

## Shame, Psychiatric Disorders and Health Promoting Life Style after Bariatric Surgery

Haldis Økland Lier<sup>1\*</sup>, Eva Biringer<sup>1</sup>, Jofrid Bjørkvik<sup>1</sup>, Jan H. Rosenvinge<sup>2</sup>, Bjarte Stubhaug<sup>1,3</sup> and Tone Tangen<sup>3</sup>

<sup>1</sup>Section of Mental Health Research, Haugesund Hospital, Helse Fonna HF, Haugesund, Norway

<sup>2</sup>Department of Psychology, Faculty of Health Sciences, University of Tromsø, Tromsø, Norway

<sup>3</sup>Section of Psychiatry, Institute of Clinical Medicine, University of Bergen, Bergen, Norway

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### Abstract

**Objective:** Postoperative outcomes after bariatric surgery depend greatly on engagement in health promoting behaviour, including regular physical activity and healthy eating behaviour. Adherence to these guidelines varies among patients after bariatric surgery. The present study examined associations between shame, psychiatric disorders and engagement in health promoting behaviour in patients with severe obesity that have undergone bariatric surgery.

**Method:** One-hundred and twenty-seven patients (F/M: 74/ 26) with median Body Mass Index (BMI) 44.1 kg/m<sup>2</sup> (IQR=6.0) and median age 40.0 years (IQR=15.0) were examined for psychiatric disorders and personality disorders. The participants completed the Eating Disorder Examination Questionnaire (EDE-Q) and Internalized Shame Scale (ISS) pre- and postoperatively. At one year follow-up, they also reported their compliance with postoperative guidelines regarding eating habits and physical activity.

**Results:** The median ISS-score was significantly higher in patients with comorbid psychiatric disorders compared to patients without comorbid psychiatric disorders (median ISS score 36.0 and 9.0 respectively,  $p < .001$ ). ISS score and self-evaluation based on body shape and weight were significantly correlated. Furthermore, preoperative ISS score was negatively correlated with level of physical activity ( $r = -.25$ ,  $p = .022$ ) one year after surgery.

**Conclusion:** The present findings suggest that patients with a high level of shame should be given priority for postoperative follow-up, in order to improve the patients' ability to establish life-style changes associated with sustained positive postoperative outcome.

**Keywords:** Bariatric surgery; Mental health; Obesity; Shame; Physical exercise; Eating habits

### Introduction

Bariatric surgery is currently recommended as the treatment of choice for patients with severe obesity (i.e. BMI > 40 kg/m<sup>2</sup> or BMI > 35 kg/m<sup>2</sup> with at least one obesity related comorbid somatic condition) [1]. Engagement in health promoting behaviours, including regular exercise and healthy eating behaviours are related to maintenance of weight loss and physical and mental wellbeing after surgery [2-7]. Adherence to these treatment guidelines in regard to physical exercise and eating habits varies among patients after bariatric surgery [4,8]. Psychological factors are found to influence psychosocial outcome, weight loss and adherence to treatment guidelines in patients that have undergone bariatric surgery [7,9-11].

Patients seeking obesity treatment, including bariatric surgery, have higher prevalence of psychiatric disorders compared to the general population [12]. A common denominator of these disorders may be an experience of shame [13-16]. Furthermore, shame is more prominent among patients with obesity than in the general population and this is irrespective of the presence of comorbid psychiatric disorders [17,18].

Shame and in particular self-criticism, for instance in depressive disorders, is found to be related to problem maintenance and an inadequate treatment response [19,20]. Shame is called "the affect of inferiority" [21] and is related to the experience of self-defect [22], personal inadequacy, inferiority and weakness [23], as well as to the experience of helplessness, often referred to as a negative outcome expectancy [24].

Several studies have explored the relationship between coping

styles, emotion regulation and shame, in the clinical context of eating disorders indicating clinically important associations between low self-esteem, shame, coping styles and the experience of helplessness, being unable to regulate neither body weight nor shameful feelings related to overweight [25-27]. One study found that the tendency to evaluate self-worth in terms of weight and shape characterized patients who regained weight after an initial weight reduction (after a life style intervention), but not so in patients able to maintain weight reduction [28]. The focus on how one's body looks rather than how it feels or functions is related to the feeling of body shame. Level of shame may constrain the way patients think and behave after bariatric surgery.

The aims of the present study were to assess the association between shame and psychiatric disorders in a sample of patients waiting for bariatric surgery, to study the relationship between level of shame and concerns about bodily shape and weight and to explore whether preoperative level of shame predicted adherence with treatment guidelines regarding physical exercise and eating habits one year after surgery.

