

ORIGINAL RESEARCH

Effect of a Family Medicine Wellness Group Program on Long-Term Weight Loss Maintenance Outcomes

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Introduction: Both the prevalence of obesity and weight-related illness continue to rise. While weight loss strategies are plentiful, the weight loss is usually temporary and evidence-based strategies for sustaining weight loss remain elusive.

Methods: Weight loss outcomes of participants in a Wellness Group (WG) visit program, which provided education and support around healthful behavioral modification, led by a family physician and dietitian were analyzed. We performed a chart review to extract last recorded weights for participants. Using statistical analyses, we analyzed weight loss outcomes for all included participants in their initial group, as well as a subgroup analysis of weight loss maintenance 1 to 13 years after the initial group for those who initially lost clinically important ($\geq 5\%$) weight. We examined the effects of gender, age, and starting Body Mass Index (BMI) on weight loss and weight loss maintenance outcomes.

Results: A total of 310 patients were included in the analysis. Participants lost a mean of 6.5% of their body weight in their first group. After an average of 6.6 years, participants had maintained an average of 3.5% weight loss. 58% of participants lost clinically important weight in their first group, and of those patients, 54% maintained clinically important weight loss. In addition, we found that participation in multiple groups was associated with improved CIWL, and that the participants with the highest starting BMIs (class III obesity) maintained more weight loss than those who were overweight.

Conclusion: This retrospective observational study demonstrates sustainable weight loss achieved by the majority of participants who initially lost clinically important weight in a WG program. (J Am Board Fam Med 2024;37:1038–1046.)

Keywords: Family Physicians, Group Visits, Obesity, Overweight, Lifestyle, Nutritionists, Weight Loss

Introduction

The prevalence of obesity in US adults has been steadily rising since 1999. As of 2016, 38% of US adult men and 41.5% of US adult women were considered to have obesity (Body Mass Index [BMI]

≥ 30), with 5.6% of men and 9.5% of women classified as having obesity class III (BMI ≥ 40).¹ The prevalence of obesity-related disease has also increased. The prevalence of diabetes in the US has increased from 9.17% in 1999 to 14.7% in 2018.² Prediabetes prevalence has increased from 29.5% to 48.3% in the same period.² Rates of obesity and weight-related disease are especially prevalent among Black, Hispanic, and American Indian populations, as well as in economically disadvantaged groups.^{1–3} A driving factor behind the increase in obesity and cardiometabolic disease is the prevalence of unhealthy lifestyle behaviors, including poor nutrition, insufficient physical activity, smoking, poor sleep, and alcohol consumption. Less than 25% of US adults meet the recommended amount of physical activity,⁴ and 9 in 10 eat fewer

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than the recommended number of fruits and vegetables.⁵ The estimated costs in the US in 2017 due to diabetes and heart disease were \$327 billion⁶ and \$226 billion⁷ respectively. This presents an extraordinary economic opportunity for the health care system through programs that are effective at helping people sustain weight loss and healthier lifestyle habits that reduce risk of obesity-related chronic disease.

Despite this increasing burden of obesity and weight-related disease on public health and the health care system, an effective method for sustained weight loss (WL) remains elusive. While dieting is often effective in the short term, the vast majority of dieters regain their lost weight within several years.^{8–10} Weight loss maintenance (WLM) is difficult to study, and the majority of studies have methodological weaknesses, including self-reported weight, retrospective design, high attrition rates, and short follow up periods.¹⁰

