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ORIGINAL CONTRIBUTIONS

Perceived Barriers in the Decision for Bariatric and Metabolic Surgery: Results from a Representative Study in Germany

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Abstract

Background Attitudes of the general public may be an influencing factor for low surgery rates: When skepticism is high, support for individuals wanting or needing to undergo surgery may diminish. This study assesses the relevance of barriers to metabolic surgery.

Methods The study was conducted using a representative sample of the German population ($n = 1007$). Participants were asked to imagine that they would have to decide for or against metabolic surgery and rate how this decision would be influenced by a number of reasons given to them (Likert scale). Results are presented by weight status.

Results The barrier found most irrelevant is that surgery could be considered cheating across all weight groups. About a fourth of the sample state that not knowing enough about surgery (28.5%), being afraid of surgery (28.3%), and potential negative consequences after surgery (24.5%) are reasons against metabolic surgery that were rated extremely relevant. Having obesity was a significant predictor of endorsement in two variables: feeling like cheating (lower probability for relevance, OR = 0.58, $p = 0.025$) and a lack of knowledge (lower probability for relevance, OR = 0.59, $p = 0.031$).

Conclusions In summary, the public's view of weight loss surgery lacks information about post-surgical consequences. It is important to address these points in the public and in social networks of patients as they may be pre- or antecedent of surgery stigma.

Keywords Metabolic surgery · Bariatric surgery · Attitudes · Barriers · General public

Highlights
- Attitudes towards barriers in WLS were investigated in a representative sample.
- Not knowing enough about and being afraid of surgery were two main concerns.
- Sociodemographics are shown to be associated with certain barriers.
- The barrier found most irrelevant is that surgery could be considered cheating.

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Introduction

Even though prevalence rates of obesity have plateaued in some countries, the number of patients affected by severe obesity is still growing. In Germany, for instance, about 1.4 million people have a BMI over 40 kg/m^2 [1]. These patients are eligible for bariatric or metabolic surgery according to international and German treatment guidelines [2]. Even more patients are eligible for surgery when patients with less severe obesity (BMI > 35 kg/m^2) but comorbid metabolic disease (e.g., T2DM) are included as recommended by guidelines.

While the number of bariatric and metabolic procedures is increasing worldwide [3], it is yet far from being available as a treatment option for all patients eligible. In Germany, for example, about 15.000 operations were performed in 2018, indicating that only a fraction of those eligible actually undergo surgery. In international comparison, 8.8 surgeries per 100.000 inhabitants per year are carried out in Germany, while other countries, such as Belgium have much higher rates [4]. The reasons for or against surgery in obesity are manifold and can be found not only in specifics of the health care system (for an overview, see [5]) but also in attitudes of physicians and the lay public [6, 7]. In Germany, for example, surgery approval rates vary substantially between federal states. These aspects can be summarized as contextual factors [8].

Further reasons lie within the individuals themselves and can either be demographic, such as age or gender, but also aspects such as perceived needs, or health behaviors [8]. In previous systematic reviews of the literature, a lack of knowledge about surgery, fear of surgery, and fear of complications were identified as barriers to receive surgery [8, 9]. A study in a US treatment center found that patients who were successfully assessed as eligible for surgery, but did not have it, stated that problems with insurance coverage (18.1%), financial hardship (21.3%), and the subjective risk appraisal for complications (43.6%) are relevant factors for their attrition [10].

As beliefs of the general public and patients interact, it is also necessary to shed light on the public's attitudes towards bariatric surgery. Social support by those around the patient can be a key point in the treatment of obesity [11]. It can also play a role not only in the decision for or against bariatric surgery, but also in accompanying the patient after surgery. Learning about the attitudes of the general population sheds light on what concerns and attitudes patients are faced with when talking to relatives and friends about considering surgery for themselves. Post-surgical weight loss and social support were found to be positively correlated, especially in terms of attendance of post-surgical support groups [12]. On the contrary, the German public was found to rate bariatric surgery less effective during a 5-year period in the 2010s. Respondents were asked to indicate their personal rating of perceived effectiveness and willingness to recommend the procedure to others. Both indicators worsen from 2010 to 2015 [7]. Additionally, a recent study in the USA concludes that negative attitudes of the general public are one reason for not being offered and not receiving bariatric surgery [13].