**\*Corresponding author:** Haldis Økland Lier, Section of Mental Health Research, Haugesund Hospital, Helse Fonna HF, P.O.Box 2170, N-5504 Haugesund, Norway, Tel: 004752733782 / 004752732700; E-mail: [haldis.johanne.oekland.lier@helse-fonna.no](mailto:haldis.johanne.oekland.lier@helse-fonna.no)

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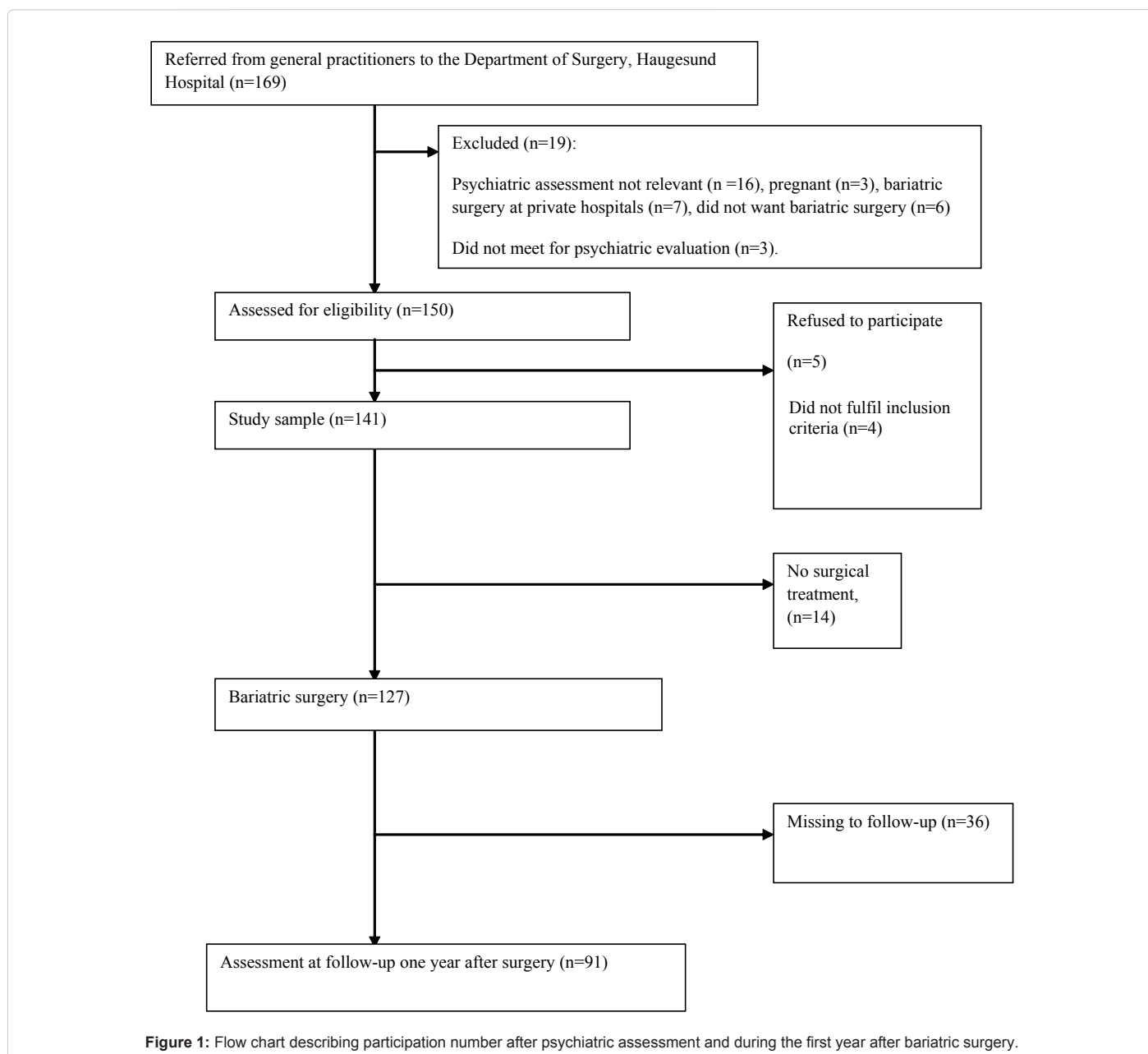
## Method

### Subjects

Initially 169 patients recruited from GP's to the Department of Surgery at Haugesund Hospital at the West coast of Norway were screened. The catchment area includes both urban and rural districts. A total of 141 patients were included. Exclusion criteria in the study were severe psychopathology (psychotic disorder, severe mood disorder), severe eating disorder, risk of suicidal behaviour, severe substance abuse or severe cognitive dysfunction, all based on clinical judgment. Four patients, three women and one man were excluded due to severe mood disorder and severe eating disorder. The patients were receiving inadequate clinical treatment and we recommend more adequate treatment for these disorders before surgery. A total of 127 patients

underwent laparoscopic Roux-en-Y gastric bypass (RYGBP). Of these, 91 patients (72%) met for follow-up assessment one year after surgery (Figure 1). Sociodemographic and pre- and postoperative clinical characteristics of the sample were analysed (Table 1). A majority of patients (74 %, n=94) were females and ethnic Norwegians (98%, n=125), median age (IQR) was 40.0 (15.0) years and median BMI (IQR) 44.1 (6.0) kg/m<sup>2</sup>. Nineteen patients (22%) rated improvement in body appearance as the most preferred postoperative outcome and 69% (n=59) rated health or physical fitness as the most preferred postoperative outcome. No statistical significant differences were found with regard to sociodemographic characteristics between patients who completed follow-up one year after surgery and patients who did not complete follow-up one year after surgery (analyses not shown).