Primary care is the ideal setting to address obesity and weight-related diseases for the following 3 reasons: (1) Primary care is the health care entry point for many patients with chronic disease, (2) primary care is more cost-effective than specialist visits and is the only specialty in which greater investment reduces health disparities while improving health,¹¹ and (3) obesity and weight-related diseases are deeply entwined with health inequity and social determinants of health. One strategy that has been developed to promote healthy lifestyle habits and treat obesity and related disease in primary care is the use of group visits. Time constraints in traditional visits¹² and lack of extensive obesity management training^{13,14} make it difficult for primary care clinicians to provide patients with adequate education, motivation, and support that effectively address obesity and related lifestyle concerns.¹⁵ Group visits provide an opportunity for health care clinicians to address a group of patients simultaneously while fostering a peer environment that leverages support, accountability, and shared lived experiences.¹⁶ Group visits for WL have been used in primary care settings across the United States and internationally, and have been shown to lead to clinically significant WL.¹⁶ However, few studies report WLM past 12 months,^{17,18} and none report outcomes past 2 years.

We have previously reported on WL, health, and behavioral outcomes of participants of an established wellness group program, involving 15

60-minute visits over the course of 20 weeks led by a family physician and a dietitian.^{19,20} To address the dearth of literature on effective programs for long-term weight loss maintenance, we analyzed the weight loss outcomes for participants in the described wellness group program up to 13 years after completion. In particular, we were interested in measuring the percentage of participants who achieved clinically important weight loss (CIWL), and among those, the percentage who maintained this CIWL.

Research Questions

The overarching goal of this study was to assess the efficacy of a Wellness Group program in enabling and empowering individuals to achieve and maintain clinically important weight loss (CIWL). Accordingly, our data analyses focused on the following research questions:

RQ1: Will participation in Wellness Groups enable individuals to achieve CIWL on completion of a WG program?

RQ2: Will participation in Wellness Groups enable individuals to maintain CIWL in the longer-term (based on most recent recorded measurements)?

RQ3: Is the amount and/or type of participation in Wellness Groups positively associated with achievement and maintenance of a CIWL?

Methods and Results

Setting

Wellness Groups were conducted at Family Practice Group (FPG), a private outpatient family medicine practice in Arlington, MA, that serves a predominantly English-speaking, privately insured patient population.

Patient Selection

Patients were referred to the Wellness Group (WG) program by their primary care physicians at FPG or self-referred through word-of-mouth, as described.¹⁹ Referred patients were those interested in additional support in improving their wellness behaviors. Most patients referred were overweight/obese and/or had obesity-related diseases. All patients who participated in WGs starting in September 2009 through December 2021 for whom data on height, weight, date of birth, and gender were available were initially included in the chart review.

Wellness Group Program Intervention

Participants in the WG Program attended 15 group sessions over 20 weeks led by a family physician and registered dietitian, focusing on improved wellness behaviors and sustainable WL. The 5 overarching dimensions addressed in the program included food quality, food quantity, exercise, activity (steps), and sleep (more information can be found at WellnessCampaign.org). Participants were encouraged to frequently communicate between group sessions via a group e-mail list to foster high levels of peer support and accountability. Participants' heights (first group only) and weights were measured and recorded at the beginning of each group session. In addition, participants were invited to repeat WGs if needed or join an advanced WG which meets biweekly without a set curriculum and offers peer support in a less structured environment. The curriculum remained the same throughout all groups and all groups were facilitated by the same family physician and dietitian. Groups moved to virtual meetings in March 2020 due to the COVID-19 pandemic and returned to a mix of virtual and in-person in the summer of 2021.

Study Design and Chart Review

We performed a chart review for all WG participants in groups starting between September 2009 and December 2021. Charts were made accessible by virtue of participants' status as FPG patients. Participants were not contacted for consent before chart review due to concerns of response bias and feasibility. Participants' gender assigned at birth, date of birth, height, and most recent weight recorded in office as of April 2023 were extracted. Patients' most recent recorded weight was designated as their final weigh in. We combined this data with participants' starting and ending weights during each group in which they participated. From these data, we calculated the following: age at first group; BMI at the start of the first group, BMI at the end of the first group, and BMI at the last measurement on record; number of regular groups participants completed; number of advanced groups participants completed; weight change and percent weight change at the end of the first group; weight change and percent weight change between the end of the first group and the final weigh-in on record; the percent of weight lost in the first group that was maintained at the final weigh-in; total weight change and percent weight change between first

weight and final weigh-in; and time elapsed between first group end and final weigh-in. This study was approved by the Tufts Social, Behavioral & Educational Research Institutional Review Board.

