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Weight Loss Strategies Associated with Body Mass Index in Overweight Adults with Type 2 Diabetes at Entry into the Look AHEAD Trial

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RUNNING HEAD: *Weight Loss Strategies*

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Objective: Intentional weight loss is recommended for type 2 diabetes, but what patients attempt and how effective strategies are in weight management is unknown. This investigation describes intentional weight loss strategies used and those related to body mass index (BMI) in a diverse sample of overweight participants with type 2 diabetes at enrollment in the Look AHEAD (Action for Health in Diabetes) clinical trial.

Research Design and Methods: A cross-sectional study of baseline weight loss strategies, including self-weighing frequency, eating patterns, and weight control practices, reported in 3,063 females and 2,082 males, aged 45 to 74 years, with a BMI $\geq$ 25 kg/m^2.

Results: Less than half (41.4%) of participants self-weighed $\geq$ 1/week. Participants ate breakfast 6.0 $\pm$ 1.8 days/week, 5.0 $\pm$ 3.1 meals/snacks per day, and 1.9 $\pm$ 2.7 fast food meals/week. The three most common weight control practices (increasing fruits and vegetables, cutting out sweets, and eating less high-carbohydrate foods) were reported by approximately 60% of participants for $\geq$ 20 weeks over the previous year. Adjusted models showed self-weighing < 1/week (B = .83), more fast food meals consumed/week (B = .14), and fewer breakfast meals consumed/week (B = -.19) were associated (p < .05) with a higher BMI (R^2 = 0.24).

Conclusion: Regular self-weighing and breakfast consumption, along with infrequent consumption of fast food were related to lower BMI in the Look AHEAD study population.

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As the prevalence of obesity has increased in the U.S., so has type 2 diabetes (1). Due to the relationship between body weight and insulin resistance (2), intentional weight loss is an essential component of treatment for type 2 diabetes (3).

Changing eating, physical activity, and other weight-related behaviors is critical for weight management (4). One behavioral technique believed to be key for successful weight management is frequent self-weighing (5). Regular self-weighing provides objective information on weight and success of specific eating and activity behaviors in reducing weight (6).

Different eating patterns may also be important for weight control. Regular consumption of meals, especially breakfast, may aid in weight control by preventing overconsumption later in the day caused by excessive hunger (7). However, regular intake of fast food may negatively impact weight control, as fast food is high in energy and fat (8).

National surveys have consistently found that the most prevalent weight control practice used by adults self-reporting an attempt to lose/maintain body weight is eating less, followed by being active (9, 10). In adults without type 2 diabetes who have actually lost or maintained weight over time, specific weight control strategies associated with successful weight control include those that target reducing energy intake, and using these strategies consistently over time (11, 12).

As little is known about intentional weight loss strategies used by individuals with type 2 diabetes, one aim of this investigation was to describe the occurrence of these strategies in a racially/ethnically diverse sample of overweight individuals with type 2 diabetes participating in the Look AHEAD (Action for Health in Diabetes) clinical trial. A second aim was to identify specific weight loss strategies related to baseline BMI. As medical nutrition therapy (MNT) is an integral part of the self-management of diabetes (13), it was hypothesized that more dietary-focused, as compared to activity-focused, strategies would be significantly related to a lower baseline BMI. Thus, we hypothesized that frequent self-weighing, regular consumption of meals, particularly breakfast, and infrequent consumption of fast food would be associated with lower BMI. Additionally, as persistent use of weight control practices that reduce energy intake has been related to actual weight loss and/or weight maintenance (11, 12), we also hypothesized that a longer duration of practices that reduce energy intake would be related to lower BMI.

Methods

Look AHEAD is a multi-center, randomized clinical trial being conducted in overweight/obese adults with type 2 diabetes at 16 centers across the U.S. This trial compares the long-term effects of an intensive lifestyle intervention for weight loss to a diabetes support and education control condition, on incidence of serious cardiovascular events (14). Participants will be followed for up to 11.5 years.

Participants

Look AHEAD recruited 5,145 participants with type 2 diabetes, aged 45 to 74 years, with a BMI $\geq$ 25 kg/m^2 ($\geq$ 27 kg/m^2 if taking insulin) and no upper limit for BMI. Recruitment was to achieve equal numbers of males and females, a minimum of 33% from racial/ethnic minority groups, with no more than 30% of participants taking insulin. Exclusion criteria included inadequate control of diabetes (i.e., HbA1c > 11%), factors affecting ability to adhere to interventions, and underlying diseases likely to limit life span and/or affect the safety of the interventions (15).

