Obesity Facts

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Psychological Benefits of a Preoperative Educational Bridging Program for Bariatric Surgery: Does Face-to-Face versus Videoconference-Based Delivery Make a Difference?

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Keywords
Bariatric surgery · Benefits · Bridging · Mental health · Online delivery · Preoperative preparation · Videoconferencing

Abstract

Introduction: Short educational programs prior to metabolic and bariatric surgery (MBS) provide information to prepare patients adequately for surgery and subsequent changes. Our knowledge of the beneficial effects of these programs on stabilizing and improving mental health of patients with obesity awaiting surgery is incomplete. The objective of this study was to assess the effects of a group-based educational program before MBS on three key factors: (i) patients' mental health, (ii) the program's perceived helpfulness from the patients' perspective, and (iii) the effectiveness of delivering the program online via videoconferencing. ***Methods:*** Validated questionnaires for anxiety, depression, stress, and quality of life before and after the program were assessed. Additionally, participants' perspectives of benefits were assessed. Two subgroups, one participating in face-to-face classes, the other participating online via videoconferencing, were compared. ***Results:*** Three hundred five patients with obesity waiting for MBS participated in the program. The dropout rate was 3%. On mean average, symptoms of anxiety (−1.1 units [SD 4.6], $p < 0.001$), depression (−0.9 units [SD 4.6], $p < 0.001$), and stress (−4.6 units [SD 15.6], $p < 0.001$) improved, while physical quality of life (+1.7 units [SD 9.7], $p = 0.016$) and body weight (−0.3 kg [SD 8.7], $p = 0.57$) remained stable. Patients perceived the program as very beneficial. The results were similar between delivery methods (face-to-face vs. videoconferencing). ***Conclusion:*** The educational program proved to be effective in bridging the gap in preoperative preparation

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while also stabilizing participants' mental health. In addition, participants perceived the program as supportive. Online participation via video conferencing can be offered as an equivalent option to face-to-face classes.

Introduction

Obesity and its associated diseases such as type 2 diabetes, hypertension, and cardiovascular diseases are major public health challenges [1–3]. Treatment strategies range from conservative approaches focusing on lifestyle changes to pharmacotherapy and metabolic and bariatric surgery (MBS) [4, 5]. MBS is particularly important in the treatment of severe obesity, as it has been shown to result in significant long-term weight loss and improvement or resolution of weight-related diseases [5, 6]. Because surgery has proven to be safe and effective in the long term, recent recommendations suggest considering MBS for individuals with a BMI of 35 kg/m^2 or higher, regardless of weight-related diseases, and even for those with class I obesity [7].

However, suboptimal weight loss or weight regain after surgery affects up to 2 out of 10 patients [8–10]. The main cause of unsuccessful weight loss appears to be unmodified behavior, mainly related to maladaptive eating patterns and sedentary lifestyle [10]. Mental illness, particularly anxiety disorders and depression, also play a significant role [11, 12] and should be addressed during the preoperative preparation [13–16]. Current preparation is provided through one-time information sessions or educational materials after conservative weight loss attempts have failed [7, 17]. Various guidelines remain vague about preoperative intervention and focus on assessing the patient's eligibility for surgery by evaluating surgical risks instead of giving explicit rules [4, 17–19]. The reason is that it is still unclear under which circumstances participation in a preoperative lifestyle intervention is beneficial. Preoperative lifestyle programs did not result in significant greater weight loss 1 year after surgery and the effect of these programs on participants' well-being and mental health remains unclear [20–22]. Another preparation method is cognitive behavioral therapy (CBT) that has short-term positive effects on psychological well-being, but these effects were not detectable in the long-term after surgery [23–25]. Furthermore, CBT is a complex intervention, and its implementation takes a long time [26]. Moreover, it is not necessary for all patients undergoing MBS [24, 25].

Given these challenges, cost-effective low-barrier interventions, such as short educational programs delivered in group settings providing information about MBS, the time after and a healthy lifestyle appear more suitable and pragmatic to prepare patients adequately for surgery and subsequent changes. Apart from their educational function, it would be interesting to know whether they have an additional positive effect on the psyche of the participants and can stabilize them until surgery. In addition, the current evidence on using digital tools instead of face-to-face meetings for preoperative interventions is limited [27, 28]. Therefore, the aim of this explorative study was to investigate whether a group-based educational preoperative program for MBS (i) can stabilize and improve patient's mental health along with (ii) the program being perceived as supportive preoperative preparation method and (iii) whether online delivery via videoconferencing is equal to face-to-face intervention.

Materials and Methods

Data were analyzed from May 2014 (start of the program) to August 2022. A more detailed description of the methods than given here can be found in online supplementary material 1 (for all online suppl. material, see https://doi.org/10.1159/000539797).

Treatment and Participants

The Viadukt II program is an educational program offered at the University Hospital Tuebingen to adults with obesity, primarily those with class 3 obesity. These patients have (i) undergone conservative therapies according to the guidelines but still need to exhaust conservative methods before qualifying for MBS as the next step in guideline-based therapy or (ii) have a primary indication for surgery, such as severe weight-related diseases that preclude conservative treatment. Further information about participants is presented in online supplementary material 1.

The program aims to bridge the time to MBS by (i) educating and preparing the patients for surgery and the period thereafter as well as to (ii) physically and psychologically stabilize them and motivate for healthy lifestyle changes. The 2-week protein diet prior to MBS to minimize the surgical risk is done separately afterward. The program lasts 3 months and consists of four theoretical sessions and three exercise sessions see Table 1 [29]. Originally, the program was conducted as face-to-face group meetings. Due to the COVID-19 pandemic, the in-person version was transformed into an online intervention via video conferencing platform in spring 2020. The content of the program remained identical. The face-to-face sessions were attended by 12 participants and each session lasted 90 min, while the

Table 1. Overview of educational sessions

1. General eating behavior
Meal rhythm and composition
Dietary recommendations
Portion size
Eating culture
Operation methods and effect on changed food intake
2. Stress and nutrition
Basics on eating motives and stress
Eating behavior analysis
Emotional eating
Coping strategies
Mindfulness and self-care
3. Theory session on exercise
Importance of physical activity
Positive effects of physical activity
Recommendations on duration and intensity
Ways to increase movement in everyday life
Sport: endurance and strength training
Tips for implementation
4. Eating behavior around and after bariatric surgery
Protein phase
Postoperative diet structure
Postoperative complications

videoconference-based sessions had no more than 10 participants and lasted 1 h each.

In case of 100% participation, program costs were covered by health insurance. Less than 100% attendance was classified as dropout. Since the program consisted of only a few sessions, missed sessions could easily be rescheduled.

Outcomes

Baseline data were collected at the start of the intervention (T0) and included socioeconomic characteristics, body weight, body height, and questionnaires assessing anxiety (GAD-7), depression (PHQ-9), perceived stress (PSQ20), and quality of life (SF-12). After the program (T1), but before surgery, the same questionnaires were completed, and weight was measured again. The psychometric questionnaires are described in detail in the online supplementary material 1. Minimal clinically important differences (MCIDs) for the questionnaires were reported when available, and the percentages of participants achieving MCIDs (improvement or worsening) were calculated. The MCID is defined as the smallest change in a clinical outcome measure that is considered meaningful and relevant to patients [30, 31]. In addition, participants completed an evaluation questionnaire at the end of the intervention, also provided in online supplementary material 1.

Body weight was measured in kilograms and height was measured in centimeters by the course instructor, details see online supplementary material 1. In the videoconference subgroup, body weight and height were self-reported. Previous literature shows that self-assessment of body weight is correct even in individuals with obesity [32, 33].

Statistical Analysis

Data are reported as mean (standard deviation, SD), confidence interval (CI) and median with 25th and 75th percentiles (interquartile range). Frequencies are expressed as percentages (%). Statistical tests were performed state to the art. Statistical details, including missing data imputation are provided in supplementary material 1. p values <0.001 were considered statistically significant, while p values between 0.001 and 0.05 were considered as trend. In short, the following three analyses were performed:

1. Testing for differences in psychometrics and body weight between the beginning (T0) and end (T1) of the intervention for the entire study group
2. A subgroup analysis testing for interactions and time effects between the two course formats "face-to-face" versus "videoconference" including a matched subgroup analysis
3. Analyses of the participants' personal benefits

Results

Data were analyzed for the intention-to-treat, per-protocol (PP), and matched population. Since no significant differences were observed between these approaches, the intention-to-treat analysis is presented in this manuscript. Tables for the total group for PP analysis can be found in online supplementary materials 2 and 3 and for subgroups (PP and matched analyses) in online supplementary materials 4 and 5.

