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RESEARCH ARTICLE

A Qualitative Assessment of a Worksite Nutrition Education Intervention

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Abstract

To assess the experience of participants who had previously completed a Community Chronic Disease Prevention intervention involving a micronutrient-dense plant-rich dietary intervention. Qualitative interviews were conducted individually or in groups of 2-3. There was a total of twelve participants who had completed a Community Chronic Disease Prevention intervention of 9- or 12-week duration. Questions were designed to be open-ended to maximize the diversity of responses and to allow exploration of a full range of participant views. Interviews were conducted at locations convenient to participants. Employees of a university or regional hospital who had completed a Community Chronic Disease Prevention dietary intervention 1.5-2 years previously. Audio-tape interviews were recorded, transcribed verbatim, and analyzed for common themes and thematic patterns. Participants reported their experiences and adherence to the dietary guidelines post-intervention. Common themes were identified, including a sense of well-being and increased mindfulness. Intervention features that facilitated adherence included regular contact, the educational component, and cooking demonstrations and tastings. Barriers to adhering to the intervention included life-long habits, as well as cultural and family issues. Identification of the experiences of individuals who have participated in a Community Chronic Disease Prevention will provide a basis for incorporating social, emotional, and psychological support into future studies.

Keywords: plant-based; vegan; diet intervention; workplace; nutrient-dense; worksite wellness

Introduction

Overweight and obesity are worldwide issues with 70.2% of Americans classified within these categories.¹ The World Health Organization² reports that worldwide, 41 million children under the age of 5 years are overweight. It is well established that overweight and obesity leads to the development of chronic diseases such as heart disease, type 2 diabetes, hypertension, osteoarthritis, and some forms of cancer.³ Besides the burden of disease, the annual healthcare costs of obesity are estimated to be around \$210 billion and the cost of job absenteeism as a result of obesity is about \$4.3 billion.¹

The cost of chronic non-communicable diseases related to obesity in the US is projected to be \$47 trillion over the next 20 years.⁴ The psychological cost of obesity is difficult to quantify and often goes unnoticed but includes stigmatization, discrimination, and social isolation.¹ In addition, Americans spend in excess of \$58.6 billion a year on diets, weight-loss supplements, and low-calorie, low-fat, low-carb food products in an attempt to combat weight gain and obesity.⁵ Many of these diets fail to result in lasting weight loss changes, possibly because they fail to promote long-lasting behavior change.⁶ Incorporating social and emotional support into behavior change interventions may positively impact outcomes.⁷

There is a mounting body of evidence supporting nutrient-dense plant-rich (minimally processed) eating patterns in reducing obesity and overweight, reducing

and/or reversing heart disease, diabetes, and hypertension, and reducing cancer risk.^{8,9,10} Seminal research has shown improved outcomes in patients with documented cardiovascular disease who transitioned to a low-fat plant-based diet.^{11,12,13} Additionally, plant-based diets have recently gained wider acceptance with the general public, through documentaries, social media, and news outlets.

Previously, this research team and colleagues conducted separate 9- and 12-week Community Chronic Disease Prevention (CCDP) nutrition interventions at the participant's worksite, either a university or hospital.^{14,15} The purpose of conducting multiple trials of different lengths was to determine efficacy as a function of intervention duration. Both consisted of a 12-hour, 2-day immersion before the intervention and one-hour weekly group meetings for the duration of the intervention. Participants who met the following criteria were eligible to participate in either intervention: employee, spouse, or adult dependent of an employee at the worksite; aged 18 to 80 years; self-reported body mass index (BMI) of 28 kg/m² or greater; self-reported waist circumference >35 inches for females and >40 inches for males; ready and willing to make a lifestyle change; not currently participating in a weight loss program; and not taking any medications that could increase medical risk or that had weight loss as a primary side effect. The dietary protocol for CCDP was micronutrient-dense, plant-rich (mNDPR). Participants were instructed to consume leafy greens, beans

(legumes), onions, mushrooms, berries, seeds (and nuts) plus tomatoes basis daily and participants were provided with the acronym GBOMBS + T to help them remember these foods. Participants were encouraged to limit the consumption of processed foods (including vegetable oils & added sugars) and refined grains. Participants were asked to consume no more than 8 ounces of animal products, including milk, butter, cheese, meat, fish, and eggs per week. In addition, they were given weekly nutrition information online in written and lecture form for the duration of the studies. Cooking demonstrations by trained staff and food tastings were part of the weekly meetings.

