

COLORADO HEALTHY PEOPLE 2010:

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Obesity Prevention

FINAL EVALUATION SUMMARY REPORT

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- JANE VISTE, MPH, Fort Collins Area United Way, Inc. (Region 1)
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- JUDY BAXTER, MA, University of Colorado Health Sciences Center
- JAMES HILL, PhD, University of Colorado, Center For Human Nutrition
- **RICHARD HAMMAN**, MD, DrPH, University of Colorado Health Science Center, Department of Preventive Medicine and Biometrics
- **HELEN THOMPSON**, *MA*, *RD*, *University* of Colorado, Center For Human Nutrition
- **LYDIA PRADO,** *PhD, University of Denver, Center for Marital and Family Studies*
- CARLA KING, PhD, RN, Carla King and Associates, Inc.
- JENNIFER ANDERSON, PhD, RD, Colorado State University Department of Food Science and Human Nutrition

- ANTONIO OLMOS-GALLO, PhD, Mental Health Corporation of Denver
- JACQUELINE BROWN, RN, MSN, Prowers County Public Health Nursing Service
- SUE BIRCH, RN, Northwest Colorado Visiting Nurse Association
- DEB CROOK, RN, MSN, Summit County Public Health Nursing

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The report development was managed by Nancy B. Csuti, DrPH, Director of Evaluation, The Colorado Trust, and edited by Christie McElhinney, Director of Communications, The Colorado Trust.

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TO OUR READERS,

When The Colorado Trust began its Colorado Healthy People 2010 initiative in 2002, each of the five funded regions of the state was responsible for selecting the health area of most concern to them. The Northwest and Southeast regions of Colorado selected increased physical exercise and improved diet as a way to reduce obesity and improve health. At the time, that seemed to be an unusual choice as few believed obesity to be a problem in Colorado. Within a year after the start of the initiative, however, the obesity and overweight epidemic in Colorado was near-daily news. Now, two years after this initiative concluded, the seriousness of the issue is well recognized nationally – obesity is the second leading cause of preventable disease in the U.S., with annual costs over \$140 billion.

The evaluation of the Colorado Healthy People 2010 obesity prevention efforts is unique in its examination of the multiple factors that influence an individual's life style – community and programmatic as well as personal factors. When the initiative was designed, there was extensive information available on obesity prevention, including weight-loss and physical activity programmatic information, but little empirical evidence that efforts made in non-clinical settings could lead to behavior change at all, much less be sustained over time. With this in mind, we anticipate that this evaluation will contribute to the literature on obesity prevention.

This evaluation shows that many "small changes" can help people to achieve remarkable improvements in their health and well-being. For example, a small increase in the number of steps walked each day can play an important role in reducing heart disease and diabetes; being held accountable by co-workers or other program participants can help to encourage and sustain healthy eating habits; and communities that provide ample, safe bike and pedestrian paths and other amenities play an important role in encouraging healthy behaviors.

It is our hope that the findings from this evaluation will help program planners and administrators to implement programs in schools, workplaces and other settings that will contribute to a healthier Colorado, and influence city and land use planners to design healthier communities. And finally, this report is a celebration of the small changes and dedicated efforts of the thousands of Coloradans who participated in this initiative. They should be proud of their individual achievements, and know that their collective effort provide us more knowledge about how to prevent obesity.

THE COLORADO TRUST

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Sincerely,

Nancy B. Conti

Nancy B. Csuti, DrPH *Director of Evaluation*

INTRODUCTION

The United States inadvertently has become "a successful obesity promotion program," as one international expert on obesity has said.¹ Experts agree that our increasingly sedentary behavior and unhealthful diets are the unintended consequences of complex societal changes, including technology dependence, transportation choices, access to energy-dense food, family structure, employment trends and more. Although by some measures Colorado is the most fit state in the nation, more than one-half of the state's adult population is estimated to be obese or overweight,² and 20% of the state's youth are estimated to be overweight or at high-risk for obesity.³ Furthermore, Type 2 Diabetes and other co-morbidities associated with obesity such as hypertension, high cholesterol, coronary heart disease and stroke also continue to increase in prevalence in both adult and youth populations in the U.S.⁴

The obesity pandemic has given rise to a significant number of interventions aimed at reducing obesity and overweight, many focusing on increased physical activity or dietary modifications. A number of the published interventions have shown moderate success at short-term weight loss with an average loss of about one pound per week while in treatment^{-5, 6} Despite satisfactory short-term results of many weight loss programs, the long-term consequences of the interventions have been disappointing. Most participants who lose weight eventually regain most or all of the weight lost.⁷⁻¹⁰

Many factors contribute to successful weight loss, increased physical activity and improved nutrition, including the physical and social environments of communities and organizations, access to information and the policies, practices and norms within social and work settings. These multiple levels of influence are referred to as a socio-ecological model.¹¹ Obesity-related research looking at community characteristics has primarily been of a cross-sectional nature¹² while less examination has been made of the community characteristics that correlate with behavior change such as sustained weight loss, increased physical activity and improved nutrition. This evaluation contributes to the general field of knowledge about obesity prevention in its examination of community and programmatic factors that influence an individual's likelihood of achieving and sustaining behavior change.

DESCRIPTION OF EVALUATION

Colorado Healthy People 2010

Healthy People 2010 (HP2010) is a statement of national health objectives, providing a framework for prevention efforts in the U.S. It identifies the most significant preventable threats to health and establishes national goals to reduce these threats.¹³

The Colorado Trust established its three-and-ahalf-year Colorado Healthy People 2010 initiative in 2002 to "help Coloradans learn about and take steps to lead healthier, longer lives, and to decrease health disparities among different populations."¹⁴ The initiative was designed "to help people in the state achieve the objectives of the national [Healthy People 2010] program, while addressing local priorities."¹⁴ The Colorado Trust chose five regional coordinating agencies and 43 community organizations across Colorado to carry out the work of this initiative.¹⁴ This evaluation focused on Regions 1 and 5.

In Region 1 (northwest Colorado), the focus of the initiative was increasing physical activity and in Region 5 it was preventing diabetes (southeast Colorado). Tables 1 and 2 list the grantees for these regions with summary information on the programs they provided.