Baseline Characteristics

$N = 360$ individuals participated in the preoperative educational program between May 2014 and August 2022. Among them, $n = 55$ did not complete any preprogram questionnaires and were excluded from the analysis. They did not differ significantly from the cohort who completed the questionnaires in terms of age, sex, weight, and BMI both at T0 and T1. Therefore, the total group consisted of $n = 305$ participants in the following analyses. Most participants had class III obesity, with an average BMI of 48.1 kg/m^2 (SD 5.9) and weight of 135.2 kg (SD 20.4) and a mean age of 41.1 years (SD 12.0). The sample predominantly comprised female subjects (76%). A detailed overview of the baseline characteristics for the total group is presented in Table 2.

Non-Completers

The dropout rate was 2.8% ($n = 10$ participants). There were no significant differences between completers and dropouts at baseline.

Subgroups

Among the participants, $n = 222$ patients attended the program face-to-face, and 97.2% completed the intervention (face-to-face subgroup). $N = 66$ patients received the intervention via videoconference due to the COVID-19

Table 2. Baseline characteristics total group and subgroups (ITT)

	Total group (N = 305)	Face-to-face group (N = 222)	Videoconference group (N = 66)	Statistics for face-to-face versus videoconference, Mann-Whitney U test/ χ^2/FFH
	mean (SD) [95% CI]	mean (SD) [95% CI]	mean (SD) [95% CI]	
Age, years	41.1 (12.0) [39.8–42.5]	41.1 (11.7) [39.5–42.6]	40.6 (12.1) [37.6–43.5]	U = 7,133.000, p = 0.745
Weight, kg	135.2 (20.4) [132.9–137.5]	134.7 (20.4) [132.0–137.4]	137.8 (20.4) [132.8–142.8]	U = 8,127.000, p = 0.177
Weight range: min to max, kg	92.0–200.0	99.0–200.0	92.0–192.0	
BMI, kg/m^2	48.1 (5.9) [47.4–48.8]	47.8 (5.3) [47.1–48.5]	48.8 (5.6) [47.4–50.2]	U = 8,324.500, p = 0.093
BMI range: min to max, kg/m^2	35.4–92.8	37.8–68.3	35.4–60.9	
	N (%)	N (%)	N (%)	
Obesity class, n (%)				
Obesity I°	0 (0)	0 (0)	0 (0)	
Obesity II°	15 (4.9)	9 (4.1)	4 (6.1)	
Obesity III°	290 (95.1)	213 (95.9)	62 (93.9)	
Sex, female	233 (76.4)	170 (76.6)	50 (75.8)	χ^2 (1) = 0.019, p = 0.891
Nationality				
German/foreigner	240/60 (78.7/19.7)	175/44 (78.8/19.8)	51/14 (77.3/21.2)	χ^2 (1) = 0.065, p = 0.799
Smoker	93 (30.5)	74 (33.3)	17 (25.8)	χ^2 (1) = 1.351, p = 0.245
Personal status				
Single	93 (30.5)	62 (27.9)	26 (39.4)	$\chi^{2\ FFH}$ = 4.729, p = 0.339
Married	164 (53.8)	124 (55.9)	31 (47)	
Separated	3 (1)	2 (0.9)	1 (1.5)	
Divorced	30 (9.8)	25 (11.3)	5 (7.6)	
Widowed	8 (2.6)	3 (1.4)	2 (3)	
Others	6 (2)	5 (2.3)	1 (1.5)	
Living situation				
Alone	43 (0.3)	31 (14)	12 (18.2)	$\chi^{2\ FFH}$ = 1.605, p = 0.965
With partner	58 (44.3)	42 (18.9)	12 (18.2)	
Alone with Child(ren)	17 (1.3)	12 (5.4)	4 (6.1)	
Partner and Child(ren)	138 (33.1)	101 (45.5)	29 (43.9)	
With parents	37 (7.5)	27 (12.2)	6 (9.1)	
Others	11 (6.6)	9 (4.1)	2 (3)	
Level of education				
Secondary school	135 (47.7)	109 (53.4)	19 (30.2)	$\chi^{2\ FFH}$ = 12.381, p = 0.011
Polytechnic	4 (1.4)	3 (1.5)	1 (1.6)	
Technical. school	101 (35.7)	65 (31.9)	29 (46)	
High school	23 (8.1)	13 (6.4)	9 (14.3)	
University	20 (7.1)	14 (6.9)	5 (7.9)	
Occupation status				
Employed	107 (35.1)	23 (34.8)	23 (34.8)	χ^2 (1) = 0.016, p = 0.900
Unemployed	193 (63.3)	42 (63.6)	42 (63.6)	

Table 2 (continued)

Questionnaires	mean (SD) [95% CI]	median [IQR]	mean (SD) [95% CI]	median [IQR]	mean (SD) [95% CI]	median [IQR]	
Anxiety (GAD-7)	7.9 (4.8) [7.3–8.4]	7.0 [4.0–11.0]	7.7 (4.9) [7.0–8.3]	7.0 [4.0–11.0]	8.2 (4.7) [7.0–9.3]	7.0 [4.0–11.3]	U = 7,539.500, p = 0.440
Depression (PHQ-9)	9.4 (5.3) [8.8–10.1]	9.0 [5.0–13.0]	9.3 (5.3) [8.5–10.1]	9.0 [5.0–13.0]	9.5 (5.4) [8.2–10.8]	8.5 [5.3–13.0]	U = 5,597.000, p = 0.951
Stress experience (PSQ20)							
Overall score	51.2 (18.5) [49.1–53.3]	53.3 [37.9–65.0]	50.5 (18.4) [48.0–53.0]	53.3 [37.1–63.3]	53.1 (19.0) [48.4–57.8]	55.0 [38.3–68.3]	U = 7,552.000, p = 0.354
Worries	50.6 (25.2) [47.7–53.5]	53.3 [33.3–66.7]	49.9 (25.5) [46.5–53.3]	53.3 [33.3–66.7]	52.5 (24.9) [46.4–58.7]	60.0 [33.3–73.3]	U = 7,504.500, p = 0.397
Tension	54.2 (22.6) [51.6–56.8]	60.0 [40.0–73.3]	52.8 (22.7) [49.7–55.8]	53.3 [33.3–66.7]	57.7 (21.9) [52.3–63.2]	60.0 [36.7–73.3]	U = 7,812.000, p = 0.166
Joy	45.6 (21.4) [43.3–48.2]	46.7 [31.7–60.0]	46.1 (20.9) [43.3–48.9]	46.7 [33.3–60.0]	44.4 (23.6) [38.6–50.3]	46.7 [26.7–63.3]	U = 6,939.000, p = 0.887
Demands	45.6 (20.6) [43.3–48.0]	43.3 [33.3–60.0]	45.4 (20.4) [42.6–48.1]	43.3 [33.3–60.0]	46.4 (21.4) [41.2–51.7]	40.0 [33.3–60.0]	U = 7,127.500, p = 0.851
Quality of life (SF-12)							
Mental component	42.7 (12.6) [41.3–44.1]	42.6 [32.6–54.3]	43.6 (12.5) [41.9–45.2]	43.3 [33.5–54.7]	40.2 (12.8) [37.0–43.3]	38.0 [29.4–51.7]	U = 6,060.000, p = 0.050
Physical component	28.6 (10.0) [27.5–29.8]	27.3 [21.6–34.9]	28.8 (10.4) [27.4–30.1]	27.8 [21.4–35.5]	28.0 (9.3) [25.7–30.3]	26.7 [21.1–34.9]	U = 6,976.000, p = 0.685

pandemic (videoconference subgroup). N = 17 participants attending both formats during the change in delivery method were excluded from the subgroup analysis to clearly distinguish between both course formats. Apart from the trend for the face-to-face subgroup to have a lower level of education ($\chi^{2\ FFH} = 12.381$, $p = 0.011$), there were no significant differences between the two subgroups in terms of baseline characteristics and questionnaires, a detailed overview is presented in Table 2.

To address possible differences resulting from unequal sample sizes between subgroups, additional analyses were conducted after matching for sex, age, and initial BMI. The baseline characterization of the matched cohorts, namely face-to-face$_{Matched}$ and videoconference$_{Matched}$, is presented in Table 3. There were no significant differences between these subgroups.

Effectiveness of the Intervention

i) Educational Bridging Improves Symptoms of Depression, Anxiety, and Perceived Stress

In the total group, anxiety symptoms significantly improved during the intervention, with a mean reduction of 1.1 units (SD 4.6, $z = -3.914$, $p < 0.001$). Similarly, depression symptoms significantly improved, with a mean reduction of 0.9 units (SD 4.6, $z = -3.771$, $p < 0.001$), see Table 4 and Figure 1. The entire group reduced their overall stress between T0 and T1 by 4.6 (SD 15.6) points ($z = -4.976$, $p < 0.001$). In particular, the subscale "worries" showed an average improvement of −7.9 points (SD 22.7, $z = -5.761$, $p < 0.001$). A mean reduction of 5 points was achieved for the subscale "tension" ($z = -4.237$, $p < 0.001$) and for the subscale "demands" ($z = -4.944$, $p < 0.001$). There were no significant changes on the "joy" subscale.

