Supplemental Information

Hepatic fibrosis, previous use of bupropion, and a history of smoking are associated with weight loss outcomes after Roux-en-Y gastric bypass surgery.
Still, et al.

The Supplemental materials have the following sections in order:

1. Methods.

2. Variable List. Descriptive summary of clinical variables analyzed.

3. Table S1. Descriptive summary of the weight loss measures.

4. Table S2. Significant predictors of less weight loss in the BMI adjusted univariate analysis for weight loss at each of the three temporal phases.

5. Table S3. Significant predictors of less weight loss in the BMI adjusted univariate analysis for weight loss at each of the three temporal phases.

6. Table S4. Significant predictors of less weight loss in the BMI adjusted univariate analysis for weight loss at each of the three temporal phases.

7. Table S5. Significant predictors of less weight loss in the BMI adjusted univariate analysis for weight loss at each of the three temporal phases.

8. Table S6. Significant predictors of less weight loss in the BMI adjusted univariate analysis for weight loss at each of the three temporal phases.

9. Table S7. Significant predictors of less weight loss in the preliminary models in common for all three weight loss phases.

10. Regression equations from early weight loss and weight loss nadir.

11. Figure S1. Scatterplot matrix for correlations among short-term, nadir, and long-term weight loss outcomes.

12. Figure S2. Residual plot for long-term weight loss equation.

Supplementary Methods.

Since 2001, all patients undergoing bariatric surgery at Geisinger Medical Center have been required to participate in a standardized multidisciplinary preoperative program that encompasses medical, psychological, nutritional, and surgical interventions and education. Patients must be tobacco free (documented by serum nicotine levels) for at least 6 months prior to the operation. Patients must also attend 2 educational sessions. A clinical nurse specialist, dietitian, and psychologist lead the first class. The second class is conducted by a bariatric surgeon. Additionally, the patients are required to read a book about bariatric surgery, complete 10 behavior modules, attend 2 support group meetings, and attempt to achieve a 10% weight loss of excess body weight. All of this must happen prior to any surgical intervention.

Initial pre-operative weight loss was attempted through an approximate 500-kcal deficit from estimated calories consumed as determined by a registered dietitian. The macronutrient composition was a prudent low-fat diet. If patients following the diet had not reached their weight loss goal by month 4, they were instructed to follow a 1000- to 1500-kcal liquid diet. In addition, patients were encouraged to wear a pedometer and walk at least 8000 steps per day and drink at least 1.92 L of water daily, while avoiding caloric beverages. Monthly behavior modification modules were also reviewed with patients.

The following data were used for the study:

- Baseline information: Length of time in pre-operative program, assessment and recommendations from the initial dietetic and psychological evaluation (rated as major issues, minor issues, or no issues to address).
- Demographics: Age at surgery, gender, race, education, marital status, income, number of children, smoking history (smoked at least 100 cigarettes in their lifetime), and alcohol use (drink alcohol monthly or more).
- Body metrics: Height, weight and BMI at baseline visit, weight and BMI immediately prior to surgery, amount of pre-operative excess weight loss, waist circumference, resting energy expenditure, and VO2Max.
- Co-morbidities: Diagnoses on each patient's active problem list during the pre-operative period. To simplify the analysis, these were rolled up into 3-digit ICD-9 codes and those that occurred in at least 2% of the population were considered for analysis (resulting in 50 co-morbidity variables).
- Medication use: Medications that were listed as active during the pre-operative period. The medications were structured using MediSpan® prescription classifications and were rolled up into medication subclass categories. The subclasses that were present in at least 2% of the population were retained, resulting in 92 medication variables.
- Laboratory results: All laboratory results prior to surgery that were found in at least 50% of the population. This resulted in 45 laboratory variables retained for analysis.

