

ORIGINAL RESEARCH

Goal setting for health behavior change: evidence from an obesity intervention for rural low-income women

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ABSTRACT

Introduction: Rural, minority populations are disproportionately affected by overweight and obesity and may benefit from lifestyle modification programs that are tailored to meet their unique needs. Obesity interventions commonly use goal setting as a behavior change strategy; however, few have investigated the specific contribution of goal setting to behavior change and/or identified the mechanisms by which goal setting may have an impact on behavior change. Furthermore, studies have not examined goal setting processes among racial/ethnic minorities. Using data from an obesity intervention for predominately minority women in rural North Carolina, this study sought to examine whether intervention participation resulted in working on goals and using goal setting strategies which in turn affected health behavior outcomes. It also examined racial/ethnic group differences in working on goals and use of goal setting strategies.

Methods: Data came from a community-based participatory research project to address obesity among low-income, predominately minority women in rural North Carolina. A quasi-experimental intervention design was used. Participants included 485 women aged 18 years and over. Intervention participants ($n=208$) received health information and goal setting support through group meetings and tailored newsletters. Comparison participants ($n=277$) received newsletters on topics unrelated to obesity. Surveys assessed physical activity, fruit and vegetable intake, goal-related stage of change, and use of goal setting strategies. Chi squared statistics were used to assess intervention group differences in changes in goal-related stage of change and use of goal setting strategies as well as racial/ethnic group differences in stage of change and use of goal setting strategies at baseline. The causal steps approach of Baron and Kenny was used to assess mediation.

Results: Intervention compared to comparison participants were more likely to move from contemplation to action/maintenance for the goals of improving diet (58% intervention, 44% comparison, $p=0.04$) and physical activity (56% intervention,



31% comparison, $p \leq 0.0001$). Intervention group differences were not found for moving from precontemplation to a higher category. At baseline, black compared to white participants were more likely to be working on the goals of getting a better education ($p < 0.0001$), owning a home ($p < 0.01$), starting a business ($p < 0.0001$), and improving job skills ($p < 0.05$). For whites only, intervention participants were more likely than comparison participants to move from contemplation to action/maintenance for the goal of improving diet ($p < 0.05$). For both blacks ($p < 0.05$) and whites ($p < 0.0001$), intervention participants were more likely than comparison participants to move from contemplation to action/maintenance for the goal of increasing physical activity. For all participants, progression in stages of change mediated the intervention effect on physical activity, but not fruit and vegetable intake. The intervention did not reveal an impact on use of goal setting strategies.

Conclusions: In this sample of low-income, rural women, the intervention's goal setting component influenced behavior change for participants who were contemplating lifestyle changes at baseline. Racial/ethnic group differences in goal setting indicate the need to gain greater understanding of individual, social, and environmental factors that may uniquely have an impact on goal setting, and the importance of tailoring obesity intervention strategies for optimal, sustainable behavior change.

Key words: diet, goals, intervention studies, minority health, obesity, physical activity.

Introduction

Overweight and obesity are associated with the leading causes of morbidity and mortality^{1,2} and have significant social and economic impacts^{2,4}. Racial/ethnic minorities are disproportionately affected by overweight and obesity. According to the 2009–2010 National Health and Nutrition Examination Survey (NHANES), 34.9% of non-Hispanic white, 49.6% of non-Hispanic black, 37.9% of Hispanic and 39.6% of Mexican American adults were obese. At 58.6%, non-Hispanic black women had the highest obesity prevalence of all racial/ethnic and gender groups⁵. Rural populations also have a higher prevalence of obesity. According to NHANES data from 2005–2008, 39.6% of rural adults were obese compared to 33.4% of urban adults⁶. These data suggest that minorities and rural populations are in particular need of effective intervention programs and may benefit from programs specifically designed for their communities.

There is a proliferation of research on behavior change strategies for weight management in the USA. Studies have addressed a number of behaviors that help individuals lose weight and sustain weight loss such as increased fruit and vegetable consumption⁷⁻⁹, decreased fast food consumption¹⁰,

and increased physical activity^{11,12}. However, many intervention studies use multiple strategies to modify behavior and, therefore, little is known about specific intervention strategies and the processes by which they lead to health-related behavior changes.