Regarding quality of life, there was no significant change in the physical component between T0 and T1. In line, there were almost no changes in weight (−0.3 kg, SD 8.7, $z = -0.561$, $p = 0.575$) and BMI (−0.1 units, SD 3.1, $z = -0.277$, $p = 0.782$) during the intervention. However, there was a trend toward improvement in the mental component of quality of life, with a mean increase of 2.3 points (SD 10.8, $z = 3.022$, $p = 0.003$). Figure 2 shows the MCIDs for anxiety, depression, physical, and mental quality of life.

ii) Participants Benefit Personally from the Program

N = 261 (85.6%) participants completed the evaluation questionnaire after the program. The overall level of satisfaction was very high across the various evaluation categories. Participants rated the importance and usefulness of the sessions very high, felt well informed and prepared for MBS. On a Likert scale ranging from 1

Table 3. Baseline characterization of the age-, sex-, and BMI-matched total sample

	Face-to-face $group_{matched}$, $n = 64$	Videoconference $group_{matched}$, $n = 64$	Statistics face-to-face versus videoconference, Mann-Whitney U/χ^2/FFH test
	mean (SD) [95% CI]	mean (SD) [95% CI]	
Age, years	40.3 (12.1) [37.3–43.3]	40.5 (12.1) [37.4–43.5]	U = 2,062.500, $p = 0.935$
Weight, kg	137.6 (20.0) [132.6–142.6]	137.7 (20.3) [132.6–142.8]	U = 2,106.500, $p = 0.780$
Weight range: min to max, kg	108.0–186.0	92.0–192.0	
BMI, kg/m^2	48.7 (5.2) [47.3–50.0]	48.8 (5.6) [47.4–50.2]	U = 2,134.000, $p = 0.682$
BMI range: min to max, kg/m^2	39.3–62.4	35.4–60.9	
	N (%)	*N* (%)	
Obesity class, *n* (%)			
Obesity I	0 (0)	0 (0.0)	χ^2 (1) = 0.000, $p = 1.000$
Obesity II	1 (1.6)	6 (9.4)	
Obesity III	63 (98.4)	58 (90.6)	
Sex, female	49 (76.6)	49 (76.6)	
Nationality			
German/foreigner	51/12 (79.9/18.8)	49/14 (76.6/21.9)	χ^2 (1) = 0.194, $p = 0.660$
Smoker	24 (37.5)	17 (26.6)	χ^2 (1) = 1.758, $p = 0.185$
Personal status			
Single	21 (32.8)	25 (39.1)	$\chi^{2\ FFH} = 1.824$, $p = 0.931$
Married	33 (51.6)	30 (46.9)	
Separated	1 (1.6)	1 (1.6)	
Divorced	7 (10.9)	5 (7.8)	
Widowed	2 (3.1)	2 (3.1)	
Others	0 (0)	1 (1.6)	
Living situation			
Alone	10 (15.6)	12 (18.8)	$\chi^{2\ FFH} = 2.187$, $p = 0.914$
With partner	10 (15.6)	11 (17.2)	
Alone with Child(ren)	3 (4.7)	4 (6.3)	
Partner and Child(ren)	27 (42.2)	28 (43.8)	
With parents	11 (17.2)	6 (9.4)	
Others	3 (4.7)	2 (3.2)	
Level of education			
Secondary school	32 (51.6)	19 (31.1)	
Polytechnic	1 (1.6)	1 (1.6)	$\chi^{2\ FFH} = 5.859$, $p = 0.272$
Technical school	20 (32.3)	29 (47.5)	
High school	5 (8.1)	8 (13.1)	
University	4 (6.5)	4 (6.6)	
Occupation status			
Employed	20 (31.3)	22 (34.4)	χ^2 (1) = 0.193, $p = 0.660$
Unemployed	44 (68.8)	41 (64.1)	

Table 3 (continued)

Questionnaires	mean (SD) [95% CI]	median [IQR]	mean (SD) [95% CI]	median [IQR]	Statistics
Anxiety (GAD-7)	7.7 (4.6) [6.6–8.9]	7.0 [4.3–10.8]	8.2 (4.8) [7.0–9.4]	7.0 [4.0–11.8]	U = 2,142.500, p = 0.651
Depression (PHQ-9)	9.5 (4.4) [8.3–10.6]	10.0 [7.0–12.0]	9.6 (5.4) [8.2–11.0]	9.0 [5.0–13.0]	U = 1,641.00, p = 0.726
Stress (PSQ20)					
Overall score	50.1 (18.7) [45.4–54.8]	51.7 [40.0–61.3]	53.5 (18.8) [48.8–58.2]	55.0 [40.0–68.3]	U = 2,269.000, p = 0.292
Worries	52.2 (26.2) [45.6–58.7]	53.3 [33.3–73.3]	53.1 (24.5) [47.0–59.3]	60.0 [33.3–73.3]	U = 2,112.000, p = 0.759
Tension	52.9 (21.1) [47.7–58.2]	53.3 [40.0–66.7]	58.2 (21.7) [52.8–63.7]	60.0 [40.0–73.3]	U = 2326.000, p = 0.183
Joy	45.8 (21.6) [40.4–51.2]	40.0 [33.3–58.3]	44.2 (23.7) [38.3–50.1]	43.3 [26.7–65.0]	U = 2,045.500, p = 0.990
Demands	41.1 (21.0) [35.9–46.4]	36.7 [26.7–58.3]	46.7 (21.4) [41.3–52.0]	43.3 [33.3–60.0]	U = 2,348.000, p = 0.150
Quality of life (SF-12)					
Mental component	43.0 (12.4) [39.9–46.1]	42.4 [32.6–54.2]	40.3 (12.8) [37.1–43.5]	38.5 [29.3–51.9]	U = 1,782.000, p = 0.205
Physical component	27.7 (10.3) [25.2–30.3]	27.9 [19.6–34.3]	28.2 (9.3) [25.9–30.5]	26.8 [21.5–35.0]	U = 2,124.500, p = 0.715

(strongly disagree) to 5 (strongly agree), no mean value in any of the queried areas fell below 4.0 points. 96% of participants would recommend the program to friends and family. The results are shown in Figure 3 and in the form of a table in the online supplementary material 6. An additional analysis focused on participants with worsening MCIDs. These subgroups also reported high levels of satisfaction with the program, with similar scores to participants who showed improvement or had stable MCIDs. Detailed information on these analyses can be found in the online supplementary material 7.

iii) Face-To-Face and Videoconference-Based Delivered Bridging Achieves Similar Effectiveness

In line with the results of the total group, both the face-to-face and videoconference subgroups showed improvements over time in anxiety, mental quality of life and for perceived stress on the overall stress scale and on the three subscales "worries," "tension," and "demands." Depressive symptoms and physical quality of life remained unchanged from T0 to T1. There were no interaction effects between the two subgroups indicating that the mode of delivery (face-to-face vs. videoconference) did not significantly influence outcomes. Table 5 and Fig. 4 provide a summary of the results for both subgroups. In addition, there were no statistically significant differences between the MCIDs achieved by the two subgroups, supporting the similar effectiveness of the two delivery modes.

Discussion

In this study, a group-based education program before MBS was evaluated for its (i) impact on the participants' mental health; (ii) beneficial effects from the patients' perspective; and (iii) feasibility and efficacy delivered online via videoconferencing versus face-to-face. The results regarding MCIDs were encouraging. Most participants (84% for anxiety, 88% for depression, and 75% for mental quality of life) either maintained or improved their symptoms. This is noteworthy as participants initially exhibited higher levels of psychological distress, consistent with previous research indicating a higher prevalence of mental illness among individuals with severe obesity compared to those with normal weight [34, 35]. Poor mental health has been identified as a predictor of unsuccessful weight loss after surgery [13, 15, 16].