Statistical Analyses and Results

We limited our analysis to patients who began the WG program at a BMI ≥ 25 ($n = 340/342$) for whom we had weight data that was at least one year after the end of their first group to assess for sustained WL ($n = 310/340$). Analyses were performed on the group of all eligible participants, as well as the subset of participants who lost a clinically important amount of weight, defined as $\geq 5\%$ of baseline body weight, in accordance with standards set by the 2013 guidelines for management of overweight and obesity in adults.²¹

All recorded data were transformed into an SPSS dataset, and all statistical analyses were performed using the SPSS statistical analysis package.

Data Transformation and New Variable

Computation

Using body weight measures recorded (a) Before starting the WG program, (b) at the End of the WG program, and (c) at a Final (longer-term) point-in-time, 2 new variables were constructed:

1. Percent body weight loss achieved (*%WL Achieved*, calculated as (Before body weight minus End body weight) \div Before body weight)
2. Percent body weight loss maintained (*%WL Maintained*, calculated as (Before body weight minus Final body weight) \div Before body weight)

These 2 outcome variables were the focal points of analyses aimed at addressing RQ₁ and RQ₂. Age groups were defined as 18 to 44, 45 to 59, and 60+, to estimate early adulthood, middle age, and older adulthood, as well as to provide sufficient power to the analyses.

Analyses Addressing RQ₁

Summary statistics were calculated for %WL Achieved. Results, summarized in Table 1, reveal that the mean %WL Achieved for the total sample of participants was 6.48%: On average, participants in the WG program achieved a body weight reduction that slightly exceeds the generally-accepted CIWL criterion of 5%. A *t*-test for independent groups was conducted to compare male and female %WL Achieved means. A one-way ANOVA was performed as an omnibus test to compare age-

Table 1. Summary Statistics for Percent Body Weight Loss (%WL) Achieved and Maintained*

	N	%WL Achieved		%WL Maintained	
		M	SD	M	SD
Total	310	6.48	0.49	3.51	1.12
Gender					
Females	200	6.34	0.46	3.47	1.25
Males	110	6.47	0.54	3.51	1.12
Age group					
18 to 44	101	6.25	0.53	1.00 _a	1.37
45 to 59	98	6.10	0.51	3.34	1.11
60+	101	6.48	0.49	6.63 _a	1.03
Starting BMI classification					
Overweight	43	6.46	0.36	1.22 _b	1.19
Obese I	112	7.01	0.48	2.48	0.92
Obese II	70	7.33	0.53	4.40	1.13
Obese III	85	6.28	0.52	6.83 _b	1.12

*Means having a common letter in the subscript differ significantly at or beyond the 0.05 level of confidence.

Abbreviations: SD, Standard deviation; BMI, Body mass index.

group and starting BMI category with respect to %WL Achieved means. These tests revealed no significant differences among groups of participants based on either gender, age-group, or BMI classifications assigned to individuals before starting a WG program. Thus, these findings provide evidence of the general efficacy of a WG program as it pertains to enabling/empowering participants to *achieve* a clinically important weight loss.