Goal setting is one strategy that has been used in intervention research to change health-related behaviors¹³ and is often incorporated into obesity interventions. Goal-setting theory, developed by Locke and Latham from the field of organizational psychology¹⁴, provides evidence for effective goal-setting strategies that may be applicable to health behavior change. Goal setting has been shown to be equally effective whether the goals are self-set, collaboratively set, or prescribed by someone else^{15,16}. Furthermore, specific and challenging goals are more likely than vague goals to lead to success¹⁵. Monitoring goal-related progress, either through self-monitoring or feedback from an external source, is an important moderator of goal achievement because it provides information necessary for adjusting strategies or level of effort^{15,17}. Goal commitment is also an important moderator of goal achievement. Commitment is greater if the goal is important to the person and importance can be enhanced by validation and support of a behavior by leaders and by public commitment to a goal. Self-efficacy can also enhance



commitment by providing the confidence needed to progress to goal achievement^{15,16,18}. Goal setting is also addressed in social cognitive theory, which emphasizes the importance of setting achievable goals as a way to increase self-efficacy leading to behavior change¹⁹.

The literature on the most effective approaches to incorporating goal setting into obesity interventions is somewhat limited. Nonetheless, research on goal setting to address weight, physical activity and diet has also shown that setting specific goals, feedback through self-monitoring, and commitment are important for goal achievement^{17,20-23}. However, there is some evidence that setting more challenging goals does not lead to greater success for weight loss²⁴. A review of goal setting for diet and physical activity found that interventions that fully support the process of goal setting include content that is primarily focused on goal setting and attainment, and they incorporate various strategies for achieving goals such as feedback, contracting, barriers counseling, and skills development, and these approaches generally result in behavior change²⁵.

There are several gaps in the knowledge of the best way to utilize goal setting in obesity interventions. First, the goal-setting component of weight-control interventions is typically neither well described nor evaluated¹⁷. In many interventions, goal setting is included as one of many intervention strategies, making its specific contribution to behavior change difficult to identify. Second, there is not an established approach for measuring strategies for goal setting and other mechanisms by which goal setting may have an impact on behavior change²⁰. Mediation analysis has been useful for defining the contribution of different intervention components and evaluating an intervention's theoretical underpinnings by testing the proposed process by which change is expected to occur²⁶. However, this approach has not been used to understand goal setting in obesity interventions. Third, there is a need for studies that examine goal setting among racial and ethnic minorities¹⁷, particularly women in rural, low-income communities that are disproportionately affected by obesity. Some obesity interventions targeting minority women have incorporated

goal setting²⁷⁻²⁹, but these occur predominately in urban areas and have not evaluated racial/ethnic differences in goal setting that may contribute to the knowledge base about optimal processes and procedures for goal setting among different racial/ethnic groups. Investigating goal-setting patterns in these populations may provide useful information for developing culturally appropriate, sustainable behavior change strategies, and identifying specific barriers and challenges interventions can address to help reduce obesity-related health disparities.

To address the gaps in the literature on goal setting for obesity interventions, this study used data from an obesity intervention for rural, predominately minority women to examine the goal-setting component of the intervention. The primary objective was to examine the mechanisms by which goal setting affected behavior change. The specific aims were to:

- examine whether intervention group participants showed a greater increase in working on goals and use of goal-setting strategies than comparison group participants
- assess whether changes in working on goals and use of goal-setting strategies mediated the association between intervention participation and health behavior outcomes.

In order to address the lack of research on goal setting among racial/ethnic minorities and to identify racial differences that may help tailor the goal-setting component of future interventions for this population, a secondary objective was to examine racial/ethnic group differences in working on goals at baseline, changes in working on goals from baseline to follow-up, and use of goal-setting strategies.