TABLE 1 Brief Overview of Colorado Healthy People 2010 Programs: Region 1(Northwest Colorado: Focus on Increasing Physical Activity)

Agency	Program	Primary Geographic Area(S)	Setting	Type of Population	Estimated Number Served	Key Activities
Girl Scouts-Moun- tain Prairie Council Girl Scouts-Chipeta Council	Girl Scouts on the Move	Larimer, Moffatt, Routt, Rio Blanc, Garfield, Pitkin, Eagle counties	Group meetings	Female youth, ages 5-17	1,812	Pedometer, nutrition awareness, new physical activity opportunities
Partners of Larimer County	FIRM (Fitness and Increased Recreation through Mentoring)	Larimer County	One-on-one and group activities	Youth, ages 8-17	30	New physical activity opportunities, nutrition classes
Colorado State University (CSU) Cooperative Extension - Larimer	Rx Health: Walking Program	Larimer County	Varied	Medical patients and other adults	701	Pedometer, exercise groups, physician recruitment for participant referrals
Fort Collins Family Medicine Residency Program Cottonwood Family Practice	Rx Health: Nutrition Classes	Larimer and Eagle counties	Varied	Medical patients and other adults		Nutrition classes
Health District of Northern Larimer County	Health District on the Move	Larimer County	Work site	Employed adults	4,997	Pedometer, work site coordinators, newsletter tips
Rocky Mountain Youth Corps	Summer Program	Statewide	Backcountry	Youth, ages 16-24	622	Physical outdoor labor, nutritious meals
	Mentoring Program	Routt County	School-based	Youth, ages 11-14	562	After-school physical activity programs, nutrition programs
Consortium for Older Adult Wellness	Active Choices	Garfield and Eagle counties	Congregate meal sites	Seniors	68	Risk screening, pedometer, peer buddy system, nutrition classes
Moffat County Healthy People	Moffat County on the Move: Walking	Moffat County	Community-wide	Adults	476	Pedometer
	Moffat County on the Move: Dog-Walking	Moffat County	Community-wide	Adults		Pedometer, intra-city competition
	Craig Middle School: The Fitness Club	Craig	School-based	Middle school youth		Expanded PE classes
	Healthy Eating on \$5 per day	Moffat County	Extension office	Low-income adults		Nutrition and food shopping classes
Full Circle of Lake County, Inc.	Extreme Teens	Lake County	School-based	Middle school youth	59	Outdoor physical activity, team build- ing; after-school, summer and weekend
Estes Park Salud Family Health Center	Estes Park on the Move: Steps	Estes Park	Community-wide	Adults	260	Health screenings, pedometer, newspaper tips
Estes Park Salud Family Foundation	Estes Park on the Move: Dog-Walking	Estes Park	Community-wide	Adults		Pedometer, intra-city competition

TABLE 2 Brief Overview of Colorado Healthy People 2010 Programs: Region 5 (Southeast Colorado: Focus on Diabetes Prevention)

Agency	Program	Primary Geographic Area(S)	Setting	Type of Population	Estimated Number Served	Key Activities
Parkview Medical Center, Inc.	Diabetes Prevention Program (DPP)	Pueblo County	School-based	Adults at-risk for diabetes	900	Pedometers, health fairs, school-wide activities, lifestyle coaches, peer support groups
CSU Cooperative Extension – Fort Collins and Lamar	Healthy, Wealthy & Wise	Prowers, Bent and Otero counties	Varied	Adults	167	Diabetes risk screen- ing, pedometer, 1:1 counseling and wellness classes based on DPP
St. Mary-Corwin Health Foundation	Intensive Diabetes Prevention Program (DPP)	Pueblo	Hospital-based	Adults at-risk for diabetes	184	Diabetes risk screen- ing, pedometer, nutrition counseling
Cheyenne County Public Health	10K 5-a-Day	Cheyenne and Kiowa counties	School-based, senior centers, work site	Students, seniors, working adults	303	Pedometers, wellness programs, nutrition education, newspaper tips; for students: free weekly healthy snacks
CSU-Pueblo (University of Southern Colorado)	Workplace Wellness	Pueblo area	Work site	Working adults	264	On-site assessment, wellness classes
Penrose-St. Francis Health Learning Center	Live Well	El Paso County		Adults at-risk for diabetes	307	Health screenings, risk reduction classes, newsletter tips
Bent County Nursing Service	Diabetes Awareness Reduces Excuses (DARE)	Bent County	Varied, but not school-based	Adults and youth	300	Risk assessment, nutrition classes, exercise programs
Teller County Public Health	Learn Early Intervention and Prevention (LEIP)	Teller County	School-based	Sixth grade youth	120	Risk assessment, nutrition classes, exercise programs
	Workplace Wellness	Teller County	Work site	Adult employees at large company	112	Risk assessment, nutrition classes, exercise programs

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Obesity Prevention Evaluation

National Research Center, Inc. (NRC) was chosen by The Colorado Trust to conduct the evaluation of its Colorado Healthy People 2010 initiative across the two regions focusing on increasing physical activity and preventing diabetes. This evaluation was designed to answer the following questions:

- [1] Did participants of relevant programs achieve sustained change in terms of dietary and physical activity behavior?
- [2] What community, programmatic and individual characteristics acted as facilitators and barriers to sustainable behavior changes?

Several data collection efforts were employed to gather the information necessary to answer the evaluation questions. To answer the first question, levels of the outcomes of interest (physical activity, daily steps, fruit and vegetable consumption and

weight maintenance or loss) were gathered through surveys of participants administered at program start, program end and one year following program end. To answer the second question, three levels of data were collected using qualitative and quantitative methods: individuallevel (participant) factors, program-level factors and community-level factors. Figure 1 depicts the design of the evaluation. More information on the design, methods, analysis and limitations of the obesity prevention evaluation can be found in the full technical report of findings.

Quotes from program participants elicited during focus group discussions or from open-ended questions on the participant surveys occur throughout this report to further illustrate participants' experiences in the programs funded by this initiative.

