Perceived Importance of Dietary Protein to Prevent Weight Gain: A National Survey among Midlife Women

Noel D. Aldrich, PhD1,1; Courtney Perry, MS, RD, PhD2; William Thomas, PhD3; Susan K. Raatz, PhD, RD4,‡; Marla Reicks, PhD, RD2

ABSTRACT

Objective: Evaluate reported use of the practice of “eating more protein” to prevent weight gain among midlife women.

Design: Cross-sectional national survey.

Participants: One thousand eight hundred twenty-four midlife women (40-60 y) from the 9 United States geographic regions, primarily married (71%), white (76%), and well educated; half were premenopausal (49%).

Outcomes: Frequency of dietary practices to prevent weight gain, Weight Efficacy Lifestyle score, self-reported weight change and body mass index over the past 2 years, and current protein intake.

Analysis: Linear regression models determined associations between weight change, protein intake, and reported use of the practice of “eating more protein” to prevent weight gain.

Results: Most women correctly identified good protein sources, and the majority could indicate the daily percent dietary energy recommended from protein. “Eating more protein” to prevent weight gain was reported by 43% of women as a practice to prevent weight gain and was associated with weight loss over a 2-year period and with increased percent energy from protein.

Conclusions and Implications: Reported use of the practice of “eating more protein” was associated with weight loss over 2 years. Education regarding dietary protein requirements may enhance the use of this practice.

Key Words: protein, midlife women, protein sources, weight gain, overweight (J Nutr Educ Behav. 2013;45:213-221.)

INTRODUCTION

Successful weight loss and maintenance of lean mass with high-protein diets has been reported in several studies among adult men and women.1-3 These effects may be related to enhanced satiety,4 increased thermogenesis,5 and improvements in body composition.6 Although many high-protein diets have reported significant results at 6 months, effectiveness in weight loss is comparable to low-fat/high-carbohydrate diets at 12 months.7 Based on the reported short-term benefits of a high-protein diet for weight loss or control, interest in including more protein in consumer diets may be increasing. A national qualitative consumer survey indicated that many consumers were interested in including more protein in their diets (~50%), whereas 40% and 37% believed protein helps them feel full and helps with weight loss, respectively.8

The Institute of Medicine Dietary Reference Intakes has established an Acceptable Macronutrient Intake Range (AMDR) for protein at 10%-35% of total calorie intake.9 The 2010 Dietary Guidelines Advisory Committee addressed dietary protein in their policy document by emphasizing the AMDR because consumers had begun to use high-protein diets more commonly for weight control.10,11 The Dietary Guidelines Policy Document emphasizes that individuals should evaluate current intake to confirm that nutritional benefits of vitamins and minerals from nutrient-dense food are attained while maintaining energy balance.

More midlife (40-59 y) women (66%) are overweight or obese in the United States (US) compared to younger (20-39 y) women (55.8%).12 Increased age has been associated with decreased activity, resulting in an energy imbalance that favors weight gain in women.13 Within the US, 66% of women and 48% of men wanted to lose weight, according to the 2003 Behavioral Risk Factor Surveillance System,14 representing a significant increase from 44% of women and 29% of men reported earlier.15,16

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In the US, healthy practices reported most often to promote weight loss have included smaller portions, increasing fruit and vegetable intake, decreasing fat intake, eliminating intake of sweetened beverages, and increasing exercise. Among midlife women in Australia, those successful at controlling weight over 2 years used a combination of practices involving decreasing the amount of food consumed and cutting down on fats and sugars. Previous studies have not specifically assessed the frequency that women report eating more protein as a weight control practice.

The purpose of this study was to (1) describe perceptions about protein sources and requirements, (2) identify the reported frequency of using the “eating more protein” practice to prevent weight gain, and (3) compare reported protein intake to reported frequency of using the “eating more protein” practice to prevent weight gain among a national sample of midlife women. This information will assist those who counsel women about weight loss and maintenance to ensure that practical recommendations about dietary protein are appropriate based on current knowledge and practice.

