

Parks Promoting Physical Activity: Synthesis of Findings From Interventions in Seven National Parks

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Background: We synthesized the results of 7 National Park Service pilot interventions designed to increase awareness of the health benefits from participation in recreation at national parks and to increase physical activity by park visitors. **Methods:** A content analysis was conducted of the final evaluation reports of the 7 participating parks. Pooled data were also analyzed from a standardized trail-intercept survey administered in 3 parks. **Results:** The theme of new and diverse partnerships was the most common benefit reported across the 7 sites. The 2 parks that focused on youth showed evidence of an increase in awareness of the benefits of physical activity. Many of the other sites found high levels of awareness at baseline (approaching 90%), suggesting little room for improvement. Five of the 7 projects showed evidence of an increase in physical activity that was associated with the intervention activities. Multivariate analyses suggested that the media exposure contributed to a small but significant increase in awareness of the importance of physical activity (6%) and number of active visits (7%). **Conclusions:** Enhancements and replication of these programs represents a promising opportunity for improving partnerships between public health and recreation to increase physical activity.

Keywords: active living, social marketing, recreation, leisure studies, parks management

The many health benefits of regular physical activity are generally known.¹ Yet, widespread inactivity and obesity in the U.S. suggests a need for more evidence-based community-level strategies coupled with diverse partnerships to increase population levels of physical activity.²⁻⁵ An array of physical activity programs have proven effective across a variety of populations and geographic settings. For example, the Task Force on Community Preventive Services has produced a set of evidence-based approaches, including informational, behavioral and social, and environmental and policy approaches for promoting physical activity in its systematic review, the *Guide to Community Preventive Services* (the *Community Guide*).^{6,7} Among the *Community Guide* recom-

mendations is a policy approach that involves creating access to places for physical activity (eg, parks) coupled with informational outreach activities.⁷ When it comes to policy approaches such as improving access, much needs to be learned about the content of the intervention, the policy process, and outcomes.⁸

The park and recreation field has generated a body of literature relevant to understanding and promoting physical activity, with a rich tradition of encouraging a variety of activities among youth and adults, including educational programs and active play.^{4,9} Yet, few of the studies in the *Community Guide* were carried out in parks despite the popularity of parks as places to exercise¹⁰ and the large potential for promoting active visits to parks.¹¹

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Until recently, sparse research existed on the amount of physical activity occurring in parks, much less about specific program and policy interventions and their effects on population subgroups (eg, youth).^{12,13} Park visitors can be encouraged to engage in physical activity through informational approaches (eg, a media campaign)¹⁴ and via environmental approaches (eg, providing access for safe places for physical activity).⁷

This need to promote active park visits is embodied in federal plans and initiatives. The *HealthierUS Initiative* called on federal agencies to improve the flow and use of information on personal fitness and increase the accessibility of resources for physical activity.¹⁵ The *National Park Service Legacy Initiative and 4-Year Plan, Doing Business in the 21st Century* declares, “The National Park Service embraces its critical responsibility to provide appropriate outdoor recreation and to contribute to the physical and mental well-being of all Americans. We will provide these opportunities both through the National Park System itself, and through our role in a seamless network of parks.”¹⁶ In March 2006, the Health and Recreation Committee of the National Park System (NPS) Advisory Board recommended that the agency undertake 7 pilot projects to determine how the NPS could effectively implement the key objectives of the *HealthierUS Initiative*. These pilot projects evaluated a variety of programs for increasing healthful physical activity by park visitors and/or residents of communities near parks. The projects included 3 “destination” parks (Acadia National Park, Sitka National Historical Park, and Zion National Park) and 4 “urban” parks (Point Reyes National Seashore, Chesapeake and Ohio (C&O) Canal National Historical Park, Cuyahoga Valley National Park, and Timucuan Ecological and Historic Preserve).

The purpose of the NPS Health and Recreation Projects was to systematically evaluate the effectiveness of communication and programming strategies in these 7 pilot parks that were designed to address at least 1 of the following outcomes:

1. Increase awareness of health benefits by park visitors derived from participation in recreation in units of the National Park System
2. Increase healthful recreation/physical activity behavior by park visitors
3. Increase healthful recreation/regular physical activity behavior as a lifestyle at home.

The current study is a synthesis of the evaluation findings from the 7 pilot projects. This synthesis is based on the reports from the sites as well as a separate, pooled analysis of trail intercept data.

Methods

Description of Interventions

The interventions and associated evaluation were unique for each park (Table 1). The target audiences varied between the parks, including general park visitors and

tourists (Acadia, Zion, and Point Reyes), cruise ship passengers (Sitka), employees of nearby businesses (C&O Canal), and youth (Cuyahoga Valley and Timucuan). Most interventions used informational media (print or electronic) to encourage park or trail use (or in the case of Timucuan, kayaking) to experience the health benefits of physical activity within parks as well as to enjoy the park’s unique attractions. Three parks used park rangers (Sitka, Zion, C&O Canal), and others used community events and programming (Acadia, Cuyahoga Valley, and Timucuan). C&O Canal was unique by launching a walking program with team competition, ranger-led hikes, and podcasts to increase trail use among employees of nearby businesses. Due to methodological and resource limitations, only 2 parks evaluated outcome 3 and thus the findings for this outcome are not presented here. Using a prepost, quasi-experimental study design,¹⁷ all interventions compared outcome measures collected before the program initiation (hereafter, baseline) and during the program period (hereafter, posttest) using at least 1 of the following evaluation methods: trail intercept surveys, trail counters, park vouchers, participant surveys, or focus groups.