- Surveys: Individual item responses (N=100) and summary scores or sub-scores (N=18) for Beck Depression Inventory (BDI)[R], Family Emotional Involvement and Criticism Scale (FEICS)[R], Impact Of Weight On Quality Of Life-Lite (IWQOL)[R], Weight Loss Readiness Test (WLR)[R], and Questionnaire on Eating and Weight Patterns (QEWP)[R].
- Perioperative information: Surgical access (laparoscopic versus open), surgeon
- Liver pathology: Routine liver biopsy specimens were formalin fixed and stained with hematoxylin and eosin for routine histology, Masson's trichrome for assessment of fibrosis (including type of fibrosis), and Perls'/Prussian Blue stain to determine iron status. All specimens were read by experienced pathologists using the criteria for NASH of Brunt.
- Postoperative information: All weight measurements (with time from surgery) occurring before a post-operative pregnancy (when present) or a revision surgery (when present). All weight measures were used regardless if they were collected from the Weight Management Clinic or other Geisinger Clinic locations.

Early weight loss: For the analyses of early weight loss, the study population was limited to the subset of patients with adequate follow-up during the time immediately following surgery (at least 4 weight measurements). The %EBWL measured at each visit were included as the predictor variable in slopes and intercepts regression models (using random effects in SAS proc mixed). The equation generated from this model was used

to calculate the %EBWL at 6-months post-surgery, which was used as the dependent variable in a multiple linear regression model for clinical predictors of early weight loss.

Weight loss nadir: The maximum weight loss during the first 36 months after surgery was identified. The analysis was limited to the subset of patients that had at least 3 weight measures occurring between 6-months and 36-months after surgery. The weight loss nadir cohort was further limited to the patients with at least one additional weight measurement occurring 30 days after the nadir weight (but before 36 months) that was greater than or equal to the nadir weight (i.e. confirming that the weight reached a nadir and was leveling off or starting to increase). This long term weight measure was used as the dependent variables in a multiple linear regression model for clinical predictors of weight loss.

Long term weight loss: The analysis of long term weight loss was limited to the subset of patients that qualified for the short term weight loss models and had at least one follow-up weight measurement occurring 36-months after surgery. For those with multiple measurements, that weight closest to 36-months was selected and used to calculate %EBWL. This long term weight measure was used as the dependent variables in a multiple linear regression model for clinical predictors of weight loss.

Regression analysis: A manual, forward, stepwise approach was used to identify the set of clinical variables that independently predicted each temporal weight loss phase. A subset of variables were selected for consideration in the multivariate model after

evaluating the strength of associations in preliminary models (univariate model p-value<0.10), their correlations with other variables already under consideration, and, in the case of categorical predictor variables, the frequency of occurrence. For model building, variables that had previously been associated with RYGB weight loss (i.e. in other published work) and had significant univariate associations ($p<0.05$) were added to initial multivariate models. Other variables were added in a stepwise fashion based on strength of association ($p<0.05$) until none of the remaining variables were significant when added to the model.

Instead of omitting data via listwise deletion of patients with missing data for laboratory result and survey variables, the statistical models included additional variables for whether or not the lab test/survey was conducted. This provided a method for estimating the effect of having (or not having) a resulted test while simultaneously evaluating the relationship between the test/survey result and the outcome. Continuous covariates were checked for non-linearity by categorizing the data into groups (for example, using quartiles of the distribution or scientifically valid cutoff values). Effect modifiers were evaluated by testing for significance of interaction terms between clinical variables. Since all outcome measures were approximately normally distributed, parametric statistical methods were appropriate for use. All tests were two-sided and $p< 0.05$ was considered significant. SAS version 9.2 (SAS Institute, Cary, NC) was used for statistical analyses.