FIGURE 1 Brief Overview of the Evaluation Design

Factors: Community health Geographic location Climate Walkability Access to healthy foods

COMMUNITY

Measured By: Secondary data Local government Walkability assessments Grocery store assessments

PARTICIPANT

Factors: **Demographics** Social support Self-efficacy Perceived environment Stated helps and hindrances

Outcomes of Interest: Physical activity Daily steps Fruit and vegetable consumption • Program start Weight maintenance or loss

Measured By: Demographics Social support Self-efficacy Perceived environment Stated helps and hindrances

Measured By: Participant surveys administered: • Program end • One-year follow-up Focus groups

PROGRAM

Factors: **Effective components Programmatic theories** Ties to community Data tracking

Measured By: Interviews with program staff Proposals **Progress reports**



PARTICIPANT PERSPECTIVE

INDIVIDUAL-LEVEL FACTORS

Workplace Wellness: Food Bank For Larimer County

Vern Stockbridge is easily the most active presence at the Food Bank for Larimer County in Fort Collins. As Warehouse Manager, he directs efforts to sort, organize and pack trucks with more than five million pounds of food for those in need each year.

When the 58-year-old was fitted with a pedometer to count his steps, he discovered that he was taking more than 20,000 steps a day – over 10 miles! Measuring Stockbridge's daily physical activity was part of the food bank's commitment to its workers' health and well-being through the Health District on the Move's workplace wellness program. The food bank, along with more than 225 companies and 5,000 employees in Northern Larimer County, as well as other employers, communities and individuals across the state, worked to improve diet and activity levels under the Colorado Healthy People 2010 initiative.

Stockbridge was a natural model for his co-workers. He knew his overall fitness had improved when he began lifting, stacking and directing the movement of parcels at the food bank's warehouse 10 years ago. The former real estate salesman and property manager lost 20 pounds after just six months on the job – his participation in Health District on the Move confirmed his progress.

"It let me know what I was doing," he said. "It made me aware of how much physical activity I was getting, working in a warehouse."

Indeed, according to Chuck Gill, Assistant Director of the food bank, quantifying results and sharing progress are what got employees moving. The Vern Stockbridge, Warehouse Manager at the Food Bank for Larimer County, encouraged teamwork among his co-workers to achieve improved workplace fitness as part of the county's Health District on the Move program.

goal for employees was to increase the number of steps they took daily by 10% each week to reach 10,000 per day. "Some people saw measurable improvements," he said. "And, as they did more, they felt better."

EVALUATION QUESTION 1:

Did participants of relevant programs achieve sustained change in terms of dietary and physical activity behavior?

Program participants made modest, but positive changes.

The results from this study suggested that the initiative was successful at increasing physical activity and at increasing fruit and vegetable consumption by program participants. Improved behaviors were sustained 12 months after program end. The gains made by participants were modest, however, and decreased from program end to follow-up. These results were similar to other studies of community-based efforts designed to increase physical activity and improve nutrition, where results have ranged from no change^{15, 16} to statistically significant but modest increases.¹⁶⁻²⁴ The reduction in levels of the behavioral outcomes at follow-up also supports the literature on many, if not most, behavioral interventions: the largest gains are experienced at program end and taper off over time.^{17, 18}

The area with the most sustained success was found in steps programs that encouraged increased walking. Although walking does not burn the same number of calories as moderate or vigorous exercise, "a simple rule of thumb is 100 calories per mile for a 160 pound person."25 Participants showed significant increases in daily steps at both program end and follow-up unlike the other behavioral outcomes where sustained levels waned after program end. On average, participants recorded making more than 1,100 more steps per day one year after the community intervention ended compared to when they began the program. Other pedometer programs have observed greater increases in steps,^{19, 26} although these studies involved a much smaller intervention group and did not include a measure of sustained change, which was a uniquely positive finding for this obesity prevention evaluation.

Although modest changes were found in the behaviors antecedent to obesity (physical activity, daily steps and nutrition), the results of this evaluation did not demonstrate that adult individuals in these programs reduced their body mass index (BMI). On the other hand, neither did participants gain weight during their participation in these programs, nor in the year following their program involvement. Over the long term, weight maintenance is seen as key to reducing the prevalence of obesity.¹ Because most participants maintained their baseline weight at the one year follow-up, this may be viewed as a success, particularly as the rate of overweight or obesity continues to increase in the rest of the population^{27, 28} and given that other studies do not show much success in maintaining weight loss. However, it also may be that the relatively short time frame or low dosage of some programs (which ranged from four once-a-week meetings to activities lasting three years) may not have been sufficient to encourage the amount of weight loss necessary to affect BMI. Additionally, weight loss was not a major focus of most of the programs; over two-thirds of the programs had little or no focus on weight loss. Other community-based programs (outside this initiative) where weight loss was a major goal have also shown no progress toward this objective.^{29, 30}

Tables 3 through 7 display participant outcomes compared to health objectives and national targets, where available. Where the change from start to end or start to follow-up in the proportion of participants meeting the health objective was statistically significant, it is marked in these tables. Figure 2 through 6 show the average levels of participant behaviors at program start, end and follow-up. Again, where the change from start to end or start to follow-up is statistically significant, it is marked. **TABLE 3** Healthy People 2010 Objectives and U.S. Targets Compared to Physical Activity Levels of Adult Participants at Program Start, End and Follow-up

"I needed to exercise because I am getting up there [in age], and I have one dog who needed to exercise because she is getting up there, and it helped us."