Table 4. Changes of outcomes for the total group (ITT)

	Total group	Statistics for T0 vs. T1
	(*n* = 305)	Wilcoxon signed-rank test
Anxiety [GAD-7]		
$Mean_{Post}$ (SD) [95% CI]	6.7 (4.2) [6.3–7.3]	$z = -3.914$, $p < 0.001$, $r = 0.227$
ΔMean between T0 and T1 (SD)	−1.1 (4.6)	
$Median_{Post}$ [IQR]	7.0 [4.0–9.0]	
MCID improved, *n* (%)	75 (24.6)	
MCID did not change, *n* (%)	180 (59.0)	
MCID worsened, *n* (%)	43 (14.1)	
Depression [PHQ-9]		
$Mean_{Post}$ (SD) [95% CI]	8.6 (5.0) [7.9–9.1]	$z = -3.771$, $p < 0.001$, $r = 0.236$
ΔMean between T0 and T1 (SD)	−0.9 (4.6)	
$Median_{Post}$ [IQR]	8.0 [5.0–12.0]	
MCID improved, *n* (%)	67 (26.3)	
MCID did not change, *n* (%)	157 (61.6)	
MCID worsened, *n* (%)	31 (12.2)	
Perceived Stress Questionnaire		
a) Overall score		
$Mean_{Post}$ (SD) [95% CI]	46.5 (17.0) [44.6–48.5]	$z = -4.976$, $p < 0.001$, $r = 0.288$
ΔMean between T0 and T1 (SD)	−4.6 (15.6)	
$Median_{Post}$ [IQR]	46.7 [36.7–58.3]	
b) Worries		
$Mean_{Post}$ (SD) [95% CI]	42.6 (23.4) [40.0–45.4]	$z = -5.761$, $p < 0.001$, $r = 0.334$
ΔMean between T0 and T1 (SD)	−7.9 (22.7)	
$Median_{Post}$ [IQR]	40.0 [26.7–60.0]	
c) Tension		
$Mean_{Post}$ (SD) [95% CI]	49.2 (19.6) [47.1–51.6]	$z = -4.237$, $p < 0.001$, $r = 0.245$
ΔMean between T0 and T1 (SD)	−4.9 (20.1)	
$Median_{Post}$ [IQR]	46.7 [40.0–60.0]	
d) Joy		
$Mean_{Post}$ (SD) [95% CI]	46.4 (19.2) [44.1–48.5]	$z = 0.473$, $p = 0.636$, $r = 0.027$
ΔMean between T0 and T1 (SD)	+0.5 (19.8)	
$Median_{Post}$ [IQR]	46.7 [33.3–60.0]	
e) Demands		
$Mean_{Post}$ (SD) [95% CI]	40.6 (18.0) [38.4–42.6]	$z = -4.944$, $p < 0.001$, $r = 0.286$
ΔMean between T0 and T1 (SD)	−5.1 (17.7)	
$Median_{Post}$ [IQR]	40 [26.7–53.3]	
Quality of Life [SF-12]		
a) Mental Sum score		
$Mean_{Post}$ (SD) [95% CI]	45.0 (11.2) [43.7–46.3]	$z = 3.022$, $p = 0.003$, $r = 0.174$
ΔMean between T0 and T1 (SD)	+2.3 (10.8)	
$Median_{Post}$ [IQR]	45.9 [36.2–54.7]	
MCID improved, *n* (%)	136 (44.6)	
MCID did not change, *n* (%)	66 (21.6)	
MCID worsened, *n* (%)	101 (33.1)	
b) Physical Sum score		
$Mean_{Post}$ (SD) [95% CI]	30.3 (10.4) [29.1–31.5]	$z = 2.407$, $p = 0.016$, $r = 0.138$
ΔMean between T0 and T1 (SD)	+1.7 (9.7)	
$Median_{Post}$ [IQR]	28.6 [21.8–38.2]	
MCID improved, *n* (%)	120 (39.3)	
MCID did not change, *n* (%)	91 (29.8)	
MCID worsened, *n* (%)	92 (30.2)	

ΔMean between T0 and T1, mean difference from baseline to postintervention; BMI, body mass index; CI, confidence interval; GAD-7, Generalized Anxiety Disorder Questionnaire; IQR, interquartile range; kg, kilogram; m: meter; MCID, minimal clinically important difference; n, sample size; PHQ-9, Patient Health Questionnaire; Post, postintervention/T1; SD, standard deviation; SF-12, Short Form 12 Health Survey; PSQ20, Perceived Stress Questionnaire, T0, Baseline; T1, post-intervention; z, Wilcoxon signed-rank test; r, effect size. $p < 0.001$ is considered as statistically significant.

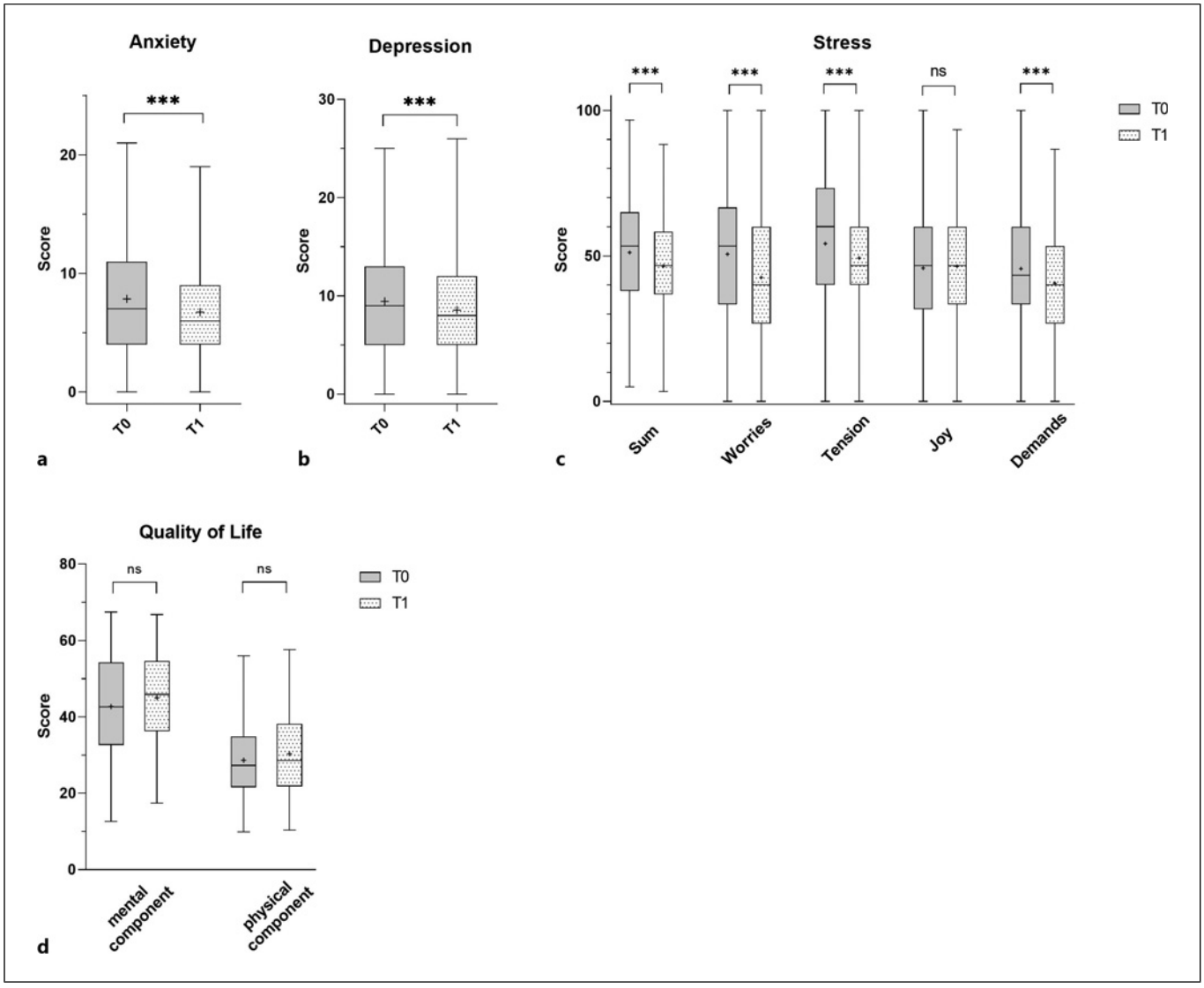

Fig. 1. Change of outcomes for the total study population for pre- (T0) and postintervention (T1): Scores for anxiety (**a**), depression (**b**), stress (**c**), and quality of life (**d**) are presented. The data are shown as box whiskers (median with upper and lower quartiles), whose difference describes the interquartile range (IQR) and minimum and maximum (=whiskers). The mean is depicted as "+." High levels for anxiety, depression, and stress indicate high symptomatic and stress levels, whereas high levels for quality of life imply high quality of life. ***Significant differences between T0 and T1 ($p < 0.001$). ns, no significant differences between T0 and T1.

Several reviews have investigated preoperative interventions but focused on the effects on weight-related outcomes [20, 36, 37]. Only a few reviews specifically explored the impact of these interventions on psychological well-being and found improvements in this aspect [20, 22, 36–40]. However, a proportion of participants (10–30%, depending on the symptom) did not experience optimal psychological stabilization through the intervention. Further attention, such as CBT prior to surgery, may be beneficial for this subgroup and could potentially reduce the risk of surgical failure.