Baseline information and demographics

- Gender
- Ethnic group
- Age
- Education
- Marital Status
- Income
- Children
- Height
- Weight at baseline
- BMI at baseline
- Waist circumference
- REE
- VO2max
- Rating from initial dietician evaluation (red, yellow, green)
- Rating from initial psychological evaluation (red, yellow, green)
- Alcohol use
- Smoking history
- Weight immediately prior to surgery
- BMI immediately prior to surgery
- Days in pre-operative program

Comorbidities on problem list from baseline to surgery using 3-digit ICD9, requiring 2% of population

- ICD_401
- ICD_272
- ICD_250
- ICD_780
- ICD_530
- ICD_311
- ICD_715
- ICD_244
- ICD_493
- ICD_724
- ICD_722
- ICD_300
- ICD_477
- ICD_346
- ICD_251
- ICD_305
- ICD_327
- ICD_296
- ICD_786
- ICD_729
- ICD_782
- ICD_309
- ICD_790
- ICD_719
- ICD_564
- ICD_256
- ICD_414
- ICD_553
- ICD_354
- ICD_789
- ICD_726
- ICD_784
- ICD_269
- ICD_592
- ICD_427
- ICD_626
- ICD_787
- ICD_268
- ICD_627
- ICD_429
- ICD_625
- ICD_276
- ICD_794
- ICD_274
- ICD_728
- ICD_357
- ICD_785
- ICD_307
- ICD_796
- ICD_428

Medications on reconciliation list from baseline to 1 month prior to surgery using subclass, requiring 2% of population

- Biguanides
- NSAID
- PPI
- SSRI
- Statins
- OpioidAgonist
- OpioidCombo
- OilSolVit
- ACE
- Salicylates
- Sympath
- BBCS
- H2
- LoopDiur
- ThyroidHorm
- AnalgOther
- MultiVit
- Insulin
- AntihistNonsed
- Calcium
- Thiazides
- Benzod
- MuscleRelax
- AntiHTNcomb
- NasalSteroids
- AnticonvMisc
- SNRI
- Sulfonylureas
- InsSensAgents
- CCB
- Potassium
- Glucocort
- ARB
- Cough_Cold_AllComb
- AnorexNonAmph
- AntidepressMisc
- MultiVitMinerals
- CorticTopical
- WaterSolubleVitamins
- Heparin
- Azithromycin
- Aminopenicillins
- NonBarbitHypnotics
- SteroidInhalants
- LeukotrieneModulators
- Tricyclic
- AntifungalsTopical
- Iron
- SmokingDeterrents
- ComboContraceptOral
- FibricAcid
- Fluoroquinolones
- Nitrates
- SerotoninAgonists
- AntiInfectiveMiscCombo
- Cephalosporins1stGen
- UrinaryAntispasmodics
- ModifiedCyclics
- PenicillinCombo
- DiureticCombo
- Tetracyclines
- AntiemetAnticholinergic
- AnticonvulsantsBenzod
- PlateAggrInhibitors
- Coumarin
- AntihyperlipidCombo
- PotSparingDiuretics
- AntiObesityAgents
- SurfactantLaxatives
- AntianxietyAgentsMisc
- ImidazoleRelAntifungal
- GoutAgents
- AntiparkinDopaminergic
- Cobalamins
- Dibenzapines
- Progestins
- IntesCholAbsorptionInhib
- Antitussives
- AntihistPhenothiazines
- Clarithromycin
- UlcerTherapyCombo
- Estrogens
- ProgestContratInjectable
- FolicAcidFolates
- BronchoAnticholinergics
- BulkLaxatives
- AntiInfectiveAgentsMisc
- AntiadrenergicAntiHTN
- BBNS
- GastrointestlStimulants
- AnalgesicCombo
- IncretinMimetAgGLP1

