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Effect of 8 Weeks of Supervised Overfeeding on Eating Attitudes and Behaviors, Eating Disorder Symptoms, and Body Image: Results from the PROOF and EAT studies

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Trial Registration:

The PROOF Study (ClinicalTrials.gov Identifier NCT00565149); the EAT Study (ClinicalTrials.gov Identifier NCT01672632)

INTRODUCTION

Overfeeding studies have been used to mimic the path to obesity, providing insight into the mechanisms through which weight gain and obesity might lead to the associated adverse metabolic effects.¹ A large body of evidence has accumulated in the past 70 years on the physiological and metabolic effects of experimental overfeeding, yet only a few studies have assessed overfeeding effects on eating behaviors and psychological constructs.

Some studies have examined the effect of short-term overfeeding on subsequent food intake,^{2,3} and considerable individual variability in the compensatory responses of food intake after overfeeding has been shown.⁴ This suggests inadequate appetite control mechanisms post-overfeeding and that intentional cognitive restraint is needed to regulate energy balance. Further, short-term overfeeding has been shown to lead to reduced hunger and increased satiety.⁵ Evidence for the effects of long-term overfeeding on eating behaviors is limited and the effects on psychological constructs such as eating disorder symptoms and body image are unknown. Understanding how long-term overfeeding and the associated weight gain affect participants' psychological/behavioral health as well as eating attitudes and behaviors is important to understand possible deleterious effects of overeating and weight gain.

We investigated the effects of eight weeks of supervised overfeeding on eating attitudes and behaviors, eating disorder symptoms, and body image, utilizing two datasets: (1) the Protein Overfeeding (PROOF) Study⁶ and (2) the Fat Cell Size, Overfeeding and Ectopic Fat (EAT) Study⁷. We hypothesized overfeeding would result in decreased hunger and desire to eat. As selective food deprivation has been shown to increase cravings for the avoided foods,⁸ we further hypothesized that overfeeding would by implication decrease food cravings. Finally, because body dissatisfaction is higher in individuals with obesity compared to those with a healthy weight,⁹ and because weight loss has been shown to improve body image

disturbance,¹⁰ we hypothesized that the overfeeding-related weight gain would lead to increases in cognitive/behavioral symptoms of eating disorders, including body dissatisfaction.

METHODS

The PROOF (ClinicalTrials.gov Identifier NCT00565149) and EAT (ClinicalTrials.gov Identifier NCT01672632) studies were approved by Pennington Biomedical Research Center's (PBRC) Institutional Review Board and recruited participants from the Baton Rouge (Louisiana) community. All participants provided written informed consent before participating in each study.

The PROOF Study

PROOF aimed to determine the effect of overfeeding 40% above energy balance with a low or high vs. normal protein diet over 8 weeks on body weight, body composition, and energy expenditure.⁶ Participants were healthy, weight-stable men or women aged 18-35 years with a body mass index (BMI) of 19-30 kg/m². Smoking, a history of eating disorders, as well as pregnancy and breastfeeding were exclusion criteria.⁶ After a weight stabilization period (2-4 weeks), participants were randomized to one of three diets containing 5% of energy from protein (low-protein diet, LPD), 15% (normal-protein diet, NPD), or 25% (high-protein diet, HPD), and participants stayed in PBRC's inpatient unit for the entire duration of the 8-week overfeeding period. All diets provided ~41% carbohydrates. Participants were overfed 40% (~954 kcal/day) above individual baseline energy requirements determined during the weight stabilization period (9-day doubly labeled water [DLW] measure with feeding to energy balance). All meals⁶ were provided by PBRC's metabolic kitchen and consumed under supervision to ensure all foods were eaten. After the inpatient overfeeding period, participants returned to free-living conditions and only came back to the Center for two follow-up assessments at week 16 (W16-Post) and week 24 (W24-Post).

The EAT Study

The EAT Study aimed to determine the effect of 40% high-fat overfeeding on adipose and skeletal muscle characteristics, ectopic fat accumulation, insulin sensitivity, and metabolic flexibility.⁷ The study included healthy, weight-stable adults aged 18-40 years with a BMI of 22.0-32.0 kg/m². Smoking, a history of eating disorders, pregnancy, and breastfeeding were exclusion criteria.⁷ After determining baseline energy requirements (2-week DLW measure with feeding to energy balance during the second week,¹¹ published in detail previously⁷) and undergoing baseline measurements, participants began the 8-week overfeeding regimen. The 40% overfeeding prescription was based on individual baseline energy requirements. All meals were prepared by PBRC's metabolic kitchen,⁶ and the diet was composed of 41% carbohydrates, 44% fat, and 15% protein. Participants consumed all meals in the PBRC inpatient unit under supervision but were free-living outside of mealtimes.⁷ After the overfeeding period, participants were offered voluntary weight loss treatment (behavioral therapy), and they returned to the Center for three follow-up assessments at week 12 (W12-Post), week 20 (W20-Post), and week 32 (W32-Post).

Outcome Measures

In PROOF, eating attitudes and behaviors, eating disorder symptoms, and body image were assessed at baseline, week 4 (W4), week 8 (W8 [at the end of the overfeeding period]), W16-Post, and W24-Post. In EAT, outcomes were assessed at baseline, W4, W8 (one day after completion of overfeeding), W12-Post, W20-Post, and W32-Post.

Eating Attitudes and Behaviors

Eating attitudes and behaviors were assessed with the Eating Inventory (EI),¹² Food Craving Inventory (FCI),¹³ and retrospective Visual Analog Scales (VAS).¹⁴

The EI is a validated measure of cognitive restraint, disinhibition (the tendency to overeat), and hunger.¹⁵ For PROOF, Cronbach's alpha coefficients were 0.98 (restraint), 0.98 (disinhibition),

and 0.96 (hunger). For EAT, Cronbach's alpha coefficients were 0.91 (restraint), 0.93 (disinhibition), and 0.88 (hunger).

The FCI is a validated measure of cravings for 33 different foods. A total cravings score is generated, as well as scores reflecting cravings for high-fat foods, carbohydrates and starches, sweets, fast-food fats, and fruits and vegetables.¹³ For PROOF, Cronbach's alpha coefficients were 0.87 (high-fat foods), 0.80 (carbohydrates/starches), 0.94 (sweets), 0.83 (fast-food fats), 0.86 (fruits/vegetables), and 0.96 (total score). For EAT, Cronbach's alpha coefficients were 0.91 (high-fat foods), 0.82 (carbohydrates/starches), 0.83 (sweets), 0.77 (fast-food fats), 0.85 (fruits/vegetables), and 0.95 (total score).

Retrospective VAS (previously validated^{14,16}) measured subjective ratings of appetite over the previous week. VAS were completed on a computer by adjusting the cursor on a 100-point sliding scale anchored by "not at all" and "extremely." VAS assessed how difficult it was to eat all food served during the past week, fullness of stomach, overall hunger, prospective food consumption, satisfaction, desire to eat, and thirst.

Eating Disorder Symptoms

The validated¹⁷ Multifactorial Assessment of Eating Disorder Symptoms (MAEDS) assessed six eating disorder symptoms: depression, binge eating, purgative behavior, fear of fatness, restrictive eating, and avoidance of forbidden foods.¹⁸ Gender-specific norms produced t-scores for each subscale. T-scores > 70 are considered high. For PROOF, Cronbach's alpha coefficients were 0.84 (depression), 0.78 (binge eating), 0.61 (purgative behavior), 0.60 (fear of fatness), 0.59 (restrictive eating), and 0.85 (avoidance of forbidden foods). For EAT, Cronbach's alpha coefficients were 0.81 (depression), 0.71 (binge eating), 0.60 (purgative behavior), 0.80 (fear of fatness), 75 (restrictive eating), and 0.89 (avoidance of forbidden foods).

Body Image

Body image was assessed using the Body Shape Questionnaire (BSQ)¹⁹ and the Body Morph Assessment (BMA) Version 2.0.²⁰

The BSQ, an attitudinal measure, is a 34-item questionnaire evaluating body image and body dissatisfaction. Items assess concerns about body shape over the past four weeks.^{19,21}

Cronbach's alpha coefficients for the BSQ were 0.86 for PROOF and 0.90 for EAT.

The BMA, considered a perceptual body image measure, is a computerized and validated body image assessment quantifying an individual's current (test-retest reliability: $r=.91$, $p<.001$), ideal ($r=.81$, $p<.001$), and acceptable ($r=.66$, $p<.001$) body size.²⁰ Body image disturbance (body dissatisfaction, $r=.89$, $p<.001$) is calculated by subtracting ideal body size from current body size.

Statistical Analyses

We assessed changes in outcome measures from baseline to W4, W8, W16-Post, and W-24-Post (PROOF); and baseline to W4, W8, W12-Post, W20-Post, and W32-Post (EAT). Further, we assessed changes from W8 through follow-up in each study (post-overfeeding change). To test for significant changes from baseline to each time point, and from W8 to the follow-up assessments, we used repeated-measures ANOVAs with week as main effect and baseline of the outcome as a covariate. Correlations between time points within subjects were accounted for. An unstructured covariance pattern was used. We also included sex and race (White vs African American) as covariates, but they were removed because sex (PROOF; all $p\geq.056$, EAT: all $p\geq.111$) and race (PROOF all $p\geq.058$, EAT: all $p\geq.151$) were not significant covariates and did not affect the results. The model for PROOF additionally included week, diet, and the week*diet interaction as covariates. The analysis was intent-to-treat utilizing all available time points for each participant. The denominator degrees of freedom method proposed by Kenward and Roger²² was used to accommodate for unbalanced data. Estimation at each time point used

the restricted maximum likelihood method. We used Tukey-Kramer adjustment to correct for multiple comparisons, and only results that were significant after adjustment are reported. Results are presented as mean (standard error [SE]) and effect sizes are provided for the overall effect (partial eta squared [η^2]: 0.01=small effect, 0.06=medium, and 0.14=large) and for the change from baseline values (Cohen's d [d]: 0.2=small effect, 0.5=medium, and 0.8=large).²³ In additional analyses, simple linear regression models assessed the association between overfeeding-related changes in weight (kg), fat mass (kg), and fat-free mass (kg) and changes in outcomes during overfeeding. Statistical analyses were performed using SAS version 9.4 (SAS Institute, Cary, NC) with the significance (alpha) level set to .050 (two-sided).

RESULTS

The PROOF Study

Participant characteristics

PROOF enrolled 28 participants, but three dropped out; hence, 25 were included in the overfeeding analyses (14 and 12 participants provided data at W16-Post and W24-Post, respectively). Baseline characteristics of the included participants are displayed in **Table 1**. Participants who dropped out did not differ significantly from those who remained in the study regarding sex ($p=.999$), race ($p=.387$), age ($p=.491$), weight ($p=.493$), or BMI ($p=.090$). Additionally, participant baseline characteristics per diet group are provided in **Supplemental Table 1**. On average, the whole sample gained 5.3 kg (95% confidence interval [CI]: 4.3 to 6.3) of weight during overfeeding.⁶ During follow up, weight remained higher than baseline, with mean increases of 3.5 kg (95 CI: 2.6 to 4.4) at W16-Post and 2.3 kg (95% CI: 1.4 to 3.2) at W24-Post (all $p<.001$), whereby only the weight at W24-Post ($p<.001$) but not at W16-Post ($p=.090$) was decreased compared to W8 (**Figure 1I**).

Effect of Overfeeding on Eating Attitudes and Behaviors

Table 2 shows changes in outcome variables for the PROOF study (including omnibus and posthoc test statistics), with all three protein groups combined. Herein, for both PROOF and EAT, we will only discuss results from post hoc tests (i.e., changes from baseline to each time point and change from W8 to the follow-up assessments) for those outcome variables where the overall (omnibus) effect was significant. **Supplemental Table 2** displays change in outcomes for each of the three diet groups.

There was no treatment effect on restraint, disinhibition, and hunger, assessed by the EI (all omnibus $p \geq .334$).

Cravings (FCI) for sweets (W8: $d = -0.6$, $p = .005$), carbohydrates (W4: $d = -0.4$, $p = .048$; W8: $d = -0.7$, $p = .002$), fats in fast-food (W8: $d = -0.6$, $p = .010$), and total cravings decreased (W8: $d = -0.6$, $p = .005$) during overfeeding. At W16-Post, cravings for carbohydrates ($d = 1.0$, $p = .001$) and the total score ($d = 0.8$, $p = .007$) were increased relative to W8, reversing the overfeeding-related decreases. Cravings for fruits/vegetables were not significantly different during overfeeding compared to baseline, however, they were increased at W16-Post ($d = 1.0$, $p = .001$).

The VAS results indicate that fullness of stomach (W4: $d = 0.7$, $p = .005$; W8: $d = 0.7$, $p = .002$) increased and hunger (W4: $d = -0.7$, $p = .006$; W8: $d = -0.5$, $p = .030$), desire to eat (W4: $d = -0.6$, $p = .017$; W8: $d = -0.7$, $p = .008$), and thirst (W4: $d = -0.5$, $p = .023$; W8: $d = -0.5$, $p = .038$) decreased during overfeeding. After overfeeding (W16-Post), desire to eat increased ($d = 0.7$, $p = .004$) compared to W8, reversing the overfeeding-related changes.

Effect of Overfeeding on Eating Disorder Symptoms

Depression (W4: $d = 0.6$, $p = .004$; W8: $d = 0.6$, $p = .003$; **Supplemental Figure 1A**) and fear of fatness (W8: $d = 0.6$, $p = .008$; **Supplemental Figure 1G**), assessed by the MAEDS, increased during overfeeding, while binge eating (W8: $d = -0.5$, $p = .028$; **Supplemental Figure 1C**) decreased. Binge eating decreased progressively from baseline, with the greatest decrease at

W24-Post ($d=-0.7$, $p=.016$). The overfeeding-related increase in fear of fatness subsided from W8 to W16-Post ($d=-0.5$, $p=.040$; **Supplemental Figure 1G**).

Effect of Overfeeding on Body Image

Concerns about body image, assessed via the BSQ, were not significantly different during overfeeding or follow-up compared to baseline (omnibus $p=.054$).

The BMA (**Supplemental Table 3**) showed increases in current body size at W4 ($d=0.6$, $p=.009$), W8 ($d=1.2$, $p<.001$), and W16-Post ($d=0.7$, $p=.026$) (**Figure 1A**). Ideal and acceptable body size were not significantly different at any time point (both omnibus $p\geq.147$). Consequently, the increases in current body size translated into increases in body dissatisfaction at W4 ($d=0.4$, $p=.044$), W8 ($d=1.1$, $p<.001$), and W16-Post ($d=0.9$, $p=.004$) (**Figure 1G**).