PROGRAM PARTICIPANT

HP2010 Objectives for Physical Activity ³¹	U.S. Target	Participants Meeting HP2010 Goal At:		
		Start	End	Follow-up
Increase the proportion of people aged 18 and over who engage in regular, preferably daily, moderate physical activity for at least 30 minutes per day	30%	23.2%	30.3%*	26.9%
Increase the proportion of adults who engage in vigorous physical activity that promotes the development and mainte- nance of cardiorespiratory fitness, three or more days per week, for 20 or more minutes per occasion	30%	30.0%	37.5%*	35.9%
Increase the proportion of adults who engage in vigorous physical activity on three or more days for 20+ minutes or in moderate physical activity on five or more days for 30+ minutes	50%	42.1%	52.0%†	47.7%
Number of participants		N=323	N=323	N=323

*p<0.05; †p<0.01; ‡p<0.001; tested using McNemar's test for correlated proportions (change from start to end, or start to follow-up)

FIGURE 2 Adult Participants' Days of Physical Activity at Start, End and Follow-up



*p<0.05; †p<0.01; ‡p<0.001; tested using dependent t-test (change from start to end, or start to follow-up)

TABLE 4 Healthy People 2010 Objectives and U.S. Targets Compared to Physical Activity Levels of Youth Participants at Program Start, End and Follow-up

HP2010 Objectives for Physical Activity ³¹	U.S. Target	Participants Meeting HP2010 Goal At:		
		Start	End	Follow-up
Increase the proportion of adolescents who engage in moderate physical activity for at least 30 minutes, on five or more of the previous seven days	35%	31.0%	39.4%	31.0%
Increase the proportion of adolescents who engage in vigorous physical activity that promotes cardiorespiratory fitness three or more days per week, for 20 or more minutes per occasion	85%	77.5%	78.9%	87.3%
Number of participants		N=71	N=71	N=71

*p<0.05; †p<0.01; ‡p<0.001; tested using McNemar's test for correlated proportions (change from start to end, or start to follow-up)

FIGURE 3 Youth Participants' Physical Activity at Program Start, End and Follow-up



*p<0.05; †p<0.01; ‡p<0.001; tested using dependent t-test (change from start to end, or start to follow-up)



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TABLE 5 *Percent of Participants Walking 10,000 or More Steps Per Day at Program Start, End and Follow-up*

Shape Up America! Objective for Daily Steps ³²	Participants Meeting 10,000 Steps Goal A		Steps Goal At:
	Start	End	Follow-up
The 10,000 Steps Program sponsored by Shape Up America! encourages people to walk 10,000 steps per day.	26.7%	34.7%*	40.3%†
Number of participants	N=176	N=176	N=176

*p<0.05; †p<0.01; ‡p<0.001; tested using McNemar's test for correlated proportions (change from start to end, or start to follow-up)

FIGURE 4 Daily Steps of Participants at Program Start, End and Follow-up



*p<0.05; †p<0.01; ‡p<0.001; tested using dependent t-test (change from start to end, or start to follow-up)

"The pedometers helped because it gives you something tangible to see how well you are doing as you go through the day, and it's something to compare from today to the next day.

PROGRAM PARTICIPANT

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TABLE 6 Healthy People 2010 Objectives and U.S. Targets Compared to Fruit and Vegetable Consumption of Participants at Program Start, End and Follow-up

"When my dad made dinner, he would usually make a sandwich and chips, but instead of chips, I asked him if I could have a salad."

YOUTH PARTICIPANT

HP2010 Objectives for Physical Activity ³¹	U.S. Target	Participants Meeting HP2010 Goal At:		
		Start	End	Follow-up
Increase the proportion of persons age two years and older who consume at least two daily servings of fruit	75%	22.9%	32.7%†	29.3%*
Increase the proportion of persons aged two years and older who consume at least three daily servings of vegetables, with at least one-third being dark-green or deep-yellow vegetables	50%	16.5%	18.8%	21.8%
Additionally, it is the recommendation of the National Cancer Institute that Americans eat five or more fruits and vegetables per day for better health ³³		18.0%†	18.0%†	15.0%
Number of participants		N=266	N=266	N=266

*p<0.05; †p<0.01; ‡p<0.001; tested using McNemar's test for correlated proportions (change from start to end, or start to follow-up)

FIGURE 5 Weekly Fruit and Vegetable Consumption of Participants at Program Start, End and Follow-up



*p<0.05; †p<0.01; ‡p<0.001; tested using dependent t-test (change from start to end, or start to follow-up)

TABLE 7 Healthy People 2010 Objectives and U.S. Targets Compared to Body Mass Index of Adult Participants at Program Start, End and Follow-up

HP2010 Objectives for Body Mass Index (BMI) ³¹	U.S. Target	Participants Meeting HP2010 Goal At:		
		Start	End	Follow-up
Increase the proportion of adults who are at a healthy weight (defined as a BMI equal or greater than 18.5 and less than 25)	60%	41.5%	41.8%	45.4%
Reduce the proportion of adults who are obese (defined as a BMI of 30 or more)	15%	24.5%	22.7%	21.6%
Number of participants		N=282	N=282	N=282

**p*<0.05; †*p*<0.01; ‡*p*<0.001; tested using McNemar's test for correlated proportions (change from start to end, or start to follow-up)





*p<0.05; †p<0.01; ‡p<0.001; tested using dependent t-test (change from start to end, or start to follow-up)



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PARTICIPANT PERSPECTIVE COMMUNITY-LEVEL FACTORS

Community Wellness: Estes Park On The Move

In 2003, when the Salud Family Health Clinic launched "Estes Park on the Move" – a community-wide health campaign through The Colorado Trust's Colorado Healthy People 2010 initiative – Kay Rosenthal spearheaded myriad efforts to get residents in the area exercising regularly. A long-time nursing administrator and educator, Rosenthal, RN, began to host a health program on Estes Park's KEPL Radio, and to write on health topics for the *Estes Park News* and *Estes Park Trail Gazette*.

> Susanne Bergeron and her hearing dog, Peru, enjoyed regular walks outdoors as participants in Estes Park on the Move, a community-wide health campaign.

She talks about fitness, diet and various ways to get people in the community involved in public health projects, and she created special programs to broaden participation, like a dog-walking challenge with the town of Craig.

"We used pedometers a lot to count and track the number of steps of participants in the initiative," said Rosenthal. She also started a website to post participants' step counts, and to provide ongoing encouragement in a supportive, community-oriented format. After the conclusion of the initiative in 2005, she still gets letters and e-mails from people who feel their lives were permanently improved by the project:

"For me it was a wonderful motivational tool to keep active and moving," wrote John Embish, 83. While he'd always been a walker and hiker, Estes Park on the Move gave him a sounding board as he remobilized after two knee surgeries. "When I was tempted to skip my workout, I thought about how it would affect my total steps for the week. And off I would go, and usually feel better for it too."