METHODS

This cross-sectional survey was part of a larger study involving midlife women to describe eating occasions and the rational, emotional, and contextual needs related to those occasions. A survey packet mailed to participants included a 1-day food record booklet, eating occasion questionnaires to assess needs related to eating occasions, and a general questionnaire booklet that included questions to assess anthropometric and physical characteristics, weight-related self-efficacy and practices, and perceptions about protein sources and requirements.

Participants

Participants were members of a national mail panel maintained by Taylor Nelson Sofres (TNS) Global. The database maintained by TNS Global includes 1.3 million persons from 500,000 households in the US. The demographic and household information of the panel’s participants is regularly updated. A sample population was selected by TNS Global that was balanced to the demographic characteristics of the US census data based on the 9 geographic regions, metropolitan and micropolitan statistical areas within the US, age, income, household size, race/ethnicity, and household composition. The study was approved with informed consent procedures by the University of Minnesota Institutional Review Board prior to data collection. Each participant who returned a completed packet received $6 from TNS Global.

In May, 2008, recruitment letters and consent forms were mailed by TNS Global to 8,000 households, and 2,713 women (33.9%) returned a signed consent form. These women were sent survey packets, and 1,634 (60.2%) completed packets were returned to TNS Global. To increase sample size, another 1,200 households were sent a survey packet and consent form in July, 2008; 292 (24.3%) completed packets were returned by August 2008, which yielded a total sample of 1,926 women. Data included in the general questionnaire were collected by TNS Global staff via machine-scannable questionnaires, reviewed where potential questions occurred as to respondent intent, and corrected prior to providing them to the researchers in an Excel (version 12, Microsoft Corporation, Redmond, WA, 2007) file.

Physical Status

A written set of instructions was included in the survey packet directing participants to complete the general questionnaire after completing all other instruments. Two pilot-tests were completed to test the instructions with mail panel members who were not part of the larger group, and the tests were revised as needed. Current height, weight, age, menopausal status, and weight 2 and 5 years ago were self-reported. Body mass index (BMI) was calculated as kg/m². Women were classified as normal weight (BMI < 25), overweight (BMI ≥ 25 and < 30), or obese (BMI ≥ 30).

Weight Gain Prevention Practices

Reported frequency of 13 practices was assessed with the question, “Have you used the following practices to prevent weight gain?” listed in a checklist format; response options were “Yes, in the past 12 months,” “Yes, more than 12 months ago,” or “Never.” The original list of practices was modified to add the practices of “eating more protein” and skipping meals, and to more clearly define supplement use to enhance satiety or to increase metabolism. Response to “Yes, in the past 12 months” and “Yes, more than 12 months ago” were both considered “Yes” for comparison of those who had ever used the practice to those who had never used the practice.

Self-Efficacy

The Weight Efficacy Lifestyle questionnaire (WELQ) was composed of 20 items, with 4 questions from each of 5 situational factors (negative emotions, availability, social pressure, physical discomfort, and positive activities). An example question from the negative emotions category was, “I can resist eating when I am angry (or irritable).” Women responded on a scale of “0” (not confident) to “9” (very confident) for each question. A higher score indicated greater self-efficacy toward food-related situations. Previous studies using the WELQ have been conducted with weight-loss groups who were predominantly white with middle to upper incomes. The generalizability of the WELQ to minority and low-income groups may be limited; however, the women in the current study were primarily white and fairly well educated.

Perceptions about Protein

Four questions were developed to evaluate dietary protein perceptions (Table 1). The questions were pretested with 42 women from TNS Global’s mail panel meeting the same recruitment criteria as those in the current study. Face validity was confirmed by several registered dietitians, who provided comments regarding suggested revisions. The first question assessed perceptions about good sources of protein. The second question assessed the frequency with which participants chose the various food types provided in the first question as a protein source. The third
question asked participants to select the daily percent energy that should come from protein. The final question evaluated perceptions about why protein may be helpful for weight loss based on current nutrition concepts regarding protein and weight loss.28

Food Intake

Actual dietary protein intake, total caloric intake, and percent energy from protein were estimated from the self-reported data that participants provided in a 1-day food record booklet. Instructions, based on those used by other investigators, instructed women to describe all food items and beverages and amounts consumed immediately after eating.29 Women were also instructed to record time eaten, type of occasion, and preparation methods/recipes over a 1-day period. The food record booklet included reduced-scale photographs of representative food items and serving sizes29 and an example of a completed 1-day record that described the food items in adequate detail. An 11-minute instructional DVD accompanied the booklet and was also available online.