The EAT Study

Participant characteristics

EAT enrolled 40 adults. Five 5 dropped out during the first week; hence 35 participants are included in the overfeeding analyses (33, 32, and 29 participants provided data at W12-Post, W20-Post, and W32-Post, respectively). Baseline characteristics of the included participants are shown in **Table 1**. Participants who dropped out did not differ significantly from those who remained in the study regarding sex ($p=.257$), race ($p=.928$), age ($p=.842$), weight ($p=.667$), or BMI ($p=.225$). On average, participants gained 6.9 kg (95% CI: 6.2 to 7.6) of weight during overfeeding. During follow up, weight remained increased compared to baseline with mean increases of 5.5 kg (95% CI: 4.6 to 6.4) at W12-Post, 3.2 kg (95% CI: 2.3 to 4.1) at W20-Post, and 2.8 kg (95% CI: 1.8 to 3.7) at W32-Post (all $p<.001$). Only the weight at W20-Post ($p<.001$) and W32-Post ($p<.001$) but not at W12-Post ($p=0.14$) was decreased compared to W8 (**Figure 1J**).

Effect of Overfeeding on Eating Attitudes and Behaviors

Table 3 shows outcome change during the EAT intervention, including omnibus and posthoc test statistics.

Hunger, assessed by the EI, was decreased at W4 ($d=-0.4$, $p=.035$) but no other time point (all $p\geq.079$). Restraint and disinhibition were not significantly different during the overfeeding period (both omnibus $p\geq.053$).

Only cravings (FCI) for carbohydrates decreased at both overfeeding time points (W4: $d=-0.7$, $p<.001$; W8: $d=-0.4$, $p=.028$). Cravings for fast-food fats ($d=-0.4$, $p=.011$) and total cravings ($d=-0.5$, $p=.005$) were decreased at W4 but returned to baseline by W8. Fruit/vegetable cravings increased at W32-Post ($d=0.4$; $p=.043$) and were increased relative to W8 at all follow-up assessments with a Cohen's d of 0.4 ($p=.004$) at W12-Post, 0.4 ($p=.013$) at W20-Post, and 0.5 ($p=.047$) at W32-Post.

The VAS results indicate that at W4 participants reported more difficulties to eat all foods ($d=1.1$, $p<.001$) and increased fullness of stomach ($d=1.1$, $p<.001$). Also, at W4, participants reported decreases in overall hunger ($d=-1.2$, $p<.001$), desire to eat ($d=-1.2$, $p<.001$), and prospective food consumption ($d=-0.5$, $p=.005$). At W8, only difficulties to eat all foods ($d=0.6$, $p=.003$) was changed. While difficulty to eat all foods and fullness of stomach increased during overfeeding, these measures decreased during follow-up. Similarly, while overall hunger and desire to eat decreased during overfeeding, these measures increased during follow-up.

Effect of Overfeeding on Eating Disorder Symptoms

The MAEDS results indicate that participants reported increased depressive symptoms at W4 ($d=0.4$, $p=.020$) and W8 ($d=0.6$, $p=.002$; **Supplemental Figure 1B**) and increases in binge eating ($d=0.4$, $p=.017$) at W4 (**Supplemental Figure 1D**) and fear of fatness ($d=0.4$; $p=.012$) at W8 (**Supplemental Figure 1H**). The depression score decreased after overfeeding and was lower at W12-Post and W20-Post compared to W8 (both $p\leq.015$). The binge eating score

decreased continuously from W4 to W20-Post but saw an increase at W32-Post ($d=0.4$, $p=.022$) relative to baseline.

Effect of Overfeeding on Body Image

The BSQ showed increased concerns about body shape at W4 ($d=0.5$, $p<.001$) and W8 ($d=0.7$, $p<.001$). Those concerns began to decrease after overfeeding, though they were still elevated at W12-Post ($d=0.4$, $p=.013$).

The BMA (**Supplemental Table 3**) showed increases in current body size ratings at W4 ($d=0.8$, $p<.001$), W8 ($d=1.4$, $p<.001$), and W12-Post ($d=0.7$, $p<.001$; **Figure 1B**) that translated into increases in body dissatisfaction at these time points (all $p<.001$; **Figure 1H**). Body dissatisfaction was still elevated at W20-Post ($p=.037$); however, compared to W8, body dissatisfaction at W20-Post ($d=-0.8$, $p=.005$) and W32-Post ($d=-0.8$, $p=.006$) had decreased.

Results for the associations between overfeeding-related changes in body weight, fat mass, and fat-free mass and changes in outcome variables are provided in **Supplemental Table 4** (PROOF) and **Supplemental Table 5** (EAT).

DISCUSSION

We examined the effects of eight weeks of supervised overfeeding on eating attitudes and behaviors, eating disorder symptoms, and body image during two overfeeding interventions.

In line with our hypotheses, hunger decreased during the overfeeding period, as assessed with the EI (PROOF only) and VAS (both studies). Decreases in hunger and desire to eat, along with increased difficulties to eat all foods and fullness of stomach (as shown in both studies), can be expected when continuously eating in excess of energy needs³. Disinhibition and restraint (EI) did not change during overfeeding in either study. This is not surprising given the “forced” nature of the overfeeding protocols. Participants were specifically instructed and willing (inclusion criterion) to eat everything served to them even when full, to gain weight, which likely overrides

any cognitive restraint to control food intake. Similarly, disinhibition, as the tendency to overeat, is not likely to change in a situation in which regular and continuous overfeeding is specifically intended and food intake does not occur *ad libitum*. Remarkably, while difficulty to eat all foods and fullness of stomach increased during overfeeding in EAT, these measures decreased during follow-up. Similarly, in EAT, overall hunger and desire to eat decreased during overfeeding, but increased during follow-up. These changes in the opposite direction during follow-up compared to overfeeding indicate an overcompensation and suggest that eating behaviors may be affected even beyond the overfeeding period. However, we did not find the same overcompensation for PROOF but rather a return (close) to baseline values, suggesting no lasting impact of the overfeeding regimen on eating attitudes and behaviors in this study.

Cravings for many foods decreased during overfeeding in both studies, as hypothesized.

Contrary to our hypothesis, cravings for high fats did not change during overfeeding in either study. We expected fat cravings to decrease (similar to other cravings), particularly given that all diets had a relatively higher fat content (PROOF: 54% [LPD], 44% [NPD], and 34% [HPD]; EAT: 44%) compared to the standard recommendations (20-35%)²⁴ and participants were overfed by 40%, leading to a substantially increased fat intake. It has been reported that eight weeks of equicaloric high-fat (>35% of energy) dietary intake led to a decrease in fat sensitivity (i.e., the ability to sense fat in the diet),²⁵ and it can be speculated whether such a decrease in fat sensitivity occurred during high-fat overfeeding, leaving fat cravings unaffected.

The MAEDS results provided mixed support for the hypothesis that overfeeding would increase eating disorder symptoms. Consistent with this hypothesis, depression and fear of fatness increased similarly during overfeeding in both studies, demonstrating that independent of the study setting (inpatient vs. free-living), continuous overfeeding affects participants' mood and fear of fatness negatively. Even with the overfeeding-related increases in these scales, however, scores were still close to and below the normative mean in both studies, indicating

that these measures were and remained well within normal limits. Nevertheless, in populations with higher scores at baseline, researchers should be cognizant of these possible adverse and potentially harmful effects.

Notably, binge eating (MAEDS) changed in opposite directions during overfeeding in PROOF (decrease) compared to EAT (increase) and changes in the same respective direction were seen at the end of each study's follow-up. Whether the different directionality (no sex or race effect) was caused by the different study settings, remains unclear. It is possible that the free-living setting in EAT exposed participants to more food cues outside of the supervised mealtimes and that those food cues in their habitual environment (in combination with the overfeeding) increased binge eating scores. In the inpatient setting in PROOF, participants were not exposed to any food cues outside of mealtimes and further had no interaction with their normal food environment, which may have prevented an increase in binge eating scores. This is only speculation and should be tested in follow-up studies. Interestingly, and similar to restraint (EI), restrictive eating did not change during follow-up on a group level in either study. An increase in restrictive eating during follow-up would be conceivable to compensate for the excess food intake during overfeeding and to control body weight. However, as indicated by the large range of the values for both restrictive eating (PROOF: ~33–60; EAT: ~27–93) and restraint (PROOF: ~2–20; EAT: ~1–16) during follow-up (data not shown), participants showed considerable individual variability in these factors post-overfeeding. These results extend previous findings demonstrating variability in appetitive mechanisms after overfeeding,⁴ and may explain why some individuals can compensate for excess caloric intake with a reduction in energy intake post-overfeeding, while others cannot. Overall, our results do not convincingly support the hypothesis of increased eating disorder symptoms during overfeeding as most of the MAEDS scales did not show strong signals of increased eating disorder pathology and scores remained low and well within normal ranges (PROOF: t-scores ~39–47; EAT: t-scores

~46–53). Our sample was young and included normal weight participants; hence, the sample reflected people in the general population who would be pre-disposed to the development of eating disorder symptoms, with the exception of the sample being predominantly men, and this may limit the generalizability of our findings.

Conversely, the BMA demonstrated that body dissatisfaction increased substantially and progressively during overfeeding and remained elevated up to 3 months after the overfeeding period. The effect sizes were also large and the largest observed in both studies. The stability of ideal and acceptable body size was remarkable and in line with the literature²⁰, as was the presumably accurate perception of increased current body size as a result of the weight gain in both studies. The increased body dissatisfaction well beyond overfeeding highlights the need for comprehensive treatment post-overfeeding to help people lose weight while also addressing body image dissatisfaction. The results further demonstrate the greater sensitivity of the BMA (perceptual measure) over the BSQ (attitudinal measure), which only detected participants' weight gain-related body dissatisfaction in EAT but not PROOF.

The present analysis has several strengths, including the use of two unique datasets of well-controlled, supervised, long-term overfeeding with repeated assessments during overfeeding and post-overfeeding. This allowed us to quantify changes that occur during overfeeding and weight gain, and to examine if such changes returned to baseline during the post-overfeeding period when much of the gained weight is lost. These types of investigation are important to identify possible deleterious effects of overeating and weight gain since short-term overfeeding studies produce modest weight gain and are of insufficient duration for many negative effects to manifest. Importantly, the results were consistent with results from free-living studies. For example, the present study found that depression increased during overfeeding, and periods of habitual overeating (e.g., during holidays or when on vacation) have been shown to have depressogenic effects.^{26,27} Similarly, body dissatisfaction is common with weight (re-) gain and

generally increased in individuals with overweight and obesity.^{9,28} Limitations included the lack of control groups, relatively small sample sizes, and use of an overfeeding protocol that tightly controlled how much excess food was consumed. This was necessary to test the study hypotheses, and the experimental approach also allowed the team to test what happens after overfeeding during the follow-up period. Nonetheless, this approach is not necessarily reflective of passive overconsumption and weight gain that occurs in free-living settings, though it serves as a good experimental model for research on weight gain during college and the COVID-19 pandemic, for example. Future research is needed to determine if similar changes occur when people naturally gain weight over relatively short periods of time.

CONCLUSIONS

In conclusion, eight weeks of overfeeding led to decreases in hunger, desire to eat, and food cravings, and increased depression and fear of fatness, which subsided after overfeeding. However, increases in body dissatisfaction that accompanied overfeeding/weight gain were large and remained up to 12 weeks beyond the overfeeding period. Thus, although many eating disorder symptoms were less affected by overfeeding/weight gain, the increase in body dissatisfaction was marked and clinically significant.

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Conflicts of Interest

The authors have no conflicts of interest to declare.

Author Contributions

G.A.B. (PROOF) and E.R. (EAT) obtained funding, designed the studies, and supervised data acquisition. D.Z. and C.H. performed statistical analyses, and C.H., S.N.F., J.L.D., C.K.M., J.W.A., and C.A.M. interpreted the data. C.H. drafted the manuscript and prepared tables and figures, and S.N.F., J.L.D., C.K.M., J.W.A., C.A.M., T.M.S., E.R., and G.A.B. provided critical revision of the manuscript for important intellectual content. All authors approved the final version of the manuscript.

FIGURE LEGENDS

Figure 1

Change in current, ideal, and acceptable body size and body dissatisfaction, as assessed with the Body Morph Assessment 2.0, and in body weight during the PROOF and EAT interventions: Change in Current Body Size (PROOF: Panel A, EAT: Panel B), Ideal Body Size (PROOF: Panel C, EAT: Panel D), Acceptable Body Size (PROOF: Panel E, EAT: Panel F), Body Dissatisfaction (PROOF: Panel G, EAT: Panel H), and body weight (PROOF: Panel I, EAT: Panel J). The shaded area indicates the overfeeding period.

* Significant ($p < .050$) change from baseline, † Significant ($p < .050$) change from Week 8 (the end of overfeeding). Values are means and standard error.

Supplemental Figure 1

Change in the subscales of the Multifactorial Assessment of Eating Disorder Symptoms questionnaire during the PROOF and EAT interventions: Change in Depression (PROOF: Panel A, EAT: Panel B), Binge Eating (PROOF: Panel C, EAT: Panel D), Purgative Behavior (PROOF: Panel E, EAT: Panel F), Fear of Fatness (PROOF: Panel G, EAT: Panel H), Restrictive Eating (PROOF: Panel I, EAT: Panel J), and Avoidance of Forbidden Foods (PROOF: Panel K, EAT: Panel L). The shaded area indicates the overfeeding period.

* Significant ($p < .050$) change from baseline, † Significant ($p < .050$) change from Week 8 (the end of overfeeding). Values are means and standard error.

Table 1. Baseline characteristics of participants in the PROOF and EAT studies.

	PROOF (N=25)	EAT (N=35)
Sex, n (%)		
Male	16 (64.0)	29 (82.9)
Female	9 (36.0)	6 (17.1)
Race, n (%)		
African American	16 (64.0)	14 (40.0)
White	7 (28.0)	20 (57.1)
Other	2 (8.0)	1 (2.9)
	Mean (SD)	Mean (SD)
Age (years)	24.1 (4.1)	26.7 (5.3)
Weight (kg)	74.4 (13.4)	79.6 (10.2)
BMI (kg/m ²)	25.1 (3.2)	25.5 (2.2)

Data are mean (standard deviation) unless stated otherwise.

Table 2. Baseline and change scores in eating attitudes and behaviors, eating disorder symptoms, and body image during PROOF.