Study Protocol and Data Collection Procedures: All participants gave informed consent, consistent with the Helsinki

Declaration and approved by the institutional review board of each center. Eligibility for Look AHEAD was determined using a series of screening visits.

Measures

Sociodemographic and Anthropometic Characteristics: Self-reported information on gender, race/ethnicity, marital status, highest level of education, employment status, and annual household income was collected from participants. Marital status was coded as either married/living in a marriage type relationship or not, and education was coded as high school or less, vocational, some college, college degree, or graduate/professional education. Annual household income was split into four categories; < $30,000, $30,000 to $59,999, $60,000 to $79,999, or ≥ $80,000. BMI was calculated using the formula kg/m^2, with height measured by a wall-mounted stadiometer and weight measured by electronic scale.

Intentional Weight Loss History: Participants reported on lifetime frequency of intentional weight loss of 5-9 lb, 10-19 lb, 20-49 lb, 50-79 lb, 80-99 lb, and 100 lb or more (16, 17). Response categories were 0, 1-2, 3-4, 5-6, and 7 or more times. Variables derived from these categories were 1) percentage of participants with at least one intentional weight loss of ≥ 5 lbs; 2) minimum number of intentional weight losses of ≥ 5 lb.; and 3) minimum total amount of intentional weight loss (defined as frequency multiplied by amount, using the lower end of the frequency and amount intervals and summing across categories) (17).

Self-Weighing: Frequency of self-weighing was determined by the question, "How often do you weigh yourself?" Response categories were never, about once a year or less, every couple of months, every month, every week, every day, and more than once per day (4). For analyses examining gender and race/ethnicity, all response categories were included. For regression analyses, the categories were dichotomized: at least once per week vs. less than once per week, and used the former as the reference in analyses as this is the recommendation given in behavioral weight control interventions (4).

Eating Patterns: Participants reported number of days/week they ate breakfast, and typical number of eating occasions, both meals and snacks, per day (18). Participants also reported how many days/week they ate any meal at fast food restaurants (8).

Weight Control Practices: Weight control practices were assessed using a list of 23 specific behaviors for weight control (12, 17, 19). Participants indicated if they had engaged in any of the specific behaviors during the previous year for weight control. Previous research indicates the best method for assessing successful weight control in adults is to ask duration of use of each strategy (12), thus, participants indicated the weekly duration of each strategy used during the previous year. Results were expressed as percentage of participants using each practice and duration of use of each practice, up to 52 weeks (one year). Participants not using a specific weight control practice received a value of zero for the duration variable (12). As the importance of each specific behavior was of interest on its impact on BMI, each of the items were considered individually in analyses (12, 17, 19) .

Statistical Analyses: To describe weight loss strategies employed by this sample, t-tests, analysis of variance (ANOVAs), and Chi-square tests were used to assess for differences between gender and/or race/ethnicities in all variables. To identify weight loss strategies associated with BMI, several steps were taken. As BMI has been related to intentional weight loss history variables (17), the relationships between BMI and minimum number of intentional weight losses of > 5 lbs and minimum total amount of intentional weight loss were examined in

univariate regression models to establish their need to be included in the larger multivariate model for BMI. To determine which weight loss strategies should be included in the larger multivariable model for BMI, associations between frequency of self-weighing, number of days/week in which breakfast was consumed, total number of meals and snacks/day, number of fast food meals consumed/week, and duration of all 23 specific weight control practices to BMI were examined in univariate regression models. Those variables significantly related to BMI were identified and a correlation matrix was conducted to look for relationships greater than .80 between variables (indicating problems with multicollinearity) (20), but no variables were associated at this level. Thus, all intentional weight loss history variables and weight loss strategies significantly associated with BMI in univariate models were included in the multivariable model of BMI. As the purpose of the multivariate model of BMI was to determine intentional weight loss history variables and weight loss strategies associated with BMI in the whole sample, age, gender, race/ethnicity, and SES were controlled in the final model.