"I feel so good," said Jeannie Logemann, 55. "I know that I can do a lot of physical activities now." Formerly sedentary, Logemann went from taking walks to Pilates, yoga and weight lifting. Her dress size went from a "tight 10" to a 4-6.

And Susanne Bergeron, who is hearing-impaired and uses a hearing dog to help her navigate through town, extols the joys of putting herself and her dog through their collective paces outdoors.

"As long as they keep counting their steps, they can count on me for support," said Rosenthal.

EVALUATION QUESTION 2:

What community, programmatic and individual characteristics acted as facilitators and barriers to sustainable behavior changes?

Exploratory analyses of the associations between factors at various levels of the socio-ecological model and changes in the outcomes of interest provide promising paths for future programming and research.

Obesity is a multi-faceted public health issue. Successful gains in the control of the disease and its antecedent behaviors may be influenced by myriad factors. As a part of this study, **over 150 individual, program and community factors were examined to determine what part, if any, they played in the behavioral changes observed in physical activity, nutrition and obesity.**

Baseline levels of the outcomes of interest showed strong associations with changes in these outcomes; those who started programs with worse behavior on a particular outcome showed greater improvement, on average, over time than did those who began with better behaviors. These findings either suggested that programs were most effective in creating change among those who needed it the most or that those who started at lower levels to begin with had more room to make greater increases. If a respondent was already exercising four or five days per week, the most that can be added is another two or three days of exercise, while those who did little exercise to begin with might find it easier to add more days of physical activity.

FIGURE 7 Individual-level Factors Associated with Increases in the Evaluation Outcomes

PARTICIPANT

Physical Activity

- Lower initial physical activity levels
- Youth Participants
- Higher perceived health status
- Greater self-efficacy
- "Higher" physical activity readiness to change stage

Daily Steps

- Lower initial daily steps
- Youth participants
- Being employed
- Higher perceived health status
- Greater perceived personal risk (who had more diagnosis of cancer, heart disease or diabetes)

Fruit and Vegetable Consumption

- Lower initial fruit and vegetable consumption
- Higher perceived health status
- Greater social support from friends for fruit and vegetable consumption

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Few demographic characteristics were associated with changes in the outcomes of interest. However, youth participants made greater increases, on average, in days of physical activity and daily steps than did their adult counterparts. Likewise, employed adults made greater increases in daily steps, on average, than did adults who were not employed.

Higher ratings of self-reported health status were associated with greater increases in days of physical activity and daily steps from program start to end, while lower health ratings were associated with smaller increases in days of physical activity and daily steps. However, higher ratings of self-reported health status were associated with smaller increases in fruit and vegetable consumption. It may be that those who felt healthier were empowered to be physically active while those who felt their health was not as good felt more compelled to improve their eating behaviors.

Perceived personal risk (measured as whether or not the respondent had been diagnosed with cancer, diabetes or heart disease in the last two years) was associated with greater increases, on average, in daily steps from program start to follow-up. It may be that those whose health improved were more motivated to continue increasing their steps even after they finished their program.

Higher ratings of self-efficacy and readiness to change in the area of physical activity were associated with greater increases in days of physical activity. On average, greater increases in fruit and vegetable consumption were observed among those with greater social support from friends.

FIGURE 8

Community-level Factors Associated with Increases in the Evaluation Outcomes

COMMUNITY

Physical Activity

- Living in communities where a greater portion of residents rated their health as "excellent" or "good"
- Living in communities where a smaller proportion of residents were classified as overweight
- Living in communities with higher percents of streets with sidewalks, street lights and bike paths

Daily Steps

- Living in communities where a greater proportion of residents rated their health as "excellent" or "good"
- "excellent" or "good"
 Living in communities where a greater proportion of residents engaged in regular physical activity
- Living in cooler communities (lower average temperature in July)

Fruit and Vegetable Consumption

- Greater perceived access to fruits and vegetables
- Living in communities in which higher percent of the area was classified as rural
- Living in communities with a greater number of food service vendors (restaurants, etc.) per capita Living in communities with more variety and
- availability of fresh produce at the grocery stores

While much cross-sectional research has been done to examine the built environment, land use patterns and transportation patterns with physical activity and obesity, little has been done to examine to what extent these factors help or hinder individuals trying to improve their health. Likewise, some research has examined the relationship between a work or school environment and dietary habits, but less has been done at the community level.

In this study, greater increases in days of physical activity and steps were found for participants in communities where a higher proportion of residents rated their health positively, where fewer residents were overweight and where residents engaged in more physical activity.

Some weather conditions also were associated with increased steps. Participants in communities with hotter July temperatures had smaller increases in daily steps than participants in communities with cooler July temperatures. However, those who lived in communities with higher average annual precipitation had greater increases in daily steps from program start to end than did those in communities with lower average annual precipitation. These contradictory findings do not present a pattern from which to draw conclusions about the impact of weather on physical activity.

Access to more active modes of transportation, such as walking and biking, was found to be associated with increases in physical activity: participants in communities where there were higher percentages of streets with sidewalks, street lights and bike paths had greater increases, on average, in days of physical activity from program start to follow-up than participants in communities with lower percentages of streets that included these amenities. Other measures of community walkability and access to facilities where physical activity can be performed also were not associated with changes in physical activity or daily steps. It may be that these indicators were too far removed from the participants; that is, a measure of the miles of bike paths in a community may not matter as much as whether the bike path is located close to a participant's home and connects to places that the participant wants to go. Further, participants' perceptions of walkability also were found to have non-significant relationships with physical activity and daily step levels. This may be due to the relatively small levels of change in the behavioral outcomes.

Increased fruit and vegetable consumption was more evident in communities with multiple stores and where stores offered larger amounts and larger varieties of fresh produce. Perceived access to produce also was significantly associated with increased intake. Expensive produce was associated with greater positive changes in the number of produce servings consumed per week. This finding likely indicates that higher prices were associated with other factors, such as greater levels of freshness and a wider selection.