Instructions to complete a 1-day food record on a weekday (Monday through Thursday) were included in 57% of survey packets, and 43%

| Table 1. Responses to Protein Questions for All Women and by Reported Use of “Eating More Protein” Practice to Prevent Weight Gain |
|---------------------------------------------------------------|------------------|------------------|------------------|---|
| “Which type(s) of foods do you think are good sources of protein?” (Mark all that apply)a | Reported Use of the “Eating More Protein” Practice, % | Did Not Report Use of the “Eating More Protein” Practice, % |
| “Which type(s) of foods do you think are good sources of protein?” (Mark all that apply)a | All Women, % | n = 1,824 | n = 775 | n = 1,049 | Pb |
| Beef, chicken, fish, pork, lamb | n = 1,824 | 94.1 | 94.7 | 93.7 | .37 |
| Milk, yogurt, cheese, eggs | n = 1,824 | 76.0 | 79.0 | 73.9 | .01 |
| Margarine, olive oil, canola oil, butter | n = 1,824 | 4.9 | 5.3 | 4.6 | .48 |
| Wheat bread, corn meal, oatmeal, pasta | n = 1,824 | 14.8 | 15.0 | 14.7 | .87 |
| Baked beans, lentils, peanuts, walnuts | n = 1,824 | 79.9 | 82.5 | 78.0 | .02 |
| Lettuce, cabbage, broccoli, carrots, greens | n = 1,824 | 14.7 | 15.2 | 14.3 | .58 |
| Apples, oranges, bananas, grapes, prunes | n = 1,824 | 11.7 | 13.7 | 10.3 | .03 |
| Soy powder, whey powder, Ensure, Boost | n = 1,824 | 43.4 | 47.1 | 40.6 | .006 |
| “How often do you choose each type(s) of food as a protein source?” (usually/always; sometimes; or rarely/never–Mark only 1 response for each food type)a,c | n = 1,824 | n = 775 | n = 1,049 |
| Beef, chicken, fish, pork, lamb | n = 1,824 | 94.1 | 97.0 | 91.9 | < .001 |
| Milk, yogurt, cheese, eggs | n = 1,824 | 87.7 | 91.6 | 84.8 | < .001 |
| Margarine, olive oil, canola oil, butter | n = 1,824 | 29.3 | 30.5 | 28.4 | .34 |
| Wheat bread, corn meal, oatmeal, pasta, rice | n = 1,824 | 44.2 | 45.0 | 43.7 | .56 |
| Baked beans, lentils, peanuts, walnuts | n = 1,824 | 82.5 | 85.0 | 80.7 | .02 |
| Lettuce, cabbage, broccoli, carrots, greens | n = 1,824 | 46.1 | 49.8 | 43.4 | .006 |
| Apples, oranges, bananas, grapes, prunes | n = 1,824 | 42.6 | 46.1 | 40.0 | .01 |
| Soy powder, whey powder, Ensure, Boost | n = 1,824 | 16.8 | 22.5 | 12.7 | < .001 |
| “How much of the calories you eat each day should come from protein?” (Mark only 1 response) | n = 1,774 | n = 762 | n = 1,012 |
| 5%-10% | n = 1,774 | 2.4 | 1.8 | 2.8 | .44 |
| 12%-15% | n = 1,774 | 12.0 | 8.2 | 15.0 | .68 |
| 20%-25% | n = 1,774 | 27.4 | 29.9 | 25.5 | .005 |
| 30%-40% | n = 1,774 | 21.3 | 30.7 | 14.2 | < .001 |
| I don’t know | n = 1,774 | 36.9 | 29.4 | 42.5 | .23 |
| “Protein is helpful for weight loss because _____?” (Mark all that apply)a,b | n = 1,824 | n = 775 | n = 1,049 |
| Builds muscle, not fat | n = 1,824 | 57.7 | 64.9 | 52.4 | < .001 |
| (Extra) is not stored in the body | n = 1,824 | 10.9 | 14.6 | 8.2 | < .001 |
| Provides more energy than carbs or fat | n = 1,824 | 42.7 | 50.1 | 37.2 | < .001 |
| Helps you feel full | n = 1,824 | 40.5 | 49.9 | 33.5 | < .001 |
| I don’t know | n = 1,824 | 17.3 | 9.2 | 23.3 | < .001 |