As part of the 12-week CCDP,¹⁴ participants were measured for height and weight, BMI and waist-to-hip ratio, blood pressure, serum lipids, glucose, high-sensitivity C-Reactive Protein (hs-CRP), and self-reported wellness measures including depressive symptoms (Patient Health Questionnaire, PHQ-9), sleep quality (Pittsburgh Sleep Quality Index, PSQI), quality of life (Quality of Life Index) and work productivity (Work Productivity and Activity Impairment, WPAI) were obtained to before the intervention and after the study. The 9-week CCDP included all the same measures as the 12-week CCDP except serum lipids, glucose, and hs-CRP. Results showed significant improvements in body weight, waist circumference, quality of life, sleep quality, and depressive symptoms for both the 9-week and 12-week CCDP.^{14,15} Significant improvements in total cholesterol, LDL cholesterol, and glucose were also shown for the 12-week CCDP.¹⁴

The purpose of this qualitative study was to assess the overall experience of participants of the 9 or 12-week CCDP and to identify facilitators of dietary intake changes as well as individual barriers to dietary adherence during and after the interventions.

Materials and Methods

Participants and Study Design

The protocol and study design were approved by the blinded Institutional Review Board (IRB) and all participants provided written informed consent. Participants were recruited via email and word of mouth from the list of 128 individuals who had previously participated in either the 9 or 12-week CCDP intervention as shown in Figure 1. Interviews were conducted with 12 participants; three from the 9-week CCDP and nine from the 12-week CCDP. Age, gender, ethnicity, and outcome measures of this subset of participants compared with those of the larger CCDP groups from which they were drawn, are shown in Table 1. There were seven individual interviews and two focus groups (with 2 or 3 participants each) from either of the two CCDP interventions of 9 or 12-week duration. For participants in the 9-week intervention, the timing of the interviews was 24-months post-intervention. For participants in the 12-week intervention, the timing of the interviews was 19-months post-intervention. The interviews were semi-structured with questions including a grand tour question: "What was the experience like for you during the intervention?" In addition, the participants were asked to estimate their current level of adherence to the

recommended dietary prescription, the reasons they did not follow 100% of the dietary protocol, the part of the intervention that was most helpful to them, and what they did not like about the intervention. They were also asked what the research team could do to improve the intervention and what aided

adherence to the mNDPR diet protocol after the end of the intervention. Both the individual interviews and the focus group interviews used the same semi-structured format and elicited similar common themes from the participants.