Synthesis of Findings From Evaluation Reports of All 7 Parks

A content analysis and synthesis were conducted of the quantitative and qualitative data provided in the final reports of each of the 7 participating parks.^{18–24}

Quantitative Data. The measures that were used to address the key study outcomes were extracted from the individual park reports, compiled, and summarized.

Qualitative Data. In conducting qualitative analysis, open-coding methods were used to identify common themes related to sustainability and replicability of the program and challenges and lessons learned. Open-coding is a process of developing categories of concepts and themes emerging from the data.^{25,26} Recurring themes containing the most respondents (parks) were primarily represented. In addition, the authors identified comments that were considered striking and relevant for potential program continuation and improvement. One coder abstracted the themes, while 2 reviewers checked the results and verified themes with the participating parks.

Intercept Surveys in 3 Parks

In addition to the synthesis of findings across all 7 parks, a more thorough evaluation of the NPS interventions was conducted among 3 parks that used a common trail-intercept survey (Acadia, Point Reyes, and Zion). The surveys supplemented infrared counters that recorded the amount of baseline/postprogram trail use. A major purpose of the intercept surveys was to determine if any changes in trail use captured by the counters could be attributed to visitors’ exposure to the parks’ programs. The reason for analyzing the pooled intercept data across the 3 parks

Table 1 Summary of the Intervention and Evaluation of the National Park Service Health and Recreation Projects, 2007

Park (state)	Target audience	Intervention components (program dates)	Evaluation	Outcomes addressed ^a		
				1	2	3
Acadia (ME)	General park visitors and tourists visiting Bar Harbor, Maine	Print and electronic media and kick-off event to promote hiking on the Great Meadow Loop Trail connecting town to park attractions (August 2007)	TS, TC	X	X	
Sitka (AK)	Cruise ship passengers	Verbal messages by park rangers, print media to promote visiting the park on foot rather than by motorized tours (May-August 2007)	TS, TC		X	
Zion (UT)	General park visitors	Verbal messages by shuttle drivers and park interpretive staff, print and electronic media to promote the Pa'rus Trail, an accessible trail for hiking and bicycling that connects the visitor center to a shuttle stop within the park (July-August 2007)	TS, TC, FG ^b		X	
Point Reyes (CA)	General recreation visitors	Print media to promote 2 trails (Bear Valley and Limantour Beach Trails) that are easily accessible and heavily used by hikers and bicyclists (late July-September 2007)	TS, PV	X	X	
C&O Canal (Wash DC)	Employees of nearby businesses	Walking program with online walking logs, team competition, ranger-led hikes, and podcasts to promote walking on the canal towpath (September-November 2007)	PS, FG ^c	X	X	
Cuyahoga Valley (OH)	6th and 7th grade middle school students in local community	Community engagement to develop program name, recreation programming (kick-off event, weekly activities, festival finale), and print and broadcast media (health fairs, local festivals, bus boards) (Summer 2007)	PS, FG ^d	X	X	X
Timucuan (FL)	Inner city youth, 10-12 years old	Community outreach and programming (kayak demonstration and paddling, picnic, ranger-led program at Kingsley Plantation) (Summer 2007)	PS, PV	X	X	X

Abbreviations: TS, trail intercept surveys; TC, trail counters; PV, park voucher; PS, participant surveys; FG, focus groups.

^a Outcome 1: increase awareness of health benefits by park visitors derived from participation in recreation in units of the National Park System. Outcome 2: increase healthful recreation/physical activity behavior by park visitors. Outcome 3: increase healthful recreation/regular physical activity behavior as a lifestyle at home.

^b Focus groups were used for process evaluation.

^c Focus groups were used to gather beliefs of target audience regarding walking on the trail, which were used to develop the targeted program messages.

^d Focus groups collected information about the effects of program activities to complement data obtained from baseline and postprogram surveys.

were to assess the combined effect of the interventions on NPS goals, as well as examine intervention effects by dose of program exposure using standard methods.

Survey Instrument and Data Collection. A trail intercept survey is a standard questionnaire used to contact visitors as they are walking on the designated trails. For the NPS evaluation, the intercept survey was designed to assess reasons for trail use, awareness of the health benefits of physical activity, intentions to be physically active, and demographic information. Where possible, items on the intercept survey originated from existing surveys that have undergone psychometric

testing.^{27,28} The survey was reviewed by a broad group of individuals from academia (parks and recreation, public health, social science) and parks and recreation staff (interpretive staff, administrative, resource specialists) from the parks and universities involved in each of the programs. Because local conditions and program strategies differed between sites, not all tools included the same response choices or items; however, variable names and definitions were standardized across intercept parks through an online survey program (Snap Survey Software) in which all parks entered their data.

Trained interviewers administered the intercept surveys face-to-face while walking with respondents on

the trails. All users of specified trails who were 18 years of age or older were sampled. At Zion and Point Reyes, multiple interviewers were stationed at different locations along the trails. Baseline surveys were collected 1 to 2 months before the interventions, and posttest surveys were collected during the intervention period.