Methods

Design and sample

Data for this study came from HOPE (Health, Opportunity, Partnerships, Empowerment) Works, a community-based



participatory research (CBPR) project to address obesity among low-income, predominately minority women in two rural counties in eastern North Carolina, USA³⁰. Overweight and obesity are common in eastern North Carolina. According to data from the Centers for Disease Control, 32% of adults in the study counties were obese in 2008³¹. In addition to poor health, the communities targeted by HOPE Works have high rates of unemployment and poverty and low levels of education. These communities are agricultural and have largely been affected by layoffs in the textile and tobacco industries. While community members recognized the need to improve health, their immediate needs were related to economic security. For this reason, HOPE Works aimed to address obesity within the context of social and economic determinants of health.

HOPE Works used a quasi-experimental intervention design that included two arms: the HOPE Works intervention group and a comparison group. Women in the intervention group were recruited through the existing social networks of community women, Circle Leaders, who were trained to lead HOPE Circles of women through the intervention. Comparison group women were recruited through community events and local media. Eligibility criteria included being 18 years or older, not pregnant, and fluent in English or Spanish. Participants were not required to be obese. Community partners were not comfortable excluding non-obese women from the program. Due to the importance of maintaining a trusting and positive relationship with community partners involved in this CBPR study, being obese was removed from the exclusion criteria. Nonetheless, more than 80% of participants had a body mass index (BMI) ≥ 25 . The final analysis sample included 485 participants (208 intervention, 277 comparison). The pre-study calculation of required sample size indicated that 500 women should be recruited, allowing for attrition to 400 at follow-up. A detailed description of the study design and sample is published elsewhere³⁰.

Intervention

Participants in the HOPE Works intervention attended bi-weekly group meetings for 6 months. The meetings were led by trained Circle Leaders who followed a curriculum

addressing the topics of healthy eating, physical activity, weight control, stress management, education, and job skills. The Circles provided social support, taught strategies for weight management, and helped women set and make progress towards reaching health and life goals. Health goals included having a healthier diet, becoming more physically active, and working on weight control. Life goals addressed topics such as employment, education, job skills, and small business development, which community members had identified as important for addressing their concerns about economic security. Participants received monthly newsletters that were tailored to variables from the baseline survey and provided individualized information and strategies for achieving behavior changes related to their goals.

Goal setting was a core component of the Circle meetings. At the second meeting, women wrote down one health goal and one life goal to work on during the program. One Circle session was devoted to teaching the women how to create SMART (specific, measurable, attainable, realistic, and timely) goals. Each woman was paired with a 'goal buddy', or a partner with whom she would check in at the beginning of each Circle meeting. Together they monitored their progress and brainstormed methods to overcome barriers to obtaining their goals. Group discussions also focused on ways to overcome barriers to reaching goals. The newsletters reviewed strategies for effective goal setting and were tailored to the participant's stage of change for each goal.

Comparison women received mailed monthly newsletters on topics such as back pain, sexually transmitted disease, and injury prevention for 6 months. These newsletters were not tailored and did not address goal setting.

Measures

Self-administered surveys were conducted at baseline and 6-month follow-up. Demographic data were collected on age, race/ethnicity, education, and income. Physical activity was measured using a modification of the physical activity questions from the Behavioral Risk Factor Surveillance System (BRFSS)³². Participants were asked whether they did



any moderate physical activity. If they answered 'yes', they were asked to report on frequency and duration. Participants responded to the same series of questions on vigorous physical activity. Categorical responses were used instead of open-ended responses based on survey pre-testing. A summary measure was derived from the data assessing total minutes of moderate and vigorous physical activity per week. Fruit and vegetable intake was assessed using six questions that were modified from the BRFSS questions on fruit and vegetable intake³². The questions assessed consumption of fruit, fruit juices, and four categories of vegetables. As with the physical activity questions, pre-testing indicated that categorical responses be used instead of open-ended responses. The questions were used to calculate total servings of fruit and vegetables per week. Height and weight data were collected to calculate BMI, but this outcome was not included in this analysis because it was the focus of another study manuscript³⁰.

