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A Worksite Vegan Nutrition Program Is Well-Accepted and Improves Health-Related Quality of Life and Work Productivity

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Key Words
Vegetarian diet · Vegan diet · Quality of life · Weight loss and maintenance · Workplace intervention

Abstract
Background/Aims: Vegetarian and vegan diets are effective in preventing and treating several chronic diseases. However, their acceptability outside a clinical trial setting has not been extensively studied. The aim of this study was to determine the acceptability of a worksite vegan nutrition program and its effects on health-related quality of life and work productivity. ***Methods:*** Employees of a major insurance corporation with a body mass index ≥25 kg/m^2 and/or a previous diagnosis of type 2 diabetes received either weekly group instruction on a low-fat vegan diet (n = 68) or received no diet instruction (n = 45) for 22 weeks. ***Results:*** The vegan group reported improvements in general health (p = 0.002), physical functioning (p = 0.001), mental health (p = 0.03), vitality (p = 0.004), and overall diet satisfaction (p < 0.001) compared with the control group. The vegan group also reported a decrease in food costs (p = 0.003), and increased difficulty finding foods when eating out (p = 0.04) compared with the control group. The vegan group reported a 40–46% decrease in health-related productivity impairments at work (p = 0.03) and in regular daily activities (p = 0.004). ***Conclusions:*** A worksite vegan nutrition program is well-accepted and can be implemented by employers to improve the health, quality of life, and work productivity of employees.

Introduction

Observational studies have consistently shown that vegetarian and vegan diets reduce the risk of obesity, cardiovascular disease and type 2 diabetes [1–3]. In clinical studies, a low-fat vegan diet has demonstrated noteworthy health benefits, including improved body weight [4–8], glycemic control [4, 9], and plasma lipid concentrations [10–12], and reduced risk of cardiovascular events [8, 12]. Recent studies of vegan diets with durations ranging from 14 to 74 weeks in individuals who were overweight, had type 2 diabetes, or had prostate cancer have reported high completion rates (86–100%), with accompanying improvements in body weight, lipids, and glycemic control [4, 6, 13, 14]. Although vegan diets have demonstrated high levels of acceptability and have led to clinical improvements in the research setting, the acceptability of such a diet outside of a clinical trial setting has not been studied.

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Worksites offer convenient, supportive environments for health promotion programs because there is no required travel time and participants often have common interests and goals [15]. Worksite programs can also reach large segments of the population that would not normally be engaged in organized health promotion programs [15]. Previous studies have reported that worksite programs improve the health and well-being of employees and reduce health care, workers' compensation, and disability costs [16–20], making them desirable tools for employers.

The aim of this study was to test the acceptability of a vegan nutrition program in the workplace and assess changes in health-related quality of life and work productivity. In addition, a secondary study sought to investigate the costs and feasibility of the nutrition program when offered with minimal involvement from the research team.

Methods

Participants

Individuals with a body mass index (BMI) ≥25 and/or a previous diagnosis of type 2 diabetes were recruited from two large corporate sites at the Government Employees Insurance Company (GEICO), the fourth largest automobile insurance company in the United States. The company's headquarters in Chevy Chase, Md., was designated the intervention site and the corporate site in Fredericksburg, Va., was designated the control site. Participants were recruited through on-site announcements in May and June 2007 to participate in the study from July through December 2007. Exclusion criteria included a history of unresolved alcohol or drug abuse or dependency, pregnancy, history of severe mental illness, unstable medical status, current use of a low-fat vegetarian diet, and an inordinate fear of blood draws. Individuals with type 2 diabetes were excluded if they had a hemoglobin A1c level >10.5%. The protocol was approved by an external institutional review board and all participants provided written informed consent.

Study Design

Participants at the intervention site had weekly group instruction on a low-fat vegan diet led by a physician, registered dietitian, and/or cooking instructor. The vegan diet consisted of vegetables, fruits, grains, and legumes, with a target macronutrient intake of 10% of energy from fat, 15% from protein, and 75% from carbohydrate. Participants were asked to avoid animal products and added fats and to favor low-glycemic-index foods. Portion sizes, energy intake, and carbohydrate intake were unrestricted.

