

Psychosocial characteristics associated with symptom perception one year after gastric bypass surgery – A prospective study

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Abstract

Background

The experience of symptoms after bariatric surgery such as pain, dumping, and fatigue, may affect behavior, quality of life, and the need for health care consultations. Attention to and interpretation of symptoms are influenced by psychological and contextual factors.

Prospective studies of psychological factors predicting physical symptom perception after bariatric surgery are scarce.

Objectives

To explore the association of preoperative negative affect, history of traumatic sexual and violent events, with frequency and intensity of self-reported symptoms, one year after Roux-en-Y gastric bypass (RYGB).

Setting

University hospital

Methods

Questionnaire data were collected before and one year after RYGB from 230 patients. Negative affect and stressful negative life events were measured preoperatively. The participants reported the number and degree of impact of various physical symptoms postoperatively.

Results

The most common symptoms reported to have a high impact on behavior were fatigue (32.8%), and dumping (28.4%). Reporting more symptoms was associated with preoperative anxiety ($r = .22$, $p = .001$), and number of stressful life events ($r = .21$, $p = .002$). Participants with a probable preoperative anxiety disorder reported higher impact of fatigue, pain, dumping, and diarrhea after surgery, while those with a probable mood disorder and history of traumatic events reported higher impact of dumping.

Conclusion

Preoperative anxiety symptoms and stressful experiences were associated with higher perceived impact of symptoms, such as dumping, fatigue, and pain after RYGB. Evaluation of psychological characteristics associated with symptom perception may be relevant during handling of symptoms not responsive to other treatment measures.

Keywords: Symptom perception, Gastric bypass, prospective, mental health, side effects

Common short and long-term symptoms and side effects after Roux-en-Y gastric bypass (RYGB) include fatigue, dumping, and abdominal pain, reported by about 50% of the patients respectively ^(1,2). Other commonly reported side effects are vomiting and diarrhea ^(1,3,4). The frequency and perceived intensity of such symptoms may affect health behavior, quality of life, and may also ultimately lead to suboptimal treatment outcome ⁽¹⁾. A recent study found that two thirds of patients had consulted health care providers and one-third had been hospitalized due to post-RYGB symptoms such as anemia, abdominal pain, or fatigue ⁽¹⁾.

People differ in how they experience and report symptoms, partly because attention to and interpretation of symptoms are influenced by psychological and contextual factors ⁽⁵⁾. The role of psychosocial factors in symptom perception in the bariatric surgery population has not been adequately elucidated. Improved knowledge in this regard could be beneficial for patient handling post RYGB, particularly in situations with undefined etiology of chronic symptoms and symptom persistence despite treatment efforts.

Bariatric populations have higher prevalence of anxiety and mood disorders, and are more likely to have a prior history of sexual or physical abuse, than several other surgical populations ^(6,7). No prospective study has previously examined preoperative psychological factors that may predict variations in the perception of physical symptoms after RYGB.

Previous experiences of symptoms and illness, external stressors, and other psychological and contextual factors may all increase detection and selective attention to bodily sensations, heighten symptom sensitivity, and influence how symptoms are interpreted and reported ⁽⁸⁾. Ambiguous, vague and widespread symptoms are more susceptible to psychological and contextual influences than intense and unambiguous symptoms ⁽⁵⁾. Symptoms presented post RYGB can be challenging to define and treat, especially when involving abdominal discomfort and fatigue. Many of the symptoms are frequent and can be

expected from the anatomic and physiologic rearrangements introduced by the surgery.

Abdominal pain in particular appears to be common ⁽⁹⁾.

Negative affect (e.g., anxiety, depressive mood) and stress seem to increase symptom complaints, and has been shown to predict post-surgery perception of a range of symptoms in various surgical populations ^(10, 11). Aceto et al. ⁽¹²⁾ found that preoperative depressive and anxiety symptoms were related to pain perception during the initial days after surgery. Fewer pre-surgical depressive symptoms have also been associated with improvements in bodily and joint specific pain, one to three years after bariatric surgery ⁽¹³⁾.