aFrequency of responses for multiple choice questions; bChi-square test (significance P < .05); cThe percentage represents the proportion who selected the combined “usually/always” and “sometimes” response options.
included instructions to complete a 1-day food record on a weekend day (Friday-Sunday). Data from the food record booklet were entered into the Nutrition Data System for Research software program (NDSR; version 2008, Nutrition Coordinating Center, University of Minnesota, Minneapolis, MN, 2008) by nutrition students trained in the use of NDSR. A registered dietitian certified in the use of NDSR software entered about 20% of the food records a second time to monitor data entry and provide regular feedback to standardize and improve quality of data entry. Data were excluded as part of the larger study when food intake information was missing, when meal times recorded on an eating occasion questionnaire did not match those on the food record booklet, and when implausible intakes were recorded. Intake data considered implausible (from about 20 women) were identified based on criteria established by researchers and mutual agreement within the context of the entire day’s intake. The exclusions resulted in nutrient intake data from 1,663 women based on 5,556 eating occasions.

Data Analysis

All statistical procedures were performed with SAS (version 9.2, SAS Inc, Cary, NC, 2002-2008) software. Descriptive statistics were used for demographic and physical characteristics, WELQ total scores, and protein intake in grams/day from the 1-day food record booklet. Primary outcome measures were tested for normality (SAS PROC UNIVARIATE) and found to be normally distributed. A generalized linear model (PROC GLM) was used to determine differences in variables by BMI group (normal, overweight, and obese) and by weight change groups. Chi-square tests were used to determine differences in categorical variables among BMI groups.

Separate multivariate regression models (SAS PROC REG) were used to identify factors associated with each of 3 dependent variables—reported weight change over 2 years, percent energy from protein, and frequency of reported use of the “eating more protein” practice to prevent weight gain. Demographic, anthropometric, and physical characteristics and the WELQ score were added to
the models as explanatory variables. Weight change, percent energy from protein, and reported use of the “eating more protein” practice to prevent weight gain were also included as independent variables when the particular factor was not being modeled as the dependent variable. Family income (<$30,000; $30,000-$49,999; $50,000-$74,999; ≥$75,000) was modeled as a 4-level categorical variable; marital status, menopausal status, and education (2+ years of college vs no college) were dichotomized as 1 = yes and 0 = no, and race/ethnicity was modeled using indicator variables. Statistical analyses were 2-sided, and P < .05 was considered significant.

RESULTS

Demographic characteristics are presented in Table 2. Of 1,926 returned questionnaires, 102 were excluded as a result of incomplete data regarding WELQ survey questions, or for self-reported age outside of 40-60 years. Analysis was completed with the remaining 1,824 questionnaires. About 40% of all women were classified as normal weight. Normal weight participants tended to be younger and were more likely to be premenopausal and married, have a larger household size, and be more educated than those in the overweight and obese BMI groups. Among all participants, a significantly lower WELQ score was observed as BMI increased.

Participants who reported current weight and weight 2 years ago (n = 1,754) were classified by weight change group. Three groups were identified, a Maintenance group (n = 381) reporting ≤1 kg weight change (mean 0.0 ± 0.42 kg), a Lose group (n = 659) reporting >1 kg weight loss (mean −9.95 ± 10.83 kg), and a Gain group (n = 714) reporting >1 kg weight gain (mean +7.20 ± 7.57 kg).