Many of the program components identified as effective in producing behavior change were positively associated with increased fruit and vegetable consumption. The specific components related to significant increases in produce intake included the use of a program orientation, skill-based learning practices, contact intensity, program tailoring, and the use of support groups and a coach or mentor. These evidence-based program components significantly influenced the change in fruits and vegetables consumed per week by individuals from start to end, but only the coach or mentor's influence persisted one year later, at follow-up. For daily steps, most of the program components were not positively related to increased steps.

The programs' relationship to behavioral outcomes was analyzed based on the elements of social cognitive theory addressed – knowledge, attitude and behavior. Steps programs were positively associated with programs focused on behavior, while produce consumption was positively associated with programs targeting knowledge and attitude. Most of the nutrition-oriented programs were in classroom settings aimed at increasing knowledge and changing attitudes.

Other program factors relating to program quality and program population targets showed some significant correlations. For instance, participants in programs aimed at high-risk individuals had lower average increases in physical activity than did participants in programs aimed at the general population, possibly because physical

FIGURE 9 *Program-level Factors Associated with Increases in the Evaluation Outcomes* activity behavior change is more challenging in high-risk populations.

Participants in programs that were familiar with their target populations and well-connected to their communities or those situated at a work site tended to show increases in steps. It may be that those programs were more successful at marketing to their target populations and addressing participants' needs.

Participants in workplace interventions showed smaller increases in fruit and vegetable consumption than did those in interventions in other settings. This is not surprising given that workplace programs focused more on steps and walking groups than they did on nutrition. However, participants in workplace interventions had greater increases in daily steps, on average, than did participants in other settings.

PROGRAM

Physical Activity

• Participation in a program aimed at the general population (rather than high risk individuals)

Daily Steps

- Participation in a program aimed at the general population (rather than high risk individuals)
- Participation in a program focused on behavior
- Participation in a program with greater ties to the community
- Participation in a program set in the workplace

Fruit and Vegetable Consumption

- Participation in a program that includes a greater number of the components considered effective in influencing behavior
- Specific components with a positive association are inclusion of an orientation, skill based learning and practice, contact intensity, ability to tailor the program to participants, and inclusion of support groups and a coach or mentor
- Participation in a program setting other than the workplace
 Programs that are focused on knowledge and attitude

The conclusion that most of the participants seemed to draw from their experience in the various Colorado Healthy People 2010 programs was that individual factors were the most influential in determining whether or not people could change their behaviors. People noted on their surveys that "me, myself and I" stood between them and behavioral change or, conversely, allowed them to make the changes they sought. They believed that their own readiness to make changes, the amount of knowledge they had about nutrition and their own motivation level either helped or hindered their ability to improve their lifestyle choices. From a practitioner or researcher's perspective, individuals' emphasis on their own control, or lack of control, as a predictor of change suggests that they were describing their own readiness to change.

Participants responded strongly to certain program factors, such as the imposition of accountability and increased awareness. An overall comparison of the comments of successful completers with the non-completers and less successful completers suggested that readiness to change, coupled with nutritional and physical activity awareness, trumped all other factors, given otherwise similar circumstances.

According to the qualitative data, environmental and social factors, though not dominant in people's minds, seemed to influence behaviors. Most notable among those community-level factors participants mentioned were: weather, produce cost and availability, and social support.

Few survey respondents volunteered community-level factors as influential in their behavioral changes. Of those who did mention their community's impact on their choices, they focused primarily on outside conditions and produce cost and availability. Both successful and unsuccessful participants commonly discussed the support, or lack of support, from family and friends for their proposed lifestyle changes. When prompted, people were vocal about the barriers to a healthy lifestyle that they encountered in their environments; however, in communities where there were ample trails, accessible recreation centers and organized community walks and runs, focus group participants cited those as helpful.

Both focus group discussions and responses to open-ended survey questions confirmed that many people felt they needed some sort of program to effect healthful changes in their lives. Once they felt healthier, they then were motivated to continue.

Participants perceived the most pivotal aspects of the programs to be external structure, pedometer step-tracking, awareness-raising and "small changes," nutrition education, peer support, program interaction and incentives.

Participants learned that small changes can make a difference in how they feel. Once they felt different, some people were able to sustain their behavior changes, especially regarding exercise. Individuals spoke of how their new feelings propelled them forward, as did those programs that had a group interaction element to them.

At all stages of program participation and follow-up, participants rarely talked about standard program incentives (e.g., gift certificates and other prizes) as motivators. When specifically asked about incentives, they dismissed them as less important than the camaraderie they had experienced and actual changes they had felt in their bodies. One exception was found among participants who shared their exercise time with their dogs, and who seemed swayed by the enjoyment and health benefits that their dogs obtained from walking with them. Additionally, some participants felt inspired by the inherent competition among their co-participants around the number of steps achieved.

Although some organizations had ceased providing the programs once the grant ended, most had not scaled back on either services or emphasis on healthy lifestyles. In interviews, program staff suggested that most of the programs were, in fact, providing more services than they did while The Trust funded their program and had even more of a focus on physical activity. Those programs that were organized by a well-established agency – such as a hospital, university or extension office - sustained their programs in more recognizable ways than did smaller community-based organizations. Thus, important organizational changes were sustained and the potential for long-term community impact remains across Colorado.

PARTICIPANT PERSPECTIVE

PROGRAM-LEVEL FACTORS

Youth Mentorship: Rocky Mountain Youth Corps

When Brandon Warren examines some of the roughly 100 miles of hiking trails he helped build in Colorado and Wyoming, he sees not only the corridors of outdoor recreation, but also the team-building efforts that went into constructing them.

The Rocky Mountain Youth Corps has been carving back country trails for the past 15 years, and – as Logistics Manager – Warren has been part of the effort for six of them. Through the Colorado Healthy People 2010 initiative, he was recruited as a youth mentor



for the trail-building crews in Rocky Mountain National Park and the Routt, Arapahoe and San Isabel National Forests, as well as other public lands. His job is to inspire the young men and women in his charge toward increased physical fitness and to function as a single unit, sculpting hillsides with recreational walkways.