Several measures were developed to evaluate the goal-setting component of the intervention. To assess whether participants were working on goals related to the intervention content, a series of questions measured goal-related stage of change. In response to several intervention-related goals (eating a healthier diet, increasing physical activity, working toward a healthier weight, getting a better education, owning a home, starting a business, improving job skills, and financial security), each participant was asked whether this was not one of her goals (precontemplation), she wanted to work on the goal but hadn't yet started (contemplation), or she was actively pursuing the goal (action). At follow-up, participants were asked to specify if they had been actively pursuing the goal in the past 6 months (action) or 6 months or more (maintenance). To assess the use of goal-setting strategies, participants were asked how often they used the following strategies: making sure the goal is achievable; writing down the goal; telling someone about the goal; breaking the goal into small steps; planning things to do to reach the goal; and setting a deadline for reaching the goal. The response options were 'none', 'a little', 'some', and 'a lot'. Given the participatory nature of this CBPR

project, all survey questions were developed with extensive input from community partners and pre-tested.

Analysis

Analyses were conducted using SAS v9.2 (SAS Institute Inc., <http://www.sas.com>). Descriptive statistics, including means (standard deviations) and percentages, were computed to describe the demographic characteristics of the study population. The intervention and comparison groups were compared on demographic characteristics using χ^2 tests for categorical variables and *t*-tests for continuous variables. The number and percentage of participants in the three categories for goal-related stage of change (precontemplation, contemplation, and action) and the two categories (condensed from four) for goal-setting strategies ('none/a little', 'some/a lot') at baseline were calculated. A χ^2 statistic was computed to examine differences between the intervention and comparison groups in changes in goal-related stage of change from baseline to follow-up (ie change or no change). For this analysis, the sample included only participants who completed both the baseline and the follow-up surveys ($n=465$). A χ^2 statistic was also computed to examine intervention group differences in goal-setting strategies from baseline to follow-up. Rao-Scott χ^2 tests were used to assess racial/ethnic group differences in stage of change and use of goal-setting strategies at baseline. All tests were adjusted for clustering by Circle in the intervention arm and used a significance level of 0.05.

For the mediation analysis, the causal steps approach of Baron and Kenny was used^{33,34} to test the hypothesized relationships using generalized linear mixed models that took into account clustering in the intervention group. More specifically, the 'a' path was estimated to assess the relationship between study group and the hypothesized mediator, the 'b' path was estimated to assess the relationship between the hypothesized mediator and each outcome, and the 'c' path was assessed to examine the relationship between the study group and each outcome. If all three tests were significant, the indirect (mediated) effect and its confidence intervals were estimated.



Ethics approval

This study was approved by the Institutional Review Board at the University of North Carolina at Chapel Hill (#03-1068).

Results

The demographic characteristics of the study population are presented in Table 1. The participants had a mean age of 47.5 ± 14.3 years. Twenty-seven per cent of the participants were white, 63% were black and 10% were from other racial and ethnic groups. Less than 3% of the population ($n=12$) was Hispanic or Latino. The 'other' category included 30 Native Americans, 2 Asians, and 16 people of mixed race. Participants had an average of 13.9 ± 2.42 years of education (or approximately 2 years post-high school education). Although the majority (42%) had an income between US\$20,000 and US\$50,000, one-third had an annual household income of less than US\$20,000. The average BMI was 33.4 (standard deviation 9.12, range 17.5–71.1). Baseline demographic characteristics by study group reveal that women in the intervention group had less education ($p \leq 0.001$), less income ($p \leq 0.001$), and higher BMI ($p \leq 0.01$) than women in the comparison group.

The degree to which participants were working on intervention-related goals at baseline is summarized in Table 2. For the goals of eating a healthier diet, increasing physical activity, and working toward a healthier weight, the majority of participants were in either the contemplation or action stage of change. For the goals of getting a better education, owning a home, starting a business, improving job skills, and financial security, responses were more evenly distributed across the three stages of change. However, nearly two-thirds (59%) of participants were in the precontemplation stage of change for the goal of starting a business. Analysis of baseline racial/ethnic group differences showed a greater percentage of blacks than whites in the contemplation and action categories for the goals of getting a better education ($p < 0.0001$), owning a home ($p < 0.01$),

starting a business ($p < 0.0001$), and improving job skills ($p = 0.02$).