Measures. The dose of self-reported exposure to the programs was measured by the number of relevant sources of information that made participants aware of the trail. Relevant sources of information included promotional media used as part of the program activities and varied by park (Table 2). Information sources were summed for participants with nonmissing data on at least half of the total possible program-specific sources of information (inclusion rate was 98% for Acadia, 67% for Point Reyes, and 83% for Zion, with no significant differences in the percentage of respondents achieving

Outcomes 1 or 2 among those with and without missing data). Baseline surveys were considered the referent group.

Outcome 1 (increase in awareness of benefits) was assessed at baseline and posttest periods using the survey items that asked about the importance of physical health benefits on the participant's visit to the park. Participants answered very unimportant, unimportant, undecided, important, and very important (coded as 1 to 5 respectively) to questions including "To get exercise," "To keep physically fit," "To improve my cardiovascular health," "To tone up my muscles," and "To lose weight." Outcome 1 was considered achieved if the participant answered very important or important to any of these physical health items. An alternate measure that summed these 5 items (sum ranging from 1 to 25) was also evaluated.

The second measure of Outcome 1 asked respondents to rate their awareness of the importance of being

Table 2 Frequency of Self-Reported Exposure to Program Promotional Materials, Trail-Intercept Survey, National Park Service Health and Recreation Projects, 2007

Program-related media	Baseline		Post-test		P ^b
	N	% ^a	N	% ^a	
Acadia	(n = 131)		(n = 213)		
Local newspaper ad	1	0.8	69	32.4	<0.01
Tourist Weekly article	0	0.0	44	20.7	<0.01
Tourist Weekly 'Trail of the Week'	0	0.0	27	12.7	<0.01
Brochure	0	0.0	24	11.3	<0.01
Maps	1	0.8	21	9.9	<0.01
E-mail	6	4.6	12	5.6	0.67
Internet websites	2	1.5	5	2.3	0.60
Newspaper articles	0	0.0	9	4.2	0.02
Point Reyes	(n = 388)		(n = 454)		
Maps	66	19.8	108	27.2	0.02
Local newspaper ad	1	0.3	12	3.0	0.01
Brochure	18	5.4	36	9.1	0.06
Newspaper articles	9	2.7	13	3.3	0.65
Posters	7	2.1	9	2.3	0.88
Zion	(n = 300)		(n = 317)		
Maps	67	26.2	90	32.1	0.13
Bus/shuttle drivers	71	33.6	80	31.2	0.58
Posters	0	0.0	21	7.5	<0.01
Brochures	90	35.2	95	33.9	0.77
Park rangers	38	14.8	62	22.1	0.03
Internet website	20	7.8	15	5.4	0.25

^a Percent of nonmissing.

^b Chi-square test.

physically active (high, medium, low). The outcome was considered to be achieved if the participant reported “high” versus “medium” or “low” awareness.

Outcome 2 (increase in physical activity behavior) was considered achieved if the participant engaged in an active visit, defined as intending to engage in exercise or recreational activity for at least 30 minutes on the trail on the day the participant was surveyed. Given the high proportion of active visits among participants, the cut-point of at least 60 minutes on the trail was also examined.

Analysis. The statistical tests used to evaluate the outcomes included the Pearson chi-square test for independent proportions, *t* test for means, and logistic regression. Associations between dose of program exposure (baseline as the referent groups vs. posttest with no reported sources of program information that made a person aware of the trail vs. posttest with ≥ 1 reported sources of program information) and outcomes 1 and 2 were assessed using multivariate models adjusted for potential confounders (ie, age, gender, race, and park for the pooled analyses). The prevalence ratio was computed using a formula to correct the adjusted odds ratio (OR) obtained from logistic regression ($OR / [(1-P_0) + (P_0 \times OR)]$) where P_0 indicates the prevalence of the outcome at baseline.²⁹ For this analysis, the prevalence ratio is a more intuitive effect measure and more appropriate for common outcomes.

Results

Synthesis of Findings From Evaluation Reports of All 7 Parks

Synthesizing the quantitative and qualitative data from the 7 evaluation reports identified common themes which are highlighted here.

Quantitative Data. *Outcome 1 (Increase in Awareness of Benefits):* Overall, 2 of the 7 sites that were focused on youth (Cuyahoga Valley and Timucuan) reported an increase in awareness of the benefits of physical activity derived from participation in recreation at national parks. Timucuan provided anecdotal evidence of an increase in awareness of the benefits of physical activity based on field observations of 33 youth participating in a kayaking program. These youth had never kayaked and some had never seen the ocean (despite their close proximity to it), so the program had a dramatic effect on their awareness of the park for providing recreational and health benefits. In addition, Cuyahoga Valley found a significant increase in awareness of the park (31% at baseline vs. 65% at posttest, $P < .05$; data not shown) among the targeted youth population ($n = 68$ and $n = 144$ surveyed at baseline and posttest, respectively), with a reported increase in the percentage of participants who intend to visit a national park in the future (18% at baseline vs. 51% at posttest; $P < .05$). The other 5 sites found high levels of awareness

at baseline (approaching 90%), suggesting little room for improvement (data not shown).

Outcome 2 (Increase in Physical Activity Behavior): As noted in the Methods, a primary outcome of the pilot projects was an increase in active visits at the parks. Five of the 7 pilot parks (Acadia, Sitka, C&O Canal, Cuyahoga Valley, and Timucuan) reported evidence of an increase in physical activity that was associated with the program activities (Table 3). Some of the estimates of intervention effects involved trail count data, whereas others involved self-reported questionnaire data from youth and adults. The differences in evaluation metrics made it difficult to directly compare results across parks. As with Outcome 1, high baseline levels of physical activity also made it difficult to achieve a program effect in some parks. For example, 1 site found at baseline that 96% of park visitors were active on the trail for 30 minutes or more.

