to whether they were dissatisfied or satisfied with overall treatment  
237 outcomes. This is a limitation of our study.

238 The response to the question ‘How satisfied are you, all things considered, with the treatment  
239 outcome after bariatric surgery?’ could be affected by factors that are not directly related to  
240 the surgical treatment. The relation between the patients and the healthcare professionals, as  
241 well as the relation to other people in their surroundings may have affected the patients’  
242 answers to this question [26]. Furthermore, the use of a single question to assess overall  
243 treatment satisfaction is a potential limitation of this study. The reliability and validity of  
244 multiple-item questionnaires may be higher because the content of the questionnaire becomes  
245 clearer to the patient, as several questions better illustrate the subject of the questionnaire [10,  
246 27]. The patient’s responses on a single item question may thereby be influenced by other  
247 aspects that may impact the patient’s answer. Due to this matter, the single item method  
248 cannot equally be compared to multi item questionnaires. On the other hand, single-item  
249 outcome measures may be beneficial in clinical practice as they take a short time to answer  
250 and may be suitable for opening a clinical conversation about the patient’s perspective [27,  
251 28]. Although multi-item assessments of patient satisfaction are available, we chose a single  
252 item question to reduce patient burden. Single item questions on satisfaction are also used in  
253 most of the studies we identified [11–16].

254 Another limitation may be that we chose to combine the response categories unsure and  
255 dissatisfied, as patients being unsure are not necessarily dissatisfied. However, we have  
256 addressed this issue by showing the patients’ characteristics stratified by the four satisfaction  
257 categories in Table 2.

258 HRQOL was measured only at the five-year follow-up, we therefore have no information  
259 about how patients would have scored on the measures at the time of their surgery or potential  
260 changes in scores during these five years. Furthermore, we did not collect information on  
261 postoperative remission of comorbidities or complications of surgery. The only measure on  
262 complications in this study was reoperation during the five years after surgery.

263 Since all patients included in this study had Norwegian ethnicity, our findings may not be  
264 generalizable to patients with other ethnicities.

### 265 Implications for clinical practice and further research

266 Until now, the recommended outcome measures after treatment for obesity have focused on  
267 assessing physical variables such as weight loss, remission of comorbid diseases, and  
268 complications due to the surgical procedure. HRQOL is also included as a recommended  
269 outcome measure [29]. All these outcomes are important to patients; however, future studies  
270 assessing treatment for obesity should also include patients' overall treatment satisfaction.

271 This outcome is an important patient-reported measure and gives important information that  
272 captures how treatment affects the individual patient's life.

273 An implication of our findings is that the follow-up of patients after bariatric surgery  
274 especially needs to address the mental and obesity-related dimensions of HRQOL as well as  
275 weight loss. Structured aftercare programs and preoperative educational programs are  
276 intended to empower the patients and help them achieve realistic expectations of treatment  
277 outcomes after bariatric surgery [30]. In a recent qualitative study [31], the patients  
278 emphasized the importance of a good psychosocial follow-up after bariatric surgery, and that  
279 patients should be offered support for their psychosocial challenges. These efforts may  
280 improve treatment satisfaction [32], and this is an important area of further investigation.

281

282 Conclusion

283 Reduced obesity-specific and mental health-related quality of life (HRQOL), as well as higher  
284 BMI were associated with lower overall satisfaction with treatment outcomes five years after  
285 surgery. We emphasize the importance of assessing patients' obesity-specific and mental  
286 HRQOL during health professionals' follow-ups with patients after bariatric surgery as a tool  
287 to increase patients' satisfaction with their treatment outcomes.

288 Conflict of interest disclosure

289 There are no conflict of interest to declare.

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368

369 Table 1. Characteristics of the 261 patients five years after undergoing bariatric surgery in  
 370 Western Norway

Variables	Total sample, n=261
Biological sex female, n (%)	88 (33.7)
Biological sex male, n (%)	173 (66.3)
Age (years), mean (SD)	48 (11)
Married/Cohabitation, n (%)	170 (65.1)
Higher education, n (%)	81 (31.0)
Preoperative BMI, mean (SD)	47.1 (7.5)
BMI at five years, mean (SD)	31.48 (5.8)
BMI change, mean (SD)	-15.6 (7.5)
Duodenal Switch n (%)	108 (41.5)
Laparoscopic Sleeve Gastrectomy n (%)	153 (58.6)
Short Form 36	
Physical component score, mean (SD)	45.8 (11.4)
Mental Component Score, mean (SD)	46.4 (11.8)
Obesity-related Problems Scale, mean (SD)	29.1 (25.3)
Reoperation at baseline *, n (%)	17 (6.5)
Reoperation after baseline**, n (%)	25 (9.6)
<p>Higher education = University College or higher            BMI = Body Mass Index (kg/m<sup>2</sup>)</p> <p>* Patients had reoperation as the baseline operation due to inadequate weight loss from previous surgery.            ** Of those re-operated after baseline 68 % had a reoperation due to surgical complications, 32 % due to weight regain.            SD = Standard Deviation</p>	

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373 Table 2. Characteristics of the 261 patients stratified by Overall Treatment Satisfaction  
 374 five years after bariatric surgery