	Change from Baseline						Change from the End of Overfeeding							
	Mean	(SE)	η^2	<i>d</i>	df	<i>F</i>	<i>t</i>	<i>p</i>	Mean	(SE)	<i>d</i>	df	<i>t</i>	<i>p</i>
Eating Inventory														
<i>Restraint</i>			0.02		47	0.36		.785						
Baseline	4.2	(0.8)												
Δ Week 4	0.4	(0.4)		0.2	47		1.03	.209						
Δ Week 8	0.8	(0.4)		0.4	47		1.80	.371						
Δ Week 16 (Post)	1.0	(0.5)		0.5	47		1.82	.462	0.2	(0.5)	0.1	47	0.37	.983
Δ Week 24 (Post)	0.6	(0.6)		0.3	47		1.08	.304	-0.2	(0.7)	-0.1	47	0.21	.997
<i>Disinhibition</i>			0.02		47	1.16		.334						
Baseline	3.8	(0.5)												
Δ Week 4	-0.4	(0.3)		-0.3	47		-1.24	.221						
Δ Week 8	0.0	(0.3)		0.0	47		0.02	.982						
Δ Week 16 (Post)	-0.2	(0.4)		-0.1	47		-0.55	.587	-0.2	(0.3)	-0.1	47	-0.61	.929
Δ Week 24 (Post)	0.2	(0.4)		0.1	47		0.52	.606	0.2	(0.4)	0.1	47	0.47	.966
<i>Hunger</i>			0.03		47	0.51		.680						
Baseline	4.6	(0.8)												
Δ Week 4	-0.3	(0.5)		-0.1	47		-0.64	.526						
Δ Week 8	-0.6	(0.5)		-0.3	47		-1.29	.205						
Δ Week 16 (Post)	-0.7	(0.6)		-0.3	47		-1.30	.199	-0.2	(0.6)	-0.1	47	-0.27	.993
Δ Week 24 (Post)	-1.2	(0.6)		-0.5	47		-1.89	.065	-0.6	(0.7)	-0.3	47	-0.84	.834
Food Craving Inventory														
<i>High Fats</i>			0.02		47	1.84		.153						
Baseline	2.5	(0.2)												
Δ Week 4	-0.1	(0.1)		-0.1	47		-0.44	.663						

Δ Week 8	-0.2	(0.1)	-0.3	47	-1.68	.099						
Δ Week 16 (Post)	0.0	(0.2)	0.0	47	0.20	.845	0.3	(0.2)	0.4	47	1.72	.323
Δ Week 24 (Post)	-0.2	(0.2)	-0.3	47	-1.02	.314	0.0	(0.2)	0.1	47	0.22	.996
<i>Sweets</i>			0.04	47	2.45	.048						
Baseline	2.4	(0.3)										
Δ Week 4	-0.2	(0.1)	-0.2	47	-1.22	.227						
Δ Week 8	-0.4	(0.1)	-0.6	47	-2.93	.005						
Δ Week 16 (Post)	0.0	(0.2)	0.0	47	-0.15	.882	0.4	(0.2)	0.6	47	2.25	.125
Δ Week 24 (Post)	-0.2	(0.2)	-0.3	47	-1.18	.245	0.2	(0.2)	0.3	47	0.86	.826
<i>Carbohydrates/Starches</i>			0.10	47	6.35	.001						
Baseline	2.3	(0.2)										
Δ Week 4	-0.3	(0.1)	-0.4	47	-2.03	.048						
Δ Week 8	-0.4	(0.1)	-0.7	47	-3.22	.002						
Δ Week 16 (Post)	0.2	(0.2)	0.3	47	1.20	.235	0.7	(0.2)	1.0	47	4.13	.001
Δ Week 24 (Post)	-0.2	(0.2)	-0.2	47	-0.84	.407	0.3	(0.2)	0.4	47	1.43	.484
<i>Fast-Food Fats</i>			0.02	47	1.58	.206						
Baseline	2.7	(0.2)										
Δ Week 4	-0.2	(0.2)	-0.3	47	-1.31	.197						
Δ Week 8	-0.4	(0.2)	-0.6	47	-2.69	.010						
Δ Week 16 (Post)	-0.2	(0.2)	-0.2	47	-0.92	.362	0.3	(0.2)	0.3	47	1.33	.547
Δ Week 24 (Post)	-0.5	(0.2)	-0.6	47	-2.03	.048	0.0	(0.2)	0.0	47	-0.05	.999
<i>Fruits and Vegetables</i>			0.20	47	6.75	.001						
Baseline	2.1	(0.2)										
Δ Week 4	-0.2	(0.1)	-0.3	47	-1.43	.158						
Δ Week 8	-0.3	(0.2)	-0.3	47	-1.69	.098						
Δ Week 16 (Post)	0.7	(0.2)	1.0	47	3.66	.001	1.0	(0.2)	1.3	47	4.29	.001
Δ Week 24 (Post)	0.0	(0.2)	0.1	47	0.21	.835	0.3	(0.3)	0.4	47	1.17	.651

Δ Week 4	-6.5	(7.3)	-0.2	45	-0.89	.378							
Δ Week 8	-14.8	(7.3)	-0.5	45	-2.03	.051							
Δ Week 16 (Post)	-4.7	(9.1)	-0.1	45	-0.51	.612	10.1	(8.3)	0.3	45	1.22	.618	
Δ Week 24 (Post)	2.3	(11.0)	0.1	45	0.21	.836	17.0	(11.4)	0.5	45	1.49	.453	
<i>Overall Satisfaction</i>			0.04	45	1.18	.330							
Baseline	63.7	(5.4)											
Δ Week 4	-2.8	(6.3)	-0.1	45	-0.45	.652							
Δ Week 8	7.7	(6.2)	0.3	45	1.23	.227							
Δ Week 16 (Post)	1.3	(8.1)	0.0	45	0.16	.870	-6.3	(8.0)	-0.2	45	-0.79	.858	
Δ Week 24 (Post)	6.9	(9.8)	0.2	45	0.70	.485	-0.8	(10.8)	0.0	45	-0.07	.942	
<i>Desire to eat</i>			0.06	45	4.65	.007							
Baseline	58.9	(5.5)											
Δ Week 4	-19.2	(7.5)	-0.6	45	-2.54	.017							
Δ Week 8	-21.9	(7.5)	-0.7	45	-2.90	.008							
Δ Week 16 (Post)	2.0	(8.7)	0.1	45	0.23	.821	23.9	(6.4)	0.7	45	3.71	.004	
Δ Week 24 (Post)	1.5	(10.2)	0.0	45	0.15	.883	23.4	(9.4)	0.7	45	2.50	.077	
<i>Overall Thirst</i>			0.18	45	3.25	.032							
Baseline	40.9	(5.8)											
Δ Week 4	-14.2	(6.0)	-0.5	45	-2.36	.023							
Δ Week 8	-12.9	(6.0)	-0.5	45	-2.13	.038							
Δ Week 16 (Post)	7.5	(8.1)	0.3	45	0.93	.357	20.4	(8.4)	0.7	45	2.43	.088	
Δ Week 24 (Post)	15.9	(9.6)	0.6	45	1.65	.105	28.8	(10.9)	1.0	45	2.65	.054	
Multifactorial Assessment of Eating Disorder Symptoms													
<i>Depression</i>			0.10	45	5.86	.003							
Baseline	38.5	(1.1)											
Δ Week 4	4.3	(1.4)	0.6	45	3.01	.004							
Δ Week 8	4.5	(1.4)	0.6	45	3.09	.003							
Δ Week 16 (Post)	3.6	(2.0)	0.5	45	1.85	.071	-0.9	(2.0)	-0.1	45	-0.42	.975	

Δ Week 4	-0.8	(1.3)	-0.1	45	-0.60	.552						
Δ Week 8	-0.1	(1.3)	0.0	45	-0.08	.937						
Δ Week 16 (Post)	-1.7	(1.7)	-0.3	45	-1.02	.314	-1.6	(1.6)	-0.2	45	-1.03	.730
Δ Week 24 (Post)	-3.3	(1.8)	-0.5	45	-1.84	.072	-3.2	(1.9)	-0.5	45	-1.67	.350

Body Shape Questionnaire

<i>Total Score</i>			0.04	47	2.74	.054						
Baseline	42.1	(1.6)										
Δ Week 4	1.3	(2.4)	0.1	47	0.56	.579						
Δ Week 8	4.3	(2.4)	0.4	47	1.83	.074						
Δ Week 16 (Post)	2.9	(2.7)	0.3	47	1.11	.274	-1.4	(1.8)	-0.1	47	-0.77	.865
Δ Week 24 (Post)	-0.7	(2.9)	-0.1	47	-0.24	.814	-5.0	(2.5)	-0.4	47	-1.99	.207

Data are mean (standard error). Effect sizes are provided for the overall effect (partial eta squared: small effect is 0.01, medium 0.06, and large 0.14) and for the change from baseline values (Cohen's *d*: small effect is 0.2, medium 0.5, and large 0.8). Bold font indicates statistical significance ($p < .050$).

Abbreviations: *d*, Cohen's *d* effect size; *df*, degrees of freedom; *F*, *F*-value, η^2 , partial eta squared; SE, standard error; *t*, *t*-value.

Table 3. Baseline and change scores in eating attitudes and behaviors, eating disorder symptoms, and body image during EAT.

	Change from Baseline							Change from the End of Overfeeding						
	Mean	(SE)	ηp^2	<i>d</i>	df	<i>F</i>	<i>t</i>	<i>p</i>	Mean	(SE)	<i>d</i>	df	<i>t</i>	<i>p</i>
Eating Inventory														
<i>Restraint</i>			0.03		125	1.53		.073						
Baseline	6.8	(0.7)												
Δ Week 4	-0.3	(0.5)		-0.1	125		-0.53	.597						
Δ Week 8	0.5	(0.5)		0.2	125		1.01	.313						
Δ Week 12 (Post)	1.0	(0.5)		0.3	125		1.91	.058	0.5	(0.5)	0.2	125	1.03	.843
Δ Week 20 (Post)	-0.4	(0.5)		-0.1	125		-0.76	.446	-0.9	(0.6)	-0.3	125	-1.56	.527
Δ Week 32 (Post)	0.7	(0.6)		0.2	125		1.18	.241	0.1	(0.7)	0.0	125	0.19	.998
<i>Disinhibition</i>			0.04		125	2.43		.053						
Baseline	3.9	(0.3)												
Δ Week 4	-0.2	(0.3)		-0.1	125		-0.48	.634						
Δ Week 8	0.3	(0.3)		0.2	125		0.96	.340						
Δ Week 12 (Post)	0.6	(0.3)		0.3	125		1.81	.073	0.3	(0.3)	0.2	125	1.04	.834
Δ Week 20 (Post)	0.5	(0.3)		0.3	125		1.60	.111	0.2	(0.3)	0.1	125	0.64	.968
Δ Week 32 (Post)	1.1	(0.3)		0.6	125		3.11	.002	0.8	(0.4)	0.4	125	1.89	.326
<i>Hunger</i>			0.05		125	3.74		.010						
Baseline	4.9	(0.5)												
Δ Week 4	-0.8	(0.4)		-0.4	125		-2.13	.035						
Δ Week 8	-0.3	(0.4)		-0.1	125		-0.67	.504						
Δ Week 12 (Post)	-0.4	(0.4)		-0.2	125		-0.88	.379	-0.1	(0.4)	0.0	125	-0.25	.999
Δ Week 20 (Post)	0.0	(0.4)		0.0	125		0.12	.905	0.3	(0.5)	0.1	125	0.69	.959
Δ Week 32 (Post)	0.7	(0.4)		0.3	125		1.77	.079	1.0	(0.5)	0.4	125	1.98	.284
Food Craving Inventory														

<i>High Fats</i>			0.05	125	1.62	.083						
Baseline	2.0	(0.2)										
Δ Week 4	-0.2	(0.1)	-0.3	125	-1.91	.058						
Δ Week 8	0.0	(0.1)	0.0	125	-0.18	.859						
Δ Week 12 (Post)	0.0	(0.1)	0.0	125	-0.10	.922	0.0	(0.1)	0.0	125	0.11	.998
Δ Week 20 (Post)	0.1	(0.1)	0.2	125	0.89	.374	0.1	(0.1)	0.2	125	1.15	.780
Δ Week 32 (Post)	0.1	(0.1)	0.2	125	1.32	.189	0.2	(0.1)	0.3	125	1.41	.622
<i>Sweets</i>			0.06	125	2.26	0.57						
Baseline	1.9	(0.1)										
Δ Week 4	-0.2	(0.1)	-0.3	125	-1.78	.077						
Δ Week 8	0.0	(0.1)	0.0	125	-0.05	.963						
Δ Week 12 (Post)	0.0	(0.1)	0.0	125	-0.22	.826	0.0	(0.1)	0.0	125	0.22	.995
Δ Week 20 (Post)	0.1	(0.1)	0.2	125	1.18	.241	0.1	(0.1)	0.2	125	1.18	.763
Δ Week 32 (Post)	0.2	(0.1)	0.3	125	1.51	.134	0.2	(0.1)	0.3	125	1.34	.665
<i>Carbohydrates/Starches</i>			0.09	125	3.68	.007						
Baseline	2.1	(0.1)										
Δ Week 4	-0.5	(0.1)	-0.7	125	-3.98	<.001						
Δ Week 8	-0.3	(0.1)	-0.4	125	-2.22	.028						
Δ Week 12 (Post)	-0.1	(0.1)	-0.2	125	-0.86	.393	0.2	(0.1)	0.2	125	1.71	.433
Δ Week 20 (Post)	0.0	(0.1)	0.1	125	0.29	.771	0.3	(0.1)	0.4	125	2.43	.114
Δ Week 32 (Post)	0.1	(0.1)	0.1	125	0.43	.667	0.3	(0.1)	0.5	125	2.23	.175
<i>Fast-Food Fats</i>			0.06	125	2.85	.027						
Baseline	2.4	(0.1)										
Δ Week 4	-0.3	(0.1)	-0.4	125	-2.58	.011						
Δ Week 8	-0.1	(0.1)	-0.2	125	-0.88	.382						
Δ Week 12 (Post)	0.1	(0.1)	0.1	125	0.52	.602	0.2	(0.1)	0.2	125	1.81	.371
Δ Week 20 (Post)	0.1	(0.1)	0.1	125	0.67	.503	0.2	(0.1)	0.3	125	1.54	.541
Δ Week 32 (Post)	0.1	(0.1)	0.2	125	1.05	.297	0.2	(0.1)	0.3	125	1.68	.451

<i>Fruits and Vegetables</i>			0.07	125	4.16	.003							
Baseline	2.1	(0.2)											
Δ Week 4	-0.2	(0.1)	-0.3	125	-1.49	.140							
Δ Week 8	-0.1	(0.1)	-0.2	125	-0.87	.386							
Δ Week 12 (Post)	0.2	(0.1)	0.3	125	1.57	.119	0.3	(0.1)	0.4	125	3.58	.004	
Δ Week 20 (Post)	0.2	(0.1)	0.3	125	1.47	.145	0.3	(0.1)	0.4	125	2.58	.013	
Δ Week 32 (Post)	0.3	(0.1)	0.4	125	2.04	.043	0.4	(0.1)	0.5	125	2.79	.047	
<i>Total Score</i>			0.08	125	3.65	.008							
Baseline	2.1	(0.1)											
Δ Week 4	-0.3	(0.1)	-0.5	125	-2.86	.005							
Δ Week 8	-0.1	(0.1)	-0.2	125	-0.95	.342							
Δ Week 12 (Post)	0.0	(0.1)	-0.1	125	-0.32	.750	0.1	(0.1)	0.1	125	0.90	.895	
Δ Week 20 (Post)	0.1	(0.1)	0.1	125	0.79	.431	0.2	(0.1)	0.3	125	1.89	.328	
Δ Week 32 (Post)	0.1	(0.1)	0.2	125	1.11	.269	0.2	(0.1)	0.4	125	1.94	.304	
Visual Analog Scales													
<i>Difficulty to eat all foods</i>			0.30	110	13.67	<.001							
Baseline	37.4	(5.9)											
Δ Week 4	25.4	(4.1)	1.1	110	6.23	<.001							
Δ Week 8	12.4	(4.0)	0.6	110	3.09	.003							
Δ Week 12 (Post)	-6.7	(4.1)	-0.3	110	-1.62	.108	-19.1	(5.1)	-0.9	110	-3.72	.003	
Δ Week 20 (Post)	-9.8	(4.1)	-0.4	110	-2.37	.020	-22.2	(5.6)	-1.0	110	-3.94	.001	
Δ Week 32 (Post)	-11.6	(4.4)	-0.5	110	-2.66	.009	-24.0	(5.9)	-1.1	110	-4.06	.001	
<i>Fullness of Stomach</i>			0.31	110	14.86	<.001							
Baseline	62.3	(3.9)											
Δ Week 4	19.5	(3.3)	1.1	110	5.95	<.001							
Δ Week 8	5.1	(3.2)	0.3	110	1.59	.114							
Δ Week 12 (Post)	-12.1	(3.3)	-0.7	110	-3.64	<.001	-17.3	(4.2)	-1.0	110	-4.10	.001	
Δ Week 20 (Post)	-11.1	(3.3)	-0.6	110	-3.32	.001	-16.2	(4.6)	-0.9	110	-3.55	.005	