To minimize dietary fat, participants were advised to use nonstick pans when cooking, steam vegetables or 'sauté' them in water or vegetable broth, top salads with nonfat dressing, choose commercial products with no more than 3 g of fat per serving, and avoid foods cooked or fried in oil. No meals were provided; however, the company cafeteria offered daily low-fat vegan options such as lentil soup, minestrone soup, veggie burgers, portabella mushroom sandwiches, salads, bean burritos, and rice and beans. Participants at the intervention site were asked to take a daily multivitamin to meet vitamin B_{12} requirements.

At the control site, no educational sessions or new food items were provided, and participants were asked to continue their habitual diets. Participants in the control group were compensated for their completion of study assessments with gift certificates (totaling USD 60 per participant) and informed that the diet program would be provided to them upon completion of the study.

Participants in the intervention and control groups were asked not to alter their exercise habits during the intervention period. Routine clinical care for participants was provided by the participants' personal physicians, and the participants were provided with a 24-hour emergency contact number of the principal investigator for cases of urgent medical problems. Adherence in the vegan group was encouraged via the weekly support group meetings, low-fat vegan options in the cafeteria, and unannounced 24-hour recalls. Improvements in weight, energy level, lipids, and other health indicators also reinforced the healthful dietary changes.

Outcome Measures

At baseline and week 22, participants completed the Eating Inventory, the Food Acceptability Questionnaire (FAQ), the Short Form-36 (SF-36), and the Work Productivity and Activity Impairment (WPAI) questionnaire.

The FAQ consists of 12 questions related to the foods eaten during the preceding 2 weeks (listed in table 1) using 7-point response scales [10]. The FAQ also asked respondents to indicate if they frequently experienced any perceived benefits or adverse effects during the preceding 2 weeks including improved digestion, increased energy, decreased energy, better sleep, and worse sleep. Test-retest reliability of a previous version of the questionnaire was assessed in a sample of 18 respondents completing the questionnaire on two occasions approximately 1 week apart. The test-retest correlations (either Pearson r, or gamma, an index of concordance) ranged from 0.70 to 1.00 [10].

Health-related quality of life was assessed using the SF-36 health survey, which includes 4 physical subscales (physical functioning, physical role limitations, bodily pain, and general health) and 4 mental subscales (vitality, social functioning, emotional role limitations, and mental health) [21]. Physical role limitations are defined as problems with work or regular daily activities as a result of one's physical health. Emotional role limitations are defined as problems with work or regular daily activities as a result of any emotional problems (such as feeling depressed or anxious). Items on the SF-36 are scored on a scale of 0–100, with a higher score indicating better health-related quality of life. The SF-36 has undergone extensive validity and reliability trials [22], and published reliability statistics have exceeded the minimum standard of 0.70, which is recommended for measures used in group comparisons, in more than 25 studies [23].

Work productivity was assessed using the Work Productivity and Activity Impairment questionnaire, general health version (WPAI-GH) [24]. The WPAI-GH consists of a series of questions that asks participants to rate how much their health problems impaired productivity at work and during regular daily activities during the preceding 7 days. Outcomes are expressed as impairment percentages, with higher values indicating greater impairment and less productivity. Overall work impairment was calculated as: (percent work time missed) + [(percent work time attended) × (percent impairment while at work)], as defined by the

original instrument. The WPAI is validated [24] and has undergone more psychometric testing than most other self-report instruments measuring work productivity [25].

The Eating Inventory provides quantitative measures of three aspects of eating behavior: dietary restraint is an index of the extent to which participants feel constrained by their assigned diets. Disinhibition indicates overeating in response to stress or other cues. Hunger refers to the subjective experience of hunger as part of one's typical daily life [26]. The Eating Inventory yields reliable scores in normal and overweight individuals, and has been used to predict success in obesity treatment and predict weight gain following smoking cessation [27].