From the patients' perspective, the program was considered a supportive method for preoperative preparation. These results are consistent with David et al. who also reported high usefulness and satisfaction of psychosocial interventions for MBS patients [38]. However, no distinctions between preoperative and postoperative interventions were made. It is interesting to note that patients who experienced a worsening in terms of MCIDs also evaluated the bridging program as beneficial. This finding suggests that participants may have perceived

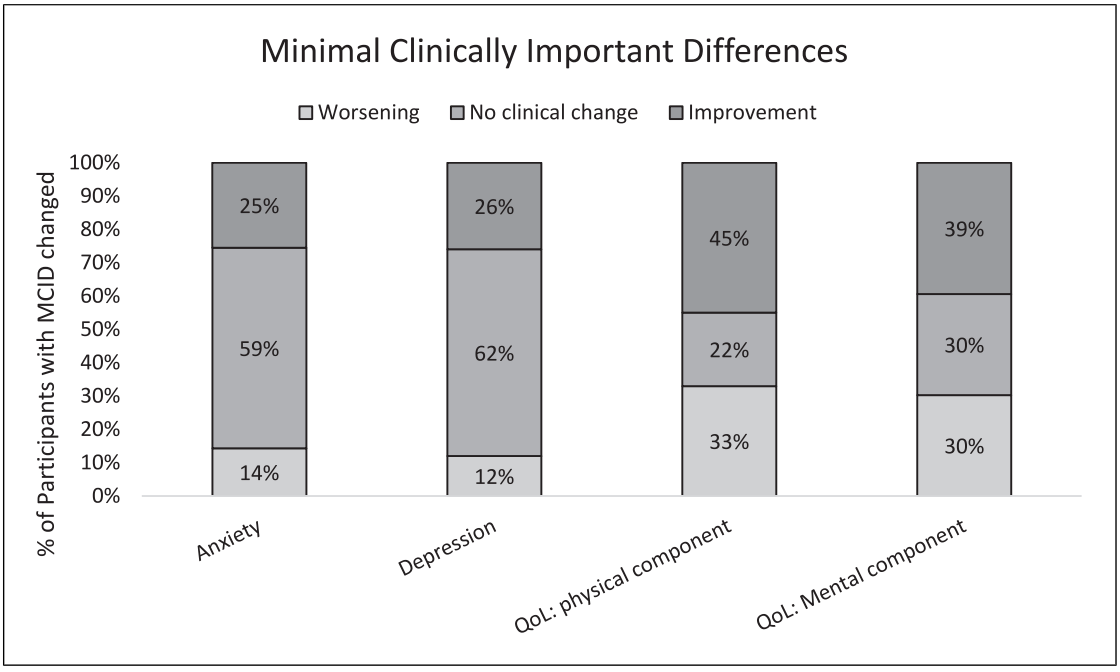

Fig. 2. Change of MCIDs from pre- (T0) to postintervention (T1). Data are presented as bar graphs showing the percentage of participants who achieved a minimum clinically important difference in each questionnaire T0 and T1.

Fig. 3. Evaluation assessment of the total group: The results of the evaluation questionnaire regarding participants' personal benefits from the program are presented on a 5-point Likert scale.

Table 5. Changes of outcomes for subgroups (ITT)

	Face-to-face group (N = 222)	Videoconference group (N = 66)	Statistics for face-to-face versus videoconference		
			ANOVA	Van der Waerden	Differences between MCIDs
Anxiety [GAD-7]					
$Mean_{Post}$ (SD) [95% CI]	6.6 (4.3) [6.1–7.2]	7.0 (4.1) [6.0–8.0]	F_{Inter} (1, 278) = 0.055, p = 0.815, $\eta_p 2$ = 0.001	χ^2_{Inter} (1) = 0.800, p = 0.371	U = 7,083.000, p = 0.981
ΔMean between T0 and T1, SD	−1.1 (4.3)	−1.5 (4.2)			
$Median_{Post}$ [IQR]	6.0 [3.0–9.0]	7.0 [4.0–10.0]			
MCID improved, n (%)	554 (24.3)	16 (24.2)	F_{Time} (1, 278) = 11.092, p <0.001, η^2_p = 0.038	χ^2_{Time} (1) = 7.095, p = 0.008	
MCID did not change, n (%)	130 (58.6)	40 (60.6)			
MCID worsened, n (%)	31 (14.0)	10 (15.2)			
Depression [PHQ-9]					
$Mean_{Post}$ (SD) [95% CI]	8.5 (5.0) [7.7–9.2]	8.5 (5.4) [7.1–9.8]	F_{Inter} (1, 236) = 0.102, p = 0.750, η^2_p = 0.001	χ^2_{Inter} (1) = 0.114, p = 0.736	U = 4,880.500, p = 0.089
ΔMean between T0 and T1 (SD)	−0.8 (4.6)	−1.0 (4.7)			
$Median_{Post}$ [IQR]	8.0 [5.0–12.0]	8.0 [4.3–11.8]			
MCID improved, n (%)	39 (17.6)	21 (31.8)	F_{Time} (1, 236) = 7.913, p = 0.005, η^2_p = 0.039	χ^2_{Time} (1) = 7.095, p = 0.002	
MCID did not change, n (%)	115 (51.8)	34 (51.5)			
MCID worsened, n (%)	20 (9.0)	9 (13.6)			
Perceived Stress (PSQ20)					
(a) Overall Score					
$Mean_{Post}$ (SD) [95% CI]	46.3 (17.3) [44.0–48.6]	46.1 (17.3) [41.8–50.4]	F_{Inter} (1, 279) = 1.579, p = 0.210, η^2_p = 0.011	χ^2_{Inter} (1) = 0.428, p = 0.513	
ΔMean between T0 and T1 (SD)	−4.3 (14.6)	−7.6 (15.3)			MCID not available
$Median_{Post}$ [IQR]	45.0 [36.7–58.3]	48.3 [33.3–57.5]	F_{Time} (1, 279) = 25.381, p <0.001, η^2_p = 0.088	χ^2_{Time} (1) = 21.854, p <0.001	
(b) Worries					
$Mean_{Post}$ (SD) [95% CI]	46.3 (17.3) [44.0–48.6]	46.1 (17.3) [41.8–50.4]	F_{Inter} (1, 279) = 0.074, p = 0.785, η^2_p = 0.001	χ^2_{Inter} (1) = 0.428, p = 0.513	
ΔMean between T0 and T1 (SD)	−4.3 (14.6)	−7.6 (15.3)			MCID not available
$Median_{Post}$ [IQR]	45.0 [36.7–58.3]	48.3 [33.3–57.5]	F_{Time} (1, 279) = 28.427, p <0.001, η^2_p = 0.098	χ^2_{Time} (1) = 14.410, p <0.001	

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Table 5 (continued)

	Face-to-face group (N = 222)	Videoconference group (N = 66)	Statistics for face-to-face versus videoconference		
			ANOVA	Van der Waerden	Differences between MCIDs
(c) Tension					
$Mean_{Post}$ (SD) [95% CI]	49.0 (19.4) [46–51.7]	49.1 (21.5) [43.8–54.5]	F_{Inter} (1, 279) = 2.998, p = 0.084, η_p^2 = 0.015	χ^2_{Inter} (1) = 0.959, p = 0.327	
ΔMean between T0 and T1 (SD)	−4.2 (19.2)	−9.0 (17.9)			MCID not available
$Median_{Post}$ [IQR]	46.7 [40.0–60.0]	53.3 [33.3–66.7]	F_{Time} (1, 279) = 19.192, p < 0.001, η_p^2 = 0.073	χ^2_{Time} (1) = 18.294, p < 0.001	
(d) Joy					
$Mean_{Post}$ (SD) [95% CI]	46.5 (19.6) [43.8–49.1]	46.8 (20.0) [41.8–51.7]	F_{Inter} (1, 279) = 0.497, p = 0.481, η_p^2 = 0.004	χ^2_{Inter} (1) = 0.090, p = 0.764	
ΔMean between T0 and T1 (SD)	+0.5 (19.1)	+3.4 (21.7)			MCID not available
$Median_{Post}$ [IQR]	46.7 [33.3–60.0]	46.7 [33.3–60.0]	F_{Time} (1, 279) = 0.937, p = 0.334, η_p^2 = 0.002	χ^2_{Time} (1) = 1.562, p = 0.211	
(e) Demands					
$Mean_{Post}$ (SD) [95% CI]	40.9 (17.9) [38.5–43.3]	46.8 (20.0) [41.8–51.7]	F_{Inter} (1, 279) = 1.768, p = 0.185, η_p^2 = 0.011	χ^2_{Inter} (1) = 0.134, p = 0.714	
ΔMean between T0 and T1 (SD)	−4.4 (17.5)	−8.3 (17.3)			MCID not available
$Median_{Post}$ [IQR]	40.0 [26.7–53.3]	46.7 [33.3–60.0]	F_{Time} (1, 279) = 23.597, p <0.001, η_p^2 = 0.076	χ^2_{Time} (1) = 13.291, p <0.001	
Quality of Life [SF-12]					
(a) Mental Sum score					
$Mean_{Post}$ (SD) [95% CI]	45.2 (11.0) [43.7–46.7]	44.8 (12.0) [41.8–47.8]	F_{Inter} (1, 284) = 3.872, p = 0.05, η_p^2 = 0.016	χ^2_{Inter} (1) = 1.207, p = 0.271	
ΔMean between T0 and T1 (SD)	+2.2 (10.9)	+4.2 (10.3)			U = 6,653.000, p = 0.330
$Median_{Post}$ [IQR]	46.2 [38.6–53.9]	45.4 [35.1–55.4]			
MCID improved, n (%)	96 (43.2)	34 (51.5)	F_{Time} (1, 284) = 17.328, p <0.001, η_p^2 = 0.071	χ^2_{Time} (1) = 8.278, p = 0.004	
MCID did not change, n (%)	47 (21.2)	14 (21.2)			
MCID worsened, n (%)	78 (35.1)	17 (25.8)			