Δ Week 32 (Post)	-4.5	(3.5)	-0.3	110	-1.29	.201	-9.7	(4.8)	-0.5	110	-2.03	.258
<i>Overall Hunger</i>			0.28	110	13.11	<.001						
Baseline	43.3	(4.0)										
Δ Week 4	-22.4	(3.5)	-1.2	110	-6.40	<.001						
Δ Week 8	-4.7	(3.4)	-0.2	110	-1.36	.176						
Δ Week 12 (Post)	8.5	(3.6)	0.4	110	2.40	.018	13.2	(4.2)	0.7	110	3.17	.017
Δ Week 20 (Post)	7.2	(3.6)	0.4	110	2.03	.045	11.9	(4.7)	0.6	110	2.51	.095
Δ Week 32 (Post)	7.2	(3.7)	0.4	110	1.92	.058	11.9	(5.0)	0.6	110	2.36	.134
<i>Prospective Food Consumption</i>			0.06	110	2.62	.039						
Baseline	61.5	(4.3)										
Δ Week 4	-12.6	(4.4)	-0.5	110	-2.84	.005						
Δ Week 8	-4.8	(4.4)	-0.2	110	-1.10	.272						
Δ Week 12 (Post)	3.1	(4.5)	0.1	110	0.68	.498	7.9	(5.1)	0.3	110	1.56	.524
Δ Week 20 (Post)	0.4	(4.5)	0.0	110	0.08	.935	5.2	(5.9)	0.2	110	0.88	.902
Δ Week 32 (Post)	0.3	(4.8)	0.2	110	0.07	.945	5.2	(6.3)	0.2	110	0.82	.925
<i>Overall Satisfaction</i>			0.06	110	1.91	.115						
Baseline	69.5	(3.5)										
Δ Week 4	4.0	(3.9)	0.2	110	1.05	.298						
Δ Week 8	-8.0	(3.8)	-0.4	110	-2.01	.056						
Δ Week 12 (Post)	-10.5	(3.9)	-0.5	110	-2.68	.009	-2.5	(4.7)	-0.1	110	-0.53	.984
Δ Week 20 (Post)	-9.7	(3.9)	-0.5	110	-2.46	.015	-1.6	(5.3)	-0.1	110	-0.31	.998
Δ Week 32 (Post)	-3.5	(4.1)	-0.2	110	-0.84	.405	4.6	(5.6)	0.2	110	0.82	.923
<i>Desire to eat</i>			0.32	110	16.93	<.001						
Baseline	49.5	(4.1)										
Δ Week 4	-23.5	(3.7)	-1.2	110	-6.36	<.001						
Δ Week 8	-4.3	(3.6)	-0.2	110	-1.19	.239						
Δ Week 12 (Post)	9.7	(3.8)	0.5	110	2.59	.011	14.0	(5.3)	0.7	110	2.64	.071
Δ Week 20 (Post)	13.4	(3.8)	0.7	110	3.57	<.001	17.7	(5.2)	0.9	110	3.40	.008

Δ Week 32 (Post)	8.7	(4.0)	0.4	110	2.18	.032	13.0	(5.4)	0.6	110	2.41	.121
<i>Overall Thirst</i>			0.05	110	2.18	.053						
Baseline	45.8	(4.5)										
Δ Week 4	5.9	(4.6)	0.2	110	1.27	.205						
Δ Week 8	4.4	(4.6)	0.2	110	0.97	.334						
Δ Week 12 (Post)	19.0	(4.7)	0.8	110	4.06	<.001	14.6	(4.6)	0.6	110	3.19	.016
Δ Week 20 (Post)	16.9	(4.7)	0.7	110	3.59	<.001	12.5	(5.6)	0.5	110	2.22	.180
Δ Week 32 (Post)	12.3	(4.9)	0.5	110	2.49	.014	7.8	(6.3)	0.3	110	1.25	.722

Multifactorial Assessment of Eating Disorder Symptoms

<i>Depression</i>			0.07	122	4.19	.007						
Baseline	42.7	(1.3)										
Δ Week 4	4.0	(1.7)	0.4	122	2.37	.020						
Δ Week 8	5.4	(1.7)	0.6	122	3.20	.002						
Δ Week 12 (Post)	2.3	(1.7)	0.2	122	1.37	.174	-3.1	(1.2)	-0.3	122	-2.47	.015
Δ Week 20 (Post)	2.3	(1.7)	0.2	122	1.37	.174	-3.1	(1.2)	-0.3	122	-2.47	.015
Δ Week 32 (Post)	3.0	(1.8)	0.3	122	1.68	.095	-2.5	(1.3)	-0.3	122	-1.90	.060
<i>Binge Eating</i>			0.04	122	2.39	.044						
Baseline	43.9	(1.4)										
Δ Week 4	3.6	(1.5)	0.4	122	2.41	.017						
Δ Week 8	2.4	(1.5)	0.3	122	1.63	.106						
Δ Week 12 (Post)	1.6	(1.5)	0.2	122	1.08	.283	-0.8	(1.4)	-0.1	122	-0.58	.978
Δ Week 20 (Post)	0.7	(1.5)	0.1	122	0.46	.644	-1.7	(1.4)	-0.2	122	-1.26	.717
Δ Week 32 (Post)	3.7	(1.6)	0.4	122	2.32	.022	1.2	(1.4)	0.1	122	0.85	.913
<i>Purgative Behavior</i>			0.01	122	0.64	.634						
Baseline	46.7	(1.3)										
Δ Week 4	2.3	(1.8)	0.2	122	1.24	.219						
Δ Week 8	1.8	(1.9)	0.2	122	0.95	.345						
Δ Week 12 (Post)	0.0	(1.9)	0.0	122	0.02	.891	-1.7	(1.8)	-0.2	122	-0.93	.886

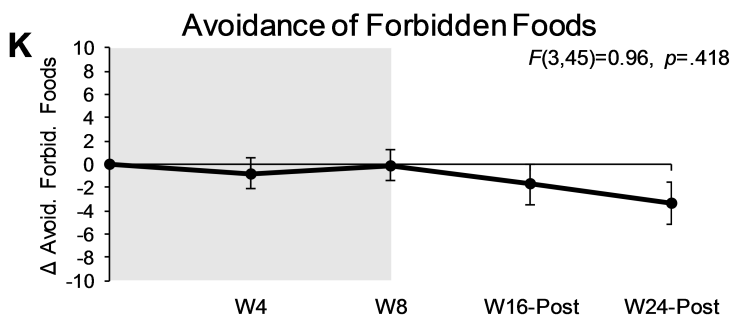
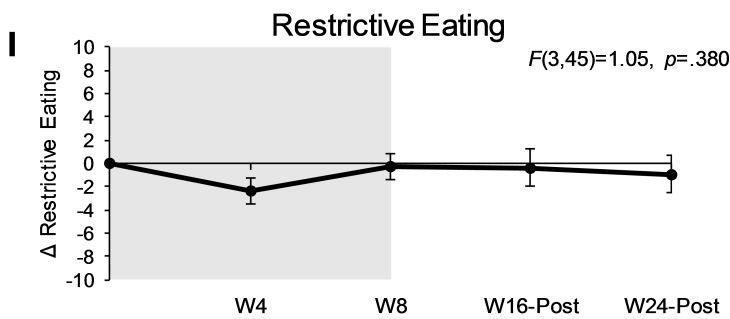
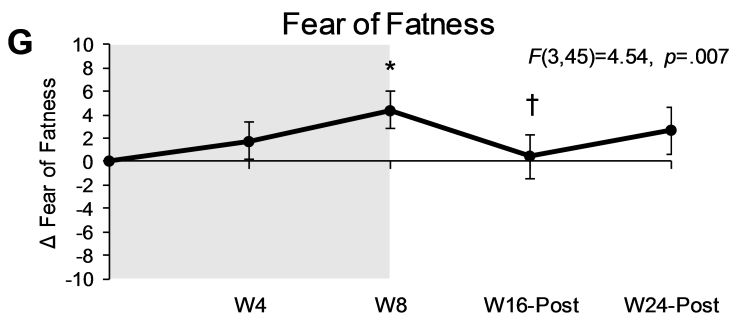
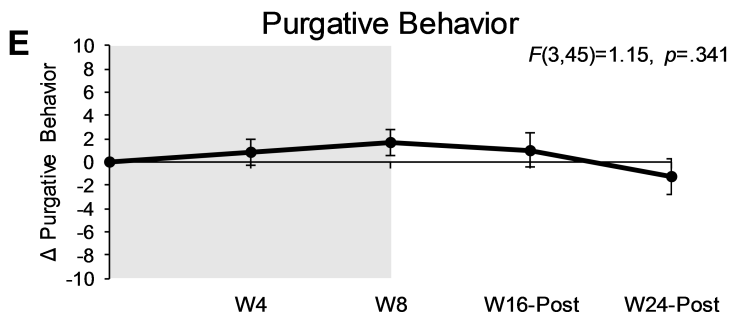
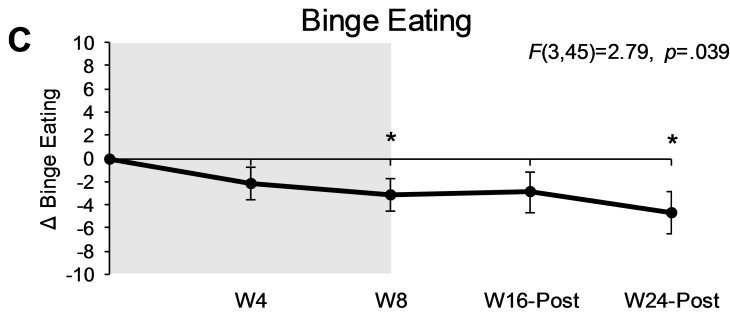
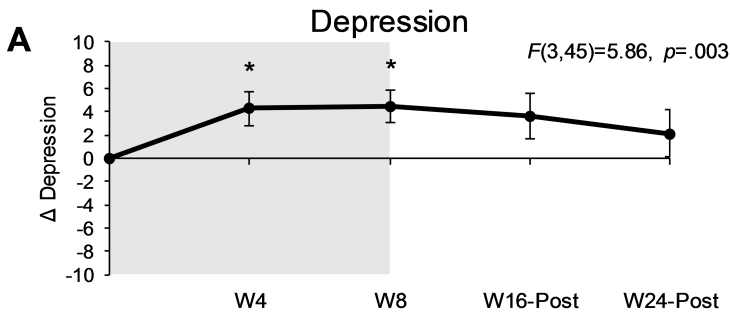
Δ Week 20 (Post)	0.7	(1.9)	0.1	122	0.39	.699	-1.0	(1.8)	-0.1	122	-0.56	.981
Δ Week 32 (Post)	2.6	(2.0)	0.2	122	1.32	.189	0.8	(1.9)	0.1	122	0.44	.992
<i>Fear of Fatness</i>			0.06	122	3.82	.013						
Baseline	46.8	(1.9)										
Δ Week 4	0.6	(1.3)	0.1	122	0.47	.640						
Δ Week 8	3.3	(1.3)	0.4	122	2.56	.012						
Δ Week 12 (Post)	2.2	(1.3)	0.3	122	1.66	.099	-1.1	(1.2)	-0.1	122	-0.94	.879
Δ Week 20 (Post)	1.0	(1.3)	0.1	122	0.77	.445	-2.3	(1.2)	-0.3	122	-1.94	.303
Δ Week 32 (Post)	1.6	(1.4)	0.2	122	1.14	.257	-1.8	(1.2)	-0.2	122	-1.42	.617
<i>Restrictive Eating</i>			0.01	122	0.46	.767						
Baseline	46.4	(1.6)										
Δ Week 4	1.1	(1.4)	0.1	122	0.78	.437						
Δ Week 8	1.1	(1.4)	0.1	122	0.79	.433						
Δ Week 12 (Post)	1.6	(1.4)	0.2	122	1.10	.272	0.5	(1.2)	0.1	122	0.40	.995
Δ Week 20 (Post)	2.1	(1.4)	0.3	122	1.47	.144	1.0	(1.2)	0.1	122	0.85	.914
Δ Week 32 (Post)	2.4	(1.5)	0.3	122	1.61	.109	1.3	(1.2)	0.2	122	1.04	.837
<i>Avoidance of Forbidden Foods</i>			0.01	122	1.22	.306						
Baseline	51.1	(1.9)										
Δ Week 4	-0.6	(1.2)	-0.1	122	-0.49	.625						
Δ Week 8	2.0	(1.2)	0.3	122	1.58	.117						
Δ Week 12 (Post)	1.7	(1.3)	0.2	122	1.34	.183	-0.3	(1.3)	0.0	122	-0.20	.998
Δ Week 20 (Post)	1.4	(1.3)	0.2	122	1.07	.287	-0.6	(1.3)	-0.1	122	-0.45	.991
Δ Week 32 (Post)	1.1	(1.3)	0.2	122	0.83	.410	-0.9	(1.4)	-0.1	122	-0.62	.971
Body Shape Questionnaire												
<i>Total Score</i>			0.02	125	2.63	.038						
Baseline	48.3	(2.2)										
Δ Week 4	9.9	(3.2)	0.5	125	3.10	<.001						
Δ Week 8	12.4	(3.2)	0.7	125	3.89	<.001						

Δ Week 12 (Post)	8.2	(3.2)	0.4	125	2.52	.013	-4.3	(2.7)	-0.2	125	-1.57	.517
Δ Week 20 (Post)	4.6	(3.3)	0.2	125	1.42	.158	-7.8	(2.7)	-0.4	125	-2.85	.040
Δ Week 32 (Post)	5.6	(3.3)	0.3	125	1.67	.097	-6.8	(2.8)	-0.4	125	-2.43	.115