Figure 1. Study timeline for qualitative participants

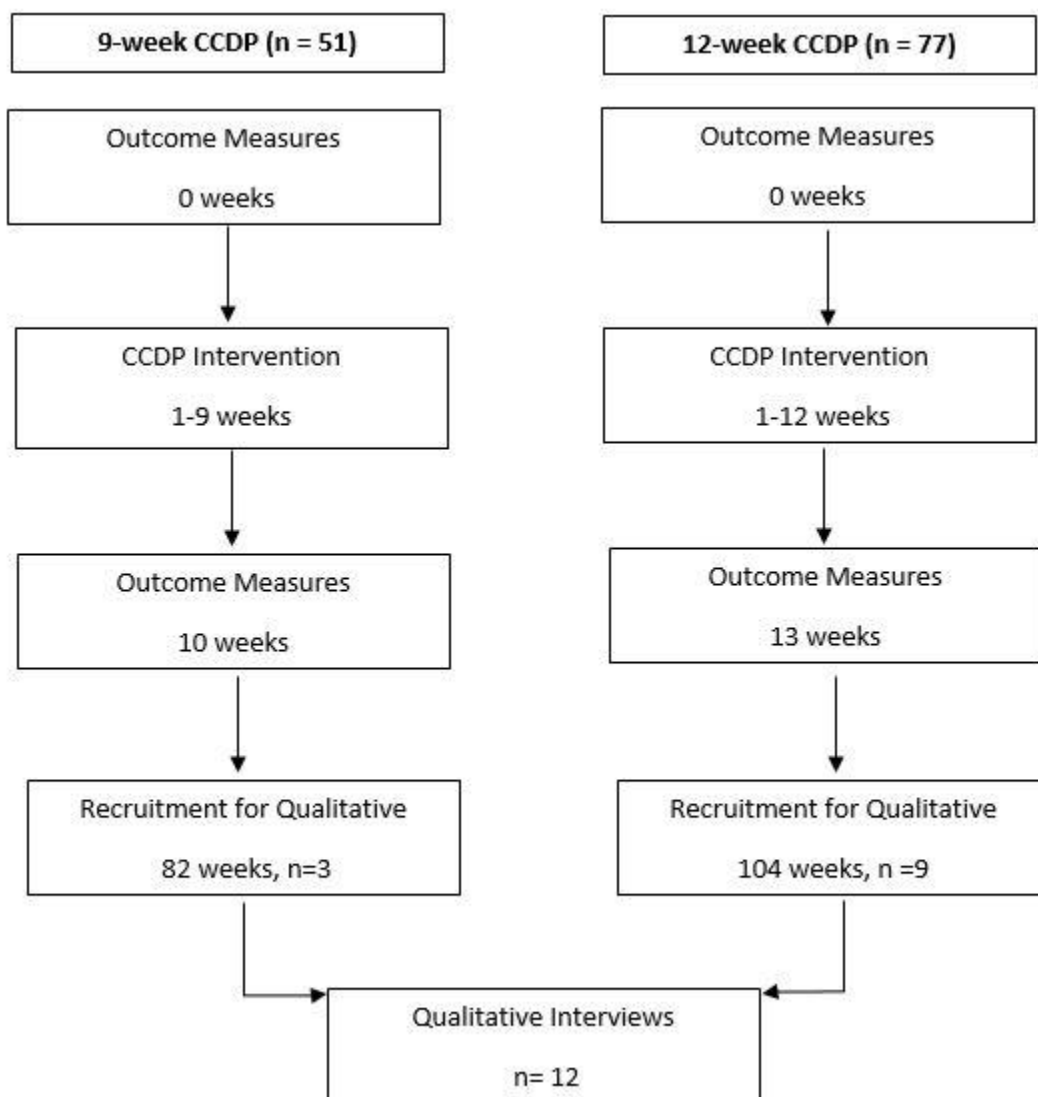


Table 1. Comparative Outcomes of Participants of the Two CCDP Studies and the Present Qualitative Study.

	CCDP 12-week			CCDP 9-week			Qualitative		
N	77			51			11		
Ethnicity	75% Caucasian, 9% Hispanic, 3% Native American, 1% Asian, 4% "other," 5% declined, and 3% "no response."			71% White, 16% Native American, 10% Hispanic, 2% Asian and 2% Black			72.73% White 18.18% Hispanic 9.09% Declined		
Gender	88% Female			78% Female			91% Female		
Mean Age	50			48			56		
	CCDP 12-week			CCDP 9-week			Qualitative		
	Pre Median	Post Median	% Change	Pre Median	Post Median	% Change	Pre Median	Post Median	% Change
Body Mass Index, kg/m ²	33.71	31.39	7.38%	32.86	30.51	7.70%	n=11 31.45	n=11 29.95	5.01%
Waist, inches	42.88	41.00	4.59%	43.25	41.50	4.22%	n=11 42.5	n=11 41	3.66%
Hips, inches	46	44.5	3.37%	45.50	43.50	4.60%	n=11 45.5	n=11 42.5	7.06%
Systolic Blood Pressure, mm Hg	132	126	4.76%	130	126	3.17%	n=11 142	n=11 127	11.81%
Diastolic Blood Pressure, mm Hg	84	74	13.51%	80	78	2.56%	n=11 88	n=11 75	17.33%
Total Cholesterol, mg/dL	213	187	13.90%	-	-	-	n=8 213.5	n=8 197.5	8.10%