Labs prior to surgery found in >50% of population

- glucose
- insulin
- hba1c
- bun
- sodium
- potassium
- CHLORIDE
- CO2
- creat
- calcium
- GFR
- WBC
- RBC
- HEMOGLOBIN
- HCT
- MCV
- MCH
- MCHC
- RDW
- PLATELET
- TSH
- TRIG
- CHOL
- HDL
- LDL
- CholHDLRat
- ALT
- AST
- AlkPhos
- TotBili
- MPV
- AnionGap
- Ferritin
- Iron
- IBC
- TransSat
- PTH
- FolicAcid
- Vitamin D 25 OH D2
- Vitamin D 25 OH D3
- Vitamin D 25 TOTAL
- Creatinine, RD Urine
- Protein, RD Urine
- Prot/Creat Ratio
- Zinc level

Survey scores and individual item responses collected prior to surgery

- BDI_cognitive
- BDI_somatic
- BDI_total
- QOL_PFScore
- QOL_SEScore
- QOL_SEXScore
- QOL_PUBScore
- QOL_WKScore
- QOLtotalscore
- FAMEI
- FAMC
- EP_binge_type
- WLR_totatt
- WLR_totcues
- WLR_totemot
- WLR_totcont
- WLR_totbep
- WLR_totex
- Habits-IMPORTANCE
- Habits-READINESS

Perioperative information

- Surgeon
- Access (Lap versus Open)

Liver Pathology

- Steatosis
- Lobular inflammation
- Perivenual fibrosis
- Portal fibrosis
- Bridging fibrosis
- Cirrhosis
- Ballooning
- Iron

Table S1: Descriptive summary of the %EBWL for each of the weight loss phases.

Time	N	Mean (SD)	Median	[Q1, Q3]	[Range]
Early weight loss	2365	64.7 (19.8)	62.9	[50.8, 76.1]	[-9.4, 185.3]
Weight loss nadir	1369	76.8 (24.5)	75.1	[59.3, 92.8]	[7.4, 180.5]
Long term weight loss	857	61.3 (26.9)	59.4	[41.9, 78.9]	[-26.3, 173.8]

Table S2: Significant predictors of worse outcome (i.e. lower early weight loss, lower weight loss nadir, higher weight regain) after controlling for baseline BMI.

	Early weight loss	Weight loss nadir	Long term weight loss
Demographics			
Age	Older	Older	Older
Gender		Male	Male
income	Lower		
Smoking history	Non-smoker		Non-Smoker
Baseline measures			
Time from baseline to surgery	More time	More time	
Pre-surgical weight loss	Lower	Lower	
Open versus laparoscopic	Open	Open	Open
BMI at baseline	Higher	Higher	Higher
Diet light status	Yellow/Red		
REE		Higher	
Waist circumference	Higher	Higher	Higher
Pathology			
Ballooning		Any	
Bridging Fibrosis	Any	Any	
Cirrhosis	Any	Yes	
Lobular Inflammation		Any	
Perivenular Fibrosis	Any	Any	Any
Portal Fibrosis	Any	Any	
Steatosis		Any	Any
Any fibrosis (2+)	Any	Any	Any

Table S3: Significant predictors of worse outcome (i.e. lower early weight loss, lower weight loss nadir, higher weight regain) after controlling for baseline BMI.

	Early weight loss	**Weight loss nadir**	**Long term weight loss**
Co-morbidities			
ICD_250 – diabetes	Yes	Yes	Yes
ICD_272 – lipids	Yes	Yes	Yes
ICD_346 – migraine		No	No
ICD_357 – toxic neuropathy	Yes	Yes	
ICD_401 – hypertension	Yes	Yes	
ICD_414 – ischemic heart	Yes	Yes	
ICD_427 – cardiac dysrhythmias	Yes		
ICD_429 – other heart complication	Yes	Yes	
ICD_530 – disease of esophagus		Yes	
ICD_715 – osteoarthrosis	Yes		
ICD_719 – other joint disorder		No	
ICD_722 – intervertebral disc disorder	Yes		
ICD_724 – Other back disorder			No
ICD_780 – General symptoms		Yes	
ICD_786 – respiratory symptoms	Yes		
Number of co-morbidities	More		

Table S4: Significant predictors of worse outcome (i.e. lower early weight loss, lower weight loss nadir, higher weight regain) after controlling for baseline BMI.