All patients had a mandatory educational seminar preoperatively



Study population, N=127					
	Preoperative assessment		One year follow-up		Comparison*
	Median	IQR**	Median	IQR**	p values
Age	40.0	15.0			
BMI	44.1	6.0	30.4	6.3	< .001
%EWL			69.5	26.8	
Level of shame (ISS)	21.0	31.5	7.0	20.5	.001
EDE-Q					
Shape concerns	3.6	2.0	1.1	2.3	< .001
Weight concerns	3.2	1.4	1.2	1.9	< .001
	N (%)				
Gender, female		94 (74%)			
Civil status					
Married/Cohabiting		80 (65%)			
Education					
<10 years		42 (33%)			
10-13 years		60 (47%)			
>13 years		23 (18%)			
Work status					
Employed		71 (60%)			

\*Wilcoxon Signed Ranks Test, N=91\*\*IQR=Interquartile range

**Table 1:** Sample characteristics.

	Preoperative measures			Postoperative measures			p**
	Mean	Median	IQR*	Mean	Median	IQR*	
Without any comorbid psychiatric disorders (52%, n=66)	16.5	8.5	18.3	8.1	4.0	8.5	.002
With comorbid Axis I psychiatric disorders (43%, n=54)	41.1	38.0	34.0	28.2	21.0	50.0	< .001
Mood disorders (22%, n=28)	47.6	42.0	30.0	34.3	31.0	51.8	.002
Anxiety disorders (29%, n=37)	44.9	45.0	34.0	33.9	21.5	51.0	.006
Eating disorders (11%, n=14)	44.3	41.0	43.8	36.9	25.5	57.3	.036
With comorbid Axis II disorders (24%, n=31)	47.2	42.0	31.0	31.3	23.0	54.3	< .001
Avoidant personality disorders (17%, n=21)	52.3	44.0	32.8	34.2	23.0	47.3	.002

\*Interquartile range

\*\* Difference in scores from preoperative assessment to postoperative assessment, Wilcoxon signed rank test

**Table 2:** Pre- and postoperative shame scores (ISS scores) for patients with and without comorbid preoperative psychiatric disorders (N=127).

	Level of shame (T0)	Shape concern (T0)	Weight concern (T0)	Level of physical activity (T1)
Level of shame (T0)				
Shape concern (T0)	.69* (< .001)			
Weight concern (T0)	.69* (< .001)	.84* (< .001)		
Level of physical activity (T1)	-.25* (.022)	-.03* (.768)	.01* (.914)	
%EWL	.02* (.842)	-.07* (.566)	-.06* (.635)	.14* (.220)

\* Spearman correlation coefficients

T0=preoperative assessment, T1= one year after surgery

**Table 3:** Correlations among preoperative ISS score, preoperative weight and shape concerns, %EWL, and postoperative level of physical activity.

and they were also offered a similar seminar after the operation. Of the patients who completed follow-up one year after surgery, 34 patients (39%) participated in a pre- and postoperative counselling programme. A description of this counselling programme is published in a previous paper [29].

## Procedure

Psychiatric assessment was required as part of the preoperative evaluation process for bariatric surgery and was conducted three to

eight months prior to scheduled surgery. The participants had a two-hour full psychiatric evaluation, after which they were asked to fill out a battery of self-report instruments measuring shame, as well as eating disorder characteristics. Patients were requested to identify their most important expectancy after surgery, i.e. whether the expectancy was related to improvement of body appearance, health or physical fitness. At one year follow-up all the preoperative measures (shame and eating disorder characteristics) were completed, in addition to a self-report of

health promoting behaviours, including regular exercise, eating small and regular meals and taking recommended vitamins.

### Assessment

**Psychiatric evaluation:** The M.I.N.I. International Neuropsychiatric Interview for DSM-IV (M.I.N.I. Norwegian version 5.0.0) having well-established reliability and validity [30,31] was used to establish lifetime and current psychiatric diagnosis and psychiatric comorbidity for Axis I symptom disorders [32]. Personality diagnoses were obtained using a shortened Norwegian version of the Structured Clinical Interview for DSM IV Axis II [33,34].