This study therefore is aimed at assessing the relevance of previously described barriers to metabolic surgery in a large representative sample in Germany. Sociodemographic predictors of barriers are explored to identify target groups who may need further support in their decision for or against surgery. It extends literature by including a population-based sample and differentiating beliefs of people with and without obesity.

Methods

Ethics

The study was approved by the Ethics Committee of the University of Leipzig (approval number 267-15-24082015).

Sampling Procedure

The sample is a cross-sectional study in a representative sample of the German population (n = 1007). The sample size was predefined to be large enough to provide meaningful group sizes across all weight groups. It was drawn with the help of a large research institute (Usuma) which used random digit dialing to call households and cell phone numbers across Germany. Regional data was provided and was documented on a federal state level. The Kish selection grid was then used to randomly select the person in the household to participate in the survey, using a random number list after assessing the number of people in the household. Usuma had to contact 2034 people to achieve the goal sample size of n = 1000. Of these, 21.6% refused to participate or could not be reached even though the line was open (11.6%). Other reasons included no time for an interview (7.3%) or discontinuation of the interview (2.4%). Characteristics of the sample are described in the "Results" section.

Independent Variables

Participants were asked to provide a range of sociodemographic information (age, gender, highest educational degree). The analysis also included a variable where participants were asked to rate the following statement: Is obesity a problem that has to be solved by the individual or by society?, giving a 5-point Likert scale (1 = completely individual problem to 5 = completely society's problem). BMI was calculated after respondents indicated their height and weight. If a participant was not willing to give information about their weight, the computer-assisted interviewer gave calculated ranges of weight according to the different body mass index (BMI) categories (under- or normal weight,

overweight, or obesity), asking the participants to state which range would apply to them. Only 28 participants refused to give this information and were therefore excluded from further analysis. Participants were also asked to indicate whether they suffered from diabetes mellitus or not.

Dependent Variables—Reasons Against Metabolic Surgery

Items of this self-constructed scale were derived from previous research on barriers and concerns towards metabolic surgery [9, 14]. A standardized procedure was used to translate the English items into German (back and forth translation by several members of the study team [15]). The scale was additionally used in a pretest via telephone ($n = 30$) and in a qualitative interview to ensure adequate translation and comprehension by the participants. The instruction asked participants to imagine that they would have to decide for or against metabolic surgery and then invited to rate how relevant each presented reason was to them. Seven items covered a range of possible concerns from feeling that surgery was cheating to fear of surgery and potential negative consequences after surgery. All items are presented in the "Results" section. Cronbach's alpha of the scale was satisfactory ($\alpha = 0.76$). A one-factor solution was found in factor analysis (eigenvalue > 1).

Statistical Analysis

All analyses were done using Stata 14.2 [16]. Only educational attainment was dichotomized to reflect educational degrees of more or less 12 years in duration. BMI was transferred into three categories (under- or normal weight, BMI < 24.9 kg/m^2; overweight, BMI > 25 and < 29.9 kg/m^2; obesity, BMI ≥ 30 kg/m^2). We also identified surgery candidates by including either patients with a BMI > 40 kg/m^2 or BMI ≥ 35 kg/m^2 and comorbid diabetes mellitus [2]. All other variables were used as metric or ordinal predictors or were naturally dichotomous (e.g., gender). Participants with missing date were excluded from analysis. Descriptive statistics were calculated, using chi^2 test to assess differences across weight categories. Ordinal logit models were used to determine predictors of the dependent variables. We calculated independent ordinal regression models for each item in the scale. The models report predictors and also cutpoints that are typically not interpreted. They represent the estimated cutpoint on the latent variable that is used to differentiate lowest endorsement from the other categories when predictor variables are estimated at zero. As the dependent variable has five categories, four cutpoints for each value are reported (differentiating the value from the other four).

Linear regression was used to analyze predictors for the complete scale. Models are only reported when significant that means that at least one predictor was significantly different from 0. All data were treated as survey data, using an analytic weight provided by the research institute to ensure representativeness of the sample.