	Early weight loss	Weight loss nadir	Long term weight loss
Medications			
med_ACE		Yes	
med_AnorexNonAmph	Yes		
med_AntidepressMisc		No	No
Med_AntifungalTopical	Yes		
med_AntihistPhenothiazines		No	No
med_AntiHTNcomb	Yes	Yes	
med_AntiObesityAgents	Yes		
Med_Antipark	Yes		
med_ARB		Yes	
med_BBCS	Yes	Yes	
Med_Benzodiazepine			Yes
med_Biguanides	Yes	Yes	Yes
med_Clarithromycin			No
Med_ComboContraceptOral	No		
med_Coumarin	Yes		
Med_Dipenzezapine			No
Med_Diuretics	Yes		
Med_Fluoroquinolones			No
Med_Glucocorticoid		No	No
Med_Heparin			No
med_InsSensAgents	Yes	Yes	Yes
med_Insulin	Yes	Yes	
Med_ IntestCholAbsorptionInhib	Yes		
med_LoopDiur	Yes	Yes	
Med_ModifiedCyclic			No
med_MultiVit	Yes	Yes	
med_MuscleRelax		Yes	No
Med_Nitrates	Yes		
Med_OpioidCombo	Yes		No
Med_plateAggrInhibitors	Yes		
med_Potassium	Yes	Yes	Yes
med_Salicylates	Yes	Yes	
med_SerotoninAgonists		No	
Med_SSRI	Yes		
med_Statins	Yes	Yes	
med_Sulfonylureas	Yes	Yes	Yes
med_SurfactantLaxatives	Yes	Yes	
Med_Thyroid	Yes		Yes
Med_tricyclic	Yes		No
Med_urinaryAntispasmodics	Yes		
Number of meds	More	More	

Table S5: Significant predictors of worse outcome (i.e. lower early weight loss, lower weight loss nadir, higher weight regain) after controlling for baseline BMI.

	Early weight loss	Weight loss nadir	Long term weight loss
Labs			
AlkPhos	Higher		
ALT		Higher	
AST		Higher	
Bun	Higher	Higher	
CHLORIDE	Lower	Lower	
CholHDLRat	Lower	Lower	
CO2	Higher	Higher	
Creatinine	Higher		
Ferritin	Lower		
GFR	Lower		
Glucose	Higher	Higher	Higher
HbA1c	Higher	Higher	Higher
HDL	Higher		
HEMOGLOBIN	Lower		
Insulin		Higher	Higher
Iron		Lower	Lower
LDL	Lower	Lower	
MCHC	Lower		
MPV	Lower		
Platelet		Lower	Lower
Potassium	Higher		
PROTEINCREATRATIO	Higher	Higher	Higher
PROTEINRDURINE	Higher	Higher	Higher
PTH			Lower
RBC	Lower		
RDW	Higher		
Socium			Lower
TotBili	Higher	Higher	
TransSat		Lower	
ZINCLEVEL	Lower		

Table S6: Significant predictors of worse outcome (i.e. lower early weight loss, lower weight loss nadir, higher weight regain) after controlling for baseline BMI.

