The Effect of a Mindful Restaurant Eating Intervention on Weight Management in Women

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INTRODUCTION

Increased obesity rates in the United States during the past 25 years have been attributed to an environment that encourages excessive food intake and sedentary behavior. Restaurant eating is one component of the current “obesogenic” food environment. Frequent eating out and consuming high-calorie foods in large portions at restaurants can contribute to excess calorie intake and weight gain. The frequency of restaurant eating has been found to have a significant, positive association with caloric and fat intake and body fatness. In one study, significantly more calories and fat were consumed on days people ate out compared with eating at home. Even during poor economic times, fast food sales remain strong, suggesting that eating out influences American food intake regardless of the economy.

Despite the increased attention to the food environment’s role in obesity and content on restaurant eating being included as a component of weight management programs, no intervention studies to date were found that primarily focused on developing restaurant eating skills. For those individuals who eat out frequently, developing the skills needed to eat out without gaining weight from the excess calories typically consumed at restaurants may be essential to long-term health.

The purpose of this pilot study was to evaluate the effectiveness of Mindful Restaurant Eating, a weight-gain prevention intervention that helps develop the skills needed to reduce caloric and fat intake when eating out.

Mindful Restaurant Eating uses knowledge about calories and fats in restaurant foods, theory-based behavior change strategies, individualized strategies based on personal preferences; and mindful eating meditations. With taste being one of the most important components of eating out, successful interventions may need to accommodate personal preferences and address how to maximize enjoyment while minimizing caloric and fat intake rather than reducing restaurant eating frequency. The mindful eating meditations are one strategy expected to enhance the enjoyment of eating out.

The guiding theoretical framework for the behavior change component of the intervention is the Health Promotion Model by Pender et al, which explains performance of health promotion behaviors. The modifiable factors from the model incorporated into this intervention to facilitate successful management of food intake in restaurants include reducing barriers, increasing perceived benefits, increasing self-efficacy or the confidence in one's ability to perform the...
behavior, and committing to a plan of action. In a systematic review evaluating the effectiveness of behavioral interventions that promote dietary change, goal setting was consistently the most effective behavioral intervention.19

The intervention was tested on perimenopausal women who eat out frequently. The focus on preventing weight gain with this population is important because risk for weight gain and increasing abdominal waist circumference is greater during the perimenopausal years,13,20 which in turn increases the risk for cardiovascular disease and diabetes.21

The research hypotheses for the study were as follows

1) Participants in the intervention group will experience less weight gain and smaller increases in waist circumference than those in the wait list control group.

2) Participants in the intervention group will have lower daily caloric and fat intake and lower caloric and fat intake per restaurant eating episode than those in the wait list control group.

3) Participants in the intervention group will report less emotional eating, more diet-related self-efficacy, and fewer barriers to weight management when eating out than those in the wait list control group.

METHODS

The Mindful Restaurant Eating intervention was a randomized controlled trial comparing the active intervention to the wait list control. The intervention, 6 weekly 2-hour sessions, was delivered to 3 cohorts that consisted of between 7 and 9 participants per group. Data were collected from both groups at baseline (time 1) and at week 6 after the intervention (time 2). The study, reviewed as expedited, was approved by The University of Texas at Austin Institutional Review Board, and signed informed consent was obtained.

Participants and Recruitment

The target population was healthy, perimenopausal women who eat out frequently. Women were aged 40 to 59 years, lived in central Texas, and reported eating out at least 3 times per week. Exclusion criteria for the study were (1) current use of appetite suppressants, weight loss medications, or hormone replacement therapy; (2) concurrent treatment for eating disorders or obesity; (3) newly diagnosed or unstable chronic health problems that influence eating behavior, weight, or metabolism; and (4) history of surgical menopause. Health problems excluded included diabetes, unstable thyroid condition, and lymphedema.

Participants were recruited from the greater metropolitan Austin, Texas, area through advertisements in newspapers, radio, television, e-mail, the Internet, and bulletin boards. To enhance retention, participants were given a $20 gift card after time 1 data collection and a $30 gift card after time 2 data collection.

Intervention

Weekly topics and mindful eating meditation exercises for the intervention are presented in Table 1. Each session included content related to weight management when eating out, interactive skill-building activities to individualize strategies and to address barriers to managing intake when eating out, and mindful eating meditations. General principles of weight management were also discussed in the beginning of the intervention. Participants received notebooks with handouts to reinforce the content, along with weekly homework exercises.