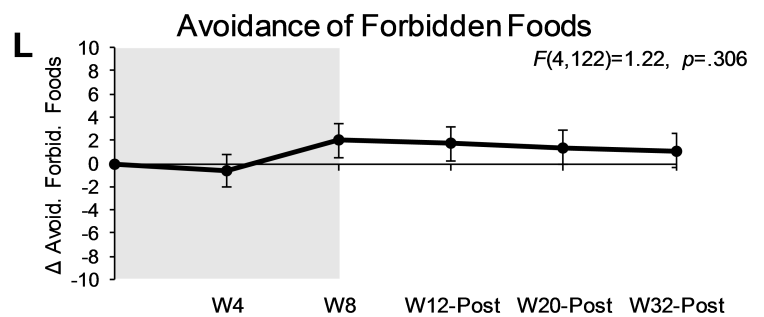
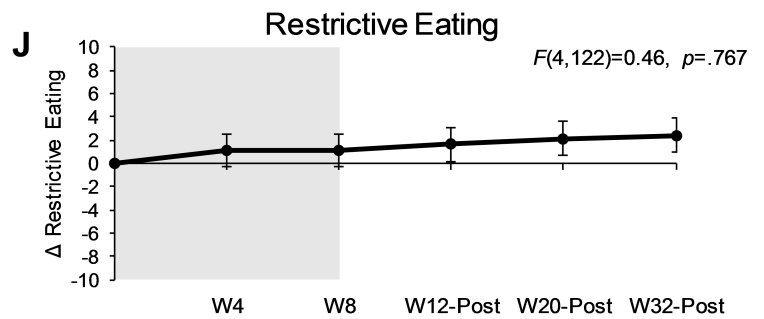
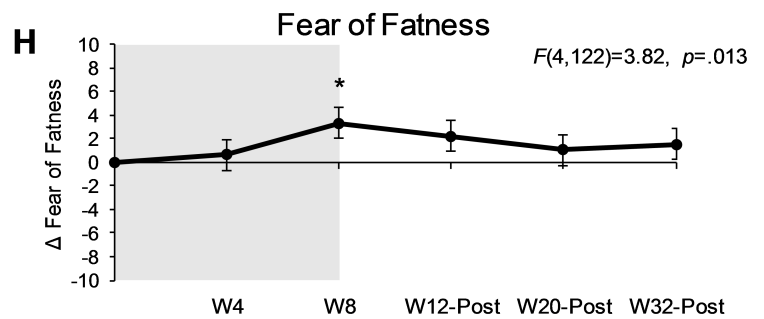
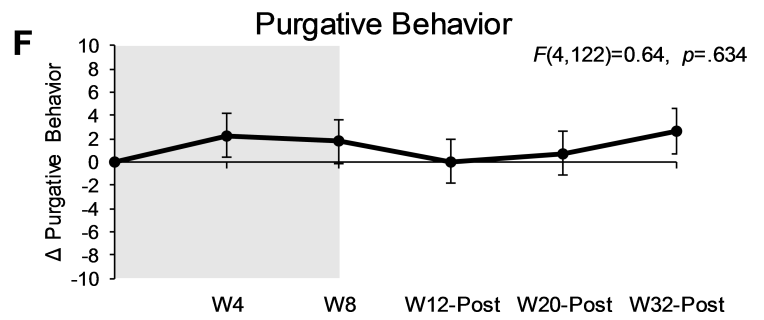
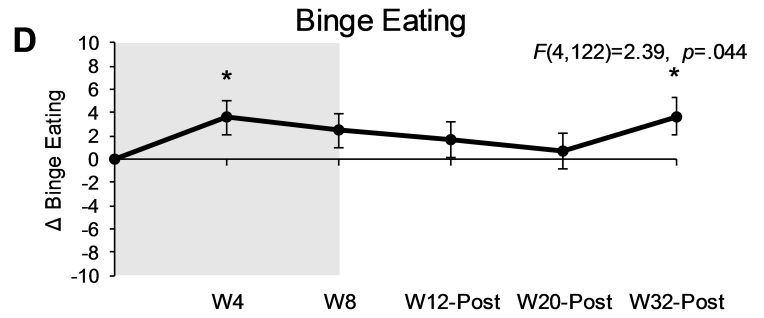
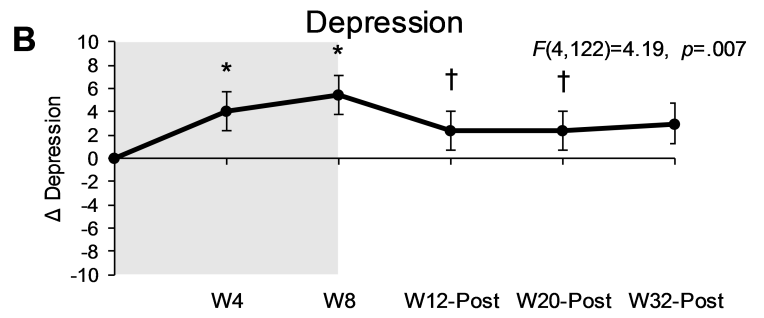
Data are mean (standard error). Effect sizes are provided for the overall effect (partial eta squared: small effect is 0.01, medium 0.06, and large 0.14) and for the change from baseline values (Cohen's *d*: small effect is 0.2, medium 0.5, and large 0.8). Bold font indicates statistical significance ($p < .050$).

Abbreviations: *d*, Cohen's *d* effect size; *df*, degrees of freedom; *F*, *F*-value, η^2 , partial eta squared; SE, standard error; *t*, *t*-value.

The PROOF Study



The EAT Study



SUPPLEMENTAL MATERIAL

Effect of 8 Weeks of Supervised Overfeeding on Eating Attitudes and Behaviors, Eating Disorder Symptoms, and Body Image: Results from the PROOF and EAT studies

Supplemental Table 1. Participant baseline characteristics per diet group in PROOF.

	HPD (n=8)	LPD (n=8)	NPD (n=9)
Sex, n (%)			
Male	5 (62.5)	5 (62.5)	6 (66.7)
Female	3 (37.5)	3 (37.5)	3 (33.3)
Race, n (%)			
African American	5 (62.5)	3 (37.5)	8 (88.9)
White	3 (37.5)	4 (50.0)	0 (0.0)
Other	0 (0.0)	1 (12.5)	1 (11.1)
	Mean (SD)	Mean (SD)	Mean (SD)
Age (years)	26.8 (2.0)	22.9 (2.7)	22.9 (5.5)
Weight (kg)	76.1 (15.4)	69.1 (11.6)	77.6 (13.0)
BMI (kg/m ²)	25.5 (3.3)	24.0 (3.2)	25.9 (3.1)

Data are mean (standard deviation) unless stated otherwise. ANOVA (continuous variables) and a Fisher's exact test (categorical variable) were used to test for baseline differences between the three groups; the HPD, LPD, and NPD groups did not differ significantly (all $p > .074$) in any of the variables shown in the table.

Abbreviations: HPD, high-protein diet, LPD, low-protein diet; NPD, normal protein diet; SD, standard deviation.

Supplemental Table 2. Baseline and change scores in eating attitudes and behaviors, eating disorder symptoms, and body image during the PROOF intervention per diet group.

	HPD			LPD			NPD			Group Comparison <i>p</i> -value
	Mean	(SE)	<i>d</i>	Mean	(SE)	<i>d</i>	Mean	(SE)	<i>d</i>	
Eating Inventory										
<i>Restraint</i>										
Baseline	4.4	(1.4)		4.6	(1.4)		3.7	(1.3)		.874
Δ Week 4	0.5	(0.7)	0.2	1.1	(0.7)	0.5	-0.2	(0.7)	-0.1	.422
Δ Week 8	0.7	(0.8)	0.3	1.5	(0.7)	0.7	0.2	(0.7)	0.1	.457
Δ Week 16 (Post)	3.8	(1.1)	1.8	1.1	(0.8)	0.5	-0.8	(0.9)	-0.4	.090
Δ Week 24 (Post)	0.5	(1.4)	0.3	1.4	(0.9)	0.7	-0.6	(1.0)	-0.3	.321
<i>Disinhibition</i>										
Baseline	4.1	(1.0)		3.9	(1.0)		3.6	(0.9)		.915
Δ Week 4	-0.5	(0.5)	-0.3	0.1	(0.5)	0.0	-0.6	(0.5)	-0.4	.649
Δ Week 8	0.2	(0.6)	0.1	-0.2	(0.5)	-0.1	0.1	(0.5)	0.1	.885
Δ Week 16 (Post)	0.1	(0.8)	0.1	-0.6	(0.6)	-0.4	0.1	(0.6)	0.1	.647
Δ Week 24 (Post)	-0.1	(1.0)	0.0	0.3	(0.6)	0.2	0.1	(0.7)	0.1	.954
<i>Hunger</i>										
Baseline	4.8	(1.4)		3.8	(1.4)		5.7	(1.3)		.497
Δ Week 4	-0.5	(0.8)	-0.2	0.0	(0.8)	0.0	-0.4	(0.8)	-0.2	.891
Δ Week 8	-1.0	(0.8)	-0.4	-0.6	(0.8)	-0.3	-0.3	(0.8)	-0.1	.835
Δ Week 16 (Post)	-0.7	(1.2)	-0.3	0.3	(0.9)	0.1	-2.0	(1.0)	-0.9	.261
Δ Week 24 (Post)	-0.9	(1.6)	-0.4	-0.3	(0.9)	-0.1	-2.6	(1.1)	-1.2	.301
Food Craving Inventory										
<i>High Fats</i>										
Baseline	2.9	(0.3)		2.2	(0.3)		2.3	(0.3)		.301
Δ Week 4	-0.6	(0.2)	-0.9	0.2	(0.2)	0.3	0.2	(0.2)	0.3	.027
Δ Week 8	-0.8	(0.2)	-1.1	-0.1	(0.2)	-0.2	0.1	(0.2)	0.1	.043
Δ Week 16 (Post)	-0.1	(0.3)	-0.2	0.2	(0.3)	0.2	0.1	(0.3)	0.1	.817

Δ Week 24 (Post)	0.0	(0.4)	0.0	0.0	(0.3)	0.0	-0.4	(0.3)	-0.6	.539
<i>Sweets</i>										
Baseline	3.2	(0.4)		2.0	(0.4)		2.0	(0.4)		.102
Δ Week 4	-0.2	(0.2)	-0.2	-0.4	(0.2)	-0.7	0.1	(0.2)	0.1	.325
Δ Week 8	-0.6	(0.3)	-0.9	-0.7	(0.2)	-1.1	0.0	(0.2)	0.1	.043
Δ Week 16 (Post)	-0.2	(0.4)	0.3	-0.2	(0.3)	-0.3	0.3	(0.3)	0.4	.409
Δ Week 24 (Post)	-0.2	(0.4)	0.3	-0.2	(0.3)	-0.3	-0.3	(0.3)	-0.5	.952
<i>Carbohydrates/Starches</i>										
Baseline	2.6	(0.4)		2.0	(0.4)		2.3	(0.3)		.498
Δ Week 4	-0.8	(0.2)	-1.3	-0.1	(0.2)	-0.2	0.0	(0.2)	0.0	.024
Δ Week 8	-0.9	(0.2)	-1.4	-0.4	(0.2)	-0.6	-0.1	(0.2)	-0.2	.069
Δ Week 16 (Post)	-0.2	(0.3)	-0.3	0.3	(0.3)	0.4	0.4	(0.3)	0.7	.341
Δ Week 24 (Post)	-0.1	(0.4)	-0.1	-0.1	(0.3)	-0.2	-0.2	(0.3)	-0.3	.968
<i>Fast-Food Fats</i>										
Baseline	3.0	(0.4)		2.3	(0.4)		2.8	(0.4)		.466
Δ Week 4	-0.6	(0.3)	-0.8	0.0	(0.3)	0.0	-0.1	(0.3)	-0.1	.238
Δ Week 8	-0.9	(0.3)	-1.2	-0.4	(0.3)	-0.6	-0.1	(0.3)	-0.1	.100
Δ Week 16 (Post)	-0.7	(0.4)	-0.9	0.0	(0.3)	0.0	0.0	(0.3)	-0.1	.373
Δ Week 24 (Post)	-0.5	(0.5)	-0.6	-0.1	(0.3)	-0.1	-0.9	(0.4)	-1.1	.269
<i>Fruits and Vegetables</i>										
Baseline	2.4	(0.4)		2.2	(0.4)		1.8	(0.4)		.446
Δ Week 4	-0.3	(0.3)	-0.4	-0.1	(0.3)	-0.2	-0.2	(0.3)	-0.3	.931
Δ Week 8	-0.5	(0.3)	-0.7	-0.4	(0.3)	-0.5	0.1	(0.3)	0.1	.259
Δ Week 16 (Post)	0.4	(0.4)	0.5	0.8	(0.3)	1.1	0.8	(0.3)	1.1	.656
Δ Week 24 (Post)	0.6	(0.5)	0.7	0.1	(0.3)	0.1	-0.2	(0.4)	-0.3	.509
<i>Total Score</i>										
Baseline	2.8	(0.3)		2.1	(0.3)		2.2	(0.3)		.265
Δ Week 4	-0.5	(0.2)	-0.9	-0.1	(0.2)	-0.2	0.0	(0.2)	0.0	.169
Δ Week 8	-0.7	(0.2)	-1.3	-0.4	(0.2)	-0.7	0.0	(0.2)	0.0	.042
Δ Week 16 (Post)	0.2	(0.3)	-0.3	0.2	(0.2)	0.3	0.3	(0.2)	0.6	.487
Δ Week 24 (Post)	0.1	(0.4)	-0.1	-0.1	(0.3)	-0.1	-0.4	(0.3)	-0.7	.661

Visual Analog Scales

Difficulty to eat all foods

Baseline	17.1	(10.5)		35.7	(12.2)		43.8	(10.5)	.217	
Δ Week 4	24.5	(12.7)	0.7	-11.5	(14.1)	-0.3	3.6	(13.0)	0.1	.179
Δ Week 8	26.2	(13.3)	0.8	6.8	(14.1)	0.2	9.5	(12.4)	0.3	.558
Δ Week 16 (Post)	-11.3	(18.9)	-0.3	-5.7	(16.7)	-0.2	-2.7	(16.5)	-0.1	.944
Δ Week 24 (Post)	-5.3	(23.9)	-0.2	2.0	(19.4)	0.1	-22.6	(19.6)	-0.7	.663

Fullness of Stomach

Baseline	53.3	(9.0)		61.3	(10.4)		40.6	(9.0)	.328	
Δ Week 4	23.3	(10.0)	0.8	5.6	(11.7)	0.2	22.4	(11.0)	0.8	.471
Δ Week 8	28.6	(10.7)	1.0	5.1	(11.7)	0.2	23.4	(10.4)	0.8	.315
Δ Week 16 (Post)	-14.4	(15.9)	-0.5	4.4	(14.1)	0.2	3.5	(13.9)	0.1	.619
Δ Week 24 (Post)	15.7	(20.1)	0.6	6.1	(16.2)	0.2	3.9	(16.4)	0.1	.896

