Back to Basics? No Weight Loss from Motivational Interviewing Compared to Nutrition Psychoeducation at One-Year Follow-Up

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Objective: Weight loss interventions have begun to receive increasing attention in primary care. Motivational interviewing (MI) is compatible with primary care because it requires relatively limited time and resources. Few studies, however, have examined the long-term impact of MI for weight loss in primary care, and none have used attention-control comparisons. This study was the first randomized controlled trial with a 12-month follow-up of two Web-supported interventions: motivational interviewing and internet condition (MIC) and nutrition psychoeducation and internet condition (NPC).

Methods: Fifty-nine patients with overweight or obesity, with and without binge-eating disorder (BED), were randomized to treatments and assessed at 12-month follow-up after completing 3-month treatments in primary care (15 months total).

Results: Mixed models examining weight loss at 12 months revealed a group and time interaction effect trend ($P = 0.054$; $d' = 0.57$). Secondary end point analysis showed a decrease ($-1.7\%$) versus an increase ($1.3\%$) in weight at 12 months among NPC and MIC patients, respectively ($P = 0.056$; $d' = 0.57$). Overall, 5 of 44 (11.4\%) participants lost or maintained 5\% weight losses; differences between treatments were not significant. BED status did not impact weight loss.

Conclusions: Two brief and scalable weight loss interventions resulted in small effect sizes for weight loss 12 months following treatment conclusion. Because MIC required significantly more resources for adequate implementation, NPC may be more cost-effective.
compared with usual care or standard of care (i.e., receiving health-related pamphlets at baseline).

With the increasing use of MI for weight loss in primary care, it is important for research to clarify potential long-term effects. The current study aimed to examine weight loss over 12 months following a 3-month MI intervention in primary care (i.e., 15 months after treatment commencement). The initial 3-month RCT compared MI to nutrition psychoeducation (attention control) and usual care at post treatment and the 3-month follow-up (17). The current analyses add to the existing literature in several ways. First, this study compared the MI intervention to an attention-control condition at the 12-month follow-up; the usual care condition was not included in current analyses because those participants were offered compassionate care following the 3-month follow-up. To our knowledge, this is the first study to test MI for weight loss in primary care against a non-MI intervention with matched time for attention (14). Second, all participants were rigorously assessed for binge-eating disorder (BED), a psychiatric disorder characterized by the presence of weekly binge eating (i.e., consuming large quantities of food in relatively brief periods of time) without regular compensatory behaviors. BED is common within primary care, is associated strongly with excess weight and poor health-related outcomes, and is thought to negatively impact weight loss treatment outcomes (17-19). Third, the RCT included online resources, which may be related to greater weight loss (14). The current RCT also incorporated strengths of the previous two studies by including both men and women, including overweight in addition to individuals with obesity, using medical assistants who are readily available in primary care settings, and including a thorough assessment of treatment fidelity. The results through the 3-month follow-up assessment were published previously (17) and showed, overall, that the attention-control nutrition psychoeducation condition resulted in significant weight loss compared with usual care post treatment and 3 months following treatment conclusion. The MI condition, however, did not differ statistically from the attention-control or usual care conditions post treatment or 3 months following treatment. The present paper reports data from 12-month follow-up assessments (i.e., 15 months from treatment commencement) to assess for long-term intervention effects.

Methods
Participants
Participants were 59 adult patients with overweight or obesity (body mass index [BMI] between 25 and 55 kg/m²) receiving primary care services at a large, urban, university-based medical health care center. They were recruited through primary care provider referrals and flyers placed in waiting or patient rooms. Recruitment was intended to enhance generalizability by utilizing relatively few exclusionary criteria. Exclusion criteria included over 65 years old, severe psychiatric (e.g., schizophrenia) or medical (e.g., cardiac disease) problems, pregnancy or breastfeeding, and uncontrolled liver or thyroid disease, hypertension, or diabetes. The Physical Activity Readiness Questionnaire (20) was used to exclude individuals with cardiovascular problems, chest pains, and unexplained or frequent dizziness. Participants endorsing high blood pressure, physical conditions that may prohibit physical activity, or explainable or infrequent dizziness on the Physical Activity Readiness Questionnaire were able to participate with primary care provider consent (20). Participants were required to have regular internet and telephone access.

Measures
The Autonomous Motivation (21) subscale of the Treatment Self-Regulation Questionnaire measures internal or personal reasons for losing weight with satisfactory reliability. Higher scores reflect higher levels of motivation.