To provide mastery experiences that build self-efficacy, participants worked on personalized weekly goals and practiced the skills needed to deal with personal barriers to managing restaurant intake during class and for homework.37 For example, participants planned meals at favorite restaurants by using calorie and fat information while incorporating calorie and fat reduction strategies. Foods were used in class to visually reinforce portion size and to practice mindful eating.

Mindful eating meditations are the intentional, nonjudgmental focus on the present eating experience.22 Two types of mindful eating meditation exercises were used in the intervention: (1) mindful eating that focuses on awareness of the sight, smell, and texture of the eating experience to maximize enjoyment26 and increase satisfaction with smaller portions; and (2) a series of guided mindfulness meditations that use the relaxation effect and focuses awareness on hunger, taste and stomach satiety, and eating triggers.23 These mindfulness meditations were adapted from work using mindfulness-based approaches to binge eating.23 For example, one meditation exercise had participants explore their fullness before and after drinking a bottle of water.

Instruments

Dietary intake was measured with the multiple-pass method for 24-hour dietary recalls. For each data collection event, 3 days’ worth of dietary intake, which included 2 weekdays and 1 weekend day, were collected. These 3 days’ worth of 24-hour recalls are considered necessary for representative intake.28 The mean caloric and fat intake per day and per restaurant eating episode during the 3 days sampled were calculated.

The 24-hour dietary recalls were chosen because food diaries may reactively change eating behavior.24 In a study comparing the multiple-pass method for 24-hour dietary recall to measured food intake, the differences between the methods for all macronutrients were less than 10%.25 There is a tendency to under-report food intake when using self-report compared with estimates of energy expenditure from the doubly-labeled water technique.26 Because error created by under-reporting would likely be distributed randomly across groups, relative effects should be valid.27 Techniques used to increase the accuracy of 24-hour dietary recalls included using a registered dietitian skilled in the multiple-pass method for dietary recall,25 using Nutrition Data System for Research software (NDSR 2009; University of Minnesota, Minneapolis, MN, 2009); and providing participants with 2-dimensional food models to improve estimation of portion sizes.

The 25-item Emotional Eating Scale (EES) measured the urge to eat in response to emotions, using a 5-point Likert-type scale, with responses ranging from “no desire to eat” to an “overwhelming desire to eat.”29 Factor analysis supported 3 subscales:
Table 1. Weekly Intervention Topics and Mindful Eating Meditation Exercise

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics</th>
<th>Mindful Eating Meditations</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Principles of Weight Management; General Strategies to</td>
<td>Introduction to Mindful Eating Exercises and Mindful</td>
</tr>
<tr>
<td></td>
<td>Prevent Weight Gain; Barriers to Weight Management When Eating Out;</td>
<td>Meditation; Practice Mindful Eating (Raisins and</td>
</tr>
<tr>
<td></td>
<td>Goal Setting Skills</td>
<td>Strawberries)</td>
</tr>
<tr>
<td>2</td>
<td>Portion Sizes; Energy Needs; General Strategies to</td>
<td>Hunger Awareness Meditation; Practice Mindful Eating (Cheese and</td>
</tr>
<tr>
<td></td>
<td>Prevent Weight Gain in Restaurants</td>
<td>Crackers)</td>
</tr>
<tr>
<td>3</td>
<td>Strategies to Improve Satiety and Satiation; Strategies to</td>
<td>Fullness Awareness Meditation; Mindful Eating Practice (Chocolate)</td>
</tr>
<tr>
<td></td>
<td>Prevent Weight Gain When Eating Fast Food; Salad</td>
<td>Hunger and Fullness Awareness Meditation; Making</td>
</tr>
<tr>
<td></td>
<td>Skills; Internet Resources</td>
<td>Mindful Eating Choices (Sweet and Salty)</td>
</tr>
<tr>
<td>4</td>
<td>Strategies to Prevent Weight Gain When Eating Out at Italian, Chinese</td>
<td>Eating Triggers Meditation; Practice Mindful Eating Buffet</td>
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<tr>
<td></td>
<td>and Mexican Restaurants</td>
<td>Style</td>
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<tr>
<td>5</td>
<td>Strategies to Prevent Weight Gain When Eating Out at Seafood, Steak</td>
<td>Integrated Mindful Eating Meditation; Review and</td>
</tr>
<tr>
<td></td>
<td>and Family-Style Restaurants</td>
<td>Practice of Mindful Eating</td>
</tr>
<tr>
<td>6</td>
<td>Strategies to Prevent Weight Gain When Eating Out for</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Breakfast, Dessert and Beverages; Relapse Prevention</td>
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</tbody>
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angriness/frustration, anxiety, and depression. The EES was internally consistent, with a Cronbach $\alpha$ of .93 in this sample for total score.