Analyses Addressing RQ₂

Summary statistics were calculated for %WL Maintained. Results, also summarized in Table 1, reveal that the mean %WL Maintained for the total sample of participants was 3.51%: On average, participants in the WG program maintained slightly over half of their %WL Achieved, which falls slightly below the generally-accepted CIWL criterion of 5%. A *t*-test for independent groups was conducted to compare male and female %WL Maintained means, which revealed no significant differences among groups of participants based on gender. However, a one-way analysis of variance (ANOVA) treating age-group classification as the independent variable revealed significant differences among at least 2 age groups ($F = 5.58, P < .001$, partial $\eta^2 = 0.038$). Accordingly, post hoc comparisons among mean scores subsequently were performed using a *t*-test for independent means ($\alpha = 0.05$, two-tailed, applying the Bonferroni

correction to protect against type I error). Results reveal that the %WL Maintained mean in the 60+ age-group is significantly higher than that in the 18 to 44 age-group, and that there were no other significant differences among age groups, gender, or starting BMI classifications.

Finally, while there were no significant differences in average %WL Achieved among participants grouped according to starting BMI classification, a one-way ANOVA indicated that at least one pair of these groups differed with respect to %WL Main-tained ($F = 4.84, P < .003$, partial $\eta^2 = 0.045$). Post hoc comparisons among mean scores subsequently were performed using a *t*-test for independent means ($\alpha = 0.05$, 2-tailed, once again applying the Bonferroni correction to protect against type I error). Results, also shown in Table 1, indicate that the mean %WL Maintained for participants in the Obese III group is significantly greater than the mean for participants in the Overweight group. There are no other significant differences among the groups. However, moving “up the ladder” from the Overweight to the Obese III group, the %WL Maintained increases monotonically (ie, %WL Maintained is lowest among participants in the Overweight group, second lowest among participants in the Obese I group, third lowest among participants in the Obese II group, and greatest among participants in the Obese III group). By way of implication, these results suggest

that participation in a WG may be increasingly beneficial to individuals who are progressively at risk of potentially adverse effects of obesity.

Moreover, weight loss maintenance outcomes of group participants were quantified based on change in weight after initial group participation and final weight compared with starting weight before group participation. As shown in Figure 1, we found that among participants who did not achieve CIWL in the initial WG ($n = 131$), 28% later achieved and maintained CIWL (end weight $\leq 95\%$ starting weight), 11% lost clinically insignificant weight (end weight $>95\%$ starting weight), 11% gained weight but ended up below their starting weight, and 49% ended up above their starting weight. In comparison, among participants who achieved CIWL in their first WG, 30% maintained or lost more weight, 23% gained weight but still maintained CIWL ($\leq 95\%$ starting weight), 20% gained weight but ended up below their starting weight (95 to 100% starting weight), and 27% ended up above their starting weight. Overall, over the course of the study period, 28% of patients who had not initially achieved CIWL did eventually lose and maintain at least 5% weight loss. Among participants who did initially maintain CIWL, 53% maintained CIWL.

In summary, on average, the individuals we studied achieved CIWL as a result of WG participation. Furthermore, on average, participants maintained at least some of the body weight loss achieved immediately after completing a WG program, with individuals in the 60+ age-group, as well as those in the Obese III starting BMI category, maintaining the CIWL that they had initially achieved.

Analyses Addressing RQ₃

In an effort to gain additional insight into factors that may have impacted WG participant outcomes, supplemental data analyses were performed. Specifically, these analyses focused on differences in CIWL achievement and maintenance related to (a) the number of WG sessions attended, (b) participation in multiple wellness groups, and (c) participation in advanced wellness groups.