Overall Hunger

Baseline	48.6	(9.0)		31.0	(10.4)		56.0	(9.0)	.213	
Δ Week 4	-14.2	(10.3)	-0.5	-12.9	(12.1)	-0.5	-29.3	(11.2)	-1.0	.524
Δ Week 8	-15.0	(10.8)	-0.5	2.1	(12.1)	0.1	-27.8	(10.6)	-1.0	.210
Δ Week 16 (Post)	11.1	(15.5)	0.4	22.8	(14.2)	0.8	-16.0	(13.6)	-0.6	.148
Δ Week 24 (Post)	-4.5	(19.6)	-0.2	11.9	(16.4)	0.4	-14.1	(16.2)	-0.5	.529

Prospective Food Consumption

Baseline	56.9	(9.2)		46.5	(10.6)		66.6	(9.2)	.377	
Δ Week 4	-15.4	(11.8)	-0.5	14.6	(13.9)	0.5	-13.0	(12.6)	-0.4	.231
Δ Week 8	-9.0	(12.4)	-0.3	-0.5	(13.9)	0.0	-29.8	(12.1)	-0.9	.276
Δ Week 16 (Post)	-2.2	(17.3)	-0.1	8.4	(16.2)	0.3	-17.4	(15.3)	-0.5	.522
Δ Week 24 (Post)	18.0	(22.0)	0.6	2.7	(18.7)	0.1	-8.6	(18.3)	-0.3	.649

Overall Satisfaction

Baseline	66.1	(9.0)		71.7	(10.4)		55.4	(9.0)	.485	
Δ Week 4	7.7	(10.6)	0.3	-7.7	(12.2)	-0.2	-10.7	(11.5)	-0.4	.449
Δ Week 8	13.7	(11.1)	0.5	-0.4	(12.2)	0.0	7.4	(10.9)	0.3	.697
Δ Week 16 (Post)	6.3	(15.9)	0.2	8.2	(14.3)	0.3	-11.3	(14.0)	-0.4	.574
Δ Week 24 (Post)	13.2	(20.2)	0.5	18.7	(16.7)	0.7	-10.1	(16.6)	-0.4	.445

Desire to eat

Baseline	61.3	(8.9)		44.7	(10.3)		67.1	(8.9)		.266
Δ Week 4	-25.5	(12.3)	-0.8	4.3	(14.6)	0.1	-31.7	(12.9)	-1.0	.190
Δ Week 8	-26.6	(12.6)	-0.8	-5.9	(14.6)	-0.2	-29.7	(12.5)	-0.9	.455
Δ Week 16 (Post)	3.3	(16.0)	0.1	21.4	(16.0)	0.7	-15.1	(14.6)	-0.5	.266
Δ Week 24 (Post)	5.4	(20.1)	0.2	12.6	(17.9)	0.4	-11.0	(17.1)	-0.3	.627
<i>Overall Thirst</i>										
Baseline	47.0	(9.7)		46.5	(11.2)		30.6	(9.7)		.431
Δ Week 4	-18.4	(10.3)	-0.6	-18.3	(11.8)	-0.6	-6.5	(11.0)	-0.2	.689
Δ Week 8	-20.8	(10.9)	-0.7	-9.6	(11.8)	-0.3	-8.4	(10.3)	-0.3	.676
Δ Week 16 (Post)	-6.7	(16.1)	-0.2	20.3	(14.2)	0.7	6.5	(14.2)	0.2	.455
Δ Week 24 (Post)	12.9	(20.1)	0.4	13.8	(16.4)	0.5	21.6	(16.6)	0.8	.926
Multifactorial Assessment of Eating Disorder Symptoms										
<i>Depression</i>										
Baseline	38.1	(1.9)		39.4	(1.9)		38.1	(1.8)		.868
Δ Week 4	3.3	(2.6)	0.5	5.7	(2.6)	0.8	3.9	(2.5)	0.5	.805
Δ Week 8	3.4	(2.8)	0.5	5.2	(2.6)	0.7	4.7	(2.5)	0.6	.897
Δ Week 16 (Post)	4.4	(4.0)	0.6	3.3	(2.9)	0.5	2.5	(3.9)	0.3	.949
Δ Week 24 (Post)	1.3	(5.0)	0.2	-0.6	(3.0)	-0.1	6.9	(3.6)	0.9	.288
<i>Binge Eating</i>										
Baseline	46.5	(3.6)		43.1	(3.6)		38.3	(3.4)		.271
Δ Week 4	-2.0	(2.6)	-0.3	-4.3	(2.5)	-0.6	-0.5	(2.3)	-0.1	.554
Δ Week 8	-2.4	(2.7)	-0.3	-6.1	(2.5)	-1.0	-1.2	(2.3)	-0.2	.336
Δ Week 16 (Post)	-7.3	(3.5)	-1.1	-2.2	(2.7)	-0.2	-1.9	(3.4)	-0.3	.452
Δ Week 24 (Post)	-6.4	(4.4)	-0.9	-4.6	(2.8)	-0.6	-3.9	(3.3)	-0.6	.900
<i>Purgative Behavior</i>										
Baseline	45.4	(1.6)		45.0	(1.6)		44.7	(1.6)		.952
Δ Week 4	-0.1	(2.0)	0.0	2.5	(2.0)	0.4	0.2	(1.9)	0.0	.601
Δ Week 8	0.8	(2.1)	0.1	1.1	(2.0)	0.2	3.0	(1.9)	0.5	.699
Δ Week 16 (Post)	0.7	(3.0)	0.1	1.2	(2.2)	0.2	0.9	(2.8)	0.2	.989
Δ Week 24 (Post)	-0.4	(3.7)	-0.1	-0.9	(2.3)	-0.2	-2.2	(2.7)	-0.4	.909
<i>Fear of Fatness</i>										
Baseline	42.5	(3.5)		43.9	(3.5)		37.3	(3.3)		.367

Δ Week 4	3.2	(2.9)	0.4	0.2	(2.9)	0.0	1.8	(2.8)	0.2	.761
Δ Week 8	4.6	(3.0)	0.6	3.0	(2.9)	0.4	5.4	(2.8)	0.7	.834
Δ Week 16 (Post)	-1.1	(3.8)	-0.1	-0.6	(3.1)	-0.1	2.8	(3.5)	0.4	.701
Δ Week 24 (Post)	-2.0	(4.7)	-0.3	3.5	(3.2)	0.4	3.2	(3.6)	0.4	.604
<i>Restrictive Eating</i>										
Baseline	43.0	(2.5)		47.9	(2.5)		41.8	(2.4)		.201
Δ Week 4	-3.6	(2.1)	-0.6	-1.4	(2.2)	-0.2	-2.2	(2.0)	-0.4	.757
Δ Week 8	0.2	(2.2)	0.0	-0.5	(2.2)	-0.1	-0.4	(2.0)	-0.1	.971
Δ Week 16 (Post)	3.9	(3.2)	0.7	-1.0	(2.4)	-0.2	-3.2	(3.1)	-0.5	.268
Δ Week 24 (Post)	-1.8	(4.0)	-0.3	0.0	(2.4)	0.0	-2.0	(2.9)	-0.3	.853
<i>Avoid. Forbidden Foods</i>										
Baseline	42.5	(4.2)		46.5	(4.2)		44.1	(4.0)		.801
Δ Week 4	2.2	(2.3)	0.3	0.3	(2.3)	0.0	-4.4	(2.2)	-0.7	.102
Δ Week 8	1.3	(2.4)	0.2	0.3	(2.3)	0.0	-1.8	(2.2)	-0.3	.613
Δ Week 16 (Post)	2.9	(3.4)	0.5	-2.6	(2.5)	-0.4	-3.4	(3.2)	-0.5	.334
Δ Week 24 (Post)	2.5	(4.2)	0.4	-3.3	(2.6)	-0.5	-6.8	(3.1)	-1.1	.218
Body Shape Questionnaire										
<i>Total Score</i>										
Baseline	40.0	(2.9)		44.5	(2.9)		41.8	(2.8)		.559
Δ Week 4	3.1	(4.2)	0.3	0.7	(4.2)	0.1	0.2	(3.9)	0.0	.868
Δ Week 8	11.0	(4.3)	0.9	4.7	(4.2)	0.4	-1.3	(3.9)	-0.1	.117
Δ Week 16 (Post)	10.8	(5.2)	0.9	2.4	(4.4)	0.2	-2.2	(4.4)	-0.2	.171
Δ Week 24 (Post)	5.2	(6.3)	0.4	-1.2	(4.5)	-0.1	-4.4	(4.9)	-0.4	.491
Body Morph Assessment										
<i>Current Body Size</i>										
Baseline	55.0	(4.4)		51.8	(4.7)		56.9	(4.4)		.725
Δ Week 4	3.6	(2.2)	0.6	3.4	(2.4)	0.6	3.5	(2.2)	0.6	.998
Δ Week 8	9.3	(2.5)	1.5	4.8	(2.6)	0.8	7.2	(2.2)	1.1	.472
Δ Week 16 (Post)	8.5	(3.6)	1.4	1.7	(2.8)	0.3	3.3	(3.1)	0.5	.336
Δ Week 24 (Post)	4.7	(4.4)	0.8	3.0	(3.6)	0.5	-0.3	(3.6)	0.0	.658
<i>Ideal Body Size</i>										

Baseline	56.1	(2.7)		51.5	(2.9)		55.3	(2.7)		.465
Δ Week 4	1.3	(1.6)	0.3	-1.1	(1.7)	-0.2	1.3	(1.6)	0.3	.520
Δ Week 8	0.4	(1.7)	0.1	-3.6	(1.7)	-0.8	0.3	(1.6)	0.1	.182
Δ Week 16 (Post)	-2.5	(2.1)	-0.6	-1.1	(1.8)	-0.2	-2.2	(1.8)	-0.5	.856
Δ Week 24 (Post)	-0.9	(2.5)	-0.2	-0.8	(2.1)	-0.2	-1.0	(2.1)	-0.2	.998
<i>Acceptable Body Size</i>										
Baseline	59.0	(2.7)		51.3	(2.9)		57.1	(2.7)		.161
Δ Week 4	1.4	(1.9)	0.3	-0.7	(2.1)	-0.1	2.8	(1.9)	0.5	.459
Δ Week 8	0.4	(2.2)	0.1	-0.9	(2.2)	-0.2	0.1	(1.9)	0.0	.912
Δ Week 16 (Post)	2.6	(3.0)	0.5	-0.8	(2.3)	-0.2	0.9	(2.6)	0.2	.676
Δ Week 24 (Post)	2.0	(3.7)	0.4	-1.1	(3.0)	-0.2	3.5	(3.0)	0.7	.557
<i>Body Dissatisfaction</i>										
Baseline	-1.1	(4.6)		0.3	(5.0)		1.6	(4.6)		.920
Δ Week 4	2.4	(2.4)	0.4	4.6	(2.6)	0.7	2.0	(2.4)	0.3	.732
Δ Week 8	7.9	(2.8)	1.2	7.6	(2.8)	1.1	6.7	(2.4)	1.0	.937
Δ Week 16 (Post)	12.7	(3.9)	1.9	2.4	(3.0)	0.4	4.8	(3.4)	0.7	.122
Δ Week 24 (Post)	6.5	(4.8)	1.0	4.4	(3.9)	0.6	0.2	(3.9)	0.0	.565

Data are mean (standard error). Effect sizes (Cohen's d): is small effect is 0.2, medium 0.5, and large 0.8.

Bold font indicates a significant group effect ($p < .050$). None of the pairwise comparisons were significant after Tukey-Kramer adjustment.

Abbreviations: d , Cohen's D effect size; HPD, high-protein diet; LPD, low-protein diet; NPD, normal-protein diet; SE, standard error.

Supplemental Table 3. Baseline and change scores in the Body Morph Assessment during PROOF and EAT.

	Change from Baseline							Change from the End of Overfeeding						
	Mean	(SE)	ηp^2	<i>d</i>	df	<i>F</i>	<i>t</i>	<i>p</i>	Mean	(SE)	<i>d</i>	df	<i>t</i>	<i>p</i>
PROOF Study														
<i>Current Body Size</i>			0.19		37	6.20		<.001						
Baseline	54.7	(2.5)												
Δ Week 4	3.5	(1.3)		0.6	37		2.78	.009						
Δ Week 8	7.0	(1.4)		1.2	37		5.19	<.001						
Δ Week 16 (Post)	4.0	(1.7)		0.7	37		2.31	.026	-3.0	(2.2)	-0.5	37	-1.33	.550
Δ Week 24 (Post)	2.2	(2.1)		0.4	37		1.02	.314	-4.8	(2.5)	-0.8	37	-1.91	.241
<i>Ideal Body Size</i>			0.04		37	1.90		.147						
Baseline	54.4	(1.6)												
Δ Week 4	0.6	(0.9)		0.1	37		0.63	.533						
Δ Week 8	-0.8	(0.9)		-0.2	37		-0.86	.395						
Δ Week 16 (Post)	-1.6	(1.1)		-0.4	37		-1.44	.158	-0.8	(0.9)	-0.2	37	-0.86	.825
Δ Week 24 (Post)	-0.7	(1.3)		-0.2	37		-0.52	.603	0.1	(1.3)	0.0	37	0.09	.926
<i>Acceptable Body Size</i>			0.01		37	0.43		.730						
Baseline	56.0	(1.7)												
Δ Week 4	1.2	(1.1)		0.2	37		1.16	.254						
Δ Week 8	-0.1	(1.1)		0.0	37		-0.13	.898						
Δ Week 16 (Post)	0.6	(1.4)		0.1	37		0.44	.660	0.8	(1.6)	0.2	37	0.48	.963
Δ Week 24 (Post)	1.4	(1.8)		0.3	37		0.82	.420	1.6	(2.1)	0.3	37	0.77	.866
<i>Body Dissatisfaction</i>			0.08		37	6.05		<.001						
Baseline	0.3	(2.6)												
Δ Week 4	2.9	(1.4)		0.4	37		2.09	.044						

Δ Week 8	7.3	(1.5)	1.1	37	4.88	<.001						
Δ Week 16 (Post)	5.8	(1.9)	0.9	37	3.05	.004	-1.5	(2.2)	-0.2	37	-0.65	.913
Δ Week 24 (Post)	3.3	(2.4)	0.5	37	1.40	.171	-4.0	(2.7)	-0.6	37	-1.46	.472