RESULTS

Participants had a mean age of 58.7 $\pm$ 6.8 years, a BMI of 35.9 $\pm$ 5.9, and were 59.5% female. Table 1 reports the sociodemographic and anthropometric characteristics. Males were older than females (59.9 $\pm$ 6.7 vs. 57.9 $\pm$ 6.8; $p < .0001$), Native Americans were younger (55.4 $\pm$ 7.3; $p < .01$), and Non-Hispanic Whites were older (59.4 $\pm$ 6.8; $p < .001$) than all other race/ethnicities. Females had a higher BMI than males (36.5 $\pm$ 6.1 vs. 35.2 $\pm$ 5.5; $p < .0001$), and Hispanics had a lower BMI than Non-Hispanic Blacks and Non-Hispanic Whites (35.3 $\pm$ 5.6 vs. 36.5 $\pm$ 5.9 [Non-Hispanic Black] and 36.0 $\pm$ 5.9 [Non-Hispanic White]; $p < .05$). Significantly fewer ($p < .0001$) Hispanic and Native Americans were highly educated, and fewer males were not married or living in a married type relationship as compared to females (16.8% vs. 43.4%; $p < .0001$). Additionally, more ($p < .0001$) males were employed as compared to females, and fewer females reported an annual household income < $30,000 as compared to males (30.2 % vs. 13.0%; $p < .0001$).

Intentional Weight Loss History - A history of intentional weight loss was very common, with 88.9% of females and 86.2% of males reporting at least one intentional weight loss of $\geq$ 5 lbs. Native American females had the lowest prevalence of prior intentional weight loss, 66.5%, while Non-Hispanic White females had the highest prevalence, 96.2%. Non-Hispanic White females also reported a greater number of intentional weight losses $\geq$ 5 lbs. (7.9 $\pm$ 6.1; $p < .0001$) than all other groups except for Other race/ethnicity females (6.4 $\pm$ 6.1) (60.8% of Other race/ethnicity participants indicated mixed race/ethnicity), with Native American females (2.9 $\pm$ 4.3) and males (2.9 $\pm$ 4.2) reporting the least number of intentional weight losses $\geq$ 5 lbs. Non-Hispanic White females also had a greater ($p < .0001$) amount of overall intentional weight loss (135 $\pm$ 139 lbs) than all other groups except for Other race/ethnicity females (97 $\pm$ 93 lbs), with again Native American females reporting the lowest amount of overall intentional weight loss (53 $\pm$ 96 lbs).

Self-Weighing - Overall, 41.4% of participants reported self-weighing at least weekly, and Non-Hispanic White males (48.5%), followed closely by Non-Hispanic White females (47.0%), reported the highest prevalence of this, while Native American females had the lowest prevalence of self-weighing at least weekly (19.2%). Non-Hispanic Black and Native American females, as well as Native American males, had the highest prevalence of never weighing themselves (11.3%, 14.8%, and 16.4%, respectively). When participants were classified by frequency of self-weighing,

those that self-weighed on a weekly basis had a lower BMI (35.3 ± 5.6; $p < .001$) than those that weighed themselves less than once per month.

Eating Patterns - Breakfast was consumed on 6.0 ± 1.8 days/week and 5.0 ± 3.1 meals/snacks were eaten per day. There were no differences in breakfast consumption between genders. Native Americans consumed breakfast fewer days/week (5.2 ± 2.2; $p < .001$) than all other race/ethnicities. Participants that consumed breakfast 7 days/week had a lower BMI (35.6 ± 5.7; $p < .0001$) than participants who consumed breakfast 3 to 6 days/week (BMI = 36.7 ± 6.3) and 2 or less days/week (BMI = 37.3 ± 6.1). Females consumed more meals and snacks/day than males (5.1 ± 3.2 vs. 4.8 ± 2.9; $p < .001$), with no differences in race/ethnicity for meals/snacks consumed/day. There was no difference in BMI by the number of meals/snacks per day.

Overall, participants consumed 1.9 ± 2.7 fast food meals/week. Hispanic males and Native American females reported the greatest number of fast food meals/week (2.6 ± 3.6 and 2.6 ± 2.8, respectively), which was greater ($p < .05$) than the number consumed per week reported by Hispanic (1.9 ± 3.0), Non-Hispanic White (1.5 ± 2.3), and Other race/ethnicity females (1.4 ± 2.0), as well as Non-Hispanic White males (1.8 ± 2.4). BMI differed ($p < .001$) between individuals reporting no fast food meals/week (BMI = 35.2 ± 5.6), 1 or 2 fast food meals/week (BMI = 36.0 ± 5.8), or 3 or more fast food meals/week (BMI = 36.9 ± 6.3).