The results of χ^2 tests examining intervention and comparison group differences in progression in goal-related stage of change from contemplation to action/maintenance are presented in Table 3. For all participants, significant group differences were evident for the goals of eating a healthier diet and increasing physical activity. Participants in the intervention group were more likely to move from contemplation at baseline to action/maintenance at follow-up on the goal of having a healthier diet than participants in the comparison group ($p \leq 0.05$). This difference was not statistically significant for black participants. The same trend was observed for the goal of increasing physical activity ($p \leq 0.001$); this was evident for both racial/ethnic groups ($p = 0.02$ for blacks, $p \leq 0.0001$ for whites). There was a similar trend for the goal of working toward a healthier weight, but this was only statistically significant for black participants ($p < 0.04$). *t*-tests were conducted to examine intervention group differences in progression in stages of change from precontemplation to a higher category, but group differences were not found (data not shown).

Table 4 depicts the use of goal-setting strategies by study participants at baseline. The most commonly used strategy was making sure that the goal is reachable, which was practised by 79% of participants some or a lot of the time. The χ^2 test assessing changes in use of these strategies from baseline to follow-up revealed no difference by intervention and comparison group ($p = 0.71$). Black and white participants were similar in their use of the strategies, with the exception of writing down the goal, which was more often used by black participants ($p = 0.01$).

The mediation analysis tested the progression in goal-related stage of change as a mediator of the intervention impact on health behavior outcomes. Results revealed that, for fruit and vegetable intake, the proportion of participants reporting movement from contemplation to action/maintenance during the study period was significantly larger in the intervention group (58%) than in the comparison group



(44%, $p \leq 0.05$; path 'a'). However, there was no difference between study groups in fruit and vegetable intake (13.6 for intervention, 12.8 for control, $p = 0.33$; path 'c'). For physical activity, a significantly larger proportion of participants in the intervention group reported movement from contemplation to action/maintenance for the goal of increasing physical activity (56%) than in the comparison group (31%, $p \leq 0.01$; path 'a'). Intervention group participants engaged in significantly more minutes of physical activity per week (138 minutes) than comparison group participants (86 minutes, $p \leq 0.05$; path 'c'). Furthermore, those who reported moving from contemplation to action/maintenance reported more physical activity minutes per week (153 minutes/week) compared to those not reporting this change (80 minutes/week, $p \leq 0.01$), indicating that the effect of the intervention on physical activity appeared to be mediated by progression in goal-related stage of change (path 'b'). The mediated effect was estimated to be 34 ± 31 minutes/week. The same trends were observed when black and white participants were examined separately.

Discussion

This study examined the goal-setting component of an obesity intervention for low-income, predominately minority women in rural North Carolina. The results support the authors' hypothesis that intervention participants over the course of the study period revealed greater progression in goal-related stage of change. Participants in the intervention compared to the comparison group were more likely to move from contemplation to action/maintenance for the goals of eating a healthier diet and increasing physical activity. There were, however, no significant differences between the intervention and comparison group for progression in non-health-related goals such as getting a better education and improving job skills. A larger proportion of participants were in the contemplation or action stage of change at baseline for health goals as opposed to life goals, suggesting that participants were more likely to make progress on goals that they were focused on at the start of the program.

This study demonstrates the importance of readiness in terms of setting and reaching goals for behavior change. While significant intervention group differences were found for progression from contemplation to a higher category for the goals of eating a healthier diet and increasing physical activity, differences were not found for movement from precontemplation to a higher category for any of the goals. This suggests that the intervention was most effective at helping women work on their goals if they were already interested in working on that particular goal. This is supported by research indicating that recognizing a need for change is a critical step in successful goal setting¹⁷. One would expect women in contemplation were more aware of the need for change than women in precontemplation. It is also possible that those who were already contemplating working on a goal were more committed to it, which could also affect goal progression¹⁵. This finding highlights the importance of allowing individuals to select their own goals and of providing strategies such as the SMART goal approach to help them achieve the goal. Further work should focus on strategies for motivating those in the precontemplation stage of change, perhaps using techniques such as motivational interviewing³⁵.