The Beck Depression Inventory (BDI) (22) assesses the current depression level, with higher scores reflecting increased depression; the BDI has excellent reliability and validity (23).

The Eating Disorder Examination (EDE-Q) (24), the self-report version of the Eating Disorder Examination (EDE) interview (25), has received psychometric support, including good test-retest reliability (26) and good convergence with the EDE interview in studies of BED performed in primary care (27). The present study used the EDE-Q version with instructions; this version includes added written definitions and examples of binge eating, which have been found to improve the performance of the self-report questionnaire in specialty clinics in individuals with BED (28). The EDE-Q global score provides an index of eating disorder symptomatology, with higher scores reflecting greater severity.

Height was measured only at baseline by using a wall measure, and weight was measured at all assessment points by using a large capacity digital scale (MedWeigh, model MS4600). Blood pressure and pulse were measured by using Mabis brand electric sphygmomanometers and used an average of two measurements. Medical assistants followed standardized instructions for obtaining the blood pressure measurements, such as how to place and adjust the armband, asking that participants keep their feet flat on the floor and not speak during measurement, and ensuring the arm is resting on the table.

Procedures
The study had Yale Institutional Review Board approval, and all participants provided written informed consent (see Barnes and colleagues (17) for previously published detailed procedures). Patients completed the battery of self-report measures and were screened by master’s or doctoral-level psychology clinicians trained in eating and weight disorders who were blinded to the patients’ treatment condition. The EDE interview (25), administered by master’s or doctoral-level psychology research clinicians, was used to diagnose BED.

Treatment was provided by medical assistants to increase generalizability to generalist primary care settings. Participants were randomly assigned, stratified by BED diagnosis, to one of three conditions. First, the motivational interviewing and internet condition (MIC) (n = 30) included five manualized sessions over 12 weeks, with guidelines to help medical assistants flexibly apply MI strategies to motivate patients for behavior changes that support weight loss. The guidelines allowed focus on BED as needed. The first appointment included an initial 60-minute in-person individual session. Following this first appointment, patients received up to four additional 20-minute MI sessions. Second, the nutrition
psychoeducation and internet condition (NPC) \( (n = 29) \) was designed as an attention control to provide patients the same frequency and length of sessions. The sessions provided basic nutritional information (e.g., recommended daily fruit/vegetable intake). At their first session, participants who were randomized to MIC and NPC also received a Lifestyle, Exercise, Attitudes, Relationships, and Nutrition (LEARN) manual \( (29) \) and orientation to a free website for tracking food intake, setting weight and intake goals, and physical activity (Livestrong.com). Third, the usual care \( (n = 30) \) participants were encouraged to continue working with their primary care providers and did not receive additional weight loss intervention (i.e., they did not receive a LEARN manual or guidance for the free website); as such, they were offered compassionate care (MIC) after completing the 3-month follow-up assessment and were not included in the currently presented 12-month follow-up assessment. Participants were reimbursed \$50 for completing the 12-month follow-up assessment.

Statistical analyses

Analyses designed to compare treatments were performed for all randomized patients (intent-to-treat). Weight and BMI outcomes were log-transformed to minimize skew. Linear mixed models were used to compare anthropometric, physiological, and psychological measures between groups over time. These models included treatment group (MIC vs. NPC) as a between-subjects factor and time (baseline vs. 12-month follow-up) as a within-subjects factor. The group by time interaction was modeled, and the best-fitting variance-covariance structure was based on Schwartz Bayesian criteria. Least squares means were compared to interpret significant effects. The percentage of weight change from baseline to 12-month follow-up was compared between groups using a t-test. Fisher’s exact test was used to compare those achieving or maintaining at least a 5% reduction in body weight at the 12-month follow-up. Both main and interactive effects of BED status were considered in all analyses. All analyses were performed using SAS, version 9.4 (SAS Institute Inc., Cary, North Carolina).

### Results

Participants had a mean age of 48.0 years \( (SD = 10.7; \) range 22-65) and a mean BMI of 34.9 kg/m\(^2\) \( (SD = 7.2) \). Most of the participants were female \( (74.6\%; \ n = 44) \), and 25.4% \( (n = 15) \) of the participants met the Diagnostic and Statistical Manual of Mental Disorders (Fifth Edition) criteria for BED. The sample was relatively diverse, with 66.1% \( (n = 39) \) of participants identifying as white, not Hispanic. There were no significant baseline differences between the conditions \( (17) \). Patient retention for the 12-month follow-up assessment was 23/30 (76.7%) in MIC, 26/29 (89.7%) in NPC, and 49/59 (83.1%) overall. Retention rates did not differ significantly between the conditions \( (P = 0.12) \).