### Shame

Shame was measured using a Norwegian translated version [35] of the Cook's Internalized Shame Scale (ISS). This scale measures shame as related primarily to perceptions of personal inadequacy, inferiority and weakness. It comprises 24 negatively worded items, interspersed with six positively worded items from Rosenberg's twelve item Self Esteem Scale in order to counteract an acquiescence bias and a negative response set. All items are rated on a five-point scale from 0 ("never") to 4 ("almost always"). Higher scores reflect greater shame. The ISS is a reliable and construct-valid instrument for both clinical and nonclinical populations [23]. Psychometric evaluations have reported high internal consistency ( $\alpha=.96$ ) and a comparable high value ( $\alpha=.93$ ) was found in the present study. The raw score of the ISS shame score is used as a measure of the intensity of shame experienced.

### Shape and weight concerns

The Eating Disorder Examination Questionnaire (EDE-Q) provides frequency data on key behavioural features for eating disorders and subscale scores, reflecting the severity of aspects of the psychopathology of eating disorders [36-38]. The full EDE-Q has demonstrated good internal consistency ( $\alpha= 0.90$ ) [39]. The participants completed the entire EDE-Q. In this study we analysed two subscales from the EDE-Q; shape concern and weight concern. Each of these subscales have demonstrated good internal consistency in previous research (shape concern,  $\alpha= 0.83$  and weight concern,  $\alpha= 0.72$ ) [39]. In the present study  $\alpha=.86$  for the shape concern subscale and  $\alpha=.65$  for the weight concern subscale was found.

### Health related behaviors and weight status

Body weight was measured to the nearest 0.5 kg using an electronic scale or self-reported (telephone interviews). The patients were asked about frequency of daily meals, use of recommended vitamins and minerals, and amount of physical activity. Reported amount of physical activity should include activity of moderate intensity level (activity affecting breathing).

### Statistical methods

As data were not normally distributed changes in BMI score and level of shame were tested by Wilcoxon signed rank test. Differences in preoperative levels of shame in different subgroups (patients who were adherent vs. non adherent to treatment guidelines regarding eating habits and patients who rated improvement in body appearance vs. improvement in health or physical fitness as their most preferred postoperative outcome) of the study population were analysed by Mann-Whitney U-test. Similarly, correlation between ISS score, level of shape and weight concerns and level of physical activity

were computed by the Spearman correlation coefficient (correlation coefficients of .10, .30, and .50 are interpreted as small, medium and large coefficients, respectively).

Tests were two-tailed, as correlations could be bidirectional, setting the  $\alpha$ -level to .05.

All data were analyzed using SPSS 18.0 for Windows.

### Ethical issues

The study was approved by the Regional Committees for Medical and Health Research Ethics and the Norwegian Social Science Data Services (NSD). The trial was registered at [www.clinicaltrials.gov](http://www.clinicaltrials.gov) prior to patient inclusion. The study was performed in accordance with the Helsinki Declaration of scientific conduct. All participants provided written informed consent prior to assessment.

### Results

#### Clinical characteristics

One year after bariatric surgery BMI was significantly reduced (44.1 vs. 30.4 (median values),  $p<.001$ ), with median percentage of excess weight loss (%EWL) of 69.5 (IQR= 26.8). Level of shape concerns (3.6 vs. 1.1 (median values),  $p<.001$ ), weight concerns (3.2 vs. 1.2 (median values),  $p<.001$ ) and level of shame (21.0 vs. 7.0 (median values),  $p<.001$ ) were also significantly reduced. Moreover, median level of physical activity was 21.4 minutes (IQR=21.4) each day and 37 % ( $n=34$ ) participated in a planned physical activity programme of 30 minutes each day, 71 % ( $n=61$ ) had four to six meals each day as recommended and 87 % ( $n=74$ ) took recommended vitamins daily. Preoperative level of shame was not significantly correlated with preoperative BMI ( $r=.01$ ,  $p=.881$ , Spearman's rank order correlation)

#### Relationship between preoperative co morbid psychiatric disorders and pre-and postoperative level of shame

Forty-eight percent ( $n= 61$ ) had one or more preoperative comorbid psychiatric disorder. The most common classes of current psychiatric disorders were mood disorders (22%,  $n= 28$ ), anxiety disorders (29%,  $n=37$ ) and personality disorders (24%,  $n= 31$ ) while 11 % ( $n= 14$ ) had an eating disorder. Among patients with mood disorders, 79 % ( $n= 22$ ) had dysthymia; 65 % ( $n=24$ ) of patients with anxiety disorders had social phobia. Sixty-eight percent ( $n= 21$ ) of the patients with a personality disorder had an avoidant personality disorder. Patients with comorbid psychiatric disorders displayed significantly higher pre- and postoperative shame scores compared to patients without a comorbid psychiatric disorder (36.0 vs. 9.0 and 15.0 vs. 4.0 (median values), respectively,  $p\le.001$ ) (Table 2).