The analysis of goal-setting strategies reveals that, at baseline, participants commonly used simple strategies such as making sure a goal is reachable and planning to do things to reach a goal. More specific strategies, such as telling someone about the goal and breaking the goal into small steps, were less commonly used. There were not intervention and comparison group differences in the use of goal-setting strategies from baseline to follow-up. This suggests that, although women worked on their goals during the intervention, they apparently did not use the strategies for goal setting that were taught by the intervention. These data suggest that teaching goal-setting strategies does not appear to have had an impact on behavior change in this study, but it is premature to draw this conclusion without a more detailed examination of goal-setting strategies used by study participants.



Table 1: Demographic characteristics of all participants, intervention participants, and comparison participants in the HOPE Works program for low-income women in rural North Carolina[†]

Variable	All women			Intervention women			Comparison women		
	N	Percentage	Mean	N	Percentage	Mean	N	Percentage	Mean
Age	480		47.5	207		47.5	273		47.6
Race/ethnicity	485			208			277		
White	132	27%		42	20%		90	32%	
Black	305	63%		142	68%		163	59%	
Other	48	10%		24	12%		24	9%	
Education (years)	474		13.9	203		12.9	271		14.6*
Income	465			200			265		
<\$20,000	145	31%		86	43%		59	22%*	
\$20,000–\$49,999	197	42%		91	46%		106	40%	
≥\$50,000	123	26%		23	12%		100	38%	
Body mass index	469		33.4	203		34.9	266		32.2**

* $p \leq 0.001$ for χ^2 test of intervention and comparison group difference

** $p \leq 0.01$ for χ^2 test of intervention and comparison group difference

[†] Includes participants who completed both baseline and follow-up surveys ($N=485$). Data are missing for some variables

Working on goals (progression in goal-related stage of change) was found to mediate the effect of the intervention on behavioral outcomes. Mediation was detected for the outcome of physical activity, with 34 ± 31 of the 151 minutes/week increase seen in the intervention group accounted for by progression in stages of change. Although there were group differences in progression in stages of change for fruit and vegetable intake, mediation was not detected because the intervention did not have a significant impact on fruit and vegetable intake. These results indicate that the intervention did influence participants to work on their physical activity goal and this, in turn, led to increased physical activity, showing that goal setting was an important intervention component for achieving behavior change. Interventions that provide comprehensive support for goal setting – establishing a goal-setting process, incorporating feedback, barriers counseling and skill development – are found to be most effective at helping participants achieve goals²⁵. Mediation analysis is a useful tool for determining which components of an intervention contribute to behavior change²⁶. The authors' understanding of goal setting for obesity interventions would be improved if intervention studies involving goal setting used this simple methodological approach to examine the pathways by which goal setting is expected to have an impact on behavior change.

The analyses of racial/ethnic group differences revealed important factors to consider when incorporating goal setting into obesity interventions for rural, minority women. Black and white women were focused on different types of goals. A majority of participants were in the contemplation or action stage of change for working on health goals of improving diet, increasing physical activity and working towards a healthier weight at baseline; however, a greater proportion of black than white participants had an interest in addressing goals related to the social determinants of health, such as getting a better education, owning a home, starting a business, and improving job skills. Although it is unclear why there is a lower reporting of interest in these goals by white participants, black participants reported significantly lower levels of education ($p < 0.0001$) and income ($p < 0.0001$) than whites. This emphasis on social determinants is consistent with two qualitative studies conducted in the rural south of the USA in which black participants identified a strong need to address the impact of social determinants, including employment and education, on their health^{36,37}. Future health interventions targeting this population should consider incorporating intervention components that address the root causes of poor health by modifying social and environmental factors³⁸.