**Weight.** Mixed models examining BMI changes from baseline to 12-month follow-up assessment revealed a nonsignificant interaction effect trend between group and time \( (F(1, 42) = 3.95; \ P = 0.053; \ d’ = 0.56) \); Table 1 shows means, standard deviations (SD), effect sizes, and confidence intervals (CI). The interaction was explained by decreases in BMI among participants in the NPC group versus BMI increases among MIC subjects. Simple group effects, however,

| Variable | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
|----------|------|----|------|----|------|----|------|----|------|----|------|----|
| BMI      |      |    | BMI  |    | BMI  |    | BMI  |    | BMI  |    | BMI  |    |
| Weight   |      |    | Weight |   | Weight |   | Weight |   | Weight |   | Weight |   |
| Systolic blood pressure | | | Systolic blood pressure | | | Systolic blood pressure | | | Systolic blood pressure | | | Systolic blood pressure |
| Diastolic blood pressure | | | Diastolic blood pressure | | | Diastolic blood pressure | | | Diastolic blood pressure | | | Diastolic blood pressure |
| Heart rate | | | Heart rate | | | Heart rate | | | Heart rate | | | Heart rate |
| BDI      |      |    | BDI  |    | BDI  |    | BDI  |    | BDI  |    | BDI  |    |
| AMQ      |      |    | AMQ  |    | AMQ  |    | AMQ  |    | AMQ  |    | AMQ  |    |
| Total EDE-Q (average) | | | Total EDE-Q (average) | | | Total EDE-Q (average) | | | Total EDE-Q (average) | | | Total EDE-Q (average) |

Table 1: Variable descriptive data

**BMI, Weight, Systolic blood pressure, Diastolic blood pressure, Heart rate, BDI, AMQ, Total EDE-Q (average)**

- **BMI**: Baseline minus baseline difference (mean, SD)
- **Weight**: Baseline minus baseline difference (mean, SD)
- **Systolic blood pressure**: Baseline minus baseline difference (mean, SD)
- **Diastolic blood pressure**: Baseline minus baseline difference (mean, SD)
- **Heart rate**: Baseline minus baseline difference (mean, SD)
- **BDI**: Baseline minus baseline difference (mean, SD)
- **AMQ**: Baseline minus baseline difference (mean, SD)
- **Total EDE-Q (average)**: Baseline minus baseline difference (mean, SD)
were not statistically significant. Following the same pattern, a similar interaction was observed for weight change (in pounds) measured over time ($F(1, 42) = 3.94; P = 0.054; d' = 0.57$). A secondary end point analysis showed a decrease ($-1.7\%$) versus an increase ($1.3\%$) in percentage weight change at 12-month follow-up for NPC and MIC participants, respectively ($t(42) = 1.96; P = 0.056; d' = 0.57$; Figure 1). On average, the percentage of weight change translates to a 3.3-pound (SD = 12.9) weight gain for MIC participants and a 3.1-pound (SD = 9.2) weight loss for NPC participants between baseline and 12-month follow-up assessment.

The likelihood of participants reaching or maintaining at least a 5% loss of initial body weight at 12-month follow-up assessment did not differ significantly between treatment conditions ($P = 0.171$); 17.4% ($n = 4$ of 23) of NPC participants lost or maintained at least 5% weight losses compared with only 4.8% ($n = 1$ of 21) of MIC participants.

**Physical and metabolic assessments.** Mixed models revealed no statistically significant effects when examining the impact of group, time, and group-by-time interactions for blood pressure and pulse.

**Psychological and motivational assessments.** The change in depression (BDI) over time was not statistically significant ($F(1, 47) = 3.80; P = 0.057$), and the effects for group and the group-by-time interaction ($d' = 0.01$) were also not statistically significant. Mixed models revealed a significant decrease in motivation (Autonomous Motivation questionnaire) over time for participants across conditions ($F(1, 57) = 7.52; P = 0.008$); effects for group and the group-by-time interaction ($d' = 0.31$) were not statistically significant. Mixed models showed a statistically significant decrease in self-reported disordered eating symptomatology (EDE-Q global) over time ($F(1, 47) = 19.78; P < 0.0005$); effects for group and the group-by-time interaction ($d' = 0.27$) were not significant.