Results

In total, $n = 1007$ interviews were conducted. Table 1 shows details of the sample's characteristics and compares it with the German general population. The sample is slightly less educated than the German general public, and people reported a lower prevalence of obesity. About half of the respondents were women and the mean age was 50.97 years. The sample contains $n = 29$ eligible surgery candidates (3% of the sample, comparable with the German public).

Rates of endorsement of reasons against metabolic surgery are listed in Table 2. They show a very heterogeneous picture: Differences across different weight status of participants are only found in two items: being afraid of surgery itself ($p = 0.005$) and potential negative consequences after surgery ($p = 0.018$). The barrier

Table 1 Characteristics of the sample

Variable	Weighted proportion	German population[a]
Gender		
Female	51.4	50.7
Male	48.6	49.3
Age groups[b]		
< 20	3.9	18.4
20–40	26.8	24.6
40–60	35.4	29.1
60–80	28.7	21.7
> 80	5.3	6.2
School[c]		
< 12 years	70.7	66.0
> 12 years	29.3	34.0
Weight category[d]		
< 25 kg/m^2	43.6	40.0
25–29.9 kg/m^2	36.9	36.4
> 30 kg/m^2	19.5	23.6
	Mean (SE)	
Age	50.97 (0.77)	
BMI	26.44 (0.23)	

$N = 978$–1,007. [a] Unless stated otherwise: Statistical Yearbook Germany (https://www.destatis.de/DE/Publikationen/StatistischesJahrbuch/Bevoelkerung.pdf?__blob=publicationFile). [b] Source: https://www.destatis.de/DE/ZahlenFakten/GesellschaftStaat/Bevoelkerung/Bevoelkerungsstand/Tabellen_/lrbev01.html. Population data includes all individuals in Germany, survey data only people 18 and older. [c] Data were derived from persons with an educational degree. [d] Mean weight categories derived from Mensink et al. [1]

Table 2 Reasons against metabolic surgery according to weight status

Reason	Weight status			*p* value[a]	OP[b]	Total
	NW	OW	OB			
It feels like cheating.				0.345		
1 = not at all relevant	38.5	35.6	25.9		68.9	32.3
	45.0	29.2	15.8		11.5	15.6
	47.7	35.1	18.3		9.8	25.2
	51.0	37.5	11.4		8.1	11.2
5 = extremely relevant	41.4	41.3	17.3		1.5	15.7
Mean	2.70	2.68	2.36	0.125	1.62	2.63
Medical prerequirements are too high.				0.966		
1 = not at all relevant	46.2	38.1	15.7		14.0	12.4
	45.3	26.0	18.7		1.7	10.3
	42.4	37.0	20.5		55.4	42.2
	46.7	31.4	22.0		20.9	18.0
5 = extremely relevant	44.7	38.6	16.7		7.9	17.2
Mean	3.17	3.16	3.20	0.961	3.07	3.17
Bureaucracy issues are too complicated.				0.298		
1 = not at all relevant	41.6	45.1	13.3		13.4	19.7
	46.2	26.8	27.1		17.5	15.9
	45.2	34.8	20.0		33.1	28.5
	40.4	41.6	18.1		25.5	20.2
5 = extremely relevant	42.3	40.5	17.2		10.6	15.6
Mean	2.94	2.97	2.97	0.971	3.02	2.98
I am afraid of surgery.				0.005		
1 = not at all relevant	33.2	42.6	23.2		13.7	16.0
	36.0	49.5	14.4		24.6	10.1
	46.9	40.2	12.9		11.4	21.5
	53.7	22.9	23.5		28.5	24.1
5 = extremely relevant	42.5	38.1	19.4		21.8	28.3
Mean	3.51	3.22	3.41	0.071	3.20	3.40
I would be afraid of negative consequences after surgery.				0.018		
1 = not at all relevant	27.3	46.5	26.3		28.2	13.9
	44.5	42.03	13.5		6.4	12.0
	46.4	31.9	21.7		31.5	25.7
	55.0	28.9	16.1		15.7	23.9
5 = extremely relevant	40.2	41.6	18.2		18.3	24.5
Mean	3.45	3.25	3.20	0.146	2.90	3.34
I do not know enough about it.				0.205		
1 = not at all relevant	28.7	46.3	25.1		40.4	13.7
	38.9	34.2	27.0		24.8	8.2
	45.8	39.1	15.2		14.0	27.7
	46.0	34.9	19.1		0.8	21.9
5 = extremely relevant	47.6	36.2	16.3		20.1	28.5
Mean	3.60	3.33	3.23	0.023	2.35	3.44
I would be afraid of the lifestyle changes necessary after surgery.				0.861		
1 = not at all relevant	38.1	39.2	22.7		34.5	16.0
	49.5	31.6	19.0		13.6	13.6
	47.6	36.1	16.3		20.7	27.4
	43.6	37.6	18.8		13.4	24.2
5 = extremely relevant	40.1	39.0	20.9		17.9	18.8
Mean	3.15	3.19	3.13	0.938	2.67	3.17