	CCDP 12-week			CCDP 9-week			Qualitative		
	Pre Median	Post Median	% Change	Pre Median	Post Median	% Change	Pre Median	Post Median	% Change
Triglycerides, mg/dL	148	144	2.8%	-	-	-	n=8 181.5	n=8 171	6.14%
TC/HDL Ratio	4	4	0%	-	-	-	n=8 4.55	n=8 4.55	0%
HDL, mg/dL	51	48	635%	-	-	-	n=8 47	n=8 44	6.82%
LDL, mg/dL	126.5	107	18.2%	-	-	-	n=8 121	n=8 110	10%
VLDL, mg/dL	28.5	29	-1.7%	-	-	-	n=8 36.5	n=8 34	7.35%
Glucose, mg/dL	98	95	3.2%	-	-	-	n=8 112.5	n=8 103.5	8.70%
hs-CRP	3.5	2.3	52.2%	-	-	-	n=8 4.15	n=8 3.35	23.88%
HbA1C	5.8	5.8	0%	-	-	-	n=8 5.75	n=8 5.75	0%
Quality of Life	21.14	24.38	-12.3%	18.8	23.96	21.54%	n=10 18.67	n=10 24.6	-24.11%
Sleep Quality	8	10	-20%	8.00	4.00	100%	n=11 11	n=10 6.5	69.23%
Depressive Symptoms	6	2	200%	7.00	2.00	250%	n=11 6	n=10 2	200%

Abbreviations: TC/HDL Ratio, Total Cholesterol to High-Density Lipoprotein Ratio; HDL, High-Density Lipoprotein; LDL, Low-Density Lipoprotein; VLDL, Very Low-Density Lipoprotein; hs-CRP, High-Sensitivity C-Reactive Protein; HbA1c, Hemoglobin A1c.

Quality of Life measured by the Quality of Life Index, Sleep Quality measured by the Pittsburgh Sleep Quality Index, and Depressive symptoms measured by the Patient-Health Questionnaire.

Data Collection and Analysis

The interviews were conducted at locations convenient to participants and were held in a conference room at a large university, a coffee shop, or a hospital conference room. Interviews lasted from 30 to 90 minutes and were audio-tape recorded and transcribed verbatim.

The transcripts were subsequently reviewed for accuracy with the tape recordings and an initial impression was developed. Two researchers then analyzed the transcripts for common themes and thematic patterns. Both of the researchers doing the analysis agreed on common themes and patterns. Theme saturation occurred when no new themes emerged. This occurred following individual interviews and/or focus groups with a total of 12 participants.

Results

All the outcome measures from the 9- and 12-week interventions have been reported previously.^{14,15} As reported in Table 1, the results from the 12-week intervention considered in this study included a median weight loss of 21 pounds ($p < .001$), waist circumference reduction of 1.88 inches ($p < .001$), and reduction in hips of 1.5 inches ($p < .001$). The median systolic blood pressure reduction was 6 mmHg ($p < .001$) and the median diastolic blood pressure reduction was 10 mmHg ($p < .001$). Significant reductions in serum lipids included a reduction in total cholesterol of 26 mg/dL ($p < .001$), and a reduction in low-density cholesterol (LDL) of 19.5 mg/dL ($p < .001$); wellness significantly improved as well as the quality of life

improved by 3.24 points ($p < .001$) and depressive symptoms improved by 4 points ($p < .001$). The 9-week intervention showed similar significant results ($p < .001$) with a median loss of weight of 15 pounds, hip circumference reduction of 2 inches, and waist circumference reduction of 1.75 inches; moreover, quality of life improved by 5.16 points, sleep quality improved by 4 points, and depressive symptoms improved by 5 points. Based on our findings, it was of interest to determine facilitators of dietary intake changes as well as individual barriers to dietary adherence during and after the interventions. "What happened when the intervention ended?"

