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

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Abstract

Objective—To evaluate the effect of a *Mindful Restaurant Eating* intervention on weight management.

Design—Random control trial.

Setting—Greater metropolitan area of Austin, Texas.

Participants—Women ($n = 35$) 40–59 years old who eat out at least 3 times per week.

Intervention—The intervention, using 6 weekly 2 hour small group sessions, focused on reducing calorie and fat intake when eating out through education, behavior change strategies, and mindful eating meditations.

Main Outcome Measures—Weight, waist circumference, self-reported daily calorie and fat intake, self-reported calories and fat consumed when eating out, emotional eating, diet related self-efficacy, and barriers to weight management when eating out.

Analysis—General linear models examined change from baseline to final endpoint to determine differences in outcomes between the intervention and control group.

Results—Participants in the intervention group lost significantly more weight ($P = .03$), had lower average daily caloric ($P = .002$) and fat intake ($P = .001$), had increased diet related self-efficacy ($P = .02$), and had fewer barriers to weight management when eating out ($P = .001$).

Conclusions and Implications—*Mindful Restaurant Eating* intervention was effective in promoting weight management in perimenopausal women.

Keywords

weight gain; prevention; restaurants; energy intake

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IRB approval from the University of Texas at Austin

INTRODUCTION

Increased obesity rates in the United States over the past 25 years¹ have been attributed to an environment that encourages excessive food intake and sedentary behavior.² Restaurant eating is one component of the current “obesogenic” food environment.³ Frequently eating out and consuming high calorie foods in large portions at restaurants can contribute to excess calorie intake and weight gain.⁴⁻⁷ The frequency of restaurant eating has been found to have a significant, positive association with caloric and fat intake, and body fatness.⁸⁻¹¹ In one study, significantly more calories and fat were consumed on days people ate out as compared to eating at home.¹¹ Even during poor economic times, fast food sales remain strong,¹² suggesting that eating out influences American food intake regardless of the economy.

Despite the increased attention to the food environment’s role in obesity,⁹⁻¹⁰ 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.¹³⁻¹⁴ 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: a) knowledge about calories and fats in restaurant foods; b) theory-based behavior change strategies; c) individualized strategies based on personal preferences; and d) mindful eating meditations. With taste being one of the most important components of eating out,¹⁵ 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.¹⁶

The guiding theoretical framework for the behavior change component of the intervention is Pender’s Health Promotion Model,¹⁷ which explains performance of health promotion behaviors. The modifiable factors from the model¹⁷ incorporated into this intervention to facilitate successful management of food intake in restaurants include: (1) reducing barriers;¹⁸ (2) increasing perceived benefits; (3) increasing self-efficacy, confidence in one’s ability to perform the behavior; and (4) 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 since 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:

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 control 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's Institutional Review Board.

Participants and Recruitment

The target population was healthy, perimenopausal women who eat out frequently. To participate, women were 40 to 59 years old, 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 (5) 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: a) content related to weight management when eating out; b) interactive skill building activities to individualize strategies and to address barriers to managing intake when eating out; and c) 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.¹⁷ For example, participants planned meals at favorite restaurants 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, nonjudgemental 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 enjoyment¹⁶ and increase satisfaction with smaller portions; and 2) a series of guided mindfulness meditations that uses 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 using the multiple-pass method for 24-hour dietary recalls. For each data collection, 3 days of dietary intake, which included 2 week days and 1 weekend day, were collected. These 3 days of 24-hour recalls are considered necessary for representative intake.²⁸ The mean caloric and fat intake per day and per restaurant eating episode over 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 to estimates of energy expenditure from 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: 1) using a registered dietician skilled in the multiple-pass method for dietary recall²⁵ using Nutrition Data System for Research software (NDSR 2009, University of Minnesota, Minneapolis, MN, 2009); and 2) providing participants with two-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: anger/frustration, anxiety, and depression.²⁹ The EES was internally consistent, with a Cronbach’s alpha of .93 in this sample for total score.

The Self-Efficacy for Eating Behaviors Scale (SEEBS) measured diet-related self-efficacy.³⁰ Responses are based on a 5-point Likert-type scale in which participants “rate how confident you are that you could really motivate yourself to do things like these consistently, for at least 6 months” (p.285).³⁰ Factor analysis supported 5 subscales: 1) Resisting Relapse; 2) Reducing Calories; 3) Reducing Salt; 4) Reducing Fat; and 5) Behavioral Skills.³⁰ 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’s 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*.”¹⁸ This instrument was internally consistent, with a Cronbach’s 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 prior to the intervention start to obtain written informed consent and baseline data. During that meeting, participants completed 4 questionnaires: Background Information Questionnaire, the EES, the SEEBS, and the BarriersRE. Participants were weighed on a calibrated scale in light clothing, and height was measured using a stadiometer without shoes. Waist circumference was measured with a tape measure at the top of the right iliac crest without compression.²¹

The first 24-hour dietary recall was collected at the initial meeting, and 2 additional 24-hour dietary recalls were randomly collected by phone 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, 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*, while 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, SEEBS, BarriersRE, and 1 of 3 days of dietary intake with 2 additional 24-hour recalls randomly collected by phone within the week.