#### Associations between preoperative level of shame, pre- and postoperative weight and shape concerns and outcome expectancies

Preoperative ISS (shame) score was significantly correlated with pre- and postoperative shape concerns ( $r=.69$  and  $r=.41$ , respectively,  $p$  values  $<.001$ ) and weight concerns ( $r=.69$  and  $r=.40$ , respectively,  $p$  values  $<.001$ ) (Table 3). Patients who rated improvement in body appearance as the most preferred postoperative outcome had significantly higher preoperative ISS shame score than patients who rated health or physical fitness as the most preferred postoperative outcome (median ISS score=34.0 and 16.5, respectively,  $p=.002$ ).



### Preoperative level of shame and adherence to treatment guidelines by physical exercise and eating habits one year after surgery

Preoperative ISS score was significantly correlated with level of physical activity one year after surgery ( $r=-.25$ ,  $p=.022$ , Spearman's rank order correlation) (Table 3). There was no difference in median preoperative ISS score for patients who adhered to recommendations regarding regular meals (20.0 vs. 22.0,  $p=.321$ ) or patients who took recommended vitamins and minerals daily (19.5 vs. 35.0,  $p=.150$ ), compared to patients who were non-adherent to these guidelines. Further, there was no significant association between preoperative ISS score and postoperative BMI ( $r=.002$ ,  $p=.983$ ) or %EWL ( $r=.023$ ,  $p=.842$ ) from preoperative assessment to follow up one year after surgery. Preoperative shape and weight concerns were not significantly correlated with level physical activity one year after surgery ( $p<.05$ ).

### Discussion

Patients with obesity and comorbid psychiatric disorders displayed significantly more preoperative shame than patients with obesity with no comorbid psychiatric disorders. Level of shame was related to weight and shape concerns both prior to and after surgery. Level of shame did also influence amount of physical exercise at follow up one year after surgery, but was not related to %EWL. Patients who rated improvement in body appearance as the most preferred postoperative outcome had significantly higher preoperative shame score than patients who rated health or physical fitness as the most preferred postoperative outcome.

The preoperative mean level of shame in the present study population was significantly higher compared to the mean level in a Norwegian non-clinical sample (mean values 27.1 vs. 21.9,  $p=.019$ ) [35]. However, it was comparable to level of shame (ISS- score) in another bariatric surgery sample (mean values 27.1 vs. 23.0,  $p=.062$ ) [40]. Accordingly, we can assume that shame is more prominent among patients seeking bariatric surgery than in a non-clinical sample.

The finding of an association between shame and psychiatric disorders is in line with several other studies showing associations between psychiatric disorders and shame [13,14,35]. However, to our knowledge this is the first study to explore shame in relation to comorbid psychiatric disorders in patients with obesity waiting for bariatric surgery. Shame can be viewed as a personality trait making individuals vulnerable to various psychiatric disorders. In patients with obesity shame may be a result of internalizing societal prejudices of obese people as being lazy, incompetent and lacking self-discipline [41,42]. Such self-devaluations may induce psychological distress that grows out of proportion and increases the burden of obesity.

In the present study level of shame and level of weight and shape concerns were significantly correlated ( $r>.60$ ). This is in accordance with earlier findings of associations between aspects of shame and shape and weight concerns [43]. Our finding of patients rating improvement in body appearance as their most preferred postoperative outcome having higher preoperative shame score compared to patients who rated improvement in health or physical fitness as their most preferred outcome supports such an association. Level of postoperative physical activity varied and only 34 % of the patients in the present study participated in a planned physical activity programme of 30 minutes each day. We found that level of preoperative shame was negatively correlated with minutes of daily physical exercise at follow-up. Earlier research indicates that shame may be a variable influencing whether a

person engage in exercise behaviour and that shame related to one's body may act as an impediment to engage in physical activity [44].

Shame has been linked to lower self-esteem, lower self- efficacy and to coping strategies of avoidance [45,46] and the association with experience of helplessness and deficient emotion regulation skills have been discussed [24,26]. Negative outcome expectancies and helplessness may lead to avoidant behavioural strategies, reinforcing the feeling of helplessness and shame. The Internalized Shame Scale, used in the present study, measure the the internal feeling of shame, or what one thinks and feels about oneself, also called "trait shame". The items explore negative global evaluations of the self, self-criticism avoidant behaviours and submissive behaviour [23]. For most patients weight loss is accompanied with considerable freedom of action, in being more physically and socially active. However, for some patients it seems difficult to establish the life-style changes associated with a favourable outcome. Performance of most types of physical activities involves potential experiences of being observed or judged by others. Some patients may wait or wish for further improvements in appearance, or greater weight losses before they face such challenges. In patients with high levels of shame, engagement in social activities might be experienced as too difficult or risky. As such, shame may pose psychological barriers to establishing and adhering to behavioural changes.

In accordance with our own clinical experience, self-views seem to constrain patients' thoughts and behaviour in general and particularly in attempting behavioural change after bariatric surgery. People who regard themselves as 'inadequate' or 'inferior' may consider themselves ineligible for various forms of participation in life [47] and negative outcome expectancies will lead to passive or avoidant coping strategies. Thus, people with negative self-views and shame will often act in ways that verify their own negative self-views [48]. This perceptual process is understood as a safety strategy and a way in which people try to exert control [48,49]. However, the negative flipside of this strategy is that negative self-views can sabotage people's ability to cope successfully with events in their lives.