Weight Gain Prevention Practices

The reported frequency of use of 13 weight gain prevention practices is presented in Table 3. The most common practices included cutting down portion size, exercising, and cutting down on fats and sugars, all reportedly used by >80% of all women. The fourth most common practice was “eating more protein” to prevent weight gain (42.5%). Frequencies of practices were significantly different between BMI groups except for following a vegetarian diet and smoking. In general, women in the normal BMI group reported using weight gain prevention practices less frequently compared to the overweight and obese groups. More obese women (~52%) than normal weight women (~34%) reported using the “eating more protein” practice to prevent weight gain.

Of the top 6 practices to prevent weight gain, 4 practices were significantly different between the Lose and Gain groups (Table 4). The Lose group reported using “eating more protein” to prevent weight gain more frequently than the Gain group, and the Gain group reported skipping meals more frequently than the Lose group. Scores on the WELQ were significantly higher in the Lose group compared to the Gain group for all 6 practices. The Maintenance group WELQ scores were significantly higher and frequencies of using practices were significantly lower for all 6 practices compared to the Lose and Gain groups, as might be expected from a group that may not face food control challenges (data not shown).

Table 3. Frequency of Weight Gain Prevention Practices among Midlife Women by BMI Groupa,b

<table>
<thead>
<tr>
<th>Practice</th>
<th>All Women, % (n)</th>
<th>Normal, % (n)</th>
<th>Overweight, % (n)</th>
<th>Obese, % (n)</th>
<th>Pc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cutting down portion size</td>
<td>86.0 (1569)</td>
<td>77.7 (568)</td>
<td>91.3 (417)</td>
<td>91.8 (684)</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Exercising</td>
<td>85.0 (1551)</td>
<td>81.5 (596)</td>
<td>87.1 (398)</td>
<td>87.6 (657)</td>
<td>.003</td>
</tr>
<tr>
<td>Cutting down on fats and sugars</td>
<td>81.7 (1491)</td>
<td>75.1 (549)</td>
<td>86.0 (393)</td>
<td>86.3 (649)</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Eating more protein</td>
<td>42.5 (775)</td>
<td>34.1 (249)</td>
<td>43.3 (198)</td>
<td>51.6 (328)</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Skipping meals</td>
<td>37.3 (680)</td>
<td>28.6 (209)</td>
<td>40.0 (183)</td>
<td>45.3 (288)</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Commercial programs</td>
<td>24.4 (445)</td>
<td>14.5 (106)</td>
<td>25.0 (114)</td>
<td>35.4 (225)</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Meal replacement items</td>
<td>20.2 (368)</td>
<td>12.9 (94)</td>
<td>21.2 (97)</td>
<td>27.8 (177)</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Metabolism supplement</td>
<td>20.1 (366)</td>
<td>12.9 (94)</td>
<td>24.1 (110)</td>
<td>25.5 (162)</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Fasting</td>
<td>20.1 (366)</td>
<td>15.1 (110)</td>
<td>23.2 (106)</td>
<td>23.6 (150)</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Satiety supplement</td>
<td>13.8 (251)</td>
<td>9.2 (67)</td>
<td>13.8 (63)</td>
<td>19.0 (121)</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Vegetarian diet</td>
<td>13.4 (245)</td>
<td>13.7 (100)</td>
<td>14.7 (67)</td>
<td>12.3 (78)</td>
<td>.50</td>
</tr>
<tr>
<td>Laxatives/diuretics</td>
<td>12.2 (223)</td>
<td>9.9 (72)</td>
<td>11.4 (52)</td>
<td>15.6 (99)</td>
<td>&lt; .005</td>
</tr>
<tr>
<td>Smoking</td>
<td>11.9 (217)</td>
<td>10.8 (79)</td>
<td>12.7 (58)</td>
<td>12.6 (80)</td>
<td>.50</td>
</tr>
</tbody>
</table>