Stressful or traumatic experiences have been associated with increased physical health complaints in general populations, an association that may be mediated by health compromising behaviors and negative affect ^(5, 14, 15). The psychobiological model posits that being subjected to even a few traumatic events might lower arousal thresholds and increase vulnerability to stress, which subsequently could affect attention and elevate the experience of distress in response to physical symptoms ^(14, 16).

The main objective of the present study was to explore the association of preoperative negative affect with frequency and impact of self-reported symptoms one year following RYGB. We also aimed to examine whether reported symptoms were related to experiencing stressful life events, including violent or sexual trauma.

Material and methods

Participants and procedure

Data were utilized from the Oslo Bariatric Surgery Study ⁽¹⁷⁾, with questionnaires completed after being approved for surgery and one year after surgery. Participants were recruited at the Center for Morbid Obesity and Bariatric Surgery at Oslo University Hospital between February 2011 and September 2013 ⁽¹⁷⁾. Of 506 eligible study participants, 302

(59.6%) consented and completed a set of questionnaires preoperatively. We excluded 16 participants who underwent sleeve gastrectomy, as symptoms/side effects may differ somewhat from RYGB. The final study sample consisted of 230 (45.5%) participants who underwent RYGB and had completed both questionnaires. Laparoscopic RYGB was performed by creating a 25-30 cc gastric pouch, 150 cm alimentary limb, and 50 cm biliopancreatic limb.

The Regional Ethics Committee for Medical Research approved the study protocol and informed written consent was obtained from all participants.

Measures

“*Symptom perception*” refers to both reported number and perceived impact of symptoms. The concept was operationalized using the question: ‘Have you experienced any side effects/changes after the operation that affects your eating behavior or physical activity?’ followed by 11 side effects and expected changes after surgery that could affect health behavior. Only what patients might consider to be negative side effects (symptoms) were retained for this study: fatigue; pain; dumping; diarrhea; constipation; heartburn; vomiting, while the changes that are expected post RYGB such as: feeling full quickly; not fancying food; increased hunger; change of taste, were excluded. For each symptom, participants rated the impact from: 1= No, 2 = A bit, 3 = Some, 4 = Quite a lot, 5 = Much, to 6 = Extremely much. The total *number of symptoms* was the sum of all responses categorized as the absence (0) or presence (1) of each symptom (presence = reported impact rating ≥ 2).

In addition, the responses (1-6) were summarized and a mean *total impact of symptoms* was computed. The responses for each symptom were also grouped into three categories: 1 = “No symptoms”, 2-3 = “Some impact of symptoms” and 4-6 = “High impact of symptoms”.

Anxiety and depressive symptoms. The Hospital Anxiety and Depression Scale (HADS), a validated instrument for clinical screening and research, was used to measure negative affect before RYGB ⁽¹⁸⁾. Two subscales with 7 items, with a response scale from 0 to 3, were added to a separate score (0–21) on anxiety and depression, with a higher total score reflecting higher levels of symptoms. Cronbach’s alpha was .84 for anxiety symptoms and .78 for depressive symptoms. The participants were also grouped into two clinical categories with a cut-off score >10 indicating a probable anxiety or mood disorder ⁽¹⁵⁾.

Number of stressful life events was assessed before surgery by adding the number of events the participants indicated on of a list of 17 negative lifetime events (e.g., death or illness in the family, job loss, divorce, violence, sexual abuse). The list was developed at the University of Tromsø and builds on the tradition from Holmes and Rahe ⁽¹⁹⁾. Four items asked specifically about experience with violent and sexual traumatic events (e.g., ‘Forced or threatened to perform sexual act, for example rape or attempted rape’). A new group variable was constructed: 1 = no stressful experiences, 2 = having experienced one or more stressful negative life events (except sexual abuse/violence), and 3 = having experienced at least one of the four listed violence and/or sexual abuse events.

Sociodemographic variables obtained included gender, marital status (married/partner vs. single), education level (high vs. low), and employment status (employed vs. unemployed). Weight was measured on the day of surgery, and one year after surgery. Weight loss was calculated as %TWL (percent total weight loss) and %EBMIL (percent excessive BMI loss) ⁽²⁰⁾.