Weight Control Practices - Prevalence rates and duration of use of the practices over the previous year are presented in Table 2. Ranking and duration of use of the weight control practices were similar across gender and race/ethnicity, and thus were collapsed across gender and race/ethnicity. The three most prevalent practices, used by approximately 60% of participants, were increase fruit and vegetable intake, cut out sweets and junk food, and eat less high-carbohydrate foods. Duration of these practices ranged from 20.3 ± 19.1 to 26.5 ± 19.3 weeks. Besides the top 3 most prevalent practices, at least 50% of participants reported increasing exercise levels, decreasing fat intake, and reducing the number of calories eaten to aid in weight control.

Relationship Between Weight Loss Strategies and BMI - Table 3 shows univariate and multivariate relationships between intentional weight loss history, weight loss strategies, and BMI. More intentional weight loss attempts and greater total amount of intentional weight loss were associated ($p > .0001$) with a higher BMI. Weighing < 1/week and less frequent breakfast and more frequent fast food consumption were related ($p < .0001$) to higher BMI. In those weight control practices in which a significant ($p < .05$) relationship was found with BMI, typically shorter duration of weight control practice was related to higher BMI. However, longer duration of three weight control practices (decrease fat intake, reduce number of calories eaten, and go to a weight loss group) was associated ($p < .05$) with higher BMI.

In the multivariate model, a larger amount of overall intentional weight loss ($B = .01$), self-weighing less than once/week ($B = .83$), and more fast food meals consumed/week ($B = .15$) were associated ($p < .05$) with higher BMI, while a greater number of days/week in which breakfast was consumed ($B = -.18$) was associated ($p < .05$) with lower BMI. R^2 for the adjusted model was 0.24. After adjustment, the durations of individual weight control practices were no longer related to BMI.

DISCUSSION

Ideally, weight management recommendations for overweight patients with type 2 diabetes should lower BMI. Thus, the purpose of this investigation was to

describe intentional weight loss strategies occurring in a diverse sample of overweight individuals with type 2 diabetes and identify strategies associated with lower BMI in the general sample.

When taken as a whole, this study found rates of intentional weight loss strategies similar to previous investigations examining participants without type 2 diabetes. For example, in this study as with previous research, prior intentional weight loss was very common, particularly in Non-Hispanic White females (12). However, less than half of participants weighed themselves weekly or more often, a rate previously described (4). While a regular eating pattern was reported (5 meals/snacks consumed/day), breakfast was skipped approximately one day/week. Fast food intake was fairly high, 2 meals/week, which is similar to what has been shown in adult women (21). However, when examined by race/ethnicity, it becomes clear that Native American participants, particularly females, appeared to have the least healthy profile for weight loss strategies (they monitored their weight less frequently, skipped breakfast more often, and consumed more fast food meals).

The top three weight control practices reported consistently by all race/ethnicities and both genders focused on dietary changes, and were practiced persistently, similar to previous reports (11). While these practices were not related to lower BMI in the adjusted model, they could reflect an attempt to influence carbohydrate consumption. Contrary to this, prior studies examining prevalence of specific weight control practices in adults without type 2 diabetes using similar measures found that the most prevalent diet-related practice targets reducing energy consumed or decreasing fat intake (11, 12, 17, 19). This study suggests that patients with type 2 diabetes use weight control practices that help meet dietary recommendations for type 2 diabetes (13). Indeed, similar to findings from this study, in a national representative sample of adults with type 2 diabetes, making healthy food choices was a health-related behavior reported by almost 80% of the participants (22).

Most importantly, this study identified a few strategies related to lower BMI in overweight individuals with type 2 diabetes. As predicted, weekly self-weighing, regularly consuming breakfast, and eating less fast food were related to lower BMI.

Randomized trials that have promoted regular self-weighing have also shown better weight control (5, 23), than conditions with less emphasis on self-weighing. While frequent self-weighing itself most likely does not reduce weight, it may play an important role in self-regulation, providing objective feedback on energy balance (4).

This study supports previous findings that consuming less fast food (8, 21) and regular breakfast consumption (7) are related to lower BMI. Greater consumption of fast food may contribute to increased BMI through excessive energy intake via passive overconsumption due to fast food's high energy-density, large portion sizes, and greater palatability (24). Eating breakfast may improve weight control by preventing excessive consumption that might occur with irregular eating patterns (25).