BMI indicates body mass index.
aNormal weight = BMI < 25 kg/m², overweight = BMI ≥ 25 and < 30 kg/m², obese = BMI ≥ 30 kg/m². Weight gain prevention practices in descending order by frequency. Responses of “Yes, in past 12 months” and “Yes, more than 12 months ago” were both considered as “Yes” for this frequency table; bChi-square test (significance P < .05).
The results of the current study based on a national survey provide information regarding the reported frequency of “eating more protein” as a weight gain prevention practice and perceptions of factors that facilitate use of the practice, such as protein sources and dietary requirements. The relatively high proportion of women who reported using the practice of “eating more protein” to prevent weight gain (~43% for all women and more than half of obese women) was consistent with the focus on protein by the 2010 Dietary Guidelines Advisory Committee, the increased interest in protein reported in another survey of adults, and clinical studies that have suggested positive effects when higher protein consumption is used as a weight control strategy.

In the current study, reported use of the “eating more protein” practice to prevent weight gain was associated with a negative weight change over 2 years, with more women in the Lose group reporting use of this practice compared to those in the Gain group. Reporting ever “eating more protein” to prevent weight gain was also associated with a greater percent energy from protein. Other studies regarding weight control strategies did not attempt to link reported use of strategies such as reducing calories/amount of food or eliminating sweets, junk food, or snacks to dietary intake. Furthermore, in their questionnaires, these earlier studies did not include the option of “eating more protein” as a practice to control weight or prevent weight gain. The addition of this option was helpful to further describe commonly used practices to prevent weight gain. However, the way that women manage to include more protein in their overall diet, including the types of food consumed and meal occasions affected, is still not known.

Although the majority of women were able to identify good sources of protein, a number indicated they usually/sometimes select from the vegetable group (46%) or fruit group (43%) when choosing a protein source. In addition, although many participants recognized soy powder, whey powder, and Ensure as good sources of protein, few (~17%) indicated they chose these food items as a protein source. Therefore, perceptions of select food items as good protein sources did not always correspond to choosing these food items as sources of protein.

About one third of women indicated, “I don’t know” in response to the question about how much of daily calories should come from protein. More information about dietary protein is needed in highly visible national dietary guidelines for consumers, such as the Nutrition Facts Panel or MyPlate consumer materials. In support of this concept, a recent study demonstrated that the majority of women had appropriate perceptions of why protein was useful for weight prevention. There was a significant association observed between the calculated percent energy from protein and reported use of the practice of “eating more protein” to prevent weight gain (P < .001). The practice of “eating more protein” was positively associated with BMI and income, whereas weight change, household size, and WELQ score were negatively associated.

Regression Models
Each of the 3 regression models demonstrated significant associations, but the overall fit of each model represented by R² was minimal, ranging from 0.02 to 0.16, which explains a limited proportion of variance (Table 5). Correlations between variables did not exceed R² = 0.30; therefore, all variables remained in each model as indicated. Current BMI and income were significant factors associated with reported use of the “eating more protein” practice to prevent weight gain. A significant association was observed between the calculated percent energy from protein and reported use of the practice of “eating more protein” to prevent weight gain (P < .001). The practice of “eating more protein” was positively associated with BMI and income, whereas weight change, household size, and WELQ score were negatively associated.

### DISCUSSION

The results of the current study based on a national survey provide information regarding the reported frequency of “eating more protein” as a weight gain prevention practice and perceptions of factors that facilitate use of the practice, such as protein sources and dietary requirements. The relatively high proportion of women who reported using the practice of “eating more protein” to prevent weight gain (~43% for all women and more than half of obese women) was consistent with the focus on protein by the 2010 Dietary Guidelines Advisory Committee, the increased interest in protein reported in another survey of adults, and clinical studies that have suggested positive effects when higher protein consumption is used as a weight control strategy.