Table 5 (continued)

	Face-to-face group (*N* = 222)	Videoconference group (*N* = 66)	Statistics for face-to-face versus videoconference: ANOVA	Van der Waerden	Differences between MCIDs
(b) Physical Sum score					
$Mean_{Post}$ (SD) [95% CI]	30.3 (10.7) [28.9–31.7]	29.6 (9.6) [27.2–32.0]	F_{Inter} (1, 284) = 0.000, p = 0.983, η_p^2 = 0.008	χ^2_{Inter} (1) = 1.939, p = 0.164	
ΔMean between T0 and T1 (SD)	+1.6 (9.9)	+2.0 (8.1)			U = 7,129.500, p = 0.923
$Median_{Post}$ [IQR]	28.1 [21.5–38.5]	28.3 [23.3–36.1]			
MCID improved, *n* (%)	84 (37.8)	28 (42.4)	F_{Time} (1, 284) = 5.710, p = 0.018, η_p^2 = 0.006	χ^2_{Time} (1) = 3.278, p = 0.007	
MCID did not change, *n* (%)	69 (31.1)	19 (28.8)			
MCID worsened, *n* (%)	68 (30.6)	18 (27.3)			

value in the program beyond the immediate reduction of symptoms.

Overall, appropriate support prior to surgery in terms of patient education is important and necessary and as shown here, can stabilize patients psychologically at the same time so that the transition phase prior to surgery is bridged in a beneficial way. Short and easy-to-implement preoperative interventions such as this educational program should be a standard part of the care pathway for individuals undergoing MBS, providing patients with realistic information about the procedure and its outcomes, associated changes, potential complications, and necessary behavioral changes. Addressing these issues is important because people who are overweight, especially those who have tried and failed to lose weight, often have unrealistic expectations about MBS as a treatment option, reflecting a general lack of knowledge in this area [41–43].

While preoperative programs may not prevent all postoperative issues or unsuccessful weight loss [16], they can potentially have a positive influence during the postoperative period. Educated patients may be more willing to seek and accept postoperative support, which may contribute to better outcomes [40, 44, 45], but this is speculative at this point since results are mixed [46].

Finally, an important finding of the study is that both face-to-face and videoconference delivery were similarly effective in stabilizing and improving the psychological situation of participants. Additionally, the personal benefit of the intervention was reported as equivalent. Acceptance of online interventions has been shown to be high in various studies considering the advantages of online programs, such as reduced travel time and costs, and increased accessibility for individuals in rural areas [27, 47]. Adherence of participants, which is an important and critical factor for treatment success, can be even increased with online delivery in certain cases [48, 49].

There are strengths and limitations of this study. To the best of our knowledge, there are no comparable intervention programs that target the preoperative period while simultaneously serving to psychologically stabilize patients undergoing surgery. While more complex CBT interventions prior to surgery may be relevant for certain subgroups of patients, the program offers a general low-threshold preparation for all patients undergoing surgery. This approach ensures that a wide range of patients can benefit from the intervention. The low dropout rate of 3% indicated that the program had high adherence among participants, and it suggests that short programs with catch-up appointments can effectively engage and retain participants. The use of validated questionnaires enhances the reliability of the findings. In addition, the results are very robust since the comparison of delivery modes (face-to-face vs. videoconference) demonstrated similar results.

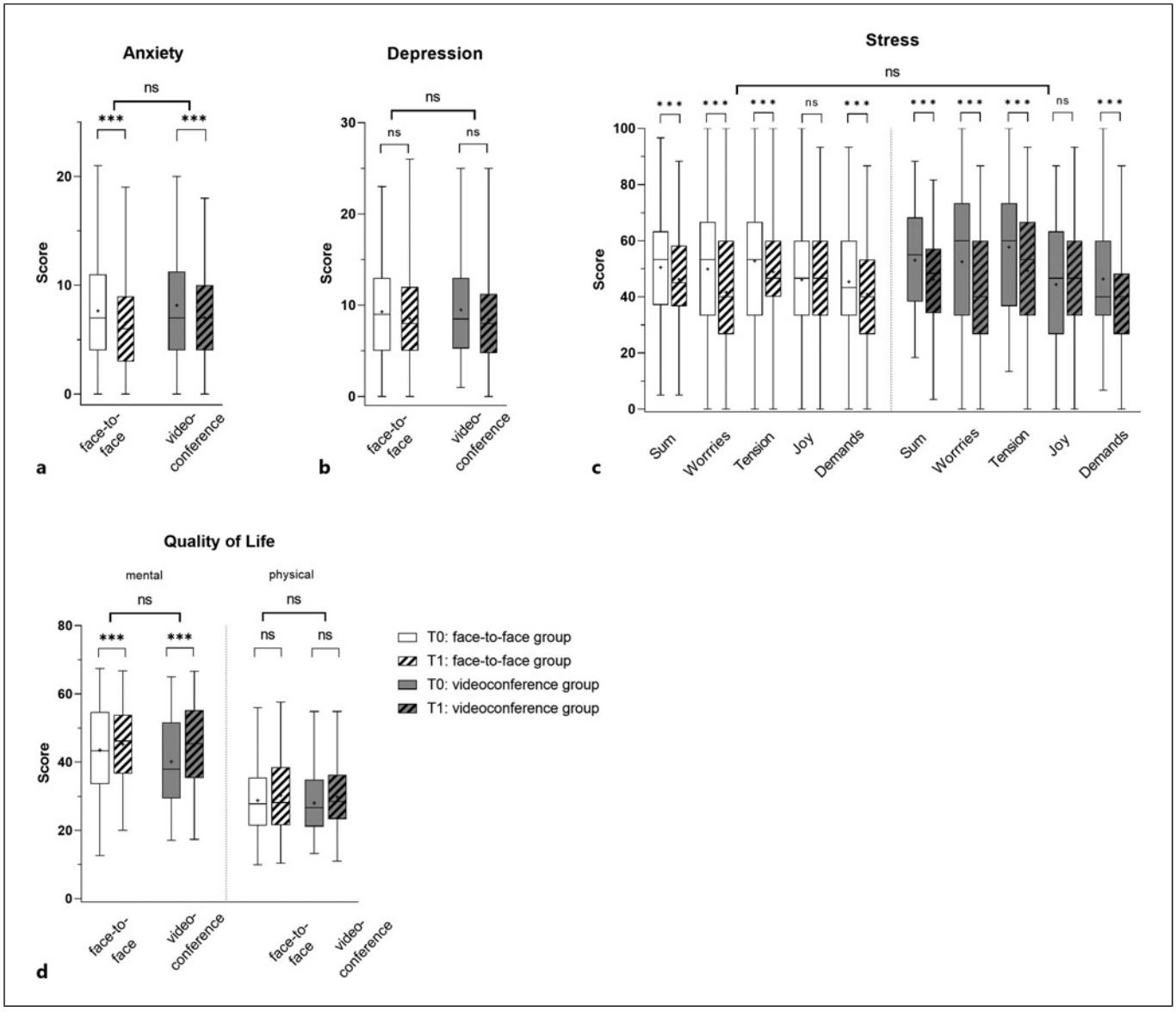

Fig. 4. Change of outcomes for the subgroups face-to-face and videoconference for pre- (T0) and postintervention (T1): scores for anxiety (**a**), depression (**b**), stress (**c**), and quality of life (**d**) are presented. The data are presented as box whiskers (median with upper and lower quartiles), whose difference describes the interquartile range (IQR) and minimum and maximum (=whiskers). The mean is depicted as "+." High levels for anxiety, depression, and stress indicate high symptomatic and stress levels, whereas high levels for quality of life imply high quality of life. Statistics for time × group interactions and main effect time are indicated: ***Significant difference ($p < 0.001$). ns, not significant.