"We start with goofy things like name games," said Warren. "And we wind up completing complex projects like water and weed mitigation, fence building, thinning underbrush and creating elaborate rock structures."

Warren says getting the job done means getting crew members to plan together and talk things out. He discourages friends from joining the corps together, preferring to split them up and have them meet new people with whom to form a working unit.

"It's all about the team," said Warren. Group dynamics that focus on building character, motivating each other to be physically resilient and, of course, learning about back country engineering are encouraged. Groups of 16- to 18-year-olds work only in the summer, while some 18- to 25-year-old crews work on trails as long as five months at a time. They trek to a project site, set up a base camp, cook their meals over camp fires and sleep in tents. At evening campfires, the crews learn about forest ecology in the corps' SEED Program (Service and Environmental Education). Corps members come out of the forest weekly to clean up and briefly spend time in a rural town, enjoying a prepared meal and a hot shower.

Youths' postings on the corps' website bear testimony to the lasting, positive impact of summers spent building trails – from their experience in the corps, youths carry forward an awareness of what it means to be a team player, and of healthy mind and body.

RECOMMENDATIONS

The following recommendations were drawn from the results of this study, as well as other published studies in the fields of obesity, physical activity and nutrition. Each recommendation has implications for both funding entities and program providers interested in enabling long-term, positive health outcomes for individuals.

Create Evidence-Based Programs

While there is always the desire to create a new and unique program, many promising practices in obesity control are beginning to emerge in the literature. A recent report from the nationally appointed Task Force on Community Preventive Services reviewed all the literature on preventing and controlling overweight and obesity in school and work site settings and identified those interventions showing the most promise.³⁴ "I think one of my biggest problems is where I work ... everybody brings in goodies and puts them right in front of me!" PROGRAM PARTICIPANT

Indeed, using evidence-based programs and interventions that have shown promise in other settings enhances the likelihood of a program being successful. Such promising practices include:

School setting

- Include elements of both nutrition and physical activity practices in programming
- Allot additional physical activity time in school
- Include non-competitive sports
- Reduce sedentary activities, especially TV viewing time

Work Setting

Establish a wellness center or group within the work place to encourage and monitor such programs as:

- Nutrition and physical activity practices
- Aerobic exercise or strength training
- Training in behavior modification techniques
- Self-directed materials (e.g. take-home flyers, etc.)
- Group or supervised exercise

"The hardest part for me was finding time to exercise. I sit at a desk all day, and I am expected to be at that desk at any given point." PROGRAM PARTICIPANT "Our social infrastructure and our physical infrastructure don't promote healthy lifestyles. I think in our society you are supposed to jump in your car and go to work and sit there and eat whatever food is available you know, the high energy stuff—here's coffee with caffeine, here's candy bars."

PROGRAM PARTICIPANT

More specific recommendations for adult programming include the use of behavioral strategies, such as planning, goal setting, self monitoring, stimulus control, cognitive restructuring, problem solving and relapse management.^{5, 6, 35} Specific recommendations for adult interventions include prescribed physical activity for at least 30 minutes per day plus weight lifting or some other form of strength training.⁶ Tailoring approaches based on the individual's specific interests, preferences and readiness to change is also recommended.³⁵⁻³⁷

For youth, additional promising program components include reducing consumption of carbonated beverages³⁸ and including parents or families in activities.^{35, 39} Targeting interventions to upper elementary and middle school youth have been found to be the most helpful.⁴⁰

The programs funded through the initiative employed a number of these strategies, but many may have benefited from the incorporation of additional evidence-based interventions or more thorough implementation of these promising techniques.

Less is known about methods to sustain behavior change. It may be that the skills required for weight maintenance are distinct from those required to achieve weight loss.³⁵ The role of the social and built environment might play a more essential role in maintenance than in short-term behavioral change.

Aim at the Environment

Over the past decade, there has been a growing recognition of the role of the environment in influencing the obesity pandemic.⁴¹ Many have argued that preventing obesity and overweight requires addressing this "obesogenic" environment and that environmental changes are likely to sustain behavior change better than interventions focused at the individual level.⁴² In the late 1970s, the social learning theorist Albert Bandura argued that environmental attributes can be the overriding determinant in behavioral constraint.⁴³ A recent review of literature on environmental factors and physical activity has found multiple significant associations in the areas of accessibility to facilities, opportunities for physical activity and safety.⁴⁴

This obesity prevention evaluation found that environmental factors such as access to ample produce and pedestrian friendly street plans were significantly associated with increases in physical activity. Future programming would benefit by adopting community planning and design features that focus on New Urbanism and Smart Growth. These features may have strong impacts not only on traffic, environmental quality, community safety and social capital, but also on opportunities for physical activity.⁴⁵⁻⁴⁸

Educational and media campaigns, together with increased availability, could impact people's nutritional intake, ensuring an environment consistently conducive to a healthy lifestyle.

"I think the one thing that really helped was the community support. I'd be absolutely down and eating something in my hand, and you'd go into the library, and someone would say, 'That's not a vegetable!"" PROGRAM PARTICIPANT

Encourage Multi-level Interventions A study conducted by the National Academy of Sciences' Institute of Medicine (IOM) found that sustained health behavioral change was more successful when interventions focused on a number of levels: individual behavior, family interactions, relationships and resources in the community, and workplace and public policy.⁴⁹

"As old as I am, I feel we hadn't been educated on so many things. Nobody taught me this kind of stuff before." PROGRAM PARTICIPANT

Additional research suggests that interventions that target multiple levels of the socio-ecologic model are the most likely to result in sustained behavior change.⁵⁰⁻⁵²

All of the interventions employed in this initiative focused on the individual, with several aiming at organization-level changes, such as more nutritious cafeteria food or improved exercise equipment. Organizational changes were primarily aimed at schools, while those interventions either directly or indirectly targeting community change were conducted by multiple organizations simultaneously.