Qualitative Data. *Overall Benefits of the Projects:* The theme of new and diverse partnerships was the most common benefit reported across the 7 sites (Table 4). These new partnerships represented numerous sectors and organizations, including health care organizations, mass media, public housing, schools, and recreation groups. New, collaborative materials and resources were also developed as a result of the efforts. These included not only the materials used in the programs (eg, press releases) but also new field skills (eg, a park ranger promoting active visits). One site reported that through the pilot effort, a local philanthropist offered to fund a similar program the following summer.

Challenges for Sustainability and Replication: Several challenges were noted among the projects. The most commonly cited challenge ($n = 5$) related to the need for a more comprehensive and sustained marketing strategy for the program. Another common challenge involved having adequate resources to carry out the programs. These costs include staff time and funds to develop program materials. Several evaluation-related challenges were noted. Respondent burden, cited by 3 parks, involved the time needed to fill out questionnaires. Joggers and solo female walkers were the least likely to be willing to complete an intercept survey.

To sustain these projects in the future, the challenges and unique successes should be addressed. Respondents from 2 parks noted that in future years and with proper training, park volunteers may be able to assist with similar programs. To continue these programs, it will be important for some sites to maintain the necessary technical abilities (eg, working with trail counters) and involve new and appropriate partners. For example, Timucuan experienced a notable success in sustaining its Timucuan Explorers program for a second year, reaching 50 new participants from a HUD apartment inner city facility and an African American church group. The involvement of African American leaders and the general visibility of the program within the African American community contributed to this success.

Table 3 Summary of Findings Related to Outcome 2 (Increase in Physical Activity Behavior) by the National Park Service Health and Recreation Pilot Projects, 2007

Site	Measures	Baseline		Posttest*		P	Direction of effect
		N	Mean/%	N	Mean/%		
Acadia	% visitors who expected to spend 30 or more minutes on the trail	131	81%	213	87%	NR	+
	Trail counts:				%change:		
	Great Meadow Loop Trail	1,164	-	2,138	+88%	NR	+
	Control 1—Gorham Mountain	11,680		15,167	+30%		
	Control 2—Compass Harbor	2,993		3,138	+5%		
	Park overall (2007)	476,631		506,833	+6%		
	Park overall (1990–2006), avg.	-		-	+15%		
Sitka	% increase in total trail counter clicks per day for every 100 visitors during the program period	-	-	-	5.4%	<.05	+
	% visitors who expected to spend 30 or more minutes on the trail	-	-	371	68%	NA	NA
Zion	Trail counts: % of park visitors who used trail	236,268	.026%	256,747	.019%	NS	0
	% visitors who expected to spend 30 or more minutes on the trail	300	76%	317	83%	NS	+
Point Reyes	% visitors who expected to spend 30 or more minutes on the trail	373	96%	437	96%	NS	0
C&O Canal	Number days walked in general	99	5.9	58	5.6	NS	0
	Number days walked at the C&O	99	1.0	58	1.0	NS	0
	Number minutes walked per day in general	99	58	58	54	NS	0
	Number minutes walked per day at C&O	99	52	58	46	NS	0
	% walking for at least 30 minutes (each day they walked)	99	85%	58	86%	NS	0
	% reporting that participation in the challenge increased use of the C&O Canal	-	-	58	42%	NA	+
	NHP for walking	-	-	58	37%	NA	+
	% reporting that in last 2 months, the number of times they walked/ran on C&O towpath increased since the start of the program	-	-	58	37%	NA	+
Cuyahoga Valley	Visited:						
	Towpath Trail	68	19%	144	22%	<.05	+
	Mustill Store		4%		11%		
	Indigo Lake		6%		16%		
	Cuyahoga Valley NP Scenic Railroad		12%		31%		
Timucuan	% youth who engaged in active participation in the park	NR		33	100%**		+

Abbreviations: NR, not reported; NS, not significant; NA, not applicable.
 *Postprogram estimates refer to measures based on data collected during the program.
 ** All participants participated in kayaking, paddling continuously for several hours.

Table 4 Examples of Benefits Reported by the National Park Service Health and Recreation Pilot Projects, 2007

Sites reporting	Thematic sub-category	Examples and quotes
7	New and diverse partnerships	<p>Acadia—New partners were made in the health and active lifestyle arena, including with the local hospital, employee wellness program leaders, YMCAs, and a nonprofit group Healthy Acadia.</p> <p>Cuyahoga Valley—The park has built a relationship with the only African American newspaper in northeast Ohio, <i>The Reporter</i>.</p> <p>Cuyahoga Valley—The park has built a relationship with the only African American newspaper in northeast Ohio, <i>The Reporter</i>.</p> <p>Timucuan—This program established a strong relationship between the NPS and Hollywood Homes, a subsidized housing community in Jacksonville.</p> <p>Point Reyes—Partnerships for this project were developed with a group called Healthy Marin Partnership, which includes members from health care organizations, public health agencies, and a community foundation.</p> <p>Sitka—Sitka NHP could create a partnership with the Sitka School district and/or with specific schools to encourage teachers and classes to use the park for outdoor educational activities.</p> <p>Zion—The area medical community was actively engaged in the process, and as a result there have been a number of offers to engage Zion National Park in fitness promotion efforts within the community.</p> <p>C&O Canal—New connection to the American Recreation Coalition. Though not involved in the challenge, its president took an interest in the project and continues to be interested in working with the park.</p>
2	New materials and resources	<p>Point Reyes—This project provided the opportunity for park and regional office staff to collaborate on project development, community outreach, production of support materials, and project management, as well as providing new field skills.</p> <p>Cuyahoga Valley—Partnerships with several community organizations resulted in resources that became available for event planning publicity and conducting onsite activities at Cuyahoga Valley NP for children and their families.</p>
1	New funding opportunities	<p>Timucuan—A local philanthropist saw an advertisement for the program while visiting the Preserve and has since become inspired to provide funding for next summer's program.</p>