Data Analysis

Data analysis was conducted using Predictive Analytics Software (PASW Statistics version 18, SPSS Inc., Chicago, IL, 2009). Prior to 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 were 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:

$$Time_{weight2} = Baseline_{weight1} + group + e_i$$

Where $Time_{weight2}$ represents the participant's weight at Time 2 and $Baseline_{weight1}$ represents the participant's weight at baseline. The participant group, active intervention or wait list control, is represented by $group$, while e_i 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 PASW Missing Values analysis procedure was used to examine patterns of missing data. Only age and 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 based on multiple imputations in which all cases were considered in the analysis.

RESULTS

The sample consisted of 35 healthy, perimenopausal women 40 to 59 years old. The mean age for the participating sample was 49.6 years old (SD = 6.8). Most participants had at least some college education (89%) with an annual family income of \$50,000 or more (58%). The sample was tri-ethnic: 54% white, 29% Hispanic/Latino, and 17% African American. The average BMI was 31.8 kg/m² (SD = 6.8), ranging from 22.1 kg/m² to 54.4 kg/m². 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% 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, SEEB scores, or BarriersRE scores. Additionally, there were no significant differences at baseline between the intervention and control groups for daily caloric and fat intake or amount of calories and fat consumed during restaurant eating episodes. However, the intervention group had a significantly $[t(33) = 2.12; P = .04]$ higher average BMI of 33.9 kg/m^2 ($SD = 7.2$) at baseline compared to the BMI ($M = 29.3 \text{ kg/m}^2$, $SD = 5.5$) of the control group. The waist circumference was also significantly $[t(33) = 2.44; P = .02]$ 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 ($\beta = -.04$, $t = -2.23$, $P = .03$, $R^2 = .989$) (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 ($\beta = -.10$, $t = -1.72$, $P = .096$, $R^2 = .917$).

Caloric and Fat Intake Outcomes

Compared to the control group, the average number of calories consumed during a 3-day period was significantly lower at Time 2 for the intervention group ($\beta = -.44$, $t = -3.43$, $P = .002$, $R^2 = .486$). The average fat intake was also significantly lower for the intervention group relative to the control group ($\beta = -.45$, $t = -3.66$, $P = .001$, $R^2 = .521$). Despite a trend for the intervention group to have a decrease in caloric ($\beta = -.28$, $t = -1.87$, $P = .07$, $R^2 = .280$) and fat intake ($\beta = -.27$, $t = -1.59$, $P = .12$, $R^2 = .085$) per restaurant eating episode at Time 2, it did not reach statistical significance in comparison to the control group.

Impact on Emotional Eating, Self-Efficacy, and Barriers

There was no significant difference in total EES scores at Time 2 ($\beta = -.073$, $t = -.55$, $P = .59$, $R^2 = .477$) between the intervention and control group. At the end of the intervention, diet-related self-efficacy was significantly higher among intervention participants ($\beta = .36$, $t = 2.54$, $P = .016$, $R^2 = .397$), and the intervention group experienced fewer barriers to managing intake when eating out ($\beta = -.38$, $t = -3.61$, $P = .001$, $R^2 = .687$) 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 that withdrew prior to 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 over 6 weeks. It is interesting to note that 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 calories after completing the intervention, which would explain their weight loss. Only part of the calorie reduction (about 124 calories) 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 over 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 management¹⁷.

There were no studies found that tested a similar intervention to 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 calorie diet for the first month, had on average a weight loss of 4.9 kg at 6 months.¹³ In a meta-analysis of weight loss clinical trials, the average weight loss was 5 to 8.5 kg at 6 months.³¹ These results appear comparable to the pilot study participants' weight loss of 1.7 kg at 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 and lack of long term follow-up necessary due to feasibility constraints of a pilot study. In other weight gain prevention studies, weight gain over time was problematic,¹⁴ and these limitations need to be addressed in future research. Another limitation was the use of self-reported intake which tends to result in under-reporting.²⁶ Strategies used to improve the accuracy of the self-reported intake were used to minimize under-reporting. Additionally, as part of informed consent, participants knew ahead of time when the first 24-hour dietary recall would be collected since 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 informing participants 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 a pressing need.