The Self-Efficacy for Eating Behaviors Scale measured diet-related self-efficacy. Responses are based on a 5-point Likert-type scale in which participants “rate how confident [they] are that [they] could really motivate [themselves] to do things like these consistently, for at least 6 months.” Factor analysis supported 5 subscales: (1) Resisting Relapse; (2) Reducing Calories; (3) Reducing Salt; (4) Reducing Fat; and (5) Behavioral Skills. Items on reducing salt were not used for this study because it was not central to weight management. To reflect the study’s focus, 4 items were reworded, substituting “at a restaurant or eating out” for “at a party.” The Cronbach $\alpha$ for the 49 items used in this study was .93.

Barriers to Weight Management in Restaurant Eating (BarriersRE) has 25 items to measure the magnitude of barriers to managing intake when eating out. Responses are based on a 5-point Likert-type scale, ranging from “not a barrier” to “overwhelming barrier.” This instrument was internally consistent, with a Cronbach $\alpha$ of .87 for this sample.

Procedures

Potential participants were screened by telephone to determine eligibility, and eligible respondents were given information about the study procedures. An initial meeting was set up within 3 weeks before the intervention start to obtain written informed consent and baseline data. During that meeting, participants completed 4 questionnaires: Background Information Questionnaire, the EES, the Self-Efficacy for Eating Behaviors Scale, and the BarriersRE. Participants were weighed on a calibrated scale in light clothing, and height without shoes was measured with a stadiometer. Waist circumference was measured with a tape measure at the top of the right iliac crest, without compression.

The first 24-hour dietary recall was collected at the initial meeting, and 2 additional 24-hour dietary recalls were randomly collected by telephone within the week. At least 1 of 3 days contained a restaurant eating episode or another day was sampled until a restaurant eating episode was captured. The principal investigator (GT), who delivered the intervention, was blinded to the data collected. Participants were randomly assigned after the initial data collection to the intervention or the wait list control group, using a computer-generated table of random numbers.

Intervention participants attended 6 weekly sessions of Mindful Restaurant Eating, whereas the control group was not contacted until the time 2 data collection was scheduled. Data for time 2 were collected in person for both groups within 1 week after the last intervention session for that cohort was completed. The time 2 data collected included weight, waist circumference, EES, Self-Efficacy for Eating Behaviors Scale, BarriersRE, and 1 of 3 days’ worth of dietary intake, with 2 additional 24-hour recalls randomly collected by telephone within the week.

Data Analysis

Data analysis was conducted with Predictive Analytics Software (version 18, SPSS Inc, Chicago, IL, 2009). Before analysis, data were evaluated for accuracy, missing data, and violation of statistical assumptions. The significance level was set at .05. To address the research hypotheses, a series of general linear models examined the mean change from baseline to final endpoint to determine differences between the outcome variables in the treatment and control groups while adjusting for baseline covariates. A series of general linear models was conducted in which the time 2 outcome variable was regressed on the baseline measure while adjusting for group effects. For example, a test for change in weight from baseline to time 2 can be modeled as $\text{Time}_{\text{weight}} = \text{Baseline}_{\text{weight}} + \text{group} + e$, where $\text{Time}_{\text{weight}}$ represents the participant’s weight at time 2 and $\text{Baseline}_{\text{weight}}$ represents the participant’s weight at baseline. The participant group, active intervention or wait list control, is represented by group, whereas $e$ represents the error term.
An intention-to-treat analysis was also conducted to model the results as if all participants who were randomized had complete data. The Predictive Analytics Software Missing Values analysis procedure was used to examine patterns of missing data. Only age and body mass index (BMI) were not missing any data; multiple imputations procedures were used in which 5 imputed data sets were created and analyzed. Unadjusted general linear models were conducted according to multiple imputations in which all cases were considered in the analysis.