Table 2: Goal-related stage of change for participants in the HOPE Works intervention at baseline by race/ethnicity

Goal	N	Stage of change			p value [†]
		Precontemplation % (n)	Contemplation % (n)	Action % (n)	
Having a healthier diet					
All	359	4% (21)	56% (267)	40% (71)	0.12
Black	298	5% (16)	58% (172)	37% (110)	
White	132	2% (3)	52% (69)	45% (60)	
Other	46	4% (2)	57% (26)	39% (18)	
Increasing physical activity					
All	471	4% (21)	57% (267)	39% (183)	0.12
Black	296	6% (17)	56% (165)	39% (114)	
White	130	2% (2)	58% (76)	40% (52)	
Other	45	4% (2)	58% (26)	38% (17)	
Working toward a healthier weight					
All	472	7% (34)	53% (249)	40% (189)	0.65
Black	297	7% (22)	54% (159)	39% (116)	
White	131	7% (9)	49% (64)	44% (58)	
Other	44	7% (3)	59% (26)	34% (15)	
Getting a better education					
All	469	34% (161)	35% (163)	31% (145)	<0.0001
Black	291	27% (80)	36% (106)	36% (105)	
White	132	52% (68)	30% (39)	19% (25)	
Other	46	28% (13)	39% (18)	33% (15)	
Owning a home					
All	468	22% (105)	24% (110)	54% (253)	<0.01
Black	293	21% (61)	27% (79)	52% (153)	
White	131	27% (35)	12% (16)	61% (80)	
Other	44	21% (9)	34% (15)	45% (20)	
Starting a business					
All	468	59% (276)	29% (137)	12% (55)	<0.0001
Black	294	53% (155)	35% (103)	12% (36)	
White	130	77% (100)	15% (19)	8% (11)	
Other	44	48% (21)	34% (15)	18% (8)	
Improving job skills					
All	472	37% (176)	33% (157)	29% (139)	0.02
Black	297	34% (100)	35% (103)	32% (94)	
White	131	48% (63)	27% (35)	25% (33)	
Other	44	30% (13)	43% (19)	27 (12)	
Financial security					
All	470	12% (56)	37% (176)	51% (238)	0.07
Black	295	13% (39)	39% (116)	47% (140)	
White	130	8% (10)	33% (43)	59% (77)	
Other	45	16% (7)	38% (17)	47% (21)	

[†] Due to small numbers for the 'other' category, p values are for differences between blacks and whites only



Table 3: Percentage in the HOPE Works intervention and comparison groups progressing from contemplation to action/maintenance for health and life goals from baseline to follow-up

Goal	Intervention estimate (%)	Comparison estimate (%)	p value
Having a healthier diet			
All	58%	44%	0.04
Black	56%	45%	0.23
White	65%	39%	0.02
Increasing my physical activity			
All	56%	31%	≤0.0001
Black	49%	32%	0.02
White	74%	28%	≤0.0001
Working toward a healthier weight			
All	53%	42%	0.13
Black	53%	35%	0.04
White	58%	50%	0.59
Getting a better education			
All	26%	14%	0.10
Black	27%	15%	0.22
White	22%	18%	0.77
Owning my own home			
All	17%	24%	0.50
Black	14%	25%	0.28
White	33%	20%	0.67
Starting my own business			
All	12%	22%	0.26
Black	12%	24%	0.22
White	50%	29%	0.57
Improving my job skills			
All	39%	33%	0.50
Black	31%	38%	0.56
White	63%	33%	0.17
Financial security			
All	46%	33%	0.50
Black	50%	44%	0.57
White	36%	38%	0.95

This study found that white participants showed greater progression than black participants in working on goals over the course of the intervention. At the individual level, black participants demonstrated no progress in working on goals to improve diet and weak progress in working on goals related to increased physical activity and healthier weight. Additionally, despite greater interest by black participants at baseline in working on life goals such as improving education and job skills, there was no progress in these areas. A longer term intervention may be necessary to detect such changes to social determinants of health. It is also possible that the structure of the intervention, specifically the social support

and information provided by the Circle meetings, may not have been enough to help participants make progress on their life goals. Furthermore, addressing more distal environmental factors by, for example, working with organizations and banks that can assist with financial literacy and empowerment (such as saving money, obtaining small business loans, and/or providing job training or education for small business development), may be necessary for modifying the social determinants of health. However, all of these efforts may be particularly challenging in rural areas where access to organizations, banks, and other resources may be limited, highlighting the need for connecting low-income,



rural populations to the resources that can help them move out of poverty, particularly black participants or those groups most negatively affected. Therefore, a combined intervention approach that incorporates changes at the individual, social, and environmental levels may be most effective for addressing social determinants of health.