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 over 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 since inadequate long term rewards for weight management efforts may contribute to weight loss failures.³² Follow-up contact is a maintenance strategy that has been found to provide benefits after the initial treatment phase³³ 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 websites are now available to help consumers eat out wisely and can be incorporated into nutrition education. Addressing barriers to healthy restaurant eating, like 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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Table 1**Weekly Intervention Topics and Mindful Eating Meditation Exercises**

Week	Topics	Mindful Eating Meditations
1	Principles of Weight Management; General Strategies to Prevent Weight Gain; Barriers to Weight Management When Eating Out; Goal Setting Skills	Introduction to Mindful Eating Exercises & Mindful Meditation; Practice Mindful Eating (Raisins & Strawberries)
2	Portion Sizes; Energy Needs; General Strategies to Prevent Weight Gain in Restaurants	Hunger Awareness Meditation; Practice Mindful Eating (Cheese and Crackers)
3	Strategies to Improve Satiety & Satiation; Strategies to Prevent Weight Gain When Eating Fast Food; Salad Skills; Internet Resources	Fullness Awareness Meditation; Mindful Eating Practice (Chocolate)
4	Strategies to Prevent Weight Gain When Eating Out at Italian, Chinese and Mexican Restaurants	Hunger & Fullness Awareness Meditation; Making Mindful Eating Choices (Sweet & Salty)
5	Strategies to Prevent Weight Gain When Eating Out at Seafood, Steak & Family-Style Restaurants	Eating Triggers Meditation; Practice Mindful Eating at Buffet Style
6	Strategies to Prevent Weight Gain When Eating Out for Breakfast, Dessert & Beverages; Relapse Prevention	Integrated Mindful Eating Meditation; Review and Practice of Mindful Eating

Table 2

Means and Standard Deviations for Time 1 and Time 2 Outcome Variables by Group Assignment (n=35)

Variable	Control (n=16)		Intervention (n=19)	
	Time 1 Mean (SD)	Time 2 Mean (SD)	Time 1 Mean (SD)	Time 2 Mean (SD)
Weight (kg)*	76.4 (14.6)	76.2 (14.5)	91.5 (19.7)	89.8 (20.1)
Waist Circumference (cm)*	91.2 (11.6)	91.8 (10.7)	102.0 (14.2)	99.3 (13.9)
Average Daily Kcal	1806.2 (351.7)	1782.0 (400.1)	1774.2 (408.9)	1417.1 (330.1)
Average Daily Fat (g)	74.6 (26.5)	70.3 (19.8)	71.8 (19.6)	52.1 (14.3)
Total Eating Out Episodes Over 3 Days	4.2 (1.8)	4.6 (2.3)	4.1 (1.8)	3.3 (1.9)
Caloric Intake/Eating Out Episode	696.5 (268.1)	687.3 (338.6)	690.6 (339.8)	518.6 (244.2)
Fat Intake (g)/Eating Out Episode	52.0 (24.1)	29.8 (16.8)	59.8 (49.8)	22.2 (12.8)
Total EES score	47.9 (17.9)	51.3 (17.5)	53.2 (16.5)	53.1 (15.0) ^a
Total SEEBS	177.3 (20.2)	174.1 (24.8)	182.8 (19.7)	195.8 (22.5) ^a
Total Barriers	62.7 (14.5)	60.4 (16.9)	61.6 (14.3)	47.6 (11.8) ^a

Note: EES: Emotional Eating Scale

^a
n=18* Significantly different ($P < .05$) at Time 1 between intervention and control

Table 3
Summary of Regression Analysis for Variables Predicting Intervention Outcomes (n = 35)

Dependent Variable (Time 2)	Intercept				Group				Time 1					
	B	SE	95% CIs	P	β	SE	95% CIs	P	β	SE	95% CIs	P		
Weight (kg)	-.38	1.59	-3.62	2.85	.811	.74	-3.16	-.14	.033	1.01	.02	.96	1.04	.000
Waist Circumference (cm)	8.05	4.77	-1.67	17.78	.101	1.42	-5.32	.46	.096	.99	.05	.81	1.02	.000
Average Daily Kcal	769.41	254.84	250.32	1288.50	.005	101.08	-852.76	-140.99	.002	.53	.14	.29	.84	.000
Average Daily Fat(g) Intake	36.42	8.45	19.21	53.62	.000	4.65	-26.46	-7.54	.001	.54	.10	.24	.67	.000
Caloric Intake /Eating Out Episode	382.31	121.59	134.65	629.97	.004	88.74	-346.84	14.68	.070	.45	.15	.14	.74	.006
Fat Intake(g)/Eating Out Episode	27.02	4.97	16.89	37.14	.000	5.04	-18.27	2.27	.122	.14	.06	-.08	.18	.411
Total Eating Out Episodes Over 3 Days	3.85	1.02	1.76	5.93	.001	-.30	-2.74	.18	.082	.15	.21	-.24	.61	.382
Total Score EES	19.89	6.62	6.38	33.40	.005	-.07	-10.80	6.22	.587	.70	.12	.40	.91	.000
Total Self-Efficacy for Eating Behavior	67.81	32.42	1.70	133.92	.045	.36	7.16	3.58	.016	.47	.18	.23	.97	.002
Total Barriers	11.42	7.21	-3.29	26.13	.123	-.38	3.10	-17.89	.001	.72	.11	.56	1.00	.000

Note. B, Unstandardized Coefficient; β , Standardized Coefficient; SE, Standard Error; CI, Confidence Interval