[a] Chi^2 test, for means from ANOVA. [b] BMI ≥ 40 or BMI ≥ 35 and comorbid T2DM ($n = 29$). *NW* normal weight, *OW* overweight, *OB* obesity, *OP* eligible for operation

found most irrelevant is that surgery could be considered cheating—across all weight groups. About a fourth of the sample state that not knowing enough about surgery (28.5%), being afraid of surgery (28.3%), and potential negative consequences after surgery (24.5%) as extremely relevant reasons against metabolic surgery.

In participants who would be eligible for surgery, results remain mainly the same. The least relevant reason against surgery is that it would be considered cheating (68.2% find this reason completely irrelevant). The most relevant barriers were being afraid of surgery (21.8%), not knowing enough about it (20.1%), and fears about consequences (18.3%) or necessary lifestyle changes (17.9%).

Additionally, data was further analyzed with regard to federal state of Germany. Concluding from Table 3, no clear patterns can be distinguished: In the majority of states, the most important barriers are the same. Smaller federal states, such as Saarland and Bremen, are low in sample size which limits the generalizability to each state. Larger states that are also high in sample size, however, repeat the overall pattern and show similar results.

Table 4 summarizes the results of multivariate ordinal logit models. Only models where at least one predictor was significant are reported. Hence, six models (all items covering reasons for or against surgery, except for the last item "I would be afraid of the lifestyle changes necessary after surgery") were run with each variable as the dependent variable. Having obesity was a significant predictor of endorsement in two variables: feeling like cheating (lower probability for stating this barrier was relevant, OR = 0.58) and a lack of knowledge (lower probability of this barrier was relevant, OR = 0.59). Higher age was associated with endorsement in three models: Medical prerequisites being too high were associated with higher age (OR = 1.01), while fears of surgery or negative consequences after surgery were higher in younger participants (OR = 0.99 and OR = 0.98). Female gender (OR = 1.49) and a lower educational attainment (OR = 0.66) were associated with higher endorsement of barriers with bureaucracy. Ascription of higher responsibility to the society for the treatment of obesity was associated with a higher fear of surgery (OR = 1.02).

In the linear regression model, using the mean score of the scale on barriers as the dependent variable, two predictors were significant. Being female was associated with more concerns ($b = 0.14$, $p = 0.048$) as well as viewing obesity more as a problem of society ($b = 0.01$, $p = 0.014$). Having obesity was not associated to barriers ($b = -0.21$, $p = 0.060$).

Discussion

This is the first study to report barriers to weight loss surgery and their importance in a large representative sample. It summarizes the relevance of individual barriers in beliefs about obesity surgery and finds a lack of knowledge, fears of surgery, and potential consequences after surgery to be considered as most relevant barriers in the German public.

In the hypothetical event of having to decide for or against surgery, people with or without obesity or even those eligible for surgery only show few differences: People with obesity found the aspect of cheating and a lack of knowledge as less relevant than people with normal weight. This finding most likely reflects an overall greater understanding and confrontation of people with obesity with this potential treatment. People in the general public may not be familiar with procedures, unless they or their relatives are affected. In light of the high prevalence of obesity, however, this is of importance: People with obesity are likely to consult with relatives and friends and may then find it difficult to find social support for a procedure when general knowledge is low and fears of bariatric surgery prevail.