Implementation Cost Study

At the end of the main intervention period, the 22-week worksite vegan nutrition program was offered to control group participants as a pilot study to assess the costs of implementation. From February 2008 to July 2008, we assessed the costs of the intervention, including nutrition instruction and group support, when administered by a local registered dietitian with minimal involvement of study personnel. Participation in the 22-week program was optional, and weight measurements were taken at the first and last meetings. Expenses related to delivery of this intervention were determined. These included compensation for instructor preparation, travel, and class time, and the costs of food samples and snacks.

Statistical Analyses

Independent samples t tests were calculated for all outcome measures to determine if there were significant differences between groups at baseline. Change scores for each participant on each item were calculated by taking the difference between the participant's 22-week response and baseline response.

For the WPAI, SF-36, and Eating Inventory scores, independent samples t tests were calculated to determine whether change scores were significantly different between groups. Paired t tests were calculated within each diet group to assess whether there were significant changes from baseline.

For the FAQ, a MANOVA was performed to determine if group differences existed on the survey responses. After finding significant multivariate effects, univariate ANOVAs were calculated on each item's change score to determine the source of the group differences. For ratings of perceived benefits and adverse effects in the FAQ, the χ^2 test for independent samples was used to compare the two diet groups for frequency of symptoms.

Statistical analyses were performed using SAS, version 8.2 (SAS Institute Inc., Cary, N.C., USA). An alpha of 0.05 was used for all determinations of significance.

Results

Of 170 (76 intervention; 94 control) individuals screened, 68 (50 female, 18 male) met participation criteria for the intervention group and 45 (43 female, 2 male) met participation criteria for the control group and were enrolled in the study. Reasons for exclusion were BMI outside the required range (n = 1), hemoglobin A1c outside the required range (n = 1), failure to meet other participation criteria (n = 2), reluctance to participate in the intervention group (n = 7), and reluctance to participate in the control group (n = 46).

The mean ages of participants in the vegan and control groups were 46 years (range 23–65 years) and 42 years (range 21–62 years), respectively (p = 0.05). The mean BMIs were 36.4 kg/m^2 (range 24.2–53.2 kg/m^2) and 36.4 kg/m^2 (range 24.0–52.4 kg/m^2), respectively (p = 0.75). Ten participants in the vegan group (14.7%) and 9 participants in the control group (20.0%) had a previous diagnosis of type 2 diabetes. No significant differences were found between groups for any clinical measures at baseline.

Of 68 intervention group participants, 65 (96%) completed anthropometric assessments and study questionnaires at 22 weeks. Of 45 control group participants, 44 (98%) completed these assessments. Reasons for failure to complete the study included medical problems unrelated to the intervention (n = 1), work relocation (n = 1), and family health issues (n = 1) in the intervention group, and personal issues (n = 1) in the control group. Data on the changes in medical outcomes and dietary intake during this intervention have been reported elsewhere [28, 29].

Acceptability

FAQ scores at baseline and week 22 are reported in table 1. There were no significant differences in FAQ scores between groups at baseline. Participants in the vegan group reported a significant increase in overall satisfaction with their diet, a significant decrease in the cost of food purchases, and a significant increase in difficulty maintaining their diet in restaurants compared with the control group (table 1). More participants in the intervention group reported improved digestion, increased energy, and better sleep than usual at week 22 compared with the control group (table 2).

Health-Related Quality of Life

SF-36 scores and their changes over the study period are reported in table 3 and figure 1, respectively. Mental health scores were significantly different between groups at baseline (p = 0.05); however, there were no baseline differences in any other subgroups. The vegan group reported a significant increase in physical functioning, general health, vitality, and mental health over the 22-week study period compared with the control group. Reductions in reported pain and role limitations due to physical health problems were greater in the vegan group, but the differences did not reach statistical significance.