One limitation of this study is the uncontrolled study design. Besides, no postoperative data were analyzed to examine the effect of the program on mental health status after surgery to evaluate whether psychological stabilization is maintained in the postoperative period. However, we do not expect an improved postoperative outcome since even more complex preoperative CBT showed only postinterventional effects that were not detectable in the postoperative period [23, 25, 38]. Further research should include postoperative follow-up, especially of participants whose mental health does not improve or stabilize during surgery preparation, to determine if these are the individuals who will not succeed after MBS. Additionally, the study's classification into subgroups based on the mode of delivery (face-to-face vs. videoconferencing) was a time-based classification due to the COVID-19 pandemic. However, research showed that psychological distress

associated with COVID-19 returned to its original level over the course of the pandemic [50, 51], and statistical analyses showed no differences at baseline or interaction effects between subgroups, so the results of the comparison can be considered reliable, and therefore the program can be well offered and delivered as a videoconference-based delivery mode.

Conclusion

We consider the educational program to be an effective and easy-to-implement intervention to bridge the gap in preoperative preparation for MBS while also stabilizing the mental health of participants. In addition, the program was very well appreciated. Online participation via video conferencing can be offered as an equivalent option to face-to-face courses.

Statement of Ethics

This study protocol was reviewed and approved by the Ethics Committee of the University Hospital Tuebingen, Germany, Approval No. 884/2019BO2 in compliance with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Written informed consent was obtained from all individual participants included in the study.

Conflict of Interest Statement

The authors declare no conflicts of interest.

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Author Contributions

Conceptualization and writing – original draft preparation: I.M. and T.L.; methodology: T.L., J.S., B.K., S.Z., R.A., A.N., G.E., and I.M.; data curation: T.L., J.S., B.K., and S.S.; data analysis: T.L., J.S., and I.M.; visualization: T.L., : writing – review and editing: all authors; supervision: I.M.; project administration: I.M., A.S., S.Z., A.N., G.E., S.Z., All authors have read and agreed to the published version of the manuscript.

Data Availability Statement

The data that support the findings of this study are not publicly available due to the fact that they contain information that could compromise the privacy of the research participants but are available from the corresponding author upon reasonable request.

References

1 Abarca-Gómez L, Abdeen ZA, Hamid ZA, Abu-Rmeileh NM, Acosta-Cazares B, Acuin C, et al. Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: a pooled analysis of 2416 population-based measurement studies in 128·9 million children, adolescents, and adults. Lancet. 2017;390(10113):2627–42. https://doi.org/10.1016/s0140-6736(17)32129-3

2 Johnson KE, Alencar MK, Coakley KE, Swift DL, Cole NH, Mermier CM, et al. Telemedicine-based health coaching is effective for inducing weight loss and improving metabolic markers. Telemed J E Health. 2019;25(2):85–92. https://doi.org/10.1089/tmj.2018.0002

3 WHO Regional Office for Europe. WHO European regional obesity report 2022 [Internet]. Copenhagen 2022. Licence: CC BY-NC-SA 3.0 IGO. [cited 2023 May 5]. Available from: https://apps.who.int/iris/handle/10665/353747

4 Yumuk V, Tsigos C, Fried M, Schindler K, Busetto L, Micic D, et al. European guidelines for obesity management in adults. Obes Facts. 2015;8(6):402–24. https://doi.org/10.1159/000442721

5 Gadde KM, Martin CK, Berthoud H-R, Heymsfield SB. Obesity: pathophysiology and management. J Am Coll Cardiol. 2018;71(1):69–84. https://doi.org/10.1016/j.jacc.2017.11.011

6 Sjöström L, Lindroos AK, Peltonen M, Torgerson J, Bouchard C, Carlsson B, et al. Lifestyle, diabetes, and cardiovascular risk factors 10 years after bariatric surgery. N Engl J Med. 2004;351(26):2683–93. https://doi.org/10.1056/NEJMoa035622

7 Eisenberg D, Shikora SA, Aarts E, Aminian A, Angrisani L, Cohen RV, et al. 2022 American Society of Metabolic and Bariatric Surgery (ASMBS) and International Federation for the Surgery of Obesity and Metabolic Disorders (IFSO) indications for metabolic and bariatric surgery. Obes Surg. 2023;33(1):3–14. https://doi.org/10.1007/s11695-022-06332-1

8 Cooper TC, Simmons EB, Webb K, Burns JL, Kushner RF. Trends in weight regain following Roux-en-Y Gastric Bypass (RYGB) bariatric surgery. Obes Surg. 2015;25(8):1474–81. https://doi.org/10.1007/s11695-014-1560-z

9 Karmali S, Brar B, Shi X, Sharma AM, de Gara C, Birch DW. Weight recidivism post-bariatric surgery: a systematic review. Obes Surg. 2013;23(11):1922–33. https://doi.org/10.1007/s11695-013-1070-4

10 Noria SF, Shelby RD, Atkins KD, Nguyen NT, Gadde KM. Weight regain after bariatric surgery: scope of the problem, causes, prevention, and treatment. Curr Diab Rep. 2023;23(3):31–42. https://doi.org/10.1007/s11892-023-01498-z

11 Kalarchian MA, Marcus MD, Levine MD, Soulakova JN, Courcoulas AP, Wisinski MS. Relationship of psychiatric disorders to 6-month outcomes after gastric bypass. Surg Obes Relat Dis. 2008;4(4):544–9. https://doi.org/10.1016/j.soard.2008.03.003

12 Semanscin-Doerr DA, Windover A, Ashton K, Heinberg LJ. Mood disorders in laparoscopic sleeve gastrectomy patients: does it affect early weight loss? Surg Obes Relat Dis. 2010;6(2):191–6. https://doi.org/10.1016/j.soard.2009.11.017

13 Athanasiadis DI, Martin A, Kapsampelis P, Monfared S, Stefanidis D. Factors associated with weight regain post-bariatric surgery: a systematic review. Surg Endos. 2021;35(8):4069–84. https://doi.org/10.1007/s00464-021-08329-w

14 Aylward L, Lilly C, Tabone L, Szoka N, Abunnaja S, Cox S. Anxiety predicts reduced weight loss 30 months after bariatric surgery. Surg Obes Relat Dis. 2022;18(7):919–27. https://doi.org/10.1016/j.soard.2022.04.007