EAT Study

<i>Current Body Shape</i>			0.14	88	7.40	<.001						
Baseline	58.6	(1.4)										
Δ Week 4	5.0	(1.3)	0.8	88	4.01	<.001						
Δ Week 8	8.8	(1.3)	1.4	88	6.78	<.001						
Δ Week 12 (Post)	4.6	(1.3)	0.7	88	3.45	<.001	-4.2	(1.4)	-0.7	88	-2.89	.038
Δ Week 20 (Post)	2.3	(1.3)	0.4	88	1.71	.091	-6.5	(1.5)	-1.0	88	-4.47	<.001
Δ Week 32 (Post)	1.4	(1.4)	0.2	88	1.00	.320	-7.3	(1.5)	-1.2	88	-4.79	<.001
<i>Ideal Body Shape</i>			0.02	88	2.35	.061						
Baseline	55.3	(0.8)										
Δ Week 4	0.0	(0.9)	0.0	88	0.03	.977						
Δ Week 8	0.9	(0.9)	0.2	88	0.95	.343						
Δ Week 12 (Post)	-1.4	(0.9)	-0.3	88	-1.54	.126	-2.3	(0.9)	-0.5	88	-2.68	.065
Δ Week 20 (Post)	-0.6	(0.9)	-0.1	88	-0.66	.508	-1.5	(0.9)	-0.3	88	-1.72	.428
Δ Week 32 (Post)	-1.2	(1.0)	-0.3	88	-1.28	.204	-2.1	(0.9)	-0.4	88	-2.32	.148
<i>Acceptable Body Shape</i>			0.01	88	0.44	.781						
Baseline	57.7	(0.8)										
Δ Week 4	0.3	(1.0)	0.1	88	0.34	.736						
Δ Week 8	1.2	(1.0)	0.2	88	1.17	.243						
Δ Week 12 (Post)	0.3	(1.0)	0.1	88	0.30	.762	-0.9	(1.1)	-0.2	88	-0.81	.927
Δ Week 20 (Post)	-0.1	(1.0)	0.0	88	-0.09	.929	-1.3	(1.1)	-0.2	88	-1.18	.761
Δ Week 32 (Post)	0.0	(1.1)	0.0	88	-0.02	.986	-1.2	(1.1)	-0.2	88	-1.06	.828
<i>Body Dissatisfaction</i>			0.07	88	4.59	.002						
Baseline	3.3	(1.5)										

Δ Week 4	5.0	(1.2)	0.8	88	4.06	<.001						
Δ Week 8	7.9	(1.3)	1.2	88	6.19	<.001						
Δ Week 12 (Post)	5.9	(1.3)	0.9	88	4.50	<.001	-2.0	(1.4)	-0.3	88	-1.40	.628
Δ Week 20 (Post)	2.8	(1.3)	0.4	88	2.12	.037	-5.1	(1.4)	-0.8	88	-3.59	.005
Δ Week 32 (Post)	2.6	(1.4)	0.4	88	1.87	.064	-5.2	(1.5)	-0.8	88	-3.51	.006

Data are mean (standard error). Effect sizes are provided for the overall effect (partial eta squared: small effect is 0.01, medium 0.06, and large 0.14) and for the change from baseline values (Cohen's *d*: small effect is 0.2, medium 0.5, and large 0.8). Bold font indicates statistical significance ($p < .050$).

Abbreviations: *d*, Cohen's *d* effect size; *df*, degrees of freedom; *F*, *F*-value, η^2 , partial eta squared; SE, standard error; *t*, *t*-value.

Supplemental Table 4. Simple linear regression analysis for the association between overfeeding-related changes in body weight^a, fat mass^b, and fat-free mass^c and changes in outcome variables in PROOF.

Eating Inventory	R²	B	SE	β	p
<i>Δ Restraint at W8</i>					
Δ Weight (kg) at W8	0.00	-0.02	0.18	-0.02	.931
Δ Fat mass (kg) at W8	0.10	0.56	0.38	0.31	.148
Δ Fat-free mass (kg) at W8	0.04	-0.19	0.21	-0.19	.377
<i>Δ Disinhibition at W8</i>					
Δ Weight (kg) at W8	0.08	0.20	0.15	0.29	.178
Δ Fat mass (kg) at W8	0.07	0.40	0.32	0.27	.221
Δ Fat-free mass (kg) at W8	0.04	0.16	0.18	0.20	.363
<i>Δ Hunger at W8</i>					
Δ Weight (kg) at W8	0.05	0.25	0.23	0.23	.284
Δ Fat mass (kg) at W8	0.19	0.99	0.45	0.43	.041
Δ Fat-free mass (kg) at W8	0.00	0.05	0.28	0.04	.855
Food Craving Inventory					
<i>Δ High Fats at W8</i>					
Δ Weight (kg) at W8	0.01	-0.05	0.09	-0.11	.606
Δ Fat mass (kg) at W8	0.01	0.09	0.19	0.10	.637
Δ Fat-free mass (kg) at W8	0.04	-0.09	0.10	-0.19	.382
<i>Δ Sweets at W8</i>					
Δ Weight (kg) at W8	0.06	0.10	0.09	0.24	.267
Δ Fat mass (kg) at W8	0.07	0.24	0.19	0.27	.217
Δ Fat-free mass (kg) at W8	0.02	0.07	0.11	0.14	.525
<i>Δ Carbohydrates/Starches at W8</i>					
Δ Weight (kg) at W8	0.02	-0.05	0.08	-0.13	.552
Δ Fat mass (kg) at W8	0.00	0.05	0.18	0.06	.779
Δ Fat-free mass (kg) at W8	0.04	-0.08	0.10	-0.19	.389
<i>Δ Fast-Food Fats at W8</i>					
Δ Weight (kg) at W8	0.00	0.01	0.10	0.01	.955
Δ Fat mass (kg) at W8	0.07	0.27	0.22	0.26	.229
Δ Fat-free mass (kg) at W8	0.02	-0.07	0.12	-0.13	.559

<i>Δ Fruits and Vegetables at W8</i>					
Δ Weight (kg) at W8	0.03	0.07	0.09	0.17	.444
Δ Fat mass (kg) at W8	0.09	0.27	0.18	0.31	.154
Δ Fat-free mass (kg) at W8	0.00	0.01	0.11	0.03	.890
<i>Δ Total Score at W8</i>					
Δ Weight (kg) at W8	0.00	0.01	0.08	0.03	.875
Δ Fat mass (kg) at W8	0.05	0.17	0.16	0.22	.321
Δ Fat-free mass (kg) at W8	0.01	-0.03	0.09	-0.08	.725
Visual Analog Scales					
<i>Δ Difficulty to eat all foods at W8</i>					
Δ Weight (kg) at W8	0.03	4.19	5.72	0.17	.473
Δ Fat mass (kg) at W8	0.00	-0.93	10.37	-0.02	.930
Δ Fat-free mass (kg) at W8	0.05	7.33	7.22	0.23	.323
<i>Δ Fullness of Stomach at W8</i>					
Δ Weight (kg) at W8	0.01	1.85	4.25	0.10	.669
Δ Fat mass (kg) at W8	0.20	-14.63	6.81	-0.45	.046
Δ Fat-free mass (kg) at W8	0.21	10.52	4.87	0.45	.044
<i>Δ Overall Hunger at W8</i>					
Δ Weight (kg) at W8	0.03	-2.93	3.76	-0.18	.446
Δ Fat mass (kg) at W8	0.08	8.09	6.56	0.28	.234
Δ Fat-free mass (kg) at W8	0.19	-8.93	4.41	-0.43	.058
<i>Δ Prospective Food Consumption at W8</i>					
Δ Weight (kg) at W8	0.09	-6.23	4.64	-0.30	.196
Δ Fat mass (kg) at W8	0.00	1.38	8.70	0.04	.876
Δ Fat-free mass (kg) at W8	0.17	-10.91	5.68	-0.41	.071
<i>Δ Overall Satisfaction at W8</i>					
Δ Weight (kg) at W8	0.01	1.35	3.88	0.08	.732
Δ Fat mass (kg) at W8	0.03	-4.99	6.86	-0.17	.477
Δ Fat-free mass (kg) at W8	0.05	4.76	4.86	0.23	.340
<i>Δ Desire to eat at W8</i>					
Δ Weight (kg) at W8	0.14	-6.35	3.78	-0.37	.110
Δ Fat mass (kg) at W8	0.02	4.14	7.19	0.13	.572
Δ Fat-free mass (kg) at W8	0.32	-12.51	4.28	-0.57	.009

<i>Δ Overall Thirst at W8</i>					
Δ Weight (kg) at W8	0.01	-1.76	4.05	-0.10	.669
Δ Fat mass (kg) at W8	0.02	-4.01	7.22	-0.13	.586
Δ Fat-free mass (kg) at W8	0.00	-0.83	5.21	-0.04	.875

Multifactorial Assessment of Eating Disorder Symptoms

<i>Δ Depression at W8</i>					
Δ Weight (kg) at W8	0.22	1.42	0.86	0.46	.129
Δ Fat mass (kg) at W8	0.18	3.70	2.46	0.43	.163
Δ Fat-free mass (kg) at W8	0.11	1.11	0.98	0.34	.285

<i>Δ Binge Eating at W8</i>					
Δ Weight (kg) at W8	0.02	-0.37	0.84	-0.14	.668
Δ Fat mass (kg) at W8	0.02	1.18	2.37	0.16	.630
Δ Fat-free mass (kg) at W8	0.04	-0.61	0.90	-0.21	.515

<i>Δ Purgative Behavior at W8</i>					
Δ Weight (kg) at W8	0.01	-0.19	0.59	-0.10	.749
Δ Fat mass (kg) at W8	0.33	-3.03	1.36	-0.58	.049
Δ Fat-free mass (kg) at W8	0.01	0.22	0.63	0.11	.736

<i>Δ Fear of Fatness at W8</i>					
Δ Weight (kg) at W8	0.01	-0.22	0.58	-0.12	.708
Δ Fat mass (kg) at W8	0.04	-0.98	1.63	-0.19	.560
Δ Fat-free mass (kg) at W8	0.00	-0.12	0.63	-0.06	.856

<i>Δ Restrictive Eating at W8</i>					
Δ Weight (kg) at W8	0.03	0.53	0.95	0.17	.588
Δ Fat mass (kg) at W8	0.00	-0.42	2.72	-0.05	.879
Δ Fat-free mass (kg) at W8	0.04	0.68	1.02	0.21	.519

<i>Δ Avoidance of Forbidden Foods at W8</i>					
Δ Weight (kg) at W8	0.01	0.26	0.68	0.12	.713
Δ Fat mass (kg) at W8	0.03	-1.04	1.90	-0.17	.597
Δ Fat-free mass (kg) at W8	0.04	0.45	0.73	0.19	.546

Body Shape Questionnaire

<i>Δ Total Score at W8</i>					
Δ Weight (kg) at W8	0.00	0.12	1.34	0.02	.932
Δ Fat mass (kg) at W8	0.01	1.14	2.89	0.09	.697
Δ Fat-free mass (kg) at W8	0.00	-0.18	1.59	-0.02	.911

Body Morph Assessment

Δ Current Body Size at W8

Δ Weight (kg) at W8	0.04	-0.57	0.64	-0.21	.384
Δ Fat mass (kg) at W8	0.02	-0.80	1.50	-0.12	.600
Δ Fat-free mass (kg) at W8	0.03	-0.64	0.79	-0.19	.432

Δ Ideal Body Size at W8

Δ Weight (kg) at W8	0.00	0.02	0.37	0.01	.963
Δ Fat mass (kg) at W8	0.00	0.23	0.86	0.06	.790
Δ Fat-free mass (kg) at W8	0.00	-0.04	0.46	-0.02	.933

Δ Acceptable Body Size at W8

Δ Weight (kg) at W8	0.08	-0.46	0.37	-0.28	.224
Δ Fat mass (kg) at W8	0.02	-0.53	0.87	-0.14	.552
Δ Fat-free mass (kg) at W8	0.07	-0.54	0.45	-0.27	.244

Δ Body Dissatisfaction at W8

Δ Weight (kg) at W8	0.05	-0.59	0.64	-0.21	.366
Δ Fat mass (kg) at W8	0.03	-1.03	1.49	-0.16	.496
Δ Fat-free mass (kg) at W8	0.03	-0.60	0.79	-0.18	.459

Bold font indicates a significant association ($p < .050$).

^a Weight was measured post void in a gown at baseline and W8. Mean weight gain during overfeeding was 5.3 kg (95% CI: 4.3 to 6.3, $p < .001$).

^b Fat mass was determined at baseline and W8 via dual x-ray absorptiometry. Mean increase in fat mass during overfeeding was 3.5 kg (95% CI: 3.0 to 4.0, $p < .001$).

^c Fat-free mass was determined at baseline and W8 via dual x-ray absorptiometry. Mean increase in fat-free mass during overfeeding was 1.8 kg (95% CI: 0.9 to 2.7, $p < .001$).

Abbreviations: B, unstandardized regression coefficient; β , standardized regression coefficient; CI, confidence interval; SE, standard error; W8, week 8.

Supplemental Table 5. Simple linear regression analysis for the association between overfeeding-related changes in body weight^a, fat mass^b, and fat-free mass^c and changes in outcome variables in EAT.

Eating Inventory	R²	B	SE	β	P
<i>Δ Restraint at W8</i>					
Δ Weight (kg) at W8	0.10	-0.45	0.24	-0.31	.069
Δ Fat mass (kg) at W8	0.05	-0.48	0.35	-0.23	0.18
Δ Fat-free mass (kg) at W8	0.05	-0.43	0.34	-0.21	0.22
<i>Δ Disinhibition at W8</i>					
Δ Weight (kg) at W8	0.04	0.18	0.15	0.21	.235
Δ Fat mass (kg) at W8	0.06	0.30	0.21	0.24	0.17
Δ Fat-free mass (kg) at W8	0.00	0.07	0.21	0.06	0.74
<i>Δ Hunger at W8</i>					
Δ Weight (kg) at W8	0.08	0.33	0.20	0.28	.108
Δ Fat mass (kg) at W8	0.06	0.41	0.29	0.24	0.17
Δ Fat-free mass (kg) at W8	0.02	0.27	0.29	0.16	0.37
Food Craving Inventory					
<i>Δ High Fats at W8</i>					
Δ Weight (kg) at W8	0.00	0.01	0.06	0.03	.843
Δ Fat mass (kg) at W8	0.01	0.05	0.09	0.10	.570
Δ Fat-free mass (kg) at W8	0.00	-0.02	0.08	-0.05	.782
<i>Δ Sweets at W8</i>					
Δ Weight (kg) at W8	0.00	0.01	0.05	0.05	.790
Δ Fat mass (kg) at W8	0.01	0.04	0.08	0.10	.574
Δ Fat-free mass (kg) at W8	0.00	-0.01	0.08	-0.03	.861
<i>Δ Carbohydrates/Starches at W8</i>					
Δ Weight (kg) at W8	0.00	0.02	0.07	0.04	.820
Δ Fat mass (kg) at W8	0.03	0.09	0.09	0.17	.327
Δ Fat-free mass (kg) at W8	0.01	-0.06	0.09	-0.11	.524
<i>Δ Fast-Food Fats at W8</i>					
Δ Weight (kg) at W8	0.02	0.06	0.08	0.14	.419
Δ Fat mass (kg) at W8	0.01	0.07	0.11	0.10	.565
Δ Fat-free mass (kg) at W8	0.01	0.06	0.11	0.10	.566