This study found that duration of the most commonly used weight control practice, increasing fruit and vegetable intake, was not related to BMI in the adjusted model. Supporting this, a randomized trial which increased fruit and vegetable intake with no prescription to reduce energy intake produced an initial small weight loss that was not maintained (26), suggesting that this strategy alone may be an ineffective method for weight control.

The strengths of this study include a large, ethnic and socioeconomically diverse sample, with objectively measured height and weight. Limitations include the inability to

conduct multivariate analyses for BMI specific to gender and race/ethnicity due to the smaller sample size in some of the different subgroups, retrospective nature of self-reported measures, potential bias associated with self-report of eating patterns and weight control practices, the limited range of BMI in participants (to be eligible to participate in the trial, a BMI $\geq$ 25 was required), and the observational, cross-sectional study design, which precludes any conclusions regarding the temporal ordering of relationships.

In conclusion, several weight loss strategies, weekly self-weighing, regular consumption of breakfast, and reduced intake of fast food, were associated with lower BMI in overweight individuals with type 2 diabetes. These strategies are specific and may be easier to implement, monitor, and adhere to as compared to global weight loss strategies (reducing calories consumed). Future research should test interventions that encourage the persistent use of these specific strategies to help with weight control in adults with type 2 diabetes.

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REFERENCES

1. Mokdad AH, Ford ES, Bowman BA, Dietz WH, Vinicor F, Bales VS, Marks JS. Prevalence of obesity, diabetes, and obesity-related health risk factors, 2001. *J Am Med Assoc.* 2003;289:76-79.
2. Felber JP, Golay A. Pathways from obesity to diabetes. *Int J Obes.* 2002;26:S39-S45.
3. Maggio C, Pi-Sunyer FX. The prevention and treatment of obesity: Application to type 2 diabetes. *Diabetes Care.* 1997;20:1744-1766.
4. Linde JA, Jeffery RW, French SA, Pronk NP, Boyle RG. Self-weighing in weight gain prevention and weight loss trials. *Ann Behav Med.* 2005;30:210-216.
5. Wing RR, Tate DF, Gorin AA, Raynor HA, Fava JL. A self-regulation program for maintenance of weight loss. *N Engl J Med.* 2006;355:1563-1571.
6. Levitsky DA, Garay J, Nausbaum M, Neighbors L, DellaValle DM. Monitoring weight daily blocks the freshman weight gain: A model for combating the epidemic of obesity. *Int J Obes.* 2006;30:1003-1010.
7. Cho S, Dietrich M, Brown CJP, Clark CA, Block G. The effect of breakfast type on total daily energy intake and body mass index: Results from the Third National Health and Nutrition Examination Survey (NHANES III). *J Am Coll Nutr.* 2003;22:296-302.
8. Jeffery RW, Baxter J, McQuire M, Linde JA. Are fast food restaurants an environmental risk factor for obesity? *Int J Behav Nutr Phys Act.* 2006;3:479-686.
9. Weiss EC, Galuska DA, Khan LK, Serdula MK. Weight-control practices among US adults, 2001-2002. *Am J Prev Med.* 2006;31:18-24.
10. Bish CL, Blanck HM, Maynard M, Serdula MK, Thompson NJ, Khan LK. Health-related quality of life and weight loss practices among overweight and obese US adults, 2003 Behavioral Risk Factor Surveillance System. *MedGenMed.* 2007;9:35.
11. Linde JA, Erickson DJ, Jeffery RW, Pronk NP, Boyle RG. The relationship between prevalence and duration of weight loss strategies and weight loss among overweight managed care organization members enrolled in a weight loss trial. *Int J Behav Nutr Phys Act.* 2006;3:e3.
12. French SA, Jeffery RW, Murray D. Is dieting good for you?: Prevalence, duration and associated weight and behaviour changes for specific weight loss strategies over four years in adults. *Int J Obes.* 1999;23:320-327.
13. American Diabetes Association. Nutrition recommendations and interventions for diabetes-2007. *Diabetes Care.* 2007;30:S48-S65.
14. Look AHEAD Research Group. The Look AHEAD Study: A description of the lifestyle intervention and the evidence supporting it. *Obesity.* 2006;14:737-752.
15. Look AHEAD Research Group. Look AHEAD (Action for Health in Diabetes): Design and methods for a clinical trial of weight loss for the prevention of cardiovascular disease in type 2 diabetes. *Control Clin Trials.* 2003;24:610-628.
16. Jeffery RW, French SA. Preventing weight gain in adults - design, methods and one-year results from the Pound of Prevention study. *Int J Obes.* 1997;21:457-464.
17. Jeffery RW, French SA. Socioeconomic status and weight control practices among 20- to 45-year-old women. *Am J Pub Health.* 1996;86:1005-1010.
18. Wyatt HR,Grunwald GK, Mosca CL, Klem M, Wing RR, Hill JO. Long-term weight loss and breakfast in subjects in the National Weight Control Registry. *Obes Res.* 2002;10:78-82.
19. Neumark-Sztainer D, Sherwood NE, French SA, Jeffery RW. Weight control behaviors among adult men and women: Cause for concern? *Obes Res.* 1999;7:179-188.