This study found that people largely perceived their social environments to be impediments to their own behavioral change. Community-based organizations may provide more effective programs if multiple tiers of the socio-ecologic model are addressed, including interventions aimed at the community and policy levels. Further, the formation of community coalitions with broad representation and an action orientation will help bring together the various stakeholders enhancing the ability to create changes along many paths of the community landscape.

Emphasize Small Changes

Qualitative results from this evaluation found that programming with a focus on small changes was important. The literature on behavior change suggests that "shaping," or the use of consecutive goals and rewards that move persons ahead in small increments, are the best way to reach a distant point.⁵³ In fact, the U.S. government launched an education campaign with the Ad Council and National Institute of Health (NIH) educating Americans that they can "take small, achievable steps to improve their health and reverse the obesity epidemic."⁵⁴ Interventions seeking to change complex behaviors such as those involved in obesity should consider incorporating shaping strategies into programming.

One example of this "small changes" approach is the use of a step counter. Participants in this initiative showed the largest levels of sustained change in the area of steps. Other published studies of pedometer use have also showed promising results.^{19, 20} Steps requires few programming resources and can create long-term behavioral change.

Although the obesity literature promotes multi-faceted interventions as most effective,^{5-6, 36, 55-56} it may be that, for improving individual outcomes of physical activity or steps, singularly focused interventions may be more effective.

"It's really amazing how little you have to do. You are surprised that just a little change makes a huge difference. It really does." PROGRAM PARTICIPANT Additionally, given limited resources and, in some cases, limited experience with multiple types of interventions, program providers may serve their communities better through focused, single-pronged, evidence-based interventions.

Develop Programs with Stronger Dosages

Changing individual behavior is difficult, particularly in areas related to physical activity, nutrition and weight.⁵⁷ Maintaining behavioral changes over time is even more difficult to accomplish.

The modest gains and waning effect of the interventions found at follow-up in this study suggest that participants may have benefited from a stronger dosage of the program. In fact, interventions found to be effective in obesity prevention and nutrition often require a more significant dose than that offered by many of the initiative programs. Longer, more intensive interventions with follow-up are necessary to achieve long-term behavior changes and better health outcomes.⁴⁹ Interventions might benefit by being administered more as a time-release capsule, spanning months or even years and offering occasional booster shots through telephone calls, e-mails, flyers and additional meetings. Programs that also alter the physical or social environment, such as creating a new exercise facility or including whole families in an intervention, may serve to sustain follow-up behavior.

Target Children and Adolescents

Several studies point to the fact that youth in the U.S. are becoming increasingly unhealthy. The rates of obesity and overweight are increasing in youth and associated diseases formerly found only in adults (e.g., hypertension, Type 2 Diabetes, hyperlipidemia) are more frequently appearing in children and adolescents.⁵⁶ Long-term studies show that obese children tend to become obese

adults.⁴² More evidence is needed to determine the effectiveness of school-based programs;⁵⁸ however, in a recent review of the literature on obesity and overweight interventions with children and youth, a majority were found to be effective.⁴² Prevention and treatment of obesity may be easier in children because they are still growing in height and can often lose fat without dieting and, thus, may not require the more drastic behavioral changes often required with adults.⁴²

The results from this study confirm this premise as youth made the largest gains in both physical activity and daily steps. (BMI could not be compared because BMI data were not analyzed for youth in this study.)

Determine Optimal Level of Community Readiness

This study found that residents living in healthier communities were more likely to make and sustain behavioral changes. The prevention literature speaks to the importance of intervention timing.⁵⁹ It may be that communities vary in their levels of readiness to address health-related behavior changes. Further, there may be key learning times in every community where health issues or issues of weight and exercise become more meaningful to residents. For instance, a community's readiness might peak post-holidays or when the weather is optimal for walking and exercise. Obesity-related programs can take advantage of these key teaching times.

Tailor Programs to Meet Participant Needs

The rates of overweight and obesity, sedentary behavior and related chronic diseases are not distributed equally in the population. Income, education, culture, personal life circumstances and presence of disability have been associated with the prevalence of these health states.⁶⁰ For example, Hispanic or African-American residents in Colorado experience higher rates of overweight, obesity and Type 2 Diabetes than do White or Caucasian residents.⁶¹ Community strategies should be "tailored" to best match the needs and lifestyles of target populations.

This evaluation found that programs that tailored strategies based on participants' circumstances and preferences showed greater success in the area of fruit and vegetable consumption. For example, tailoring programs to relative health risk, readiness to change or program preference (e.g., individual or group setting, didactic or skills-based classes) are among customizations that have improved individual long-term outcomes in other studies.⁶²

Consider the Setting

School and workplace settings provide ample opportunities for nutrition and physical activity interventions because both are locations where adults and children spend a substantial amount of time, consume a substantial proportion of daily calories and are often "captive."³⁴ Both types of settings may have existing facilities that support regular physical activity.³⁴ In this study, it was found that daily steps increased if the intervention was conducted in the workplace. For youth, participants and program staff thought that providing and teaching new types of physical activities in and out of school helped to improve youth physical activity levels.

Promote Sustainable Programming

The longer a program exists, the more participants it can serve. Therefore, sustainable programs are more likely to influence a community's health by affecting the environment in which people live and work. Sustainability can be achieved through incorporation of key program elements into the existing organizational programming.^{63, 64} For these reasons, and given the inevitability of staff turnover, program planners may want to consider which healthy lifestyle program components can be incorporated into existing programming without necessarily securing additional funding resources. Tracking program data and conducting basic evaluations of participant outcomes can help determine which programs to continue.

Focus on Prevention

Traditionally, much of the interest in obesity and overweight has focused on treatment rather than prevention; however, it may be easier and less expensive to prevent community ills. A movement toward prevention will likely yield more long-term outcomes than will treatment. Interventions aimed at behaviors antecedent to overweight and obesity, focusing on children and youth, targeting general populations (not just high-risk individuals) and changing the built and social environment may prove the best strategies for Colorado to use to reverse the obesity incline. Given the direction of U.S. health statistics in the areas of obesity, nutrition and physical activity, prevention is more critical than ever.

Creating and funding programs that follow these recommendations could lend strength to future attempts at community-oriented behavioral change.

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