In line with this, for some patients undergoing bariatric surgery, it seems essential that weight loss is reinforced by positive changes in self-image in order to attain behavioral changes related to an overall positive outcome. Patients' self-image, including both specific perceptions of their appearance and physical attractiveness as well as more general feelings of worthiness or shame, should be assessed and challenged. We strongly believe, from clinical experience supported by the research findings in this study that a comprehensive approach is called for in bringing about healthy life-style and thereby sustainable weight loss in patients with obesity. Any intervention program should address aspects of psychological wellbeing, negative self-views and shame, aiming at strengthening positive self-views and motivation for change to improve outcome and patients' satisfaction with treatment. A clearer understanding of the experience of shame in patients undergoing bariatric surgery might be important and might lead to development of more specific adjunctive treatment strategies. Earlier studies have reported that such treatments should include techniques that help patients develop inner caring, compassion and self-reassurance [49].

In the present study there was no significant association between level of physical activity and %EWL at follow-up one year after surgery. This finding might be explained by the fact that strong anatomical restriction, caused by surgery, can override any possible influence of

level of physical activity on weight loss in the short term. Our finding is in accordance with findings in a study by Rosenberger et al. [50]. Rosenberger et al. reported that frequency of total physical activity was not associated with mean percentage of excess BMI loss (%EBL) one year after bariatric surgery. However, moderate/strenuous physical activity was associated with %EBL at one year follow-up [50]. The present study did not include a measure of intensity of physical activity and this might explain the lack of a significant association between physical activity and weight loss.

### Strengths and limitations

The external validity of the present findings is strengthened by the fact that drop-out analyses showed no significant differences between completers and non-completers at one year follow-up. Thus, it seems reasonable to assume that our findings are representative of patients undergoing bariatric surgery and that our conclusions can be generalized to other patients undergoing bariatric surgery.

There are some limitations of the study. A one year follow-up may be too short to capture both the establishing and maintenance of life style changes over time. Furthermore, assessment of adherence to treatment guidelines was made using only retrospective self-report. Real time self-monitoring has been found to give more accurate information. Also, the use of self-report measure is subject to self-report bias [52]. In one study participants overestimated the number of days exercised and underestimated the exercise duration [53]. The correlation between preoperative shame score and physical exercise is medium ( $r < .30$ ). However, as the number of variables that cause behaviour increases, the correlation between a single variable and the behaviour decreases [54]. Hence, it has been argued that even small effect sizes are noteworthy if they have implications for a significant issue [55]. This argument seems relevant for our findings, since level of physical activity is found to be associated with psychological wellbeing, greater weight loss and weight loss maintenance in bariatric surgery [3,6].

In spite of these limitations, our findings suggest that it may be beneficial to focus on patients with high preoperative level of shame, in order to improve patients' ability to establish life-style changes associated with postoperative outcome. Further research is needed to determine if interventions to reduce shame can increase level of physical activity in patients undergoing bariatric surgery and to study if such interventions should be delivered pre- or postoperatively. Objective monitoring of physical activity with for instance accelerometers could be used in replication research of the current research questions.

### Conclusion

Engagement in regular exercise is related to maintenance of weight loss and physical and mental wellbeing after surgery. In the present study level of physical activity varied among patients one year after surgery. Level of preoperative shame was negatively correlated with level of physical activity, but not %EWL one year after surgery. The present finding suggest that patients with high preoperative level of shame should be given priority for postoperative follow-up, in order to improve patient's ability to establish life-style changes associated with postoperative outcome.

### References

1. Picot J, Jones J, Colquitt JL, Gospodarevskaya E, Loveman E, et al. (2009) The clinical effectiveness and cost-effectiveness of bariatric (weight loss)

surgery for obesity: a systematic review and economic evaluation. *Health Technol Assess* 13: 1-190.

2. Silver HJ, Torquati A, Jensen GL, Richards WO (2006) Weight, dietary and physical activity behaviors two years after gastric bypass. *Obes Surg* 16: 859-864.

3. Livhits M, Mercado C, Yermilov I, Parikh J, Dutson E, et al. (2010) Exercise Following Bariatric Surgery: Systematic Review. *Obes Surg* 20: 657-665.

4. Forbush S, Nof L, Echternach J, Hill C, Rainey J (2011) Influence of Activity Levels and Energy Intake on Percent Excess Weight Loss After Roux-en-Y Gastric Bypass. *Obes Surg* 21: 1731-1738.

5. Sarwer DB, Wadden TA, Moore RH, Baker AW, Gibbons LM, et al. (2008) Preoperative eating behavior, postoperative dietary adherence, and weight loss after gastric bypass surgery. *Surg Obes Relat Dis* 4: 640-646.