Sense of Well-Being While Following the Protocol

The first question asked the participants to report on their experience during the intervention. The major theme that emerged from the data was a sense of improvement in well-being during participation in the intervention. Examples of reports from participants included descriptions such as "life-changing," with all of the participants indicating that they "felt great". When participants were asked to expand upon their responses, many could not articulate them other than to report that they "just felt better." One participant said: "I felt amazing. I just felt cleaner," while another said: "It took a while to finally get around to realizing how much better I felt following the diet." Another participant reported: "I just feel lighter [on the inside]." "For me, it feels like my life was saved." A few participants expressed "feeling

bad” when they cheated. “The first time I cheated, I had some cheese and I just didn’t feel good.” Others expressed feeling bloated and sluggish when they ventured off the plan.

Part of the well-being may be attributed to better sleep quality. One participant expressed it this way: “I sleep well. I don’t wake up during the night and ...[I] wake up with energy. I look forward to a smoothie or my morning oatmeal...And losing the forty-five pounds [because of the intervention] made it possible for my surgeon to go ahead with the hip replacement. Feeling good means now that I have a new hip that I can walk up the stairs [at work]. Before, I didn’t have the stamina. I still work, I’m 68 now and I don’t have to worry about retiring.” Another said: “I was having a lot of hot flashes and not sleeping and now I don’t get hot flashes anymore [because of the intervention]. I do feel better. I sleep better. I feel satisfied, I feel happy.”

Another positive aspect of the experience with the intervention was an improvement in mood and temperament. One participant expressed feeling that her “brain fog” was gone and “plant-based eating has changed my way of dealing emotionally with stressful situations.” Another said: “plant-based eating calms a person.” Many participants noticed that they were “not as irritable” as they once were. A common expression among participants was, “My mood was elevated.”

Mindfulness in Eating and Other Aspects of Life

Another theme that emerged from the data was an increase in mindfulness of foods

consumed and why consumption of these foods was encouraged. “I definitely feel better, and it made me kind of think, okay, well why am I eating ice cream at ten o’clock at night? It’s because I don’t wanna talk to my family or avoid problems. So, it makes you think about other stuff in your life, like why am I doing that?” Another expressed it this way: “This helps me to get back into that pattern of paying attention to my body every day with everything I eat.” Only one of the participants returned to the exact way they were eating before the study. “I think I am eating healthier than I was...I am not following it as strictly, but I definitely use all those principles in everything we do now. And my whole family has changed, which was really tough to make happen at first ‘cause I have 3 teenagers. We stopped drinking soda.” Even though they did not completely adhere to the protocol, the overall eating habits of the family improved, and everyone was more mindful of what they ate. “With teenagers it is hard, but I think my kids eat way better now.”

Positive Features of the Intervention and Ways to Improve It

Participants reported on what they liked most about the intervention, what was helpful, and what would make it easier for them to adhere to the diet. All participants reported that the weekly meetings were informative, the most helpful and that the cooking demonstrations were what kept them on track. “Truly, it was the meetings every week and the social meeting together because then I could hear other people’s ideas of how they were making it work...the biggest thing was actually having

them bring the food to our meeting and show how to cook it and the smells that came from that food and to be able to taste it, that was the final key clencher.” They also said that additional cooking demonstrations and tastings would help them adhere to the protocol after the intervention ended. A number of participants said that they thought that having a health coach would be helpful. Two participants did have health coaches provided through their health insurance while participating in the intervention and said it made participating in the intervention easier because they had someone to talk to about it, possibly providing social and emotional support.