Statistical analyses

Pearson’s product-moment correlation coefficient r was calculated to measure the relation between the study variables, and partial correlations when adjusting for a significant

confounder. The heartburn and vomiting variables had a skewed distribution and therefore only analyzed as categorical variables. Multivariate analysis of variance (MANOVA) was used to test preoperative group differences to reduce the risk for Type I error and to take the relation between outcome variables into account. The included five outcome variables after surgery were: fatigue, pain, dumping, diarrhea, and constipation. Only a variable significantly correlated with both the independent and outcome variables was entered as a covariate. If the result from MANOVA has a significant effect, Θ (Roy's largest root) = $p < .05$, a separate univariate Analysis of variance (ANOVA) can be calculated ⁽²¹⁾. Due to the number of tests conducted a more rigorous significance level of $p < .01$ was chosen for the separate tests and the correlation analysis. The time period between approval and surgery varied considerably, but none of the study variables were associated with length of waiting period. A multivariate logistic regression with baseline study variables predicting non-participation after surgery showed no significant differences between the groups.

Results

The study sample ($n = 230$) included 78.3 % women, the mean age was 44.5 years (SD 9.6). Mean preoperative weight and BMI were 125.0 kg, (20.5), and 45.0 kg/m² (5.7), respectively. At follow-up, mean weight was 88.6 kg (17.8) and BMI 30.6 kg/m² (5.2). Mean %TWL was 29.2 % (8.3) and mean %EBMIL was 74.6 % (21.7).

The most common reported high impact symptoms were fatigue (32.8%) and dumping (28.4%). The mean number of reported symptoms at follow-up was 3.8 (1.6) (Table 1). There were no differences in total number or perceived impact of symptoms after surgery with regard to gender, marital status, education, or employment. Higher %TWL was associated with higher reported impact of pain ($p = .005$) and constipation ($p = .004$). %TWL was not significantly related to impact of any of the other symptoms studied (Table 1), nor with

preoperative anxiety or depressive symptoms.

Anxiety and depression

Before surgery, 11% (n=26) of the patients had a probable mood disorder, whereas the prevalence of probable anxiety disorder was 21% (n=50). More participants, 28.0% (n=14/50) reported heartburn symptoms (but not vomiting symptoms) after surgery in the probable anxiety group, compared to 11.7% (n=21/179) in the group with lower scores on anxiety symptoms ($X^2 = 7.98$, $p = .004$). No group difference in depressive symptoms was related to presence of either heartburn or vomiting symptoms after surgery.

Reporting more symptoms, and higher impact of fatigue, pain, dumping, and diarrhea were all significantly correlated with higher preoperative anxiety, while more depressive symptoms were associated with dumping.

There was a significant difference between the two preoperative anxiety groups on the combined five symptoms after surgery ($\Theta 0.13$, $F(5, 218) = 5.58$, $p = .001$). When analyzing the symptoms separately (Table 2), the probable anxiety disorder group reported significantly higher mean impact of fatigue ($p = .001$), dumping ($p = .000$), and diarrhea ($p = .000$) than the low anxiety group. They also reported more symptoms after surgery ($p = .002$). There was an effect of preoperative levels of depressive symptoms ($\Theta 0.06$, $F(5, 218) = 2.43$, $p = .033$), on the combined impact of symptoms after surgery. Analyzed separately, the only significant symptom difference was dumping, with a higher perceived impact in the probable mood disorder group ($p = .002$) (Table 2).

Stressful negative life events

Number of previous stressful negative life events was not associated with preoperative depressive symptoms, or with %TWL. Preoperative anxiety symptoms were included as a covariate as it was significantly correlated with both frequency of reported stressful life events ($r = .25$, $p = .000$) and impact of several symptoms after surgery (see Table 2). Higher

frequency of stressful life events was significantly correlated with reporting higher total number of symptoms, and with mean impact of fatigue, pain and dumping (Table 3). Eighty-two participants (36%) indicated previous experience of at least one sexual or violent stressful life events (mean traumatic events = 1.88, SD = 1.00). There was a significant difference between the three preoperative stressful life events groups on the combined five symptoms after surgery (Θ 0.08, $F(5, 217) = 3.56$, $p = .004$). Analyzed separately, the group reporting previous violence/sexual abuse events scored significantly higher on perceived impact of dumping ($p = .001$), compared to the other two groups (Table 3).