6. Rosenberger PH, Henderson KE, White MA, Masheb RM, Grilo CM (2011) Physical Activity in Gastric Bypass Patients: Associations with Weight Loss and Psychosocial Functioning at 12-Month Follow-Up. *Obes Surg* 21: 1564-1569.

7. Junior WS, do Amaral JL, Nonino-Borges CB (2011) Factors Related to Weight Loss up to 4 Years after Bariatric Surgery. *Obes Surg* 21: 1724-1730.

8. Thomas JG, Bond DS, Ryder BA, Leahey TM, Vithiananthan S, et al. (2011) Ecological momentary assessment of recommended postoperative eating and activity behaviors. *Surg Obes Relat Dis* 7: 206-212.

9. Herpertz S, Kielmann R, Wolf AM, Hebebrand J, Senf W (2004) Do psychosocial variables predict weight loss or mental health after obesity surgery? A systematic review. *Obes Res* 12: 1554-1569.

10. de Zwaan M, Enderle J, Wagner S, Mühlhans B, Ditzel B (2011) Anxiety and depression in bariatric surgery patients: A prospective, follow-up study using structured clinical interviews. *J Affect Disord* 133:61-68.

11. White MA, Kalarchian MA, Masheb RM, Marcus MD, Grilo CM (2010) Loss of control over eating predicts outcomes in bariatric surgery patients: a prospective, 24-month follow-up study. *J Clin Psychiatry* 71: 175-184.

12. Mühlhans B, Horbach T, de Zwaan M (2009) Psychiatric disorders in bariatric surgery candidates: a review of the literature and results of a German prebariatric surgery sample. *Gen Hosp Psychiatry* 31: 414-421.

13. Andrews B, Qian M, Valentine JD (2002) Predicting depressive symptoms with a new measure of shame: The Experience of Shame Scale. *Br J Clin Psychol* 41: 29-42.

14. Fergus TA, Valentiner DP, McGrath PB, Jencius S (2010) Shame- and guilt-proneness: relationships with anxiety disorder symptoms in a clinical sample. *J Anxiety Disord* 24: 811-815.

15. Schoenleber M, Berenbaum H (2010) Shame aversion and shame-proneness in Cluster C personality disorders. *J Abnorm Psychol* 119: 197-205.

16. Swan S, Andrews B (2003) The relationship between shame, eating disorders and disclosure in treatment. *Br J Clin Psychol* 42: 367-378.

17. Malterud K, Ulriksen K (2010) "Norwegians fear fatness more than anything else"--a qualitative study of normative newspaper messages on obesity and health. *Patient Educ Couns* 81: 47-52.

18. Sjöberg RL, Nilsson KW, Leppert J (2005) Obesity, shame, and depression in school-aged children: a population-based study. *Pediatrics* 116: e389-e392.

19. Rector NA, Bagby RM, Segal ZV, Joffe RT, Levitt AJ (2000) Self-Criticism and Dependency in Depressed Patients treated with Cognitive Therapy or Pharmacotherapy. *Cognitive Therapy and Research* 24: 571-584.

20. Andrews B, Hunter E (1997) Shame, early abuse and course of depression in a clinical sample. A preliminary study. *Cognitions and Emotions* 11: 373-381.

21. Kaufmann G (1989) The psychology of shame. Springer, New York.

22. Tangney JP, Miller RS, Flicker L, Barlow DH (1996) Are shame, guilt, and embarrassment distinct emotions? *J Pers Soc Psychol* 70:1256-1269.

23. Rybak CJ, Brown BM (1996) Assessment of internalized shame: Validity and reliability of the internalized shame scale. *Alcohol Treat Q* 14: 71-83.