A common theme was that there needed to be a way to continue the connection with the study team and also the other participants, thereby increasing social support. “A longer program [intervention] and setting up a buddy system would make sticking to it easier.” Another idea was “more family involvement, maybe family night with cooking and eating.” Several participants said that a formal support group would help them build a community of healthy eaters. The participants felt that if there was some way to continue meeting, “maybe once a month” they would have an easier time adhering to the protocol. Some participants thought a monthly newsletter and informal meetings with smaller groups might be beneficial.

Challenges to Adhering to the Protocol

Following the completion of the interventions, most participants (92%) reported that they adhered to the protocol at least 50% of the

time, with two of those continuing to adhere 100% of the time, and one reported total non-adherence. When participants were asked the reason for not adhering to the study protocol 100% of the time, the common response was that it was hard to change life-long eating habits. The difficulty in changing habits may be related to associating food with comfort and cultural implications. “I’m Mexican, eating plant-based was hard.” Another related this barrier: “It is easier to stay on track when reporting to other people.”

The intervention addressed psychological reasons for food choices, but making the necessary changes was difficult for most participants. Another common barrier to following the mNDPR diet 100% of the time was the lack of support from family members. “I have to go home and cook different meals for my husband and children than what I eat.” [The barrier] “my family still wants me to cook other stuff. And I cook every day for 5 people and it’s kind of hard to keep them all content and happy.” “My family missed sausage and gravy.” “My kids had to have pizza.” “Family is important, and food is part of the family tradition, so it is hard to change.”

Discussion

During the intervention, participants saw significant improvement in their anthropometric and biometric physiological outcome measures. Results from the current study indicate participants also felt better while following the dietary protocol. After the intervention concluded, the majority of participants in the current study maintained a more healthful eating pattern than before

they participated in the study. They reported more knowledge about good nutrition and the most current information about what that means. They were more mindful of their eating patterns and conscious of when they were eating healthfully. Interestingly, only one participant had returned to her previous eating habits, but even she reported that it was a conscious decision because she did not want to cook for herself. Those who had the most support or who lived alone were more likely to follow the dietary protocol to a higher degree.

These findings suggest these interventions increased participants' nutritional knowledge and awareness, however, the application of improving overall dietary habits and practices varied among the interviewed participants. The primary aim of these interventions was to assist participants in their reduction of the overall risk of chronic diseases, in parallel to increase self-efficacy as it relates to dietary practices. The intent is that these participants will continue to benefit from their participation in the respective interventions.

It is well-established that individual nutritional practices have a synergistic impact when practiced over time.^{16,17} Dietary habits do not need to be viewed from an all-or-nothing perspective to show long-term reduction in chronic disease risk. Similar interventions show that the greater adherence to the recommended dietary protocol, the greater reduction in chronic disease risk.¹⁸ However, at each level of adherence, there is a reduction in chronic disease risk despite not adhering to the dietary protocol 100%.¹⁹

The mechanisms and dynamics involved in the relationship among nutrition, behaviors, cultural influences, and sustainable lifestyle practices are complex. The finding that 11 of the 12 participants interviewed in this present study reported a routine 50-95% adherence post-intervention is noteworthy. Long-term adherence may be the result of the intervention design which provided a blend of knowledge-based learning (lectures), practical food demonstrations with supporting electronic materials (recipes and shopping tips), question and answer sessions, participant interaction with one another, and the study team (experts), and sampling of the food that was demonstrated.

Even greater adherence may have been observed if the participants had been allowed to help with the food demonstrations if more time had been devoted to the food demonstrations during each session if follow-up sessions had been offered more frequently and for a longer period (ongoing support group), and if more time interaction among participants had been allowed. Furthermore, incorporating social support such as inviting family and friends to sessions or having more small group interactions may promote adherence.

Strengths and Limitations

This study had both strengths and limitations. The use of interviews conducted either individually or in small focus groups provided an opportunity to gain an understanding of participant views in a way that allowed discussion and expression of diverse opinions. Unlike surveys, this methodology allowed us

to obtain insight into participant views concerning issues about which we, as researchers, might not have thought to inquire. In addition, the recruitment of a diverse group of individuals to participate in this study led to a range of experiences and views. Indeed, the data we obtained identified a range of issues and were raised by participants from a variety of backgrounds.