20. Tabachnick BG, Fidell LS. Using multivariate statistics. Third Edition ed. New York: Harper Collins, 1996.
21. French SA, Harnack L, Jeffery RW. Fast food restaurant use among women in the Pound of Prevention study: Dietary, behavioral and demographic correlates. *Int J Obes*. 2000;24:1353-1359.
22. Green AJ, Bazata DD, Fox KM, Grandy S, Group SS. Health-related behaviors of people with diabetes and those with cardiometabolic risk factors: Results from SHIELD. *Int J Clin Prac.* 2007;61:1791-1797.
23. Adachi Y, Sato C, Yamatsu K, Ito S, Adachi K, Yamagami T. A randomized controlled trial on the long-term effects of a 1-month behavioral weight control program assisted by computer tailored advice. *Behav Res Ther.* 2007;45:459-470.
24. Isganaitis E, Lustig RH. Fast food, central nervous system insulin resistance, and obesity. *Arterio Throm Vasc Biol.* 2005;25:2451-2462.
25. Martin A, Normand S, Sotheir M, Peyrant J, Louche-Pelisser C, Laville M. Is advice for breakfast consumption justified? Results from a short-term dietary and metabolic experiment in young healthy men. *Bri J Nutr.* 2000;84:337-344.
26. Howard BV, Manson JE, Stefanick ML, Beresford SA, Frank G, Jones B, Rodabough RJ, Snetselaar L, Thomson C, Tinker L, Vitolins M, Prentice R. Low-fat dietary patterns and weight change over 7 years: The Women's Health Initiative dietary modification trial. *J Am Med Assoc.* 2006;295:39-49.

Table 1 *Baseline characteristics of Look AHEAD participants*

	Females (n = 3,063)					Males (n = 2,082)				
	NH* White	NH Black	Hispanic	Native American	Other†	NH White	NH Black	Hispanic	Native American	Other
N (%)	1,665	614	483	203	98	1,581	189	194	55	63
	(54.4)	(20.1)	(15.8)	(6.6)	(3.2)	(75.9)	(9.1)	(9.3)	(2.6)	(3.0)
Age (M ± SD)	58.6 ± 6.9	57.7 ± 6.4	56.9 ± 6.1	55.0 ± 7.3	57.2 ± 6.7	60.3 ± 6.6	58.6 ± 7.3	58.7 ± 6.5	56.7 ± 7.2	59.7 ± 7.0
BMI‡ (M ±SD)	36.7 ± 6.2	36.8 ± 6.0	35.5 ± 5.7	36.3 ± 6.5	35.7 ± 6.3	35.3 ± 5.5	35.5 ± 5.5	34.7 ± 5.2	33.4 ± 5.2	33.5 ± 5.1
Education (%)										
≤ High school	18.9	17.9	55.1	40.0	7.6	9.0	18.0	33.0	39.2	6.6
Vocational	4.6	7.6	4.6	7.7	5.4	2.7	5.8	4.7	3.9	1.6
Some college	26.5	28.7	19.8	31.3	26.1	22.3	28.0	23.0	25.5	27.9
College degree	22.5	22.8	11.9	17.4	33.7	26.0	20.6	23.0	21.6	23.0
Grad/prof education§	27.4	22.9	8.6	3.6	27.2	39.9	27.5	16.2	9.8	41.0
Married/ Live-in (%)	61.7	39.6	61.8	52.2	59.2	85.9	72.5	78.9	70.9	71.4
Employed (%)	67.4	68.3	54.0	63.8	75.8	82.2	78.6	74.5	69.8	75.5
Family income (%)										
<$30,000	19.6	32.3	53.5	53.1	23.9	7.7	22.5	42.5	31.5	3.4
$30,000-$59,000	35.3	39.4	30.4	33.0	36.4	26.1	20.7	24.2	42.6	27.1
$60,000-$79,000	17.7	15.6	9.1	7.3	20.5	18.1	20.1	12.4	14.8	17.0
≥$80,000	27.4	12.8	7.0	6.7	19.3	48.1	36.7	21.0	11.1	52.5

*Non-Hispanic.