	Early weight loss	Weight loss nadir	Long term weight loss
Beck depression inventory			
Q11 – Agitation	No more agitated	No more agitated	
Q12 – Loss of interest			Not lost interest
Q15 – Loss of energy	No energy		
Q21 – Interest in sex	No change		
Cognitive subscore			Higher score
IW-QOL total score			
PF total score	Lower PF		
PF Score Q1	Lower PF	Lower PF	
PF Score Q2	Lower PF		
PF Score Q3	Lower PF		
PF Score Q4	Lower PF		
PF Score Q6	Lower PF		
PF Score Q7	Lower PF		Lower PF
PF Score Q8	Lower PF		
PF Score Q9	Lower PF		
PUB total score	More distress	More distress	
PUB Score Q2	More distress		
PUB Score Q3	More distress		
PUB Score Q4	More distress		
WK Score Q1	Less work		
FECIS survey			
Q4 – Family faults friends		Never	
Q11 – If upset, family upset		Almost always	
Weight loss readiness test			
Q1 – motivated to lose weight	Less motivated	Less motivated	Less motivated
Q2 – certain to stay committed	Less certain		
Total exercise score	Less exercise		
Q22 – exercise brings positivity	More negative		
Habits survey			
Q3A – increase protein important		Very important	
Q4A – follow dietician important	Not important		
Q4B – follow dietician confident	Not confident		
Eating Patterns survey			
Q4F – no planned meal times			Yes

Table S7: Significant predictors of less weight loss in the preliminary models for all three weight loss phases (i.e. p-value<0.05 after controlling for baseline BMI).

	Direction of association the predicts less weight loss
Demographics	
Age	Older
Baseline measures	
Open versus laparoscopic	Open
BMI at baseline	Higher
Waist circumference	Higher
Pathology	
Perivenular fibrosis	Present
Any type of fibrosis	Present
Co-morbidities	
ICD 250.** – diabetes	Active disease present
ICD 272.** – lipids	Active disease present
Medications	
Biguanides	Active use of medication
Insulin Sensitizing Agents	Active use of medication
Potassium Supplementation	Active use of medication
Sulfonylureas	Active use of medication
Labs	
Glucose	Higher
HbA1c	Higher
Iron deficiency*	More deficient
Protein/creatinine ratio	Higher
Weight loss readiness test	
Q1 – motivated to lose weight	Less motivated

*Iron deficiency as measured by lab tests including serum iron, serum ferritin, or red cell distribution width

Regression equations from early weight loss and weight loss nadir

The equation to determine the predicted amount of early %EBWL is:

6-month %EBWL = 58.3 + 43.3*BMI35 + 23.1*BMI40 + 8.9*BMI50 – 8.9*PreEWL1 – 6.3*PreEWL2 – 6.5*PreEWL3 – 5.0*PreEWL4 – 5.3*open – 2.0*age40 – 4.4*age50 – 7.4*age60 + 6.0*waist44 + 2.8*waist45 + 0.7*waist50 – 0.3*waist55 – 3.8*preoptime2 – 1.8*CholHDL1 + 0.1*CholHDL2 + 2.3*smoker – 0.3*ComorbBurden – 1.9*InsSensAgent – 1.5*PubDistress – 3.0*anisocytosis + 2.5*commitment – 8.8*fibrosis*BMI35 – 8.8*fibrosis*BMI40 + 2.2*fibrosis*BMI50 + 2.2*fibrosis*BMI60.

where, BMI35 = 1 if baseline BMI 35-39.9, else = 0
BMI40 = 1 if baseline BMI 40-49.9, else = 0
BMI50 = 1 if baseline BMI 50-59.9, else = 0
BMI60 = 1 if baseline BMI 60+, else = 0
PreEWL1 = 1 if had pre-surgical excess weight gain, else = 0
PreEWL2 = 1 if had pre-surgical EWL 0-5%, else = 0
PreEWL3 = 1 if had pre-surgical EWL 5-10%, else = 0
PreEWL4 = 1 if had pre-surgical EWL 10-19%, else = 0
open = 1 if had open surgical approach, else = 0
age40 = 1 if age 40-49, else = 0
age50 = 1 if age 50-59, else = 0
age60 = 1 if age 60+, else = 0
waist44 = 1 if waist circumference <45, else = 0
waist45 = 1 if waist circumference 45-49, else = 0
waist50 = 1 if waist circumference 50-54, else = 0
waist55 = 1 if waist circumference 55-59, else = 0
preoptime2 = 1 if time from baseline to surgery > 2 years, else = 0
CholHDL1 = 1 if cholesterol HDL ratio <4, else = 0
CholHDL2 = 1 if cholesterol HDL ratio 4 – 4.9, else = 0
smoker = 1 if current smoker or had history of smoking, else = 0
ComorbBurden = number of co-morbidities
InsSensAgent = 1 if insulin sensitizing agent during pre-op period, else = 0
PubDistress = 1 if had low public distress score, else = 0
anisocytosis = 1 if had red cell distribution width >15%, else = 0
commitment = 1 if extremely certain of commitment to program, else = 0
fibrosis = 1 if had any fibrosis on liver pathology, else = 0