A limitation is that the 12 participants in the current study were a small percentage of the total participants in the two interventions from which they were drawn, and these 12 individuals may be similar in the extent to which they succeeded in the intervention and/or their continued adherence to the protocol. Overall, a comparison of the group of 12 with the total participants from the two CCDP studies shows that this subset had less improvement in some outcome measures (BMI, waist circumference, total cholesterol, LDL, hs-CRP) and greater improvement in other outcome measures (hip circumference, systolic and diastolic blood pressure), so it is likely that the participants interviewed in this study were broadly representative of the larger groups. A further limitation of this study is that long-term adherence was a self-reported measurement based on perception of adherence. To more accurately assess long-term adherence, future interventions should consider collecting 24-hour diet recalls and another point of measure for blood lipid profiles and wellness measures.

Conclusion

Similar to other plant-based interventions, participants did not completely adhere to the

diet post-intervention, but for the participants interviewed in this study, adherence over time was maintained at a higher level than is often reported.¹⁹ A more thorough examination of the long-term adherence and impact of plant-based diets is warranted given the limitations of this study. Specifically, future studies might consider addressing these issues with methods that engage a larger sample size, monitoring diet using a 24-hour diet recall to assess adherence over time and conducting long-term anthropometric measurements. The data that we collected could be used for future studies to develop a new survey tool to be utilized at the end of interventions. Overall, this study provides a basis for methods to improve adherence to plant-based diet interventions, even if participants are not 100% adherent.

For future interventions, an even greater level of long-term adherence may be observed if one-on-one health coaching sessions were provided for each participant. This would allow for more personalized recommendations from the general principles provided during each weekly group session. In the one-on-one sessions, the participant would also be able to address any private barriers they are experiencing that they may be reluctant to share in a group session.

Improved long-term adherence may also be observed if each participant was initially assessed/screened for the specific stage of change they are guided by the Transtheoretical Model (TTM), and then periodically reassessed throughout the intervention. Determining the starting point in

the readiness to change will allow us to spend some time up-front seeking to increase readiness to change so the appropriate approach can be made about where the participant is currently at in the TTM stages.

Future interventions may want to address a more balanced holistic approach to diet by combining more components of wellness including mental, emotional, and spiritual components so health is approached synergistically. While lectures and cooking demonstration formats were successful in assisting behavior change short-term, a more comprehensive and practical approach to how to apply this information may prove to be advantageous.

As we have seen an increased emphasis on calling the dietary pattern and lifestyle utilized in the interventions addressed in this report as “plant-based,” we have seen a broader openness and acceptance. In previous interventions, we used terms such as vegetarian or vegan, and some potential participants claimed they did not participate because they were not vegetarian or vegan. Using the term plant-based has been shown to turn the focus to food ingredients and reach a much larger audience.²⁰ This is also consistent with the increased number of food products being marketed in the plant-based sphere.²¹

Another way to increase the adherence and broader acceptance of plant-based lifestyles may be by addressing the impact dietary choices can have on natural resources and the environment. One of the primary benefits of shifting to a more plant-dominant dietary

pattern is that it is less resource-intensive and environmentally destructive with a reduction in greenhouse gas emissions when compared to an animal protein-centered dietary pattern.^{22,23} In addition, the land and water necessary to produce plant-based dietary protein are generally far less.^{24,25}

In light of the outcomes found in our qualitative review, moving forward, we encourage using a multi-component interventional approach so individuals and communities can experience greater physical, mental, emotional, and environmental health, which results in improved quality of life. Plant-based diets have been found to be safe, effective, and beneficial for all stages of the life cycle, from pregnancy and lactation to childhood, to old age.²⁶ In addition, consumer interest in plant-based diets has soared²⁷ and the production of food products has grown exponentially.^{21,28} Public health advocates now have an unprecedented opportunity to make a lasting impact on the health of our populations and our natural resources.

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Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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