The analysis of racial differences in use of goal-setting strategies revealed that black participants were more likely than white participants to write down their goals. In an effort to identify optimal goal-setting procedures for different racial/ethnic groups, future research should further examine differences in the use of strategies and potential impact on behavior change. This study is limited by the quasi-experimental study design, which is not as robust as a randomized trial; however, this was the only feasible approach for implementing this community-based study. Furthermore, generalizability is limited in CBPR studies such that the results may only be generalizable to similar populations in similar communities. The goal-setting measures were developed specifically for the study population and were not previously validated. However, the data come from a CBPR study in which all of the measures were developed with the input of community partners and pre-tested in the study communities. While this study involves a more detailed assessment of the goal-setting component than many other weight control intervention studies^{17,25}, the questions on goal setting are somewhat limited. All surveys used with the study sample are kept within a maximum length to avoid participant burden. Thus, many additional factors could have been tested and should be considered in future obesity intervention studies that involve goal setting. For example, moderators of goal setting could be examined, such as goal commitment, goal importance, and self-efficacy to better understand the mechanisms by which the intervention has an impact on behavior change. Collection and analysis of qualitative data on goal setting would have been helpful since measures of goal-setting strategies were not helpful for understanding goal achievement. Furthermore, the short intervention time frame may have limited the ability to detect changes in life goals that would require more time to achieve.

This study has a number of strengths. First, it involved a unique population of predominately low-income and minority women

living in a rural location. Review studies on dietary and physical activity interventions involving goal setting reveal that studies involving minority, low-income and rural populations are limited^{17,25}. Second, the study addressed limitations of previous research by using goal-setting theory to help design an intervention that fully supports strategic goal setting. Finally, this study had an adequate sample size to detect group differences.

In conclusion, this research uniquely contributes to the body of literature on goal setting for obesity interventions by using mediation to identify the specific effect of goal setting on behavior change. The ability to demonstrate that progression in goal-related stage of change in physical activity leads to increased physical activity for those contemplating change at baseline indicates such interventions can be successful at incrementally improving obesity-related lifestyle behaviors. The lack of progression among those in precontemplation at baseline indicates the need for tailored approaches and strategies to increase readiness for change. The study also adds to the knowledge base on goal setting among minority populations, revealing that black women may focus on different goals than white women. This further highlights the importance of tailoring materials to meet participants' needs and interests. Furthermore, economic and social needs may have to be addressed for women in resource-constrained environments to successfully meet their health goals.

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Table 4: Goal setting strategies used by participants in the HOPE Works intervention at baseline by race/ethnicity

Strategy	N	Use		p value [†]
		None/A little % (n)	Some/A lot % (n)	
Make sure goal is reachable				
All	474	19% (93)	79% (381)	0.43
Black	296	20% (59)	80% (237)	
White	132	17% (22)	85% (110)	
Other	46	26% (12)	74% (34)	
Write down goal				
All	472	53% (259)	44% (213)	0.01
Black	296	51% (152)	49% (144)	
White	132	64% (85)	36% (47)	
Other	44	50% (22)	50% (22)	
Tell someone about goal				
All	474	48% (228)	52% (246)	0.16
Black	297	47% (139)	53% (158)	
White	132	54% (71)	46% (61)	
Other	45	18 (40%)	27 (60%)	
Break the goal into small steps				
All	474	52% (250)	46% (224)	0.26
Black	297	56% (165)	44% (132)	
White	132	49% (65)	51% (67)	
Other	45	44% (20)	56% (25)	
Plan things to do to reach goal				
All	477	35% (168)	64% (309)	0.44
Black	300	34% (101)	66% (199)	
White	132	38% (50)	62% (82)	
Other	45	38% (17)	62% (28)	
Set a deadline for reaching goal				
All	474	43% (208)	55% (266)	0.30
Black	297	42% (126)	58% (171)	
White	132	48% (63)	52% (69)	
Other	45	42% (19)	58% (26)	

[†]Due to small numbers for the 'other' category, p values are for differences between blacks and whites only

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