Discussion

To our knowledge, this is the first prospective study examining associations between preoperative psychosocial factors and frequency and intensity of self-reported symptoms following RYGB. The main finding was that more preoperative anxiety symptoms and stressful life event experiences were associated with reporting more symptoms and higher impact of dumping, pain, fatigue and (to some extent) diarrhea, postoperatively. Dumping and fatigue were the most commonly reported symptoms after RYGB, which is consistent with previous findings⁽¹⁾. Anxious affect, and to some extent stress, have been found to increase patients' vigilance for detecting potentially threatening symptoms and sensitivity for internal body sensations^(5, 8, 10). Negative affect has previously been associated with perceived gastrointestinal problems such as diarrhea, heartburn and nausea, both in general and clinical populations⁽²²⁾.

The prevalence of probable mood and anxiety disorders in this study is comparable to the baseline prevalence reported in the Swedish Obesity Subjects (SOS) study⁽²³⁾. Having a probable preoperative anxiety disorder was associated with fatigue, dumping, diarrhea and heartburn symptoms. A high anxiety level may increase the tendency to catastrophize

interpretations of somatic sensations and exaggerate perception of the intensity^(8, 24).

Catastrophizing, the appraisal of bodily sensations as threatening and unmanageable, also relates to beliefs about coping abilities which may affect the perceived impact of symptoms on behavior and function⁽¹⁰⁾. Another possible explanation is that participants experienced a significant impact of symptoms already before surgery, coinciding with previous research showing a reciprocal relationship between symptoms (especially pain) and anxiety⁽¹⁰⁾.

The reported impact of dumping stands out, as it is associated with all of the preoperative psychological factors included. Dumping incorporates several other ambiguous symptoms (e.g., nausea, fatigue, pain), which may increase the probability of an association with preoperative negative affect and stress^(2, 25). Research show that expectations about symptoms can lead to a confirmatory response, wherein the individual tends to have enhanced perceptions of symptoms⁽²⁶⁾. Because patients often expect to experience dumping after surgery, negative affect could increase the risk of interpreting these as dumping^(2, 5, 26, 27). An alternative explanation is that patients reporting several negative stressful experiences, or with a probable anxiety or mood disorder, might find it more difficult to control their diet, which is essential in order to avoid dumping symptoms⁽²⁾. The finding that past violence/sexual abuse experience was associated with higher impact of dumping is in accordance with observations in studies of other patient populations where experiences of past traumatic events have been related to unspecific complaints such as gastrointestinal symptoms^(14, 15, 28, 29). In addition to a psychobiological explanation, increased symptom perception could serve as an avoidance strategy, adopted to distract oneself from distressing thoughts and emotions, or that symptom reporting carries a secondary gain by getting attention from others^(5, 30).

Our findings suggests that screening for anxiety symptoms and stressful life events might be beneficial among patients undergoing RYGB surgery. Distress connected to side effects/symptoms after RYGB may influence being less conscientious about following the

post-op regimen, or not being able to feel happy/satisfied with their weight loss outcomes. Knowing which patients that may be most affected by which symptoms can help clinicians to focus their efforts and resources to patients in higher risk for distress. Targeting change of attention focus (e.g., teach patients what to look out for) and de-catastrophize by reducing perceived threat of symptoms (e.g., training them to re-interpret bodily signals), could be helpful tools in preoperative counselling and education. The results from this study can also guide clinicians in teaching patients ways to minimize, avoid, or cope with symptoms during follow-up consultations ^(8, 30).