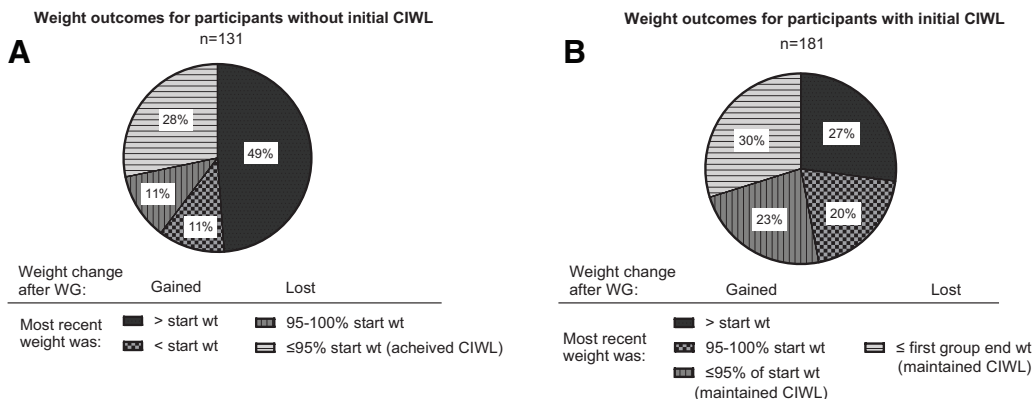
First, we compared individuals who *achieved* a CIWL with those who did not. Results, summarized in Table 2, reveal that, on average, the cohort of participants who lost at least 5% of their starting body weight attended significantly more group sessions than their counterparts who did not. In addition, a significantly greater percentage of participants who lost at least 5% of their starting body weight attended multiple regular and advanced groups than their counterparts who did not lose at least 5% of their starting body weight.

For the most part, subgroup comparisons revealed no significant differences among groups of participants based on either gender, age-group, or BMI classifications before starting a WG program. However, 2 comparisons did reveal significant differences among subgroups:

1. On average, females ($M = 1.86$) participated in significantly more multiple regular groups than males ($M = 1.45$).
2. On average, individuals in the 60+ age group ($M = 1.09$) participated in significantly more advanced groups than did individuals in the 18-44 age group ($M = .43$).

Thus, and with the exception of the preceding 2 subgroup comparisons, the number and variety in

Figure 1. Weight outcomes for patients who did not (A) and did (B) achieve CIWL in their first WG.



Notes: CIWL, clinically important weight loss; WG, Wellness group.

Table 2. Group Participation by CIWL Achievement*†

Attendance	N	Number of Sessions		Multiple Regular Groups		Any Multiple Groups	Any Advanced Groups
		M‡	SD	M§	SD	%	%
Outcome							
Lost at least 5%	179	13.49 _a	2.03	1.87 _b	1.22	39 _c	62 days
Did not lose at least 5%	131	12.17 _a	1.58	1.53 _b	2.06	19 _c	38 days

*Participants who achieved at least a 5% loss of their starting body weight versus those who did not.

†Means having a common letter in the subscript differ significantly at or beyond the 0.05 level of confidence based on a *t*-test for independent group means. Percentages having a common letter in the subscript differ significantly at or beyond the 0.05 level of confidence based on a *z*-test for independent proportions.

‡Mean number of sessions attended.

§Mean number of groups attended.

||Percent of individuals who participated.

Abbreviations: CIWL, clinically important weight loss; SD, Standard deviation.

type of groups attended seems to influence CIWL achievement for all WG participants.

With regard to CIWL *maintenance*, we performed analyses comparable to those described immediately above, but focused on comparing: (a) individuals who lost at least 5% of their starting body weight, but *did not maintain* that loss over time, and (b) individuals who *achieved and maintained* at least a 5% loss of their starting body weight. Results, displayed in Table 3, reveal that, on average, the group that maintained a CIWL attended significantly more sessions who did not maintain a CIWL ($t = 2.31, P < .05$ 2-tailed, $d = 0.35$). In addition, a significantly greater percentage of participants who maintained a CIWL attended at least one advanced group than their counterparts who did not maintain a CIWL ($z = 1.99, P < .05$, 2-tailed). There were no other statistically significant differences between the 2 groups.

Finally, supplemental analyses were conducted to determine if the 2 groups differed with respect to gender, age, and/or starting BMI classification. Results, summarized in Table 4, reveal that the percentage of participants in the 60+ age-group was significantly greater for individuals who maintained a CIWL over time than for those who did not. In addition, the percentage of participants whose starting BMI was Obese III was significantly greater for individuals who maintained a CIWL over time than for those who did not. There were no other significant differences between the 2 groups with respect to demographics or starting BMI classifications.