RESULTS

The sample consisted of 35 healthy, perimenopausal women aged 40 to 59 years. The mean age for the participating sample was 49.6 years (SD = 5.9 years). The mean age for the participating sample was 49.6 years (SD = 5.9 years). The sample was triethnic: 54% white, 29% Hispanic/Latino, and 17% African American. The average BMI was 31.8 (SD = 6.8), ranging from 22.1 to 54.4. Participants reported eating out on average 5.6 times per week (SD = 3.4). Current eating patterns at the start of the study varied, with 31% of participants dieting, 23% eating to maintain weight, and 46% eating whatever they wanted. Of the 43 participants who consented to participate, 35 completed the study, for an attrition rate of 19%. There were no significant differences at baseline in age, BMI, or reported frequency of eating out between those who completed and those who dropped out of the study.

There were no significant differences at baseline between the intervention and control groups for age, educational level, ethnicity, income, reported frequency of eating out, time spent dieting, EES scores, Self-Efficacy for Eating Behaviors Scale scores, or BarriersRE scores. Additionally, there were no significant differences at baseline between the intervention and control groups for daily caloric intake and fat intake or amount of calories and fat consumed during restaurant eating episodes. However, the intervention group had a significantly (t33 = 2.12; P = .04) higher average BMI of 33.9 (SD = 7.2) at baseline compared with the BMI (mean = 29.3; SD = 5.5) of the control group. The waist circumference was also significantly (t33 = 2.44; P = .02) higher for the intervention group at baseline than for the control group. The means and standard deviations for the dependent variables for time 1 and time 2 by group assignment are presented in Table 2.

Weight and Waist Circumference Outcomes

Results of the regression analysis indicated that the intervention group had significantly less weight gain at time 2 than the control group after controlling for time 1 weight (β = −.04; t = −2.23; P = .03; R² = 0.989) (Table 3). In addition, the intervention group also had a decrease in waist circumference at time 2 relative to the control group, which was not statistically significant (β = −.10; t = −1.72; P = .10; R² = 0.917).

Caloric and Fat Intake Outcomes

Compared with that of the control group, the average number of calories consumed during a 3-day period was significantly lower at time 2 for the intervention group (β = −.44; t = −3.43; P = .002; R² = 0.486). The average fat intake was also significantly lower for the intervention group relative to the control group (β = −.45; t = −3.66; P = .001; R² = 0.521). The intervention group showed no significant decrease in caloric (β = −.28; t = −1.87; P = .07; R² = 0.280) and fat intake (β = −.27; t = −1.59; P = .12; R² = 0.085) per restaurant eating episode at time 2.

Influence on Emotional Eating, Self-efficacy, and Barriers

There was no significant difference in total EES scores at time 2 (β = −.073; t = −.55; P = .59; R² = 0.477) between the intervention and control group.

<table>
<thead>
<tr>
<th>Table 2. Means and Standard Deviations for Time 1 and Time 2 Outcome Variables by Group Assignment, mean (SD) (n = 35)</th>
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<tbody>
<tr>
<td><strong>Variable</strong></td>
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<tr>
<td>---------------</td>
</tr>
<tr>
<td>Weight, kgᵃ</td>
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<tr>
<td>Waist circumference, cmᵃ</td>
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<tr>
<td>Average daily kcal</td>
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<tr>
<td>Average daily fat, g</td>
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<tr>
<td>Total eating out episodes during 3 days</td>
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<tr>
<td>Caloric intake/eating out episode</td>
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<tr>
<td>Fat intake/eating out episode, g</td>
</tr>
<tr>
<td>Total EES score</td>
</tr>
<tr>
<td>Total SEEBS</td>
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<tr>
<td>Total barriers</td>
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EES indicates Emotional Eating Scale; SEEBS, Self-Efficacy for Eating Behaviors Scale.
ᵃSignificantly different (P < .05) at time 1 between intervention and control;ᵇSignificantly different (P < .05) at time 2 between intervention and control;ᵃn = 18.
At the end of the intervention, diet-related self-efficacy was significantly higher among intervention participants ($\beta = .36; t = 2.54; P = .02; R^2 = 0.397$), and the intervention group experienced fewer barriers to managing intake when eating out ($\beta = -.38; t = -3.74; P = .001; R^2 = 0.687$) than the control group.

**Intention-to-Treat Analysis**

The intention-to-treat analysis modeled the results as if all 43 participants in the study, including the 8 who withdrew before completing time 2 data collection, had completed the study. Results of the multiple imputations analysis were consistent with the findings for the 35 participants who completed the study. For instance, when all 43 cases were considered, the intervention group still reported significantly less weight gain and lower average daily caloric and fat intake than the control group. Models based on the imputed data also indicated that the intervention group perceived greater diet-related self-efficacy and fewer barriers at time 2 relative to the control group.