Study strengths include a prospective design, in-depth analyses of symptoms, and a single center design where all patients received a comparable surgical procedure and management. Study limitations include lack of information regarding whether patients experienced the symptoms in question even before surgery. Due to the wording of the symptom question it was not apparent whether a given symptom was experienced only in a short period after surgery or if it was still present after one year. The provision of a long list of symptoms might have led to an over-endorsement of symptoms. The stressful negative life events listed were not a validated measure, making comparisons with other studies challenging.

Conclusion

In this study we found that preoperative anxiety symptoms and stressful life experiences were associated with higher perceived impact of symptoms, especially ambiguous symptoms (e.g., dumping, fatigue, and pain) one year after RYGB. The perceived impact of symptoms after surgery was most evident among patients with a probable preoperative anxiety disorder. The findings may be relevant for handling strategies particularly for patients with symptoms of undefined etiology with little response to attempts of symptom relief. They

may also be beneficial in patient screening, counseling and education prior to bariatric surgery. Further research is needed on the reciprocal relationship between changes in mental health and physical symptom after surgery.

There are no conflicts of interests

References

1. Gribsholt SB, Pedersen AM, Svensson E, Thomsen RW, Richelsen B. Prevalence of self-reported symptoms after gastric bypass surgery for obesity. *JAMA Surg.* 2016;151(6):504-11.
2. Berg P, McCallum R. Dumping Syndrome: A review of the current concepts of pathophysiology, diagnosis, and treatment. *Dig Dis Sci.* 2016;61(1):11-18.
3. Kalarchian MA, Marcus MD, Courcoulas AP, Cheng Y, Levine MD. Self-report of gastrointestinal side effects after bariatric surgery. *Surg Obes Relat Dis.* 2014;10(6):1202-7.
4. Sovik TT, Karlsson J, Aasheim ET, et al. Gastrointestinal function and eating behavior after gastric bypass and duodenal switch. *Surg Obes Relat Dis.* 2013;9(5):641-7.
5. Pennebaker JW. *The psychology of physical symptoms.* New York: Springer; 1982.
6. Gabert DL, Majumdar SR, Sharma AM, et al. Prevalence and predictors of self-reported sexual abuse in severely obese patients in a population-based bariatric program. *J Obes.* 2013;2013:7.
7. Kalarchian MA, Marcus MD, Levine MD, et al. Psychiatric disorders among bariatric surgery candidates: relationship to obesity and functional health status. *Am J Psychiatry.* 2007;164(2):328-34; quiz 74.
8. Howren MB, Suls J. The symptom perception hypothesis revised: depression and anxiety play different roles in concurrent and retrospective physical symptom reporting. *J Pers Soc Psychol.* 2011;100(1):182-95.
9. Høgestøl IK, Chahal-Kummen M, Eribe I, et al. Chronic abdominal pain and symptoms 5 years after Gastric bypass for morbid obesity. *Obes Surg.* 2017;27(6):1438-45.
10. Woo AK. Depression and Anxiety in Pain. *Rev Pain.* 2010;4(1):8-12. doi: 10.1177/204946371000400103.

11. Skotzko CE. Symptom perception in CHF: (why mind matters). *Heart Fail Rev.* 2009;14(1):29-34.
12. Aceto P, Lai C, Perilli V, et al. Factors affecting acute pain perception and analgesics consumption in patients undergoing bariatric surgery. *Physiol Behav.* 2016;163:1-6.
13. King WC, Chen JY, Belle SH, et al. Change in pain and physical function following bariatric surgery for severe obesity. *JAMA.* 2016;315(13):1362-71.
14. D'Andrea W, Sharma R, Zelechowski AD, Spinazzola J. Physical health problems after single trauma exposure: when stress takes root in the body. *J Am Psychiatr Nurses Assoc.* 2011;17(6):378-92.
15. Paras ML, Murad MH, Chen LP, et al. Sexual abuse and lifetime diagnosis of somatic disorders: a systematic review and meta-analysis. *JAMA.* 2009;302(5):550-61.
16. Schulz A, Vogele C. Interoception and stress. *Front Psychol.* 2015;6:993.
17. Kvaalem IL, Bergh I, von Soest T, et al. A comparison of behavioral and psychological characteristics of patients opting for surgical and conservative treatment for morbid obesity. *BMC Obes.* 2015;3:6.
18. Zigmond AS, Snaith RP. The Hospital Anxiety and Depression Scale. *Acta Psychiatr Scand.* 1983;67:361-70.
19. Holmes TH, Rahe RH. The Social Readjustment Rating Scale. *J Psychosom Res.* 1967;11(2):213-8.
20. Brethauer SA, Kim J, el Chaar M, et al. Standardized outcomes reporting in metabolic and bariatric surgery. *Surg Obes Relat Dis.* 2015;11(3):489-506.
21. Field A. *Discovering statistics using SPSS.* 3 ed. London: Sage; 2009.
22. Fond G, Loundou A, Hamdani N, et al. Anxiety and depression comorbidities in irritable bowel syndrome (IBS): a systematic review and meta-analysis. *Eur Arch Psychiatry Clin Neurosci.* 2014;264(8):651-60.