Generally, it has been described that people that underwent bariatric surgery experience residual obesity stigma. While people with obesity are often the focus of ridicule and maltreatment [17], the kind of weight loss treatment seems to predict what is left of this stigma after weight loss. They are perceived as less healthy and lazier compared with individuals that were presented to have lost weight due to lifestyle changes [18, 19]. This stigma can be internalized by patients themselves: Up to 50% of bariatric patients do not disclose that they have had surgery, fearing judgment and devaluation. Even more so, many patients agree to statements like "I should have tried more myself" or "I cheated" [14]. There are first findings that this kind of internalization of a public stigma can be associated with lower dietary adherence [20] and physical activity [21]. Addressing the stigma of weight loss surgery in patients as well as their social network is therefore an important task for health care professionals and obesity experts alike.

It also becomes clear that the perceived risks of obesity surgery as well as anticipated negative consequences after surgery are still major barriers to consider surgery. This calls for a sensible and thorough patient-provider interaction regarding the topic: Advising physicians and surgeons need to be aware of these fears and proactively address them during their contact. As much as 50% of eligible patients drop out after initial contact and assessment [10], and the identification of barriers can help to come closer to a model of shared decision-making, in which the patient can openly talk about resentments. Reflecting this finding, a recent study found that eligible candidates explicitly articulate a need for information about risks of complications and consequences for daily life [22].

In Germany, institutional and structural barriers to surgery can be considered high: Patients have to apply for reimbursement to their insurance company and have to undergo several assessments and fulfill prerequisites by documenting lifestyle change attempts. This is also reflected in this study and can be a specific barrier to older and less educated patients. Health literacy as a concept of one's ability to seek and find medical information and help has been found to be lower among patients with obesity [23]. This is another barrier to guideline adhered treatment that patients can encounter.

Table 3 Distribution across Germany, answer "completely agree" to top 3 barriers

Federal state	Weighted proportion	Top 3 barriers
Schleswig-Holstein	3.48	1. Not knowing enough (24.6%)
		2. Medical prerequisites too high (12.6%)
		3. Afraid of surgery (10.4%)
Hamburg	2.18	1. Afraid of surgery (16.2%)
		2. Not knowing enough (14.8%)
		3. Medical prerequisites too high (13.1%)
Lower Saxony	9.57	1. Afraid of surgery (29.7%)
		2. Not knowing enough (25.7%)
		3. Negative consequences after surgery (20.6%)
Bremen	0.82	1. Medical prerequisites too high (32.0%)
		2. Bureaucracy (25.0%)
		3. Feels like cheating (23.6%)
North Rhine-Westphalia	21.62	1. Not knowing enough (36.1%)
		2. Negative consequences after surgery (32.9%)
		3. Afraid of surgery (32.2%)
Hesse	7.47	1. Afraid of surgery (27.9%)
		2. Negative consequences after surgery (25.6%)
		3. Not knowing enough (19.8%)
Rhineland-Palatinate	4.94	1. Not knowing enough (40.5%)
		2. Afraid of surgery (34.2%)
		3. Negative consequences after surgery (23.6%)
Baden-Württemberg	13.06	1. Afraid of surgery (30.9%)
		2. Negative consequences after surgery (27.0%)
		3. Feels like cheating (24.1%)
Bavaria	15.57	1. Afraid of surgery (37.4%)
		2. Negative consequences after surgery (31.3%)
		3. Not knowing enough (29.0%)
Saarland	1.24	1. Negative consequences after surgery (6.3%)
		2. Feels like cheating (5.4%)
		3. Medical prerequisites too high (5.1%)
Berlin	4.30	1. Afraid of necessary lifestyle changes (29.7%)
		2. Afraid of surgery (29.6%)
		3. Negative consequences after surgery (23.6%)
Brandenburg	3.08	1. Afraid of surgery (30.1%)
		2. Not knowing enough (29.0%)
		3. Negative consequences after surgery (13.0%)
Mecklenburg-Western Pomerania	2.01	1. Negative consequences after surgery (24.0%)
		2. Not knowing enough (15.0%)
		3. Afraid of necessary lifestyle changes (11.4%)
Saxony	5.09	1. Not knowing enough (24.5%)
		2. Negative consequences after surgery (11.9%)
		3. Afraid of surgery (10.1%)
Saxony-Anhalt	2.84	1. Bureaucracy (39.9%)
		2. Not knowing enough (39.4%)
		3. Afraid of surgery (35.7%)
Thuringia	2.72	1. Medical prerequisites too high (35.8%)
		2. Not knowing enough (26.4%)
		3. Feels like cheating (25.7%)