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### Table 4. Top 6 Most Frequently Used Weight Gain Prevention Practices and WELQ Scores by Lose Group and Gain Group

<table>
<thead>
<tr>
<th>Practice</th>
<th>Lose Group (−9.95 ± 10.84 kg)</th>
<th>Gain Group (+7.19 ± 5.75 kg)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smaller portions/fewer meals</td>
<td>91.9 (606)</td>
<td>88.2 (630)</td>
<td>.02</td>
</tr>
<tr>
<td>WELQ Score</td>
<td>121 ± 36 (606)</td>
<td>112 ± 37 (630)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Exercising</td>
<td>89.1 (587)</td>
<td>86.3 (616)</td>
<td>.12</td>
</tr>
<tr>
<td>WELQ Score</td>
<td>122 ± 37 (587)</td>
<td>111 ± 37 (616)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Cutting down on fats/sugars</td>
<td>87.7 (578)</td>
<td>81.8 (584)</td>
<td>.002</td>
</tr>
<tr>
<td>WELQ Score</td>
<td>122 ± 36 (578)</td>
<td>112 ± 38 (584)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Eating more protein</td>
<td>50.4 (332)</td>
<td>41.5 (296)</td>
<td>.001</td>
</tr>
<tr>
<td>WELQ Score</td>
<td>120 ± 37 (332)</td>
<td>109 ± 37 (296)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Skipping meals</td>
<td>37.5 (247)</td>
<td>43.6 (311)</td>
<td>.02</td>
</tr>
<tr>
<td>WELQ Score</td>
<td>118 ± 37 (247)</td>
<td>110 ± 37 (311)</td>
<td>.006</td>
</tr>
<tr>
<td>Commercial programs</td>
<td>28.8 (190)</td>
<td>25.8 (184)</td>
<td>.20</td>
</tr>
<tr>
<td>WELQ Score</td>
<td>116 ± 37 (190)</td>
<td>98 ± 38 (184)</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

WELQ indicates the Weight Efficacy Lifestyle questionnaire.

**a**Values represent % (n) and P value for Chi square test (significance P < .05); **b**Values represent mean ± SD (n) and P value from General Linear Models procedure (significance level α = .05); **c**WELQ score for those reporting use of the particular practice by Lose and Gain Groups; **d**Lose group (n = 659) reporting >1 kg weight loss over 2 years; **e**Gain group (n = 714) reporting >1 kg weight gained over 2 years; **f**Mean ± standard error (kg weight change over 2 years).
important. A nutrient energy content may be cation about energy balance and mac- hydrates or fats. Given that the energetic than when they eat carbo-

protein intake made them feel more to the diet or that they felt that contributions of each macronutrient may not be aware of the basic energy tent with the premise that consumers carbohydrates or fats, which is consis-
estary Guidelines policy document, consumers are aware of the AMDR ture document. The extent that consumers may be exposed to only se-
lected messages and not read the en-
tire document. The extent that consumers are aware of the AMDR outlined in the policy document is not known, yet they are encouraged to consume an appropriate number of calories within the AMDR to manage body weight. Some women in the cur-

The strengths of this study include the large number of midlife women from a national mail panel. Although re-
quests to participate were sent to a sam-
ple balanced according to US Census data for demographic characteristics, self-selection resulted in a nonrepresentative national sample, which is a limitation of the study. Other limitations were that a 1-day food record to assess dietary intake limits the ability to accurately estimate usual intake. Women (n = 161) who provided problematic food record data (missing, mismatched times, or im-
plausible intakes) had lower levels of education (P < .001) and income (P < .001) and were less likely to be white (P < .001) than the remaining women, whereas BMI, age, household size, and employment status did not differ. Therefore, exclusion of data from these women may have lessened the likeli-
hood of observing relationships be-

food intake. Ever using the practice of “eating more protein” to prevent weight gain was not correlated with eating self-efficacy reflected in the WELQ score. Although increased self-efficacy has been associated with fiber and fruit and vegetable intakes, limited cross-sectional studies have examined the relationship between self-efficacy and protein intake. The strengths of this study include the large number of midlife women from a national mail panel. Although re-
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Table 5. Multivariate Linear Regression Models for Weight Change, Reported Use of the “Eating More Protein” Practice to Prevent Weight Gain, and Percent Energy from Protein among Midlife Women