**DISCUSSION**

The intervention, *Mindful Restaurant Eating*, was found to be effective in preventing weight gain and reducing daily caloric and fat intake. Although the intention of the intervention was weight maintenance and the majority of participants were not dieting with the intent to lose weight at the start of the study (69%), on average the intervention group lost 1.7 kg during 6 weeks. The number of times that participants ate out, as captured in the 3-day 24-hour recalls, did not significantly decrease from time 1 to time 2, indicating that participants were able to successfully manage their weight while continuing their usual, frequent eating-out patterns.

Overall, the participants in the intervention group reduced their daily caloric intake by about 297 kcal after completing the intervention, which would explain their weight loss. Only part of the calorie reduction (about 124 kcal) can be accounted for during eating out, indicating that fewer calories were also consumed at home.
Weekly goals, set by each participant, often targeted general weight loss strategies such as reducing portions, which may have led to consuming fewer calories at home. The weight loss and reduction in caloric intake during 6 weeks for those in the intervention was clinically significant and further supports the effectiveness of the intervention. Additionally, the intervention increased perceived diet-related self-efficacy, along with reducing the perceived barriers to managing weight when eating out. Self-efficacy and barriers to health-promoting behaviors have both been important concepts in predicting successful lifestyle change, including weight management.17

There were no studies found that tested an intervention similar to that used in this pilot study. In comparison, the Women’s Healthy Lifestyle Project, which was a lifestyle intervention focused on preventing weight gain during menopause that used 15 group sessions and included a 1,300-cal diet for the first month, produced on average a weight loss of 4.9 kg by 6 months.13 In a meta-analysis of weight loss clinical trials, the average weight loss was 5 to 8.5 kg by 6 months.31 These results appear comparable to the pilot study participants’ weight loss of 1.7 kg by 6 weeks but also highlight the need for longer follow-up that would provide data for comparison at a comparable interval.

The main limitations of this study were a small convenience sample that may not have enough power to allow for detection of significant differences and may lack long-term follow-up necessary because of feasibility constraints of a pilot study. In other weight-gain prevention studies, weight gain over time was problematic,5 and these limitations need to be addressed in future research. Another limitation was the use of self-reported intake, which tends to result in underreporting.26 Strategies used to improve the accuracy of the self-reported intake were used to minimize underreporting. Additionally, as part of informed consent, participants knew ahead of time when the first 24-hour dietary recall would be collected because it was part of a scheduled meeting; this knowledge could have influenced food intake for that day. To reduce the reactive effect, the 24-hour dietary recall was only briefly mentioned when participants were informed about data collection.

Despite these limitations, this study adds to the literature because interventions that focus on the individual developing restaurant eating skills needed to manage intake when eating out have not been tested before. The results from this pilot study are promising and warrant further examination because the need for innovative approaches to weight gain prevention continues to be pressing.

IMPLICATIONS FOR RESEARCH AND PRACTICE

Despite the small sample size, the intervention Mindful Restaurant Eating was successful in promoting weight management. Further research is needed with a larger sample and a longer follow-up period. In past weight gain prevention studies, weight gain becomes problematic during the long term. Future studies should include long-term follow-up support focused on positive feedback for goal attainment and on recognizing past successes in managing food intake in restaurants. The emphasis on accountability, goal attainment, and positive reinforcement may be useful because inadequate long-term rewards for weight management efforts may contribute to weight loss failures.52 Follow-up contact is a maintenance strategy that has been found to provide benefits after the initial treatment phase53 and may be a cost-effective way to enhance the intervention. If effective, this intervention could be adapted for a variety of populations that frequently eat out, such as adolescents, college students, and working parents.

Identifying those who eat out frequently may be useful for tailoring nutrition education. This assessment data can be used to make sure that adequate knowledge and resources about the caloric and fat content of favorite restaurant foods are presented in educating the consumer. Numerous books, handouts,34 and Web sites are now available to help consumers eat out wisely and can be incorporated into nutrition education. Addressing barriers to healthful restaurant eating, such as taste, convenience, price, and family preferences,35 also needs to be incorporated into nutrition education by using such strategies as managing portion size when eating out to avoid excess calories. To address the obesity epidemic, creative solutions are needed; developing restaurant eating skills to manage intake in the high-risk restaurant food environment may be one of those solutions.

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REFERENCES


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