Similar considerations were noted regarding the ability to replicate these programs in other areas. Since many of the parks are unique in their history and design, a needs assessment in other parks should be conducted to capitalize on their special qualities. As with sustainability, a stable funding base is needed for replication. In addition, some programs highlighted the need for proper training for park staff in use of trail counters. There also is a need for staff at each site with experience in evaluation. It was suggested that the intercept survey tool could be modified to capture more data on visitors' perspectives and the unique attributes of other national parks.

Intercept Surveys in 3 Parks

Combining data from the intercept surveys highlighted the shared and unique characteristics of visitors across the 3 participating parks (Acadia, Zion, Point Reyes; Table 5).

Characteristics of Survey Respondents. There were notable differences in the characteristics of the survey respondents between parks. The survey respondents

from Point Reyes tended to be slightly younger, more educated, and more diverse with respect to race/ethnicity than the other parks. Zion had a higher proportion of visitors (versus full- or part-time residents) among their survey respondents than Acadia or Point Reyes, and these differences in resident status were generally consistent with the patterns observed for the previous night's accommodations (home vs. other). The main activity engaged in by survey respondents was walking, with Zion reporting the highest share of bicycling. Walking was the predominant mode of accessing the park for users at Acadia and Zion, with the latter due to closure of the park to vehicular traffic during that time of the year. In contrast, the vast majority of visitors at Point Reyes used their automobiles to access the park. Acadia trail users were more likely to be alone on the trail compared with users of the other trails. No differences between parks were observed by behavioral stage of change.

Changes in the characteristics of survey respondents between the baseline and posttest time periods were also observed (Table 5). Acadia was the only park with

Table 5 Characteristics of Respondents to the Trail-Intercept Survey by the National Park Service Health and Recreation Projects, 2007

Characteristics	Acadia (%)			Zion (%)			Point Reyes (%)		
	Baseline n = 131	Post-test n = 213	P ^a	Baseline n = 300	Post-test n = 317	P ^a	Baseline n = 388	Post-test n = 454	P ^a
Age (yrs) ^b									
<40	41.5	22.8	0.001	34.6	31.3	0.314	43.9	44.8	0.965
40–64	53.8	68.4		57.4	61.9		51.0	50.3	
65+	4.6	8.7		8.0	6.8		5.1	4.9	
Female gender	51.1	55.4	0.442	50.0	55.9	0.186	56.7	53.7	0.390
Education ^b									
High school or less	10.7	7.3	0.353	8.1	5.8	0.481	8.1	6.4	0.376
Some college or college graduate	55	51.9		55.9	57.5		44.7	49.3	
Graduate or professional degree	34.4	40.8		36.0	36.7		47.2	44.3	
Race/ethnicity ^b									
Non-Hispanic White	99.2	99.0	0.691	91.6	91.6	0.657	79.9	77.9	0.095
Non-Hispanic Black	0	0.0		1.5	0.3		1.2	3.5	
Asian	0.8	0.5		2.6	3.0		9.3	6.4	
Hispanic	0	0.0		2.9	3.0		6.9	7.3	
Other	0	0.5		1.5	2.0		2.7	4.9	
Resident status									
Visitor	40.5	71.0	<0.001	87.6	86.4	0.702	52.7	58.1	0.034
Full-time resident	38.2	16.9		8.7	8.2		39.4	31.1	
Part-time resident	21.4	12.1		3.7	5.4		7.9	10.8	
Accommodations last night ^b									
Home	61.1	27.2	<0.001	12.0	13.7	0.658	75.6	67.0	0.027
Hotel/motel/Cabin rental	14.5	39.3		39.5	41.0		4.2	9.0	
Campground	7.6	14.1		45.4	41.7		8.4	10.2	
With friends/family	4.6	3.4		2.4	1.3		9.2	9.5	
Bed & breakfast	3.1	3.4		0.7	2.3		2.5	4.4	
Other	9.2	12.6		0.0	0.0		0.0	0.0	

(continued)

Table 5 (continued)