Discussion

In this study, we examined weight loss maintenance outcomes over a decade after participation in a

Table 3. Group Participation by CIWL Maintenance*

Attendance	N	Number of Sessions		Multiple Regular Groups		Any Multiple Groups	Any Advanced Groups
		M‡	SD	M‡	SD	% §	%
Outcome							
Maintained a CIWL	96	13.72 _a	1.67	1.95	1.11	45.4	61.2
Did not maintain a CIWL	83	13.29 _a	1.44	1.82	1.31	49.5	62.1

*Means having a common letter in the subscript differ significantly at or beyond the 0.05 level of confidence based on a *t*-test for independent group means. Percentages having a common letter in the subscript differ significantly at or beyond the 0.05 level of confidence based on a *z*-test for independent proportions.

‡Mean number of sessions attended.

‡Mean number of groups attended.

§Percent of individuals who participated.

Abbreviations: CIWL, clinically important weight loss; SD, Standard deviation.

Table 4. Demographic and Starting BMI Classification by Maintenance Outcomes*

	N	Did Not Maintain CIWL	Maintained CIWL
		83	96
		%	%
Total	179		
Gender			
Females	109	67.5	55.8
Males	70	32.5	44.2
Age group			
18 to 44	59	37.7	30.1
45 to 59	56	33.8	25.2
60+	64	28.6 _a	44.7 _a
Starting BMI classification			
Overweight	26	18.1	11.5
Obese I	69	42.2	35.4
Obese II	48	26.5	27.1
Obese III	36	13.3 _b	26.0 _b

*Means having a common letter in the subscript differ significantly at or beyond the 0.05 level of confidence.

Abbreviations: CIWL, clinically important weight loss; SD, Standard deviation.

novel Wellness Group model that incorporates education from a physician and dietitian, as well as high levels of peer support and accountability that are in part achieved through the use of a group e-mail list. 58% of participants lost clinically significant weight in their first group, with an average 6.5% WL for all participants, which is slightly higher than many lifestyle modification programs, which result in CIWL for an average of 54% of participants.²⁴ Moreover, improved wellness behaviors and weight loss must be maintained to sustain the health benefits initially gained.²⁵ While long-term weight loss maintenance has proved elusive in the literature,^{9,10} we find that after up to 13 years after WG participation, most patients (54%) who initially achieved CIWL maintained CIWL, that is, were at a weight that was at least 5% less than their initial, pre-WG weight. This was most pronounced for participants who began the program at the highest BMIs: those with Class III obesity maintained, on average, a 6.8% WL at follow up, compared with 4.4% for those with Class II obesity, 2.5% for those with Class I obesity, and 1.2% for those who were overweight. These results indicate the WG program is associated with the most benefit (ie, most significant WLM) for patients with highest

levels of BMI. Analyses of national weight loss registries have identified several tools used by weight loss maintainers, including strategies for planning meals, improved nutrition choices, and daily activity.²⁶ The focus of the WG curriculum on creating long-lasting improved wellness habits such as these, as opposed to rapid weight loss through unsustainable restriction may contribute to the WLM success of WG participants relative to other reported interventions. As social support has been shown to be a key determinant of WLM,²⁷ the emphasis of the WG program on fostering peer support within the group, as well as encouraging healthy external supports, likely also plays a role in the success of the WG program in facilitating sustained WL.

While many patients successfully applied lessons from their initial WG and maintained their WL and improved wellness behaviors without further intervention, others chose to participate in subsequent groups to further support and provide accountability. We found that patients who lost clinically important weight in their first WG were significantly more likely to participate in subsequent groups than those who lost <5% of their weight. It is likely that these patients found the format and content of WGs to be helpful for their goals and were encouraged by their success, and so were inclined to continue. In line with our 2017 findings,¹⁹ patients who participated in at least one advanced group after their initial group participation were more likely to maintain CIWL. Participation in additional groups represents patients' commitment to improved lifestyle habits, and provides continual accountability in these goals, likely facilitating maintained WL.