The equation to determine the predicted weight loss nadir:

%EBWL nadir = 75.1 + 40.8*BMI35 + 22.4*BMI40 + 8.7*BMI50 – 10.3*PreEWL1 – 6.5*PreEWL2 – 7.0*PreEWL3 – 6.1*PreEWL4 – 4.4*Diabetes1 – 8.4*Diabetes2 – 3.7*age40 – 5.0*age50 – 8.6*age60 – 3.2*open + 6.5*waist44 + 0.4*waist45 – 1.7*waist50 – 1.7*waist55 + 6.2*bupropion – 4.6*IronDef – 3.9*CholHDL1 – 4.3*CholHDL2 + 5.1*motivated – 2.8*hypertension – 10.6*fibrosis*BMI35 – 10.6*fibrosis*BMI40 – 1.6*fibrosis*BMI50 – 1.6*fibrosis*BMI60.

where, BMI35 = 1 if baseline BMI 35-39.9, else = 0
BMI40 = 1 if baseline BMI 40-49.9, else = 0
BMI50 = 1 if baseline BMI 50-59.9, else = 0
BMI60 = 1 if baseline BMI 60+, else = 0
PreEWL1 = 1 if had pre-surgical excess weight gain, else = 0
PreEWL2 = 1 if had pre-surgical EWL 0-5%, else = 0
PreEWL3 = 1 if had pre-surgical EWL 5-10%, else = 0
PreEWL4 = 1 if had pre-surgical EWL 10-19%, else = 0
Diabetes1 = 1 if had pre-surgical diabetes with HbA1c<9, else = 0
Diabetes2 = 1 if had pre-surgical diabetes with HbA1c 9+, else = 0
age40 = 1 if age 40-49, else = 0
age50 = 1 if age 50-59, else = 0
age60 = 1 if age 60+, else = 0
open = 1 if had open surgical approach, else = 0
waist44 = 1 if waist circumference <45, else = 0
waist45 = 1 if waist circumference 45-49, else = 0
waist50 = 1 if waist circumference 50-54, else = 0
waist55 = 1 if waist circumference 55-59, else = 0
bupropion = 1 if used bupropion during pre-surgical period, else = 0
IronDef = 1 if low transferrin saturation (male<15%, female<12%), else = 0
CholHDL1 = 1 if cholesterol HDL ratio <4, else = 0
CholHDL2 = 1 if cholesterol HDL ratio 4 – 4.9, else = 0
Motivated = 1 if extremely motivated compared to prior attempts, else = 0
Hypertension = 1 if had pro-surgical hypertension diagnosis, else = 0
fibrosis = 1 if had any fibrosis on liver pathology, else = 0

Figure S1. Scatterplot matrix for correlations among short-term, nadir, and long-term weight loss outcomes. As expected, early and nadir, and nadir and long-term are more highly correlated than early and long-term.