Characteristics	Acadia (%)		Zion (%)		Point Reyes (%)		
	Baseline n = 131	Post-test n = 213	Baseline n = 300	Post-test n = 317	Baseline n = 388	Post-test n = 454	P ^a
Frequency of activity type ^b							
Walking	69.5	91.1	66.2	67.6	84.5	92.5	0.003
Jogging/running	30.5	8.9	5.1	5.1	11.8	6.7	
Bicycling	0.0	0.0	28.7	27.0	2.8	0.5	
In-line/roller skating	0.0	0.0	0.0	0.3	0.9	0.2	
Method of access to park							
Walk	44.3	67.1	40.7	39.5	6.8	5.8	0.248
Automobile	35.1	20.0	11.0	18.0	89.2	90.3	
Jog/run	18.3	6.7	3.1	3.2	1.6	3.0	
Bicycle	0.0	0.5	23.8	24.4	0.8	0.7	
Park shuttle	2.3	4.8	18.6	12.9	0.3	0.2	
Bus (not park shuttle)	0.0	0.0	2.8	1.6	0.5	0.0	
Other	0.0	1	0.0	0.3	0.8	0.0	
Party size							
Alone	56.3	33.8	30.1	33.3	20.7	18.0	<0.001
Group of 2 specifically	32.8	43.7	42.7	38.0	35.6	45.2	
Group of 3–4 people specifically	7.8	16.9	20.4	24.2	22.4	29.1	
Group of 5+ people specifically	3.1	5.6	6.8	4.4	21.3	7.7	
Intentions to be active in the future (stage of change) ^b							
Precontemplation	2.3	2.9	4.7	4.7	3.3	2.6	0.254
Contemplation	5.3	3.4	5.4	5.4	4.1	6.3	
Preparation	5.3	10.7	9.5	6.3	8.9	7.0	
Action	9.9	4.9	7.1	9.5	10.6	7.7	
Maintenance	77.1	78.2	73.3	74.1	73.2	76.6	

^a Derived from chi-square test.

^b Precontemplation = not active and do not plan to be in the next 6 months; contemplation = not active but intend to be in the next 30 days; action = active less than 6 months; maintenance = active more than 6 months.

changes in the age distribution of trail users between the baseline and posttest assessment periods—the proportion of older survey respondents was significantly higher at posttest compared with baseline. No meaningful changes between baseline and posttest were observed for gender, educational status, or race for any of the parks. Acadia and Point Reyes observed changes in the make-up of respondents with regard to resident status, previous night's accommodations, activity engaged in on trail, and party size. At posttest, there was a significant increase in the proportion of users who were visitors (versus full- or part-time residents) and, similarly, a reduction in users who stayed at home the previous night. In addition, more Acadia and Point Reyes users reported walking on the trail and walking to access the trail (Acadia only) at posttest than baseline. Both Acadia and Point Reyes observed

changes in party size. No differences were observed in stage of change between intervention periods.

Self-Reported Exposure to Park-Specific Media. Between baseline and posttest, trail users reported a higher frequency of nearly all of the program media materials when reporting the sources of information that made them aware of the trail (Table 2). Overall, these results indicate that the promotional materials were well disseminated into the communities.

Associations Between the Programs and NPS Outcomes. *Outcome 1 (Increase in Awareness of Benefits):* Physical health was reported by the majority of respondents as important to experience on their visit to the park. There were no significant increases in the

Table 6 Association Between Self-Reported Exposure to Program Promotional Materials and Outcome 1 (Increase in Awareness of Benefits), Trail-Intercept Survey, National Park Service Health and Recreation Pilot Projects, 2007

Number of self-reported sources of information relevant to each park's program	N ^a	Physical health as important reason to visit park		High awareness of the importance of physical activity	
		% rating physical health as important	Adjusted prevalence ratio (95% CI) ^b	% with high awareness	Adjusted prevalence ratio (95% CI) ^b
All parks pooled					
baseline	662	88.7	1.0	84.6	1.0
posttest, n = 0 information source	295	83.4	0.93 (0.86, 0.99)	79.9	0.98 (0.91, 1.04)
posttest, n ≥ 1 information source	431	92.3	1.03 (0.98, 1.07)	85.9	1.06 (1.01, 1.09)
Acadia ^c					
baseline	130	96.2	1.0	93.1	1.0
posttest, n = 0 information source	64	89.1	0.92 (0.72, 1.00)	92.2	0.98 (0.83, 1.04)
posttest, n ≥ 1 information source	142	97.2	1.01 (0.91, 1.03)	95.1	1.00 (0.88, 1.05)
Point Reyes ^d					
baseline	268	86.0	1.0	73.7	1.0
posttest, n = 0 information source	171	81.0	0.94 (0.83, 1.02)	73.8	1.00 (0.89, 1.11)
posttest, n ≥ 1 information source	98	90.8	1.06 (0.96, 1.11)	81.6	1.11 (0.98, 1.21)
Zion ^e					
baseline	263	87.7	1.0	91.6	1.0
posttest, n = 0 information source	58	84.2	0.96 (0.81, 1.05)	84.5	0.93 (0.79, 1.01)
posttest, n ≥ 1 information source	192	89.5	1.02 (0.94, 1.07)	94.8	1.03 (0.98, 1.06)

^a Nonmissing data on outcome, age, gender, race, and at least half of the total possible program-specific information sources.

^b Adjusted for age, gender, race, and park (pooled analysis only).

^c Programs included local newspaper article, local newspaper ad, maps, brochure, tourist weekly article, tourist weekly 'Trail of the week,' e-mail, and internet websites.

^d Programs included local newspaper ad, newspaper articles, brochure, maps, and posters.

^e Programs included posters, maps, brochures, internet website, and bus/shuttle drivers' verbal scripts.

proportion of respondents who rated physical health as important to the visit experience between baseline and posttest, after accounting for exposure to the program's promotion materials (Table 6). Similar, nonsignificant results were found when using the summary mean measure across levels of intervention dose ($P = .193$; data not shown).