Table 1. Responses to the FAQ at baseline and at week 22

	Vegan group (n = 65)			Control group (n = 44)			p value
	baseline	22 weeks	change	baseline	22 weeks	change	
1	How well do you like these foods? (1 = not at all, 7 = extremely)						
	6 (5–6)	6 (5–6)	0 (–1 to 1)	6 (5–6)	6 (5–6)	0 (0 to 0)	0.82
2	How well do you like the taste of these foods? (1 = not at all, 7 = extremely)						
	6 (5–6)	6 (5–6)	0 (–1 to 1)	6 (5–6)	6 (5–6)	0 (0 to 0)	0.57
3	How appealing or unappealing do you find the appearance of these foods? (1 = extremely unappealing, 7 = extremely appealing)						
	5 (4–6)	5 (4–6)	0 (–1 to 1)	6 (5–6)	6 (5–6)	0 (0–1)	0.52
4	How boring are these foods? (1 = not at all, 7 = extremely)						
	3 (1–4)	3 (2–4)	0 (–1 to 1)	2 (1–4)	2 (1–3)	0 (–1 to 0)	0.09
5	How easy or difficult has it been for you to prepare these foods? (1 = extremely difficult, 7 = extremely easy)						
	4 (4–6)	5 (4–6)	0 (–1 to 1)	5 (5–6)	6 (5–7)	0 (0–1)	0.82
6	How easy or difficult has it been for you to purchase these foods? (1 = extremely difficult, 7 = extremely easy)						
	5 (4–7)	5 (4–6)	0 (–1 to 1)	6 (5–7)	6 (5–7)	0 (0–1)	0.23
7	How easy or difficult has it been for you to maintain your current diet at restaurants? (1 = extremely difficult, 7 = extremely easy)						
	4 (3–6)	4 (3–5)	0 (–2 to 1)	5 (3–5)	5 (3–6)	1 (0–1)	0.04
8	How much effort does it take for you to stay on this diet? (1 = more effort than is possible, 7 = no effort at all)						
	4 (3–6)	4 (3–5)	0 (–1 to 1)	5 (3–6)	5 (4–6)	0 (–1 to 1)	0.70
9	How satisfied or dissatisfied do you feel after eating a meal on this diet? (1 = extremely dissatisfied, 7 = extremely satisfied)						
	5 (4–6)	6 (5–6)	1 (0–2)	5 (4–6)	5 (4–6)	0 (–1 to 1)	0.14
10	Overall, how satisfied or dissatisfied are you with this diet? (1 = extremely dissatisfied, 7 = extremely satisfied)						
	4 (4–5)	6 (5–7)***	1 (0–3)	5 (4–6)	5 (4–6)	0 (–1 to 1)	0.007
11	How much has your current diet affected the cost of your food purchases? (1 = n/a, 2 = food is much more expensive, 7 = food is much less expensive)						
	3 (2–5)	4 (3–5)*	1 (–1 to 2)	4 (1–5)	3 (1–5)	0 (–2 to 0)	0.003

Data represent median (interquartile range). p values represent significance of differences in change scores between diet groups using univariate ANOVAs. Significant within-group difference compared with baseline using a paired t test: * $p < 0.05$, *** $p < 0.001$. n/a = I am not on any special diet.

Work Productivity and Activity Impairment

WPAI values are reported in table 4. There were no significant baseline differences between groups. Participants in the vegan diet group reported a 40% decrease in the amount of their health problems affected their productivity at work and a 46% decrease in the amount of their health problems affected their productivity doing regular daily activities. These changes were greater than the corresponding changes in the control group.

Restraint, Hunger, and Disinhibition

Responses to the Eating Inventory are listed in table 5. There were no significant baseline differences between groups. Ratings of restraint, disinhibition and hunger significantly increased in the vegan group. These changes were significantly different from the corresponding changes in the control group. Changes in restraint in the vegan group were related to meeting attendance ($r = 0.33$, $p = 0.008$) and weight loss ($r = -0.23$, $p = 0.07$). Changes in disinhibition and hunger in the vegan group were not related to weight loss or meeting attendance (data not shown).