24. Ursin H, Eriksen HR (2010) Cognitive activation theory of stress (CATS). *Neurosci Biobehav Rev* 34: 877-881.

25. Conradt M, Dierk JM, Schlumberger P, Rauh E, Hebebrand J, et al. (2008) Who copes well? Obesity-Related Coping and its Associations with Shame, Guilt, and Weight Loss. *J Clin psychol* 64: 1129-1144.
26. Gupta S, Rosenthal MZ, Mancini AD, Cheavens JS, Lynch TR (2008) Emotion regulation skills mediate the effects of shame on eating disorder symptoms in women. *Eat Disord* 16: 405-417.
27. Goss K, Allan S (2009) Shame, pride and eating disorders. *Clin Psychol Psychother* 16:303-316.
28. Byrne S, Cooper Z, Fairburn C (2003) Weight maintenance and relapse in obesity: a qualitative study. *Int J Obes* 27: 955-962.
29. Lier HO, Biringer E, Stubhaug B, Tangen T (2011) The impact of preoperative counseling on postoperative treatment adherence in bariatric surgery patients: A randomized controlled trial. *Patient educ couns* (Epub ahead of print).
30. Lecrubier Y, Sheehan DV, Hergueta T, Weiller E (1998) The Mini International Neuropsychiatric Interview. *European Psychiatry* 13: 198s.
31. Lecrubier Y, Sheehan D, Weiller E, Amorim P, Bonora I, et al. (1997) The Mini International Neuropsychiatric Interview (MINI). A short diagnostic structured interview: reliability and validity according to the CIDI. *European Psychiatry* 12: 224-231.
32. American Psychiatric Association (1994) *Diagnostic and Statistical Manual of Mental Disorders*. 4th edition Washington DC, USA.
33. First MB, Gibbon M, Williams JB, Spitzer RL, Benjamin LS (1997) *Structured Clinical Interview for Dsm-IV Axis I Personality Disorders*: American Psychiatric Publishing, Incorporated.
34. First MB GM, Spitzer RL, Williams JBW, Benjamin LS (1997) *User's guide for the structured clinical interview for DSM-IV Axis I personality disorders [SCID-II]*. American Psychiatric Press.
35. Vikan A, Hassel A, Rugset A, Johansen H, Moen T (2010) A test of shame in outpatients with emotional disorders. *Nord J Psychiatry* 64: 196-202.
36. Fairburn CG, Beglin SJ (1994) Assessment of eating disorders: interview or self-report questionnaire? *Int J Eat Disord* 16: 363-370.
37. Kalarchian MA, Wilson GT, Brolin RE, Bradley L (2000) Assessment of eating disorders in bariatric surgery candidates: self-report questionnaire versus interview. *Int J Eat Disord* 28: 465-469.
38. Luce KH, Crowther JH (1999) The reliability of the Eating Disorder Examination-Self-Report Questionnaire Version (EDE-Q). *Int J Eat Disord* 25: 349-351.
39. Peterson CB, Crosby RD, Wonderlich SA, Joiner T, Crow SJ, et al. (2007) Psychometric properties of the eating disorder examination-questionnaire: factor structure and internal consistency. *Int J Eat Disord* 40: 386-389.
40. Rosenberger PH, Henderson KE, Grilo CM (2006) Correlates of Body Image Dissatisfaction in Extremely Obese Female Bariatric Surgery Candidates. *Obes Surg* 16: 1331-1336.
41. Lupton D (1996) *Food, body and the self*. London: Sage Publications Ltd.
42. Throsby K (2007) "How could you let yourself get like that?" Stories of the origins of obesity in accounts of weight loss surgery. *Soc Sci Med* 65: 1561-1571.
43. Gee A, Troop NA (2003) Shame, depressive symptoms and eating, weight and shape concerns in a non-clinical sample. *Eat Weight Disord* 8: 72-75.
44. Jakul L (2011) *Maintenance of a healthy lifestyle: Differences in the obese and non-obese*. Dissertation Abstract. University of Manitoba.
45. Yelsma P, Brown NM, Elison J (2002) Shame-focused coping styles and their associations with self-esteem. *Psychol Rep* 90: 1179-1189.
46. Baldwin KM, Baldwin JR, Ewald T (2006) The relationship among shame, guilt, and self-efficacy. *Am J Psychother* 60: 1-21.
47. Bergner RM, Holmes JR (2000) Self-concepts and self-concept change: A status dynamic approach. *Psychotherapy* 37: 36-44
48. Swann WB, Chang-Schneider C, Mc-Clarty KL (2007) Do people's Self-Views Matter? Self-Concept and Self-Esteem in Everyday Life. *Am Psychol* 84-94.
49. Gilbert P, Irons S (2005) Focused therapies and compassionate mind training for shame and self-attacking, using cognitive behavioural, emotional imagery and compassionate mind training. In P.Gilbert (Edn), *Compassion: Conceptualisations research and use in psychotherapy*. London: Brunner-Routledge.
50. Rosenberger PH, Henderson KE, White MA, Masheb RM, Grilo CM (2011) Physical Activity in Gastric Bypass Patients: Associations with Weight Loss and Psychosocial Functioning at 12-Month Follow-Up. *Obes Surg* 21: 1564-1569.
51. Gilbert P, Pehl J, Allan S (1994) The phenomenology of shame and guilt: an empirical investigation. *Br J Med Psychol* 67: 23-36.
52. Neilson HK, Robson PJ, Friedenreich CM, Csizmad I (2008) Estimating activity energy expenditure: how valid are physical activity questionnaires? *Am J Clin Nutr* 87: 279-291.
53. Matt GE, Garcia M, Primicias WW, Frericks L, De Faria F (1999) Exploring biases in self-reported exercising behavior heuristics based on recency, frequency, and preference. *Percept Mot Skills* 88: 126-128.
54. Ahadi S, Diener E (1989) Multiple determinants and effect sizes. *J Pers Soc Psychol* 56: 398-406.
55. Rosenthal R (1994) *The handbook of research synthesis, vol. Parametric measures of effect sizes*. New York: Russell Sage Foundation.