High awareness of the importance of being physically active was also present among trail users at both baseline and posttest (Table 6). When data from all of the parks were pooled, a significant but small (6%) increase in the prevalence of high awareness was observed among trail users reporting at least 1 program-related media as their source of information for using the trail at posttest as compared with users at baseline.

Outcome 2 (Increase in Physical Activity Behavior): As with Outcome 1, there was a high proportion of trail users who intended to engage in an active visit on the trail (ie, spend 30 minutes or more in recreational or exercise activity) at baseline and posttest. Because of this ceiling effect, an alternative cut-point of 60 minutes or more was also used to define an active visit. The multivariate analyses suggested that the media contributed to an increase in number of active visits, defined using both the 30-minute and 60-minute cut-points (Table 7). The results indicated that trail users who reported at least 1 program-related media as their source of information for using the trail at posttest were 7% more likely to engage in an active visit (≥ 30 minutes) (adjusted prevalence ratio = 1.07) than users at baseline. The effect was slightly larger

Table 7 Association Between Self-Reported Exposure to Program Promotional Materials and Expected Duration on Trail for Exercise or Recreational Purposes [Outcome 2 (Increase in Physical Activity Behavior)], Trail-Intercept Survey, National Park Service Health and Recreation Pilot Projects, 2007

Number of self-reported sources of information relevant to each park's program	N ^c	≥ 30 minutes ^a		≥ 60 minutes ^b	
		% ≥ 30 minutes	Adjusted Prevalence Ratio ^d (95% CI)	% ≥ 60 minutes	Adjusted Prevalence Ratio ^d (95% CI)
All parks pooled					
baseline	661	85.3	1.0	54.3	1.0
posttest, n = 0 information source	293	87.4	0.98 (0.90, 1.04)	52.6	0.86 (0.70, 0.99)
posttest, n ≥ 1 information source	432	90.3	1.07 (1.04, 1.10)	49.3	1.11 (1.04, 1.17)
Acadia ^e					
baseline	130	80.8	1.0	20.8	1.0
posttest, n = 0 information source	64	79.7	0.97 (0.78, 1.10)	17.2	0.87 (0.43, 1.34)
posttest, n ≥ 1 information source	142	90.1	1.10 (0.98, 1.16)	32.4	1.41 (1.05, 1.66)
Point Reyes ^f					
baseline	268	91.3	1.0	85.1	1.0
posttest, n = 0 information source	171	94.7	0.97 (0.82, 1.04)	78.9	0.98 (0.90, 1.02)
posttest, n ≥ 1 information source	98	96.9	1.04 (0.99, 1.07)	86.7	1.01 (0.92, 1.03)
Zion ^g					
baseline	263	76.4	1.0	39.5	1.0
posttest, n = 0 information source	58	74.1	0.99 (0.81, 1.13)	13.8	0.45 (0.21, 0.91)
posttest, n ≥ 1 information source	192	87.0	1.13 (1.04, 1.20)	42.7	1.39 (1.06, 1.77)

^a Outcome variable for logistic regression coded as ≥ 30 minutes vs. < 30 minutes.

^b Outcome variable for logistic regression coded as ≥ 60 minutes vs. < 30 minutes.

^c Nonmissing data on outcome, age, gender, race, and at least half of the total possible program-specific information sources.

^d Adjusted for age, gender, race, and park (pooled analysis only).

^e Programs included local newspaper article, local newspaper ad, maps, brochure, tourist weekly article, tourist weekly 'Trail of the week,' e-mail, and internet websites.

^f Programs included local newspaper ad, newspaper articles, brochure, maps, and posters.

^g Programs included posters, maps, brochures, internet website, and bus/shuttle drivers' verbal scripts.

for ≥ 60 minutes (adjusted prevalence ratio = 1.11). This effect was highest for Acadia and Zion when using the 60-minute cut-point for defining an active visit. Although based on smaller sample sizes, trail users at Acadia who reported at least 1 program-related media contact were 41% more likely to plan an active visit (>60 minutes) than users at baseline (adjusted prevalence ratio = 1.41; 95% CI: 1.05, 1.66). At Zion, the corresponding increase was 39% (adjusted prevalence ratio = 1.39; 95% CI: 1.06, 1.77).

Discussion

The potential benefits from park visits can be physical, psychological, social, economic, and environmental.³⁰ In particular, this project focused on the physical health benefits of park usage, examining awareness and changes in rates of physical activity. The findings from the 7 NPS pilot projects have important implications for promoting active visits to parks. For relatively low cost (average of \$71,100 per project ranging from \$39,000 to \$100,000) and burden on park staff, 5 of 7 projects showed evidence of effectiveness in increasing rates of physical activity. The pooled analysis of trail intercept data were consistent with these findings, suggesting that trail users who received the program materials at posttest were slightly more likely to engage in exercise or recreational activity for 30 or more minutes duration compared with users at baseline. These data should prove useful in understanding the policy implications of a full-scale NPS-wide initiative.

Most of the research on parks and trails to date has focused on whether access and specific features of parks and trails are associated with physical activity (ie, If you build it, will they come?). In studies to date, proximity to parks and trails has generally been associated with increased physical activity.¹² This study extends this previous research by focusing on promotional activities within 7 destination and urban parks. These approaches take into account ecological levels of behavior change: individual, interpersonal, organizational, environmental, and public policy levels.^{4,12,31-33} For example, use of an urban trail may increase if policies are enacted to maintain and upgrade the trail, along with local worksites promoting trail use and local media encouraging trail use.