Table 4 Ordinal logit models for dependent variables

	OR[a]	SE[b]	T[c]	$p > t$[d]	95% Conf. interval[e]	
Model 1: It feels like cheating.						
Weight category						
25–29.9 kg/m^2	0.964	0.167	− 0.21	0.831	0.687	1.353
> 30 g/m^2	0.584	0.139	− 2.25	0.025	0.366	0.933
Age	1.001	0.004	0.25	0.805	0.992	1.010
Gender (ref = male)	1.086	0.171	0.52	0.602	0.797	1.480
Education (ref = < 12 years)	0.897	0.134	− 0.72	0.470	0.669	1.204
Responsibility for a solution[f]	1.012	0.010	1.21	0.226	0.993	1.031
/Cut1	− 0.671	0.379	− 1.77	0.077	− 1.415	0.073
/Cut2	− 0.007	0.376	− 0.02	0.985	− 0.745	0.731
/Cut3	1.087	0.379	2.87	0.004	0.343	1.832
/Cut4	1.782	0.372	4.80	0.000	1.053	2.512
Model 2: Medical prerequirements are too high.						
Weight category						
25–29.9 kg/m^2	0.883	0.168	− 0.65	0.513	0.608	1.282
> 30 g/m^2	1.007	0.219	0.03	0.975	0.657	1.542
Age	1.013	0.005	2.71	0.007	1.00	1.023
Gender (ref = male)	0.936	0.148	− 0.42	0.675	0.685	1.277
Education (ref = < 12 years)	1.353	0.209	1.95	0.051	0.999	1.834
Responsibility for a solution	1.011	0.001	1.06	0.288	0.991	1.030
/Cut1	− 1.367	0.332	− 4.12	0.000	− 2.019	− 0.715
/Cut2	− 0.625	0.330	− 1.90	0.058	− 1.272	0.0219
/Cut3	1.235	0.336	3.67	0.000	0.5745	1.895
/Cut4	2.218	0.327	6.79	0.000	1.577	2.860
Model 3: Bureaucracy issues are too complicated.						
Weight category						
25–29.9 kg/m^2	1.086	0.208	0.43	0.668	0.745	1.582
> 30 g/m^2	0.978	0.202	− 0.11	0.914	0.652	1.466
Age	1.004	0.004	0.86	0.389	0.995	1.012
Gender (ref = male)	1.487	0.240	2.46	0.014	1.044	2.040
Education (ref = < 12 years)	0.660	0.097	− 2.82	0.005	0.494	0.881
Responsibility for a solution	1.010	0.017	0.60	0.552	0.977	1.044
/Cut1	− 0.747	0.355	− 2.10	0.036	− 1.444	− 0.050
/Cut2	0.079	0.351	0.22	0.822	− 0.610	0.768
/Cut3	1.285	0.353	3.64	0.000	0.592	1.978
/Cut4	2.414	0.349	6.92	0.000	1.729	3.099
Model 4: I am afraid of surgery.						
Weight category						
25–29.9 kg/m^2	0.869	0.155	− 0.79	0.430	0.613	1.233
> 30 g/m^2	1.000	0.228	0.00	0.999	0.639	1.565
Age	.990	0.004	− 2.16	0.031	0.982	0.999
Gender (ref = male)	1.566	0.247	2.84	0.005	1.148	2.135
Education (ref = < 12 years)	.958	0.132	− 0.31	0.758	0.731	1.256
Responsibility for a solution	1.017	0.007	2.52	0.012	1.004	1.031
/Cut1	− 1.491	0.325	− 4.59	0.000	− 2.129	− 0.853
/Cut2	− 0.864	0.347	− 2.49	0.013	− 1.545	− 0.183
/Cut3	0.110	0.355	0.31	0.757	− 0.587	0.807
/Cut4	1.1673	0.363	3.21	0.001	0.454	1.880
Model 5: I would be afraid of negative consequences after surgery.						