15 Lai C, Aceto P, Santucci FR, Pierro L, Petrucci I, Cacioppo M, et al. Preoperative psychological characteristics affecting mid-term outcome after bariatric surgery: a follow-up study. Eat Weight Disord. 2021; 26(2):585–90. https://doi.org/10.1007/s40519-020-00892-w
16 Wild B, Hünnemeyer K, Sauer H, Hain B, Mack I, Schellberg D, et al. A 1-year videoconferencing-based psychoeducational group intervention following bariatric surgery: results of a randomized controlled study. Surg Obes Rel Dis. 2015; 11(6):1349–60. https://doi.org/10.1016/j.soard.2015.05.018
17 Mechanick JI, Apovian C, Brethauer S, Garvey WT, Joffe AM, Kim J, et al. Clinical practice guidelines for the perioperative nutrition, metabolic, and nonsurgical support of patients undergoing bariatric procedures: 2019 update: cosponsored by American association of clinical endocrinologists/American college of endocrinology, the obesity society, American society for metabolic & bariatric surgery, obesity medicine association, and American society of anesthesiologists. Surg Obes Rel Dis. 2020;16(2):175–247. https://doi.org/10.1016/j.soard.2019.10.025
18 Deutsche Gesellschaft für Allgemein- und Viszeralchirurgie e.V. (DGAV). S3-Leitlinie: Chirurgie der Adipositas und metabolischer Erkrankungen. Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften e.V. (AWMF). 2018. Nr. 088-001. [cited 2023 May 5]. Available from: https://www.awmf.org/uploads/tx_szleitlinien/088-001L_S3_Chirurgie-Adipositas-metabolische-Erkrankugen_2018-02.pdf.German
19 O'Kane M, Parretti HM, Pinkney J, Welbourn R, Hughes CA, Mok J, et al. British Obesity and Metabolic Surgery Society Guidelines on perioperative and postoperative biochemical monitoring and micronutrient replacement for patients undergoing bariatric surgery-2020 update. Obes Rev. 2020;21(11):e13087. https://doi.org/10.1111/obr.13087
20 Kushner BS, Eagon JC. Systematic review and meta-analysis of the effectiveness of insurance requirements for supervised weight loss prior to bariatric surgery. Obes Surg. 2021;31(12): 5396–408. https://doi.org/10.1007/s11695-021-05731-0
21 Lau T, Cook J, Archid R, Stengel A, Zipfel S, Mack I. Effects of lifestyle and educational bridging programs before bariatric surgery on postoperative weight loss: a systematic review and meta-analysis. Obes Facts. 2023;16(1): 1–10. https://doi.org/10.1159/000526945
22 Lodewijks Y, van der Ven R, Nienhuijs S. A broad focus on additional programmes prior to bariatric surgery: a systematic review. Clin Obes. 2022;12(3):e12518. https://doi.org/10.1111/cob.12518
23 Gade H, Friborg O, Rosenvinge JH, Småstuen MC, Hjelmesæth J. The impact of a preoperative Cognitive Behavioural Therapy (CBT) on dysfunctional eating behaviours, affective symptoms and body weight 1 Year after bariatric surgery: a randomised controlled trial. Obes Surg. 2015;25(11):2112–9. https://doi.org/10.1007/s11695-015-1673-z
24 Hjelmesæth J, Rosenvinge JH, Gade H, Friborg O. Effects of cognitive behavioral therapy on eating behaviors, affective symptoms, and weight loss after bariatric surgery: a randomized clinical trial. Obes Surg. 2019;29(1):61–9. https://doi.org/10.1007/s11695-018-3471-x
25 Paul L, van der Heiden C, van Hoeken D, Deen M, Vlijm A, Klaassen RA, et al. Cognitive behavioral therapy versus usual care before bariatric surgery: one-year follow-up results of a randomized controlled trial. Obes Surg. 2021;31(3):970–9. https://doi.org/10.1007/s11695-020-05081-3
26 Richards DA, Ekers D, McMillan D, Taylor RS, Byford S, Warren FC, et al. Cost and outcome of behavioural activation versus cognitive behavioural therapy for depression (COBRA): a randomised, controlled, non-inferiority trial. Lancet. 2016;388(10047): 871–80. https://doi.org/10.1016/S0140-6736(16)31140-0
27 Coldebella B, Armfield NR, Bambling M, Hansen J, Edirippulige S. The use of telemedicine for delivering healthcare to bariatric surgery patients: a literature review. J Telemed Telecare. 2018;24(10):651–60. https://doi.org/10.1177/1357633X18795356
28 Messiah SE, Sacher PM, Yudkin J, Ofori A, Qureshi FG, Schneider B, et al. Application and effectiveness of eHealth strategies for metabolic and bariatric surgery patients: a systematic review. Digit Health. 2020;6: 2055207619898987. https://doi.org/10.1177/2055207619898987
29 Deutsche Adipositas-Gesellschaft (DAG) e.V., Deutsche Gesellschaft für Ernährung (DGE) e.V., Deutsche Gesellschaft für Ernährungsmedizin (DGEM) e.V. Interdisziplinäre Leitlinie der Qualität S3 zur "Prävention und Therapie der Adipositas. AWMF-Register Nr. 050/001. 2014. [cited 2023 May 5]. Available from: https://register.awmf.org/assets/guidelines/050-001l_S3_Adipositas_Pr%C3%A4vention_Therapie_2014-11-abgelaufen.pdf.German
30 de Vet HCW, Mokkink LB, Terwee CB. Minimal clinically important difference (MCID). In: Michalos AC, editor. Encyclopedia of quality of life and well-being research. Dordrecht: Springer; 2014. p. 4071–2.
31 Draak THP, de Greef BTA, Faber CG, Merkies ISJ; PeriNomS study group. The minimum clinically important difference: which direction to take. Eur J Neurol. 2019;26(6):850–5. https://doi.org/10.1111/ene.13941
32 Christian NJ, King WC, Yanovski SZ, Courcoulas AP, Belle SH. Validity of self-reported weights following bariatric surgery. JAMA. 2013;310(22):2454–6. https://doi.org/10.1001/jama.2013.281043
33 Stunkard AJ, Albaum JM. The accuracy of self-reported weights. Am J Clin Nutr. 1981; 34(8):1593–9. https://doi.org/10.1093/ajcn/34.8.1593
34 Amiri S, Behnezhad S. Obesity and anxiety symptoms: a systematic review and meta-analysis. Neuropsychiatr. 2019;33(2): 72–89. https://doi.org/10.1007/s40211-019-0302-9
35 Pereira-Miranda E, Costa PRF, Queiroz VAO, Pereira-Santos M, Santana MLP. Overweight and obesity associated with higher depression prevalence in adults: a systematic review and meta-analysis. J Am Coll Nutr. 2017;36(3):223–33. https://doi.org/10.1080/07315724.2016.1261053
36 Cassie S, Menezes C, Birch DW, Shi X, Karmali S. Effect of preoperative weight loss in bariatric surgical patients: a systematic review. Surg Obes Rel Dis. 2011;7(6):760–7. https://doi.org/10.1016/j.soard.2011.08.011
37 Stewart F, Avenell A. Behavioural interventions for severe obesity before and/or after bariatric surgery: a systematic review and meta-analysis. Obes Surg. 2016;26(6): 1203–14. https://doi.org/10.1007/s11695-015-1873-6
38 David LA, Sijercic I, Cassin SE. Preoperative and post-operative psychosocial interventions for bariatric surgery patients: a systematic review. Obes Rev. 2020;21(4):e12926. https://doi.org/10.1111/obr.12926
39 Marshall S, Mackay H, Matthews C, Maimone IR, Isenring E. Does intensive multidisciplinary intervention for adults who elect bariatric surgery improve post-operative weight loss, co-morbidities, and quality of life? A systematic review and meta-analysis. Obes Rev. 2020;21(7): e13012. https://doi.org/10.1111/obr.13012
40 Liu RH. Do behavioral interventions delivered before bariatric surgery impact weight loss in adults? A systematic scoping review. Bariatr Surg Pract Patient Care. 2016;11(2):39–48. https://doi.org/10.1089/bari.2015.0047
41 Bauchowitz A, Azarbad L, Day K, Gonder-Frederick L. Evaluation of expectations and knowledge in bariatric surgery patients. Surg Obes Relat Dis. 2007;3(5):554–8. https://doi.org/10.1016/j.soard.2007.05.005
42 Kaly P, Orellana S, Torrella T, Takagishi C, Saff-Koche L, Murr MM. Unrealistic weight loss expectations in candidates for bariatric surgery. Surg Obes Relat Dis. 2008;4(1):6–10. https://doi.org/10.1016/j.soard.2007.10.012
43 Wee CC, Jones DB, Davis RB, Bourland AC, Hamel MB. Understanding patients' value of weight loss and expectations for bariatric surgery. Obes Surg. 2006;16(4):496–500. https://doi.org/10.1381/096089206776327260
44 Groller KD. Systematic review of patient education practices in weight loss surgery. Surg Obes Rel Dis. 2017;13(6):1072–85. https://doi.org/10.1016/j.soard.2017.01.008

45 Sierżantowicz R, Ładny JR, Lewko J, Hady HR. Assessment of education effects on patient involvement and bariatric treatment outcome: an observational study. Wideochir Inne Tech Maloinwazyjne. 2020;15(1):157–65. https://doi.org/10.5114/wiitm.2019.88649
46 Madan AK, Tichansky DS. Patients postoperatively forget aspects of preoperative patient education. Obes Surg. 2005;15(7):1066–9. https://doi.org/10.1381/0960892054621198
47 Maurice AP, Punnasseril JEJ, King SE, Dodd BR. Improving access to bariatric surgery for rural and remote patients: experiences from a state-wide bariatric telehealth service in Australia. Obes Surg. 2020;30(11):4401–10. https://doi.org/10.1007/s11695-020-04804-w
48 Lujan J, Tuero C, Landecho MF, Moncada R, J AC, Rotellar F, et al. Impact of routine and long-term follow-up on weight loss after bariatric surgery. Obes Surg. 2020;30(11):4293–9. https://doi.org/10.1007/s11695-020-04788-7
49 Reiber B, Barendregt R, de Vries R, Bruin SC, van der Peet DL. Is adherence to follow-up after bariatric surgery necessary? A systematic review and meta-analysis. Obes Surg. 2022;32(3):904–11. https://doi.org/10.1007/s11695-021-05857-1
50 Mata J, Wenz A, Rettig T, Reifenscheid M, Möhring K, Krieger U, et al. Health behaviors and mental health during the COVID-19 pandemic: A longitudinal population-based survey in Germany. Soc Sci Med. 2021;287:114333. https://doi.org/10.1016/j.socscimed.2021.114333
51 Mahmud S, Mohsin M, Dewan MN, Muyeed A. The Global Prevalence of Depression, Anxiety, Stress, and Insomnia Among General Population During COVID-19 Pandemic: A Systematic Review and Meta-analysis. Trends in Psychol. 2022;31(1):143–170. https://doi.org/10.1007/s43076-021-00116-9