23. Karlsson J, Sjostrom M, Sullivan M. Swedish obese subjects (SOS)--an intervention study of obesity. Two-year follow-up of health-related quality of life (HRQL) and eating behavior after gastric surgery for severe obesity *Int J Obes*. 1998;22:113-26.
24. Quartana PJ, Campbell CM, Edwards RR. Pain catastrophizing: a critical review. *Expert Rev Neurother*. 2009;9(5):745-58.
25. Mala T, Hewitt S, Dahl, et al. Dumpingsyndrom etter kirurgi på magesekken. *Tidsskr Nor Legeforen*. 2015;135:137-41.
26. Van den Bergh O, Bogaerts K, Diest IV. Symptom perception, Awareness and interpretation A2 - Wright, James D. *International Encyclopedia of the Social & Behavioral Sciences (Second Edition)*. Oxford: Elsevier; 2015. p. 866-72.
27. Groven KS, Raheim M, Engelsrud G. Living with bodily changes after weight loss surgery. Women's experiences of food and "dumping". *Phenomenology & Practice*. 2012;6(1):36-54.
28. Zoellner LA, Goodwin ML, Foa EB. PTSD severity and health perceptions in female victims of sexual assault. *J Trauma Stress*. 2000;13(4):635-49.
29. Young Casey C, Greenberg MA, Nicassio PM, Harpin RE, Hubbard D. Transition from acute to chronic pain and disability: a model including cognitive, affective, and trauma factors. *Pain*. 2008;134(1-2):69-79.
30. Malterud K, Guassora AD, Graungaard AH, Reventlow S. Understanding medical symptoms: a conceptual review and analysis. *Theor Med Bioeth*. 2015;36(6):411-24.

Table 1. Descriptive statistics of reported impact of symptoms, and correlation (Pearson's r) between reported impact and number of symptoms with %TWL one year after Roux-en-Y gastric bypass

		No symptoms	Some impact of symptoms ¹	High impact of symptoms ²	Total impact of symptom		% TWL	
Impact	n	%	%	%	Mean	SD	r	p
1.Fatigue	229	21.3	45.9	32.8	2.91	1.63	.06	.40
2.Pain	229	43.8	43.0	13.2	2.03	1.23	.19	.005
3.Dumping	229	8.3	63.3	28.4	3.00	1.38	.10	.13
4.Diarrhea	229	41.5	44.1	14.4	2.12	1.36	-.01	.99
5. Constipation	230	46.5	39.2	14.3	2.04	1.36	.20	.004
6.Vomiting	230	72.2	23.9	3.9	1.42	0.85	-	-
7.Heartburn	229	84.8	14.8	0.4	1.24	0.50	-	-
Total number	229		Range = 0-7		3.79	1.62	.17	.02
of symptoms								

Total mean	230	Range = 1.00-5.20	2.42	0.92	.16	.02
impact of symptoms 1-5						

Note: ¹Some impact of symptoms = "A bit/ Some"; ²High impact of symptoms = "Quite a lot/ Much/ Extremely much";

SD = Standard deviation; r = Pearson's product-moment correlation coefficient; p = significance value; %TWL = Percent total weight loss

Table 2: Correlations (Pearson's r) between reported impact and number of symptoms one year after Roux-en-Y gastric bypass surgery with preoperative anxiety and depressive symptoms. Separate univariate Analysis of variance (ANOVA) of reported impact and number of symptoms between groups with no or probable preoperative anxiety or mood disorder.