Implementation Cost Study

At the end of the main study, 16 control group participants began the optional program initiated at their site. These participants attended an average of 46% of meetings and lost a mean of 4.1 kg. Attendance was sig-

Table 2. Symptoms and benefits reported on the FAQ at baseline and week 22

Symptoms	Vegan group (n = 65)		Control group (n = 44)		p value
	week 0	week 22	week 0	week 22	
Increased energy	4 (6%)	20 (31%)***	5 (11%)	5 (11%)	0.02
Decreased energy	19 (29%)	9 (14%)*	10 (23%)	13 (30%)	0.11
Dizziness	2 (3%)	5 (8%)	3 (7%)	3 (7%)	0.65
Better digestion	3 (5%)	26 (40%)***	3 (7%)	2 (5%)	<0.001
Gassiness	15 (23%)	31 (48%)*	5 (11%)	15 (34%)*	0.93
Improved hair texture	0 (0%)	4 (6%)	1 (2%)	2 (5%)	0.34
Excess hair growth	0 (0%)	1 (2%)	1 (2%)	0 (0%)	0.34
Hair thinning or loss	5 (8%)	6 (9%)	1 (2%)	2 (5%)	0.76
Better sleep than usual	4 (6%)	17 (26%)**	4 (9%)	4 (9%)	0.03
Worse sleep than usual	11 (17%)	7 (11%)	8 (18%)	12 (27%)	0.20

Data represent number of participants. p values represent significance of differences between diet groups in frequency of changes in reported symptoms from baseline to week 22 using χ^2. Significant within-group difference compared with baseline using a paired t test: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 3. Responses to the SF-36 questionnaire at baseline and week 22

	Vegan group (n = 65)			Control group (n = 44)			Effect size	p value
	baseline	22 weeks	change	baseline	22 weeks	change		
Physical functioning	80.8 ± 2.5	89.9 ± 1.8***	9.1 ± 1.9	83.0 ± 2.7	83.2 ± 3.1	0.23 ± 1.7	8.9 (3.6–14.2)	0.001
General health	57.5 ± 2.4	70.2 ± 2.1***	12.6 ± 2.1	62.9 ± 3.3	65.2 ± 3.4	2.3 ± 2.2	10.3 (4.2–16.4)	0.002
Physical role limitations	78.5 ± 4.1	86.9 ± 3.6	8.5 ± 4.7	79.0 ± 4.9	76.7 ± 5.1	–2.3 ± 4.0	10.7 (–1.4 to 22.9)	0.08
Emotional role limitations	81.0 ± 4.1	89.7 ± 2.8*	8.7 ± 4.2	82.6 ± 5.1	89.4 ± 3.7	6.8 ± 5.7	1.9 (–11.9 to 15.7)	0.79
Bodily pain	75.7 ± 2.8	82.0 ± 2.7*	6.4 ± 2.7	77.4 ± 3.3	77.2 ± 3.0	–0.3 ± 2.5	6.7 (–0.7 to 14.0)	0.07
Vitality	49.6 ± 2.6	60.3 ± 2.3***	10.8 ± 2.6	51.0 ± 2.7	50.7 ± 3.5	–0.3 ± 2.6	11.0 (3.5–18.5)	0.004
Social functioning	80.8 ± 3.0	86.9 ± 2.6*	6.2 ± 2.6	81.3 ± 3.6	83.0 ± 3.2	1.7 ± 2.9	4.4 (–3.5 to 12.4)	0.27
Mental health[1]	71.8 ± 2.2	76.9 ± 2.3*	5.1 ± 2.0	78.3 ± 2.5	76.8 ± 2.7	–1.5 ± 1.9	6.6 (0.8–12.3)	0.03

Data represent mean ± standard error. p values represent significance of differences in change scores between diet groups using independent samples t tests. Significant within-group difference compared with baseline using a paired t test: * $p < 0.05$, *** $p < 0.001$.

[1] Significant between-group difference at baseline using an independent samples t test: $p = 0.05$.