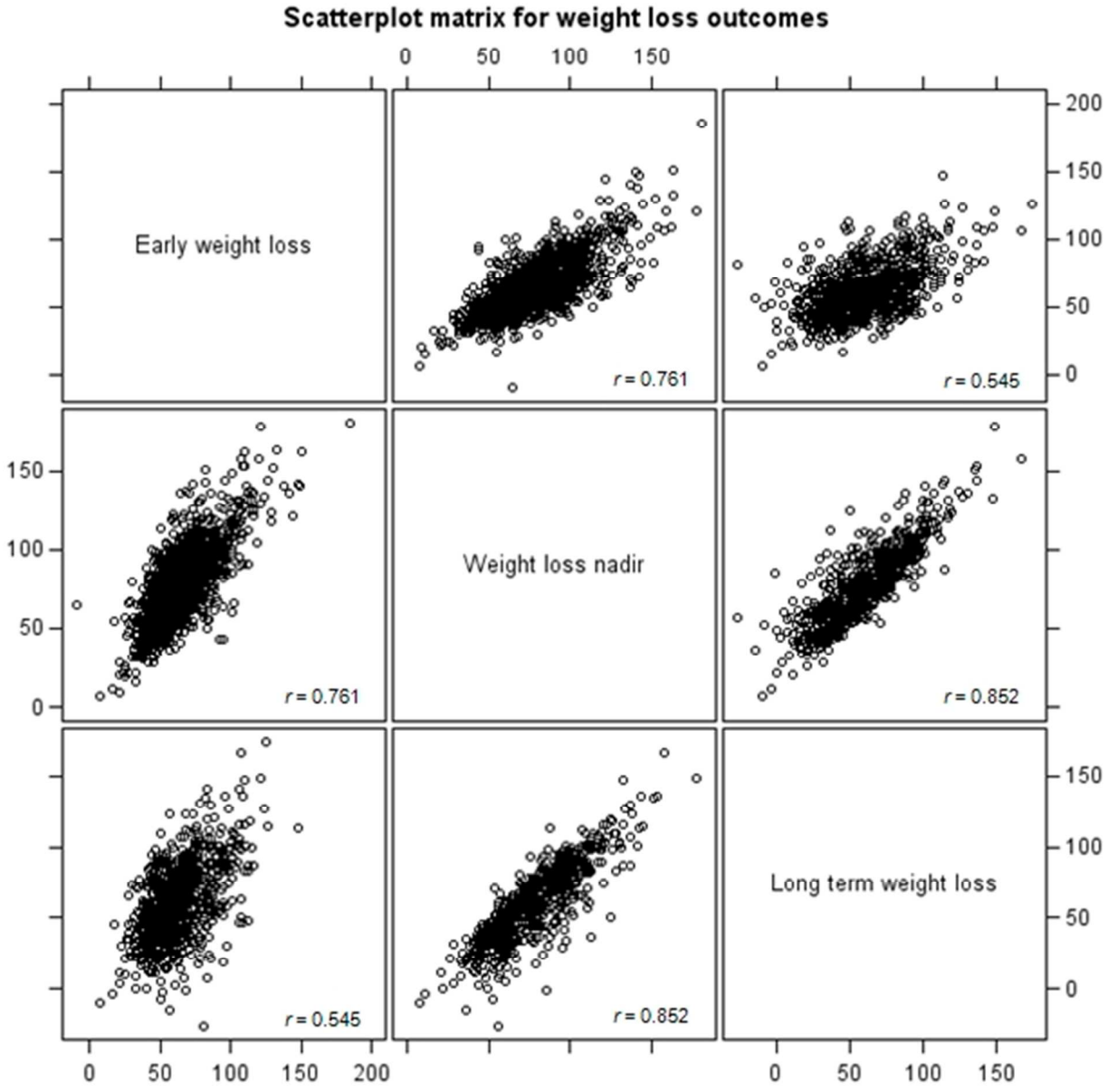

Figure S2. Residual plot for long-term weight loss equation. A residual was calculated as the difference between the predicted value for %EBWL and the actual value observed for each patient. This residual was then plotted on the y-axis against the predicted value on the x-axis. The plot indicates that the model is homoscedastic, i.e., that the variation in residuals is independent of the predicted value and that the model is unbiased, i.e., the values of the residuals are independent of the predicted values.