<i>Δ Fruits and Vegetables at W8</i>					
Δ Weight (kg) at W8	0.04	0.08	0.07	0.20	.238
Δ Fat mass (kg) at W8	0.02	0.09	0.10	0.15	.375
Δ Fat-free mass (kg) at W8	0.02	0.08	0.10	0.14	.432
<i>Δ Total Score at W8</i>					
Δ Weight (kg) at W8	0.00	0.02	0.06	0.06	.714
Δ Fat mass (kg) at W8	0.02	0.06	0.08	0.13	.445
Δ Fat-free mass (kg) at W8	0.00	-0.02	0.08	-0.04	.819
Visual Analog Scales					
<i>Δ Difficulty to eat all foods at W8</i>					
Δ Weight (kg) at W8	0.12	6.06	3.02	0.35	.054
Δ Fat mass (kg) at W8	0.08	6.85	4.38	0.28	.129
Δ Fat-free mass (kg) at W8	0.05	5.20	4.41	0.21	.248
<i>Δ Fullness of Stomach at W8</i>					
Δ Weight (kg) at W8	0.01	0.71	1.51	0.09	.641
Δ Fat mass (kg) at W8	0.01	0.86	2.14	0.07	.690
Δ Fat-free mass (kg) at W8	0.00	0.55	2.12	0.05	.796
<i>Δ Overall Hunger at W8</i>					
Δ Weight (kg) at W8	0.06	-3.56	2.52	-0.25	.167
Δ Fat mass (kg) at W8	0.06	-4.67	3.58	-0.24	.203
Δ Fat-free mass (kg) at W8	0.02	-2.43	3.62	-0.12	.507
<i>Δ Prospective Food Consumption at W8</i>					
Δ Weight (kg) at W8	0.03	2.83	2.94	0.18	.343
Δ Fat mass (kg) at W8	0.06	5.43	4.11	0.24	.197
Δ Fat-free mass (kg) at W8	0.00	0.25	4.19	0.01	.953
<i>Δ Overall Satisfaction at W8</i>					
Δ Weight (kg) at W8	0.00	0.67	2.39	0.05	.782
Δ Fat mass (kg) at W8	0.01	1.99	3.37	0.11	.559
Δ Fat-free mass (kg) at W8	0.00	-0.64	3.36	-0.04	.851
<i>Δ Desire to eat at W8</i>					
Δ Weight (kg) at W8	0.02	-2.23	2.95	-0.14	.456
Δ Fat mass (kg) at W8	0.03	-3.83	4.15	-0.17	.364
Δ Fat-free mass (kg) at W8	0.00	-0.62	4.17	-0.03	.883

<i>Δ Overall Thirst at W8</i>					
Δ Weight (kg) at W8	0.03	2.87	2.96	0.18	.341
Δ Fat mass (kg) at W8	0.03	3.93	4.20	0.17	.357
Δ Fat-free mass (kg) at W8	0.01	1.78	4.21	0.08	.675

Multifactorial Assessment of Eating Disorder Symptoms

<i>Δ Depression at W8</i>					
Δ Weight (kg) at W8	0.02	-0.79	0.89	-0.15	.385
Δ Fat mass (kg) at W8	0.01	-0.72	1.35	-0.09	.598
Δ Fat-free mass (kg) at W8	0.02	-0.94	1.27	-0.13	.463

<i>Δ Binge Eating at W8</i>					
Δ Weight (kg) at W8	0.01	-0.40	0.65	-0.11	.543
Δ Fat mass (kg) at W8	0.06	-1.39	0.96	-0.25	.159
Δ Fat-free mass (kg) at W8	0.01	0.42	0.93	0.08	.657

<i>Δ Purgative Behavior at W8</i>					
Δ Weight (kg) at W8	0.00	0.13	0.66	0.03	.847
Δ Fat mass (kg) at W8	0.00	-0.01	1.00	0.00	.994
Δ Fat-free mass (kg) at W8	0.00	0.26	0.93	0.05	.779

<i>Δ Fear of Fatness at W8</i>					
Δ Weight (kg) at W8	0.01	0.36	0.79	0.08	.652
Δ Fat mass (kg) at W8	0.00	0.45	1.19	0.07	.709
Δ Fat-free mass (kg) at W8	0.00	0.32	1.12	0.05	.774

<i>Δ Restrictive Eating at W8</i>					
Δ Weight (kg) at W8	0.05	-0.84	0.67	-0.22	.220
Δ Fat mass (kg) at W8	0.13	-2.10	0.97	-0.36	.039
Δ Fat-free mass (kg) at W8	0.00	0.16	0.98	0.03	.873

<i>Δ Avoidance of Forbidden Foods at W8</i>					
Δ Weight (kg) at W8	0.01	-0.37	0.54	-0.12	.495
Δ Fat mass (kg) at W8	0.00	0.08	0.82	0.02	.926
Δ Fat-free mass (kg) at W8	0.04	-0.81	0.75	-0.19	.289

Body Shape Questionnaire

<i>Δ Total Score at W8</i>					
Δ Weight (kg) at W8	0.05	-2.74	2.16	-0.22	.213
Δ Fat mass (kg) at W8	0.03	-3.37	3.13	-0.18	.288
Δ Fat-free mass (kg) at W8	0.02	-2.22	3.10	-0.12	.480

Body Morph Assessment

Δ Current Body Size at W8

Δ Weight (kg) at W8	0.01	0.34	0.79	0.09	.677
Δ Fat mass (kg) at W8	0.07	1.37	1.01	0.27	.188
Δ Fat-free mass (kg) at W8	0.03	-0.86	1.08	-0.16	.434

Δ Ideal Body Size at W8

Δ Weight (kg) at W8	0.05	-0.60	0.51	-0.23	.257
Δ Fat mass (kg) at W8	0.00	1.37	1.01	0.27	.798
Δ Fat-free mass (kg) at W8	0.07	-0.93	0.70	-0.26	.196

Δ Acceptable Body Size at W8

Δ Weight (kg) at W8	0.03	-0.34	0.43	-0.16	.429
Δ Fat mass (kg) at W8	0.00	-0.19	0.57	-0.07	.738
Δ Fat-free mass (kg) at W8	0.02	-0.44	0.59	-0.15	.462

Δ Body Dissatisfaction at W8

Δ Weight (kg) at W8	0.05	0.93	0.82	0.23	.268
Δ Fat mass (kg) at W8	0.08	1.55	1.06	0.29	.158
Δ Fat-free mass (kg) at W8	0.00	0.07	1.16	0.01	.953

Bold font indicates a significant association ($p < .05$).

^a Weight was measured post void in a gown at baseline and W8. Mean weight gain during overfeeding was 6.9 kg (95% CI: 6.2 to 7.6, $p < .001$).

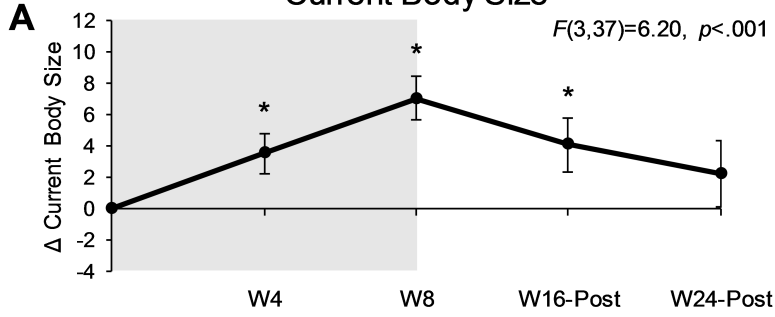
^b Fat mass was determined at baseline and W8 via dual x-ray absorptiometry. Mean increase in fat mass during overfeeding was 4.2 kg (95% CI: 3.8 to 4.6, $p < .001$).

^c Fat-free mass was determined at baseline and W8 via dual x-ray absorptiometry. Mean increase in fat-free mass during overfeeding was 2.7 kg (95% CI: 2.2 to 3.2, $p < .001$).

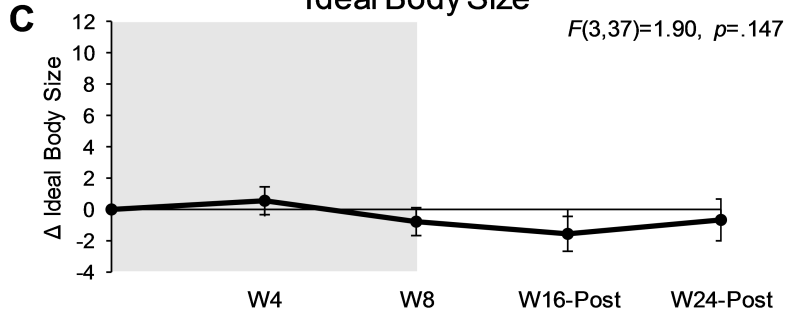
Abbreviations: B, unstandardized regression coefficient; β , standardized regression coefficient; CI, confidence interval; SE, standard error; W8, week 8.

The PROOF Study

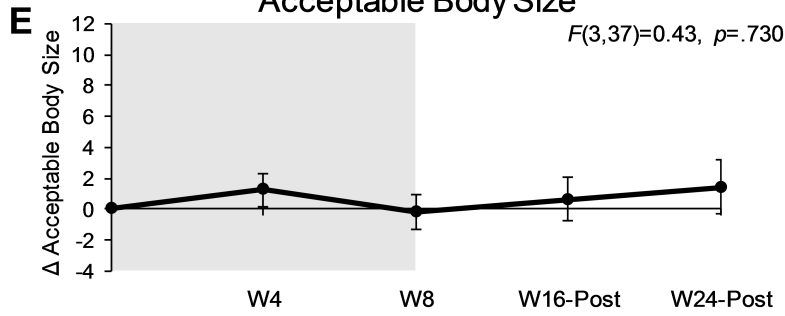
Current Body Size



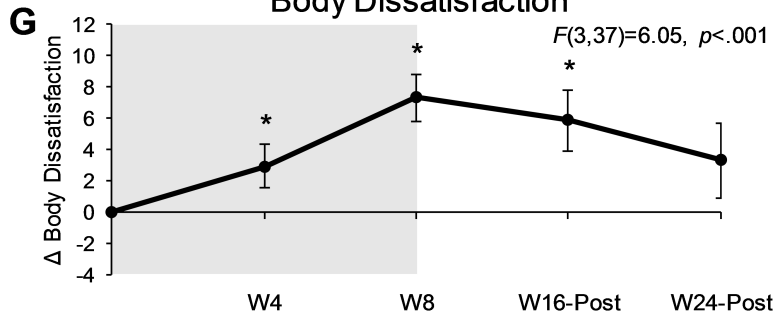
Ideal Body Size



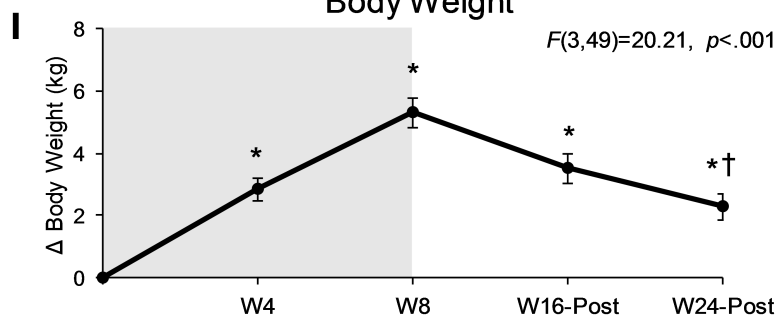
Acceptable Body Size



Body Dissatisfaction

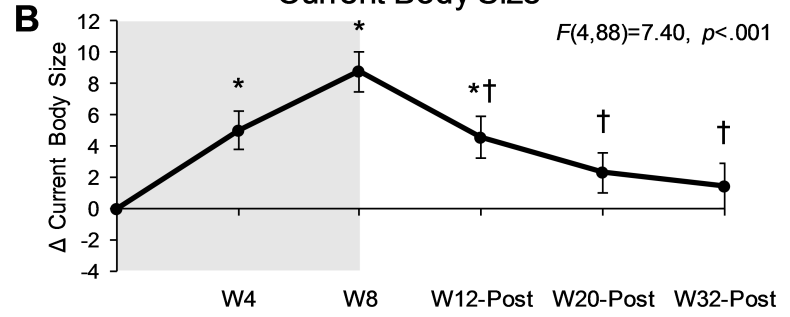


Body Weight

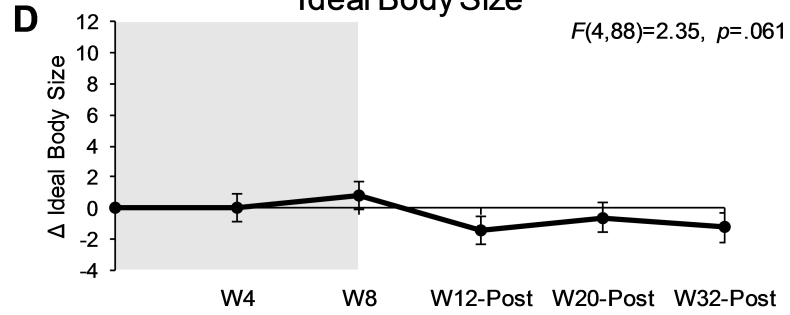


The EAT Study

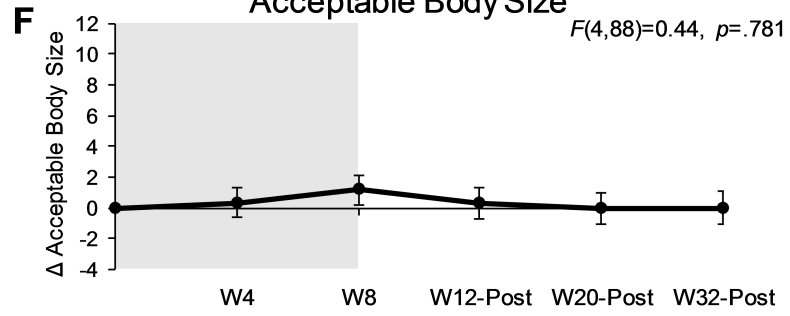
Current Body Size



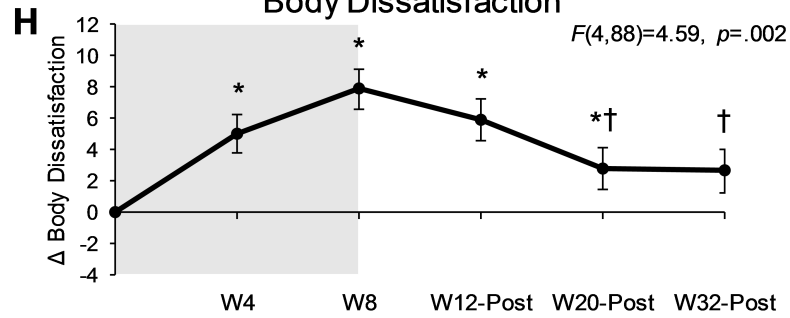
Ideal Body Size



Acceptable Body Size



Body Dissatisfaction



Body Weight