Table 4. Responses to the WPAI questionnaire at baseline and week 22

	Vegan group (n = 65)			Control group (n = 44)			Effect size	p value
	baseline	22 weeks	change	baseline	22 weeks	change		
Impairment at work, %	14.3 ± 2.5	8.2 ± 2.0*	–6.1 ± 2.7	11.4 ± 2.8	13.4 ± 3.2	2.0 ± 2.8	–8.1 (–16.2 to –0.1)	0.047
Impairment with regular daily activities, %	20.5 ± 3.2	10.6 ± 2.1**	–9.8 ± 3.3	15.5 ± 3.7	15.5 ± 3.7	0.0 ± 3.0	–9.8 (–19.2 to –0.5)	0.04
Overall work impairment	16.6 ± 3.0	10.4 ± 2.3	–6.2 ± 3.1	15.5 ± 3.7	15.5 ± 3.4	1.4 ± 3.5	–7.6 (–17.2 to 2.1)	0.12

Data represent mean ± standard error. p values represent significance of differences in change scores between diet groups using independent samples t tests. Significant within-group difference compared with baseline using a paired t test: * $p < 0.05$, ** $p < 0.01$.

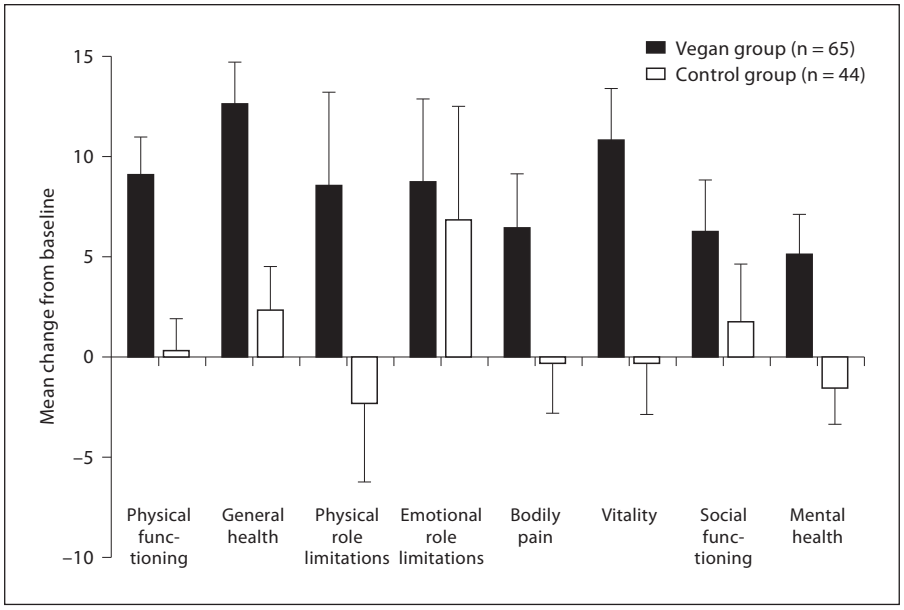

Fig. 1. Mean changes in SF-36 summary scores from baseline to week 22.

Table 5. Responses to the Eating Inventory questionnaire at baseline and week 22

	Vegan group (n = 65)			Control group (n = 44)			Effect size	p value
	baseline	22 weeks	change	baseline	22 weeks	change		
Restraint	11.4 ± 0.2	11.9 ± 0.2	0.5 ± 0.3	12.0 ± 0.3	10.9 ± 0.3**	–1.1 ± 0.3	1.6 (0.6–2.5)	0.001
Disinhibition	7.0 ± 0.2	8.7 ± 0.3***	1.7 ± 0.3	7.2 ± 0.3	7.2 ± 0.4	0.1 ± 0.3	1.7 (0.8–2.6)	<0.001
Hunger	7.0 ± 0.3	8.7 ± 0.2***	1.6 ± 0.3	7.9 ± 0.4	7.2 ± 0.4	–0.7 ± 0.4	2.3 (1.4–3.3)	<0.001

Data represent mean ± standard error. p values represent significance of differences in change scores between diet groups using independent samples t tests. Significant within-group difference compared with baseline using a paired t test: ** p < 0.01, *** p < 0.001.

nificantly correlated with weight loss (r = –0.61, p = 0.01). Of participants who attended >50% of meetings (n = 8), the mean weight loss was –6.1 kg. Expenses related to delivery of this intervention, which required 3–5 h of instructor preparation time each week, totaled USD 3,614, which is equivalent to USD 181–241 per participant for a 22-week intervention serving 15–20 participants.