<table>
<thead>
<tr>
<th>Variables</th>
<th>Y = Weight Change (n = 1,560)</th>
<th>Y = Reported Use of the “Eating More Protein” Practice (n = 1,550)</th>
<th>Y = % Energy from Protein (n = 1,550)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β ± SE</td>
<td>P</td>
<td>β ± SE</td>
</tr>
<tr>
<td>Demographic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight change</td>
<td>−</td>
<td>−0.01 ± 0.00</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Current body mass index</td>
<td>−</td>
<td>0.01 ± 0.00</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Household size</td>
<td>.78</td>
<td>−0.03 ± 0.01</td>
<td>.02</td>
</tr>
<tr>
<td>Education</td>
<td>.58</td>
<td>.56</td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td>0.51 ± 0.23</td>
<td>.03</td>
<td>0.03 ± 0.01</td>
</tr>
<tr>
<td>African American</td>
<td>.23</td>
<td>.92</td>
<td></td>
</tr>
<tr>
<td>Asian</td>
<td>.83</td>
<td>.68</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>.46</td>
<td>.27</td>
<td></td>
</tr>
<tr>
<td>Menopausal status</td>
<td>.43</td>
<td>.18</td>
<td></td>
</tr>
<tr>
<td>Martial status</td>
<td>.24</td>
<td>.21</td>
<td></td>
</tr>
<tr>
<td>Dietary behavior</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Energy from protein</td>
<td>−.40</td>
<td>0.01 ± 0.00</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>WELQ score</td>
<td>−.05 ± 0.01</td>
<td>&lt; .001</td>
<td>−0.001 ± 0.000</td>
</tr>
<tr>
<td>Reported use of the “eating more protein” practice</td>
<td>−2.34 ± 0.56</td>
<td>&lt; .001</td>
<td>−</td>
</tr>
</tbody>
</table>

WELQ indicates Weight Efficacy Lifestyle questionnaire. Note: Each model includes explanatory variables shown, unless omitted as indicated by a dash mark. Multiple regression analysis (significance P < .05).

The measure to assess frequency of using the “eating more protein” prac-
tice to prevent weight gain was based on ever having used the practice, which may not be reflected in a 1-day record of food intake. Ever using the practice of “eating more protein” to prevent weight gain was based on ever having used the practice, which may not be reflected in a 1-day record of food intake. Ever using the practice of “eating more protein” to prevent weight gain was not correlated with eating self-efficacy reflected in the WELQ score. Although increased self-efficacy has been associated with fiber and fruit and vegetable intakes, limited cross-sectional studies have examined the relationship between self-efficacy and protein intake. The strengths of this study include the large number of midlife women from a national mail panel. Although re-
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hood of observing relationships be-

IMPLICATIONS FOR RESEARCH AND PRACTICE

The practice of “eating more protein” to prevent weight gain was the fourth

study among adolescents and their parents showed a lack of knowledge of calories contained in carbohydrates relative to protein and fat. Although this information is provided in the Dietary Guidelines policy document, consumers may be exposed to only se-
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tire document. The extent that consumers are aware of the AMDR outlined in the policy document is not known, yet they are encouraged to consume an appropriate number of calories within the AMDR to manage body weight. Some women in the cur-

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IMPLICATIONS FOR RESEARCH AND PRACTICE

The practice of “eating more protein” to prevent weight gain was the fourth
most frequent practice reportedly used among a national sample of midlife women. Reported use of this practice was related to self-reported weight loss over 2 years. Two factors associated with effective use of this practice included the level of protein intake and self-efficacy toward weight management. Women may need more information regarding protein energy content and effective selection of protein sources to enhance protein intake as a weight management strategy. Additional research is needed to evaluate the change in self-efficacy that may be associated with information about protein. Given that the majority of Americans are overweight, identifying the most effective practices and related factors surrounding successful weight loss and prevention of weight gain are important.

ACKNOWLEDGMENTS
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REFERENCES