Table 4 (continued)

	OR[a]	SE[b]	T^c	$p > t^d$	95% Conf. interval[e]	
Weight category						
25–29.9 kg/m^2	1.010	0.183	0.05	0.958	0.707	1.442
> 30 g/m^2	0.820	0.187	− 0.87	0.386	0.524	1.285
Age	0.983	0.005	− 3.75	0.000	0.974	0.992
Gender (ref = male)	1.353	0.214	1.91	0.056	0.992	1.846
Education (ref = < 12 years)	0.921	0.130	− 0.58	0.559	0.699	1.214
Responsibility for a solution	1.010	0.007	1.33	0.183	0.995	1.025
/Cut1	− 2.288	0.362	− 6.32	0.000	− 2.999	− 1.577
/Cut2	− 1.491	0.367	− 4.06	0.000	− 2.212	− 0.771
/Cut3	− 0.350	0.372	− 0.94	0.347	− 1.079	0.380
/Cut4	0.735	0.372	1.98	0.048	0.005	1.466
Model 6: I do not know enough about it.						
Weight category						
25–29.9 kg/m^2	0.729	0.121	− 1.91	0.057	0.526	1.010
> 30 g/m^2	0.590	0.144	− 2.16	0.031	0.366	0.953
Age	1.003	0.004	0.75	0.455	0.995	1.012
Gender (ref = male)	1.100	0.178	0.59	0.556	0.801	1.510
Education (ref = < 12 years)	0.823	0.1155106	− 1.39	0.165	0.624	1.083
Responsibility for a solution	1.011	0.0078421	1.36	0.175	0.995	1.026
/Cut1	− 1.792	0.3205498	− 5.59	0.000	− 2.421	− 1.163
/Cut2	− 1.213	0.3301477	− 3.68	0.000	− 1.861	− 0.565
/Cut3	0.056	0.33563	0.17	0.867	− 0.602	0.715
/Cut4	1.003	0.341133	2.94	0.003	0.334	1.673

[a] Proportional odds ratios for ordered logit model. [b] Standard error of individual regression coefficient. [c,d] Test statistics and p value. [e] 95% CI for OR. [f] 1 = completely individual problem, 5 = completely society problem

Cut1, estimated cutpoints on latent variable used to differentiate low endorsement (not relevant at all) from all other categories of the dependent variable when values of the predictor variables are evaluated at zero. All other cutpoints represent each value of the ordinal dependent variable

The study also finds gender differences for some barriers to obesity surgery: Women reported a higher fear of surgery than men. Counseling according to gender differences and thereby considering variables that may influence a greater need for information are therefore important.

Strengths and Limitations

This study has several strengths and limitations. Although the sample is large and representative, the number of people with severe obesity is too low to conduct meaningful subgroup analyses. Further studies in patients that are eligible for surgery but do not have it are needed to further explore mechanisms behind attrition. The hypothetical framing of the question for the dependent variable is a novel and innovative approach; however, it may be far from actual behavior or explicit attitudes. The use of a 5-point Likert scale leaves room for speculation as the middle category cannot be easily interpreted. Longitudinal studies to assess to what extent these attitudes actually translate to behavior would be of value.

Conclusion

In summary, we find that the public's view of weight loss surgery is still limited in terms of knowledge, and it lacks information about post-surgical consequences. It is important to address these points in the public and in social networks of patients as they may be pre- or antecedent of surgery stigma which affects post-surgical patients negatively.

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Compliance with Ethical Standards

The study was approved by the Ethics Committee of the University of Leipzig (approval number 267-15-24082015).

Conflict of Interest CLS has received honoraria from Ethicon (Johnson & Johnson) for talks and consultation. All other authors declare that they have no conflict of interest.

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