**Role of BED.** BED did not significantly predict or moderate any treatment outcomes.

**Discussion**

The 12-month follow-up assessment results indicated that MIC did not result in significant weight losses following a 3-month intervention in primary care. The condition designed as an attention control (NPC) also did not differ significantly from MIC. BED diagnosis did not negatively impact weight loss outcomes. There were improvements over time in disordered eating for participants in both conditions, and motivation decreased for all participants. Depression, blood pressure, and pulse did not change significantly.

Our findings are consistent with those reported by Hardcastle and colleagues (16) and Martin and colleagues (15); although both studies tested interventions that were 6 months in length, neither reported significant weight losses for individuals receiving MI in primary care 1 year following treatment. In our study, participants randomized to NPC (attention-control condition) maintained, on average, almost a 2% initial body weight loss after receiving a total of only 2 hours and 20 minutes of nutrition psychoeducation. Similarly, 1 year after receiving treatment, 4 of 23 (17.4%) NPC participants maintained a 5% or more weight loss, a goal associated with attenuating weight-related health consequences (30,31); only 1 of 21 (4.8%) individuals receiving MI maintained a 5% weight loss. The latter finding is similar to that reported by Martin and colleagues (15), who reported 7% of participants maintained or achieved a 5% or more weight loss 12 months following MI treatment.

Our previously published data found that NPC participants had greater weight losses at post treatment and 3 months following treatment cessation than MIC participants (17); however, by 12-month follow-up, the two conditions did not significantly differ in weight loss. Importantly, the current results are despite extensive MI training, supervision, and treatment fidelity assurance. The MI was delivered with expected skill by the carefully trained and monitored medical assistants. Because of the basic nature of the NPC condition, the attention-control condition required significantly fewer resources to ensure treatment fidelity compared with MIC. Replication of our findings observed for NPC and MIC through 12 months following the interventions warrants further examination, as they are the first to compare MI for weight loss in primary care to a non-MI attention-matched intervention.

When comparing these weight changes to more intensive behavioral interventions, such as the Diabetes Prevention Program, they appear quite minor (32). From a public health standpoint, however, if one in approximately every six Americans with overweight or obesity could maintain a 5% or more weight loss from a widely disseminated and implemented, brief (2 hours and 20 minutes), scalable intervention like NPC, the intervention could help large numbers of people lose small, but significant, amounts of weight. Similarly, NPC participants maintained, on average, a 3-pound weight loss from baseline to 12-month follow-up, whereas participants receiving MI gained approximately 3 pounds during the same period. Preventing further weight gain may be an important focus for preventing associated health-related consequences.

Similar to the previously published posttreatment and 3-month follow-up outcomes (17), there was no significant impact of BED diagnosis on weight loss outcomes. Overall, the literature has been mixed on whether BED impacts weight loss trials (18,19). Perhaps individuals with BED recruited from primary care for the current...
trial differ from those recruited through specialty clinics for weight loss treatment (31).

Overall, disordered eating symptoms improved over time, while motivation decreased, mirroring posttreatment and 3-month follow-up assessments (19). The two previous assessments of MI for weight loss in primary care did not assess these variables (15,16). It is not surprising that motivation continued to decrease given the high motivation at treatment onset (17). In terms of physiological assessments, Hardcastle and colleagues (16) also found no significant improvements in blood pressure 1 year after treatment. Neither of the longer-term follow-up assessments of MI for weight loss in primary care reported data on depression or resting heart rate.

It is important to consider the limitations of the current study. The sample size was small, and while the inclusion/exclusion criteria were meant to mimic typical primary care patients, results may not generalize to non–treatment-seeking populations or to patients with significant psychological and physical comorbidities. There was no usual care comparison condition for this longer-term outcome time point. Based on other similar trials and the initial published RCT results, it would be reasonable to expect that participants randomized to usual care would not weigh significantly less on average by the 12-month follow-up assessment (15,16,19). Indeed, on average, adults with overweight or obesity without BED reported gaining 2 pounds, and those with BED reported gaining 18 pounds in the year prior to initiating weight loss treatment (33).

In conclusion, the current longer-term follow-up assessment of two brief and scalable weight loss treatments delivered in primary care by medical assistants revealed that neither treatment resulted in significant weight losses 12 months after finishing treatments. The results do suggest, however, that a brief and straightforward nutrition psychoeducation may help prevent weight gain over time (compared with MI) and may result in a 5% weight loss for approximately one in six individuals. Findings of the initial RCT, combined with current results, also suggested that individuals seek weight loss treatment when already highly motivated. Future research should examine whether MI enhances treatment enrollment or participation in nutrition psychoeducation in primary care settings or if it is beneficial for individuals less motivated to lose weight.

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