	Anxiety symptoms							Depressive symptoms						
	Total anxiety symptoms n = 228		No disorder n=178	Probable disorder n=50	F	p	η^2	Total depressive symptoms n=228		No disorder n=202	Probable disorder n=26	F	p	η^2
	r	p	Mean (SD)	Mean (SD)				r	p	Mean (SD)	Mean (SD)			
Impact														
Fatigue	.26	.000	2.73 (1.58)	3.61(1.66)	11.86	.001	0.05	.13	.05	2.85 (1.61)	3.44 (1.73)	2.91	.09	-
Pain	.20	.003	1.94 (1.18)	2.38 (1.35)	5.13	.02	-	.02	.79	2.00 (1.23)	2.27 (1.25)	1.06	.30	-
Dumping	.27	.000	2.80 (1.27)	3.72 (1.53)	18.62	.000	0.08	.15	.03	2.91 (1.34)	3.80 (1.41)	9.72	.002	0.04
Diarrhea	.26	.000	1.95 (1.19)	2.76 (1.70)	14.80	.000	0.06	.12	.07	2.05 (1.28)	2.73 (1.76)	5.94	.02	-
Constipation	.05	.46	2.03 (1.35)	2.12 (1.41)	0.18	.67	-	-.05	.43	2.06 (1.36)	1.96 (1.40)	0.12	.73	-
Total number of symptoms	.22	.001	3.62 (1.62)	4.46 (1.46)	11.04	.001	0.05	.05	.45	3.78 (1.65)	4.00 (1.29)	0.42	.52	-

Note: r = Pearson's product-moment correlation coefficient; p = significance value; SD = Standard deviation; F = F-test of significance: F is between-groups variance divided by within-groups variance; η^2 = Partial eta squared: The magnitude of the effect size for the partial eta squared is 0.01 (small), 0.06 (medium), and 0.14 (large)

Table 3: Partial correlations between reported impact and number of symptoms one year after Roux-en-Y gastric bypass surgery with previous number stressful life events. Separate univariate Analysis of covariance (ANCOVA) of reported impact and number of symptoms between groups with no stressful events, experience with stressful events, and stressful events including violence/sexual abuse. Adjusted for preoperative anxiety symptoms.

	Stressful negative life events							
	Total number of stressful events n = 221		No stressful events n = 10	Stressful events - Other n = 135	Stressful events - Violence/sexual abuse n = 79			
Impact	Partial r	p	Mean (SD)	Mean (SD)	Mean (SD)	F (adj)	p	η^2
Fatigue	.25	.000	2.45 (1.16)	2.79 (1.55)	3.22 (1.77)	2.35	.10	-
Pain	.22	.001	1.89 (0.92)	1.85 (1.07)	2.36 (1.45)	6.57	.11	-
Dumping	.31	.000	2.42 (1.49)	2.78 (1.20)	3.47 (1.51)	7.86	.001	0.07
Diarrhea	.16	.015	2.52 (1.84)	1.99 (1.52)	2.37 (1.56)	2.05	.13	-
Constipation	.07	.31	2.22 (1.62)	1.87 (1.21)	2.23 (1.43)	2.01	.14	-
Total number	.21	.002	3.19 (1.92)	3.71 (1.60)	4.04 (1.56)	2.00	.14	-

of symptoms

Note: Partial r = Partial correlation adjusted for preoperative anxiety symptoms; p = significance value; SD = Standard deviation; F (adj) = F-test of significance (adjusted for preoperative anxiety symptoms); F is between-groups variance divided by within-groups variance; η^2 = Partial eta squared: The magnitude of the effect size for the partial eta squared is 0.01 (small), 0.06 (medium), and 0.14 (large)