Reports of gender differences in WL and WLM in the literature have been heterogeneous.^{27,28} In our study, we found no significant differences between males and females in terms of initial CIWL as well as CIWL maintained. However, on average, females did participate in more advanced groups than their male counterparts. This may be due to the nature of the advanced group as a more open-ended forum focused on social support, which may be more comfortable for women who are socialized to rely more on social supports. There may also be an element of positive feedback, where more women continue in advanced groups due to it already being a female-dominated space. Similar to gender, reports of the influence of age on WL and WLM have been mixed, with an overall conclusion of little effect.²⁷

Surprisingly, we found that participants aged 60+ maintained a greater %WL than those aged 18 to 44. It is possible that this is due to the fact that many in the older age-group are retired and have more time to focus on healthy habits than the youngest age-group. However, more research is necessary to elucidate the mechanisms by which older age improves CIWL maintenance for WG participants.

The location of this study within a family medicine practice confers several advantages. Most WG participants are patients at the practice and come in for regular visits. Established trust and rapport with physicians and staff leading the group may improve commitment to the group. In addition, although recruitment of patients through the practice protects against some attrition in follow up, as patient weights are accessible through chart review, we did not have one year follow up data for 9% (32/342) of the WG participants, some of whom were likely not patients at the practice and were instead referred through word of mouth. The patients not included in this analysis (n = 32) lost slightly less weight (mean -4.8%) than those for whom we did have follow up data at least one year after WG end (mean -6.5%) This may bias our analysis in reporting more substantial weight loss on average in the first WG; however, those lost to follow up still lost, on average, nearly a clinically significant amount of weight. Finally, most participants in the WG were white, middle- to upper-class, and privately insured.¹⁹ Because obesity and related diseases are correlated with poor nutritional quality, lack of physical activity, and high stress loads, among other factors, that are exacerbated and mediated by social determinants of health,²⁹ the outcomes of this WG may not be generalizable to a wider, more diverse or marginalized population.

A limitation of our study is the use of BMI as a proxy for overweight/obesity and health, and weight loss as a proxy for health improvement. While we have previously shown that benefits of WGs extend to improved wellness behaviors and health biomarkers, including systolic blood pressure and triglyceride levels,^{19,20} BMI and weight loss alone are inadequate as sole measures of health or health improvement.³⁰⁻³² In this study, we sought to analyze the most complete sample of WG participants as possible to produce the most accurate picture of WG efficacy. To achieve this, weight was the most convenient variable to measure. In addition to our records of participants' weights before

and after each WG, chart review gave us recent, accurate data on patient weights without need for further contact. This prevents attrition and response biases, as well as bias due to self-reporting, all which are significant limitations to most studies on weight loss interventions.^{9,10} However, our current work does not account for patients' weight loss efforts outside of the WG program. While the WG program was key for CIWL and maintenance for many patients, it represents only one of many factors that may have influenced patients' weight. Future work may expand on long-term impacts of the WG program, including on wellness behaviors and attitudes as well as on biomarkers of health such as blood pressure, blood lipid levels, and glycohemoglobin levels. In addition, future work can assess the efficacy of the WG program in broader populations, including in communities of color and low-income communities.

Despite continually increasing rates of obesity and weight-related disease in the US population, physicians lack consistent, evidence-based nonsurgical and nonpharmacological treatment options to aid patients in sustained weight loss and wellness behavior change. In this study, we present further data on the efficacy of a Wellness Group Program, emphasizing sustainable lifestyle change and improved wellness behaviors, in a primary care setting for long-term weight loss maintenance.

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To see this article online, please go to: <http://jabfm.org/content/37/6/1038.full>.

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