Variable	Very satisfied N= 134 (51.3%)	Satisfied N= 81 (31.0%)	Unsure N= 36 (13.8%)	Dissatisfied N= 10 (3.8 %)
Age, mean ± SD	48.4 ± 10.4	48.2 ± 10.7	45.6 ± 12.3	49.7 ± 13.6
Biological sex male, n (%)	81 (60.4)	59 (72.8)	23 (63.9)	10 (100)
Higher education, n (%)	41 (30.6)	27 (33.8)	9 (25.0)	4 (40.0)
Married/cohabitation, n (%)	81 (60.4)	56 (69.1)	26 (72.2)	7 (70.0)
Preoperative BMI, mean ± SD	47.7 ± 7.3	46.0 ± 7.6	46.5 ± 7.6	49.4 ± 7.6
Five years BMI, mean ± SD	29.8 ± 4.4	31.6 ± 4.9	34.6 ± 7.3	41.9 ± 7.4
BMI change, mean ± SD	-18.1 ± 7.1	-14.4 ± 7.4	-11.9 ± 6.2	- 7.5 ± 3.1
Operation procedure DS, n (%) LSG, n (%)	71 (65.7) 63 (41.2)	26 (24.1) 55 (35.9)	10 (9.3) 26 (17.0)	1 (.9) 9 (5.9)
Reoperation at baseline*	6 (35.3)	7 (41.2)	3 (17.6)	1 (5.9)
Reoperation after baseline n (%) **	15 (60.0)	4 (16.0)	3 (12.0)	3 (12.0)
Short Form 36, mean ± SD				
Physical Component Score (PCS)	49.2 ± 11.0	43.8 ± 10.4	40.2 ± 11.7	37.7 ± 8.1
Mental Component Score (MCS)	50.0 ± 10.8	45.1 ± 11.0	40.1 ± 11.5	32.8 ± 12.3
Physical function	51.2 ± 8.3	47.6 ± 8.5	44.5 ± 12.1	43.7 ± 6.6
Role physical	48.4 ± 11.0	43.0 ± 12.4	41.7 ± 11.9	37.1 ± 11.6
Bodily pain	47.2.7 ± 13.7	42.8 ± 12.5	40.9 ± 13.5	37.9 ± 10.3
General health	50.3 ± 11.4	43.9 ± 10.2	40.3 ± 11.1	38.8 ± 9.7
Vitality	49.5 ± 11.2	43.1 ± 10.4	39.5 ± 10.3	37.5 ± 11.0
Social functioning	49.5 ± 10.1	44.1 ± 11.6	41.0 ± 11.8	34.3 ± 11.7
Role emotional	49.2 ± 11.1	46.8 ± 12.4	39.7 ± 13.1	35.3 ± 12.6
Mental health	51.4 ± 9.3	47.1 ± 10.7	45.5 ± 9.9	36.8 ± 15.1
Obesity-related Problems Scale, mean ± SD	20.2 ± 21.1	32.1 ± 24.2	47.0 ± 25.5	59.6 ± 22.7
Higher education = University College or higher BMI = Body Mass Index (kg/m <sup>2</sup> ) DS = Duodenal Switch LSG = Laparoscopic Sleeve Gastrectomy * In this material, 17 patients had a reoperation as the baseline operation due to inadequate weight loss from a previous surgery. **Of those re-operated after baseline 68 % had a reoperation due to surgical complications, 32 % due to weight regain. SD = Standard Deviation				

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377 Table 3. Univariate and multivariable analysis of Overall Treatment Satisfaction  
 378 (dichotomized dissatisfied/unsure vs. very satisfied/satisfied) of 261 patients at five-year  
 379 follow-up after bariatric surgery in Western Norway

Variable	Univariate model			Multivariable model		
	OR	95 % CI	p-value	OR	95 % CI	p-value
Age (per 2 SD)	0.7	0.4 – 1.4	0.31	1.2	0.5 – 2.7	0.70
Men (reference women)	0.7	0.4 – 1.5	0.39	1.9	0.8 – 4.8	0.16
Body Mass Index (per 2 SD)	7.1	3.4 – 14.5	<0.001	6.1	2.7 – 14.0	<0.001
Obesity Problem Scale (per 2 SD)	7.6	3.7 – 15.5	<0.001	3.0	1.1 – 7.8	0.03
Physical Component Score (per 2 SD)	0.3	0.1 – 0.5	<0.001	0.8	0.3 – 2.1	0.65
Mental Component Score (per 2 SD)	0.2	0.1 – 0.4	<0.001	0.3	0.1 – 0.8	0.02
LSG (DS reference)	2.6	1.3 – 5.4	0.01	3.3	1.3 – 8.8	0.01
Reoperation at baseline*	1.5	0.5 – 4.8	0.51	1.9	0.5 – 8.3	0.34
Reoperation after baseline**	1.5	0.6 – 4.1	0.38	1.3	0.3 – 4.6	0.72

The odds-ratio represent the odds for being dissatisfied/unsure  
 OR= Odds Ratio  
 CI= Confidence Interval  
 SD= Standard deviation  
 LSG= Laparoscopic Sleeve Gastrectomy  
 DS= The Duodenal Switch  
 Physical and Mental Component Score from the Short-Form 36  
 \* Reference is not re-operated. 17 patients had a reoperation as the baseline operation due to inadequate weight loss from a previous surgery.  
 \*\* Reference is not re-operated. Of those re-operated after baseline 68 % had a re-operation due to surgical complications, 32 % due to weight regain  
 A two-tailed p-value < 0.05 indicated statistical significance

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