†60.8% of Other participants indicated they were mixed in regards to race/ethnicity.

‡Body mass index.

§Graduate/professional.

Table 2 *Prevalance (in rank order) and duration of weight control practices used over the previous year by Look AHEAD participants*

	Prevalence (%)	Duration in weeks (M ± SD)
Increase fruits and vegetables	65.0	26.5 ± 19.3
Cut out sweets and junk food	61.7	22.9 ± 19.2
Eat less high-carbohydrate foods	57.5	20.3 ± 19.1
Increase exercise levels	55.1	21.1 ± 17.3
Decrease fat intake	55.0	18.0 ± 17.5
Reduce number of calories eaten	51.8	18.7 ± 17.5
Record food intake daily	37.5	9.1 ± 11.2
Eat less meat	34.9	22.8 ± 19.4
Cut out between meal snacking	34.3	14.6 ± 15.9
Use home exercise equipment	30.2	18.9 ± 17.5
Eat special low calorie diet foods	21.0	22.3 ± 19.0
Drink fewer alcoholic beverages	18.5	25.6 ± 20.6
Use a very low calorie diet	17.6	16.1 ± 16.9
Count fat grams	16.4	18.0 ± 18.3
Eat meal replacements	15.8	10.4 ± 13.6
Record exercise daily	14.7	17.4 ± 17.5
Count calories	14.6	12.2 ± 15.0
Go to a weight loss group	11.9	13.3 ± 13.2
Keep a graph of exercise	7.8	15.4 ± 17.3
Keep a graph of weight	6.7	18.8 ± 18.0
Fast or go without food entirely	5.3	5.7 ± 11.8
Take diet pills	4.3	9.3 ± 12.0
Smoke cigarettes	3.5	20.2 ± 23.6

Table 3 *Parameter estimates of weight control behaviors in relation to BMI in Look AHEAD Participants*

Independent Variable	Univariate Unadjusted Model*	Adjusted Multivariate Model*†
Number of intentional weight losses ≥ 5 lbs	0.2766‡	0.0877
Amount of intentional weight lost (lbs)	0.0146‡	0.0138‡
Regular self-weighing		
< weekly	1.5191‡	0.8339‡
≥ weekly	REF	REF
Breakfast eaten days/week	-0.3072‡	-0.1786‡
Number of meals/snacks eaten/day	0.0418	
Number of fast food meals eaten/week	0.2597‡	0.1499‡
Number of weeks duration of:		
Increase fruits and vegetables	-0.0063	
Cut out sweets and junk food	-0.0260‡	0.0048
Eat less high-carbohydrate foods	-0.0233‡	-0.0098
Increase exercise levels	-0.0350‡	-0.0447
Decrease fat intake	0.0378‡	0.0110
Reduce number of calories eaten	0.0210‡	-0.0072
Record food intake daily	0.0104	
Eat less meat	0.0094	
Cut out between meal snacking	-0.0070	
Use home exercise equipment	-0.0477‡	-0.0299
Eat special low calorie diet foods	-0.0009	
Drink fewer alcoholic beverages	-0.0614‡	0.7297
Use a very low calorie diet	-0.0209‡	-0.0347
Count fat grams	-0.0149	
Eat meal replacements	0.0554	
Record exercise daily	-0.0058	
Count calories	-0.0099	
Go to a weight loss group	0.0643‡	0.0666
Keep a graph of exercise	-0.0472‡	-0.0442
Keep a graph of weight	-0.0230	
Fast or go without food entirely	0.0236	
Take diet pills	0.0707	
Smoke cigarettes	0.0050	

* Reported estimates are Beta coefficients (linear regression).

†The model is controlled for age, gender, race/ethnicity, household income, and education.

‡ Significant at $p < .05$.