Discussion

The current findings demonstrate that a low-fat vegan diet is highly acceptable outside of a clinical trial setting, in a corporate environment typical of major businesses. Participants in the vegan diet group reported increased satisfaction with their diet and improvements in physical functioning, mental health, vitality, and work productivity compared with control group participants.

Our findings are consistent with those of other studies of a low-fat vegan diet [10, 14, 30, 31]. In a 2-month intervention with 35 premenopausal women, 33 (94%) reported the diet to be good, moderately good, or extremely good, 30 (86%) reported that the foods were fairly, moderately, or extremely easy to prepare, and 29 (83%) reported that they would continue with the diet at least most of the time in the future [10]. Likewise, in a previous 14-week study of overweight and obese postmenopausal women, 26/28 (93%) of vegan group participants rated the diet as good, moderately good, or extremely good, 21/28 (75%) rated the foods as fairly, moderately or extremely easy to prepare, and most of the participants (86%) reported that they would continue following a vegan diet at

least most of the time in the future [31]. The fact that participants following a vegan diet in this study had greater diet satisfaction compared with control group participants with no diet restrictions is notable. As further evidence of the participants' acceptance of the vegan diet, after completing the study, participants at both sites initiated a weekly support group that has been ongoing for over 2 years.

The current study reported greater improvements in physical functioning, vitality, and mental health in the vegan group compared with the control group. The minimum clinically important difference, defined as the smallest difference in score that is clinically important, for individual SF-36 domain scores is 5.0–10.0 points [32]. Scores of participants in the vegan diet group increased by at least the minimum clinically important difference in each of the 8 SF-36 subscales, but did so in only 1 of the subscales in the control group. Such an improvement in quality of life is desirable for an employer because it can translate to an improvement in work productivity [33].

Our finding that a worksite nutrition program increased work productivity is consistent with that of other worksite studies [17]. The improvement in work productivity may be due to in large part to improvement in health. Sullivan et al. [34] recently reported that individuals with diabetes, dyslipidemia, and hypertension had more missed work days and more lost productivity compared with individuals without these conditions. Obesity exacerbated these effects.

Participants in the vegan diet group had an unexpected increase in disinhibition and hunger ratings on the Eating Inventory questionnaire. In the majority of studies, disinhibition and hunger decrease with weight loss, and higher levels of disinhibition predict weight gain [35]. Previous studies of a low-fat vegan diet from our group have also reported a decrease in disinhibition and hunger at 16 and 22 weeks [14, 31]. Despite the increase in hunger and disinhibition ratings in the present study, participants reported a high satisfaction with their diet (median = 6 on a scale from 1 to 7) and had significant weight loss.

A well-accepted worksite nutrition program could have a dramatic impact on employer health care costs, especially if weight loss is achieved and sustained. Compared with normal weight individuals, health care costs are 21–54% higher for individuals with a BMI of 30–35, 43–57% higher for individuals with a BMI of 35–40, and 78–111% higher for individuals with a BMI of >40 [36]. Medication costs have also been shown to be 77–227% higher in obese individuals compared with normal weight individuals [36]. A 2005 meta-analysis of 22 studies reported an average decrease of 26% in health care costs, 27% decrease in sick leave, and 32% reduction in workers' compensation cost for employees participating in worksite health promotion and wellness programs [20].

Our subsequent implementation cost study for control group participants, led by a local registered dietitian, demonstrated that this worksite vegan program was effective in achieving weight loss at a low cost. Instructor time and associated costs may decrease if the same instructor led subsequent programs and, therefore, needed less preparation time.

This study's strengths include the use of a multicomponent intervention, high completion rate, and translational study design. A limitation of this study is that group assignment was not random for either the sites or individual participants due to the location of the sites (the control site was located ~55 miles from the investigators and the intervention site). The study also included self-selected volunteers and was relatively short in duration.

This study demonstrates that a vegan diet is acceptable, not only in research settings, but in a typical corporate environment. It improves quality of life and productivity, and is low in cost. A large, randomized trial is warranted to confirm the efficacy and acceptability of a worksite vegan nutrition program.

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