Visitors to NPS parks and trails are different from the general public. This can be illustrated with data on intentions to change behavior. In studies of population-wide samples, between 8 and 25% of respondents are in the precontemplation stage.^{34,35} In the data from the sites conducting intercept surveys, only 3% to 4% of the sample was in the precontemplation stage. In setting public health recommendations, the minimal level for physical activity is often determined to be at least 30 minutes a day of moderate-intensity activity on 5 or more days a week, or at least 20 minutes a day of vigorous-intensity activity on 3 or more days a week, or both. In 2005, slightly less than half the adult US population engaged in recommended levels of physical activity.² In contrast, among the 3 parks with pooled trail intercept data, 86% of

respondents planned to spend 30 minutes or more on the trail. Epidemiologic studies have documented a continuous dose-response gradient of outcome variables across a wide range of activity or fitness levels.³⁶ Therefore, even though park users are at a different stage of change and activity level than the overall population, benefits from additional physical activity are likely. Future programs should focus on segments of the population who are most at-risk of inactivity (eg, youth, lower-income), and evaluations should include populations living in the target communities, not only park- or trail-users.

The important role of partnerships was prominent in implementing and sustaining the parks' programming. Partnerships (people and organizations from multiple sectors working together for a common purpose) are fundamental for health improvement.³⁷ For promotion of physical activity, transdisciplinary partnerships are needed that include parks and recreation, leisure studies, economics, political science, transportation, urban planning, and public health.^{37,38} A key concept in building these partnerships is the participation of nonacademic researchers in creating the knowledge base.³⁹ In sustaining long-term programs in the NPS, a continuing commitment to inclusive, multisectoral partnerships is needed.

Limitations of the Evaluation

It is important to note several limitations of this pilot evaluation. First, we relied on self-reported data among park users, for which there are several potential biases (eg, lack of correlation with objective data on physical activity, park usage does not equate to regular physical activity participation, possible under-representation of lower socioeconomic segments of the population). Second, because many of the parks in the pilot evaluation were unique, we were unable to identify a suitable control group for each site. Third, for some pilot sites, the sample size was relatively small, resulting in low statistical power. A larger sample might have allowed subgroup analysis for 2 main types of parks. Fourth, details about the administration of the intercept surveys (eg, training and number of data collectors, response rates) were not consistently recorded or provided in the reports. This information would permit replicability of study methods and a more rigorous assessment of the validity of the results. Fifth, given the variation in parks, their target audiences, and program components, standardization across all parks in assessing program impacts was not feasible. Sixth, the unique aspects, successes and challenges of individual parks were missed in this synthesis report; readers interested in learning more are encouraged to contact the authors for the individual park reports. And finally, most parks did not attempt to address Outcome 3 (increase in physical activity as a lifestyle at home) due to the short duration of the programs and the difficulty in measuring physical activity as a lifestyle in the home environment. Despite the methodological limitations, findings from the pilot studies were valuable for informing the feasibility and priorities for future programs in

NPS parks (eg, importance of partnerships, resources, targeting high-risk populations) as well as improving evaluation methods.

Recommendations

The cross-site findings from this pilot evaluation led to a set of recommendations. This advice comes from the evaluation team. When considering implementation of these, leadership, staff, and partners of the NPS should consider each recommendation for its feasibility, timeliness, and appropriateness within the NPS. The recommendations are provided under 2 main headings: those for research and those related to management and policy.

Areas of Future Research

These recommendations for future study emanate directly from the science, including recommendations for additional research that would add value to the current work.

1. *Continue and improve evaluation strategies.* For future assessments, some evaluation and analytic changes should be considered: 1) ensure the evaluation time line is realistic (ie, there is enough time to show change); 2) measure a series of intermediate indicators (eg, intentions to change⁴⁰) that are feasible for short-term projects; 3) use more mixed-method approaches (ie, qualitative and quantitative methods) within each site; 4) standardize evaluation tools and analytic strategies (eg, when possible, use parallel evaluation tools across parks); and 5) employ use of objective measures of physical activity whenever possible (eg, pedometers or accelerometers).⁴¹ Evaluation should be a fundamental component of all NPS programs. Several of the pilot projects have developed innovative evaluation approaches. These should be continued and expanded. In addition, several evaluation questions should be answered in the future: 1) To what extent do programs such as these actually capture new users to the park? 2) Among the information strategies used, are some more effective than others? and 3) Which are the critical partnerships that should be developed?
2. *Ensure adequate sample sizes, both within and across parks.* Since time and resources were limited for these pilot projects, future efforts should consider using more sites and larger sample sizes within each site. This will allow for within-group analyses (eg, men compared with women, local residents compared with visitors) and would also compare effects by type of park (eg, destination versus urban parks). This is a need because most studies in the literature have examined use of neighborhood parks.¹²
3. *Identify approaches for special (high-risk) populations.* Certain groups (eg, persons with less education, racial/ethnic minorities) are at high risk for physical inactivity.² These projects need to better address the underlying reasons why high-risk groups

sometimes do not participate in programs.⁴² Such work will increase the reach of NPS programs. Some of the pilot projects addressed these populations, but future projects should build on current lessons to better reach high-risk groups. Of note, the youth-focused programs (ie, Cuyahoga Valley, Timucuan) showed evidence of sustainability over time.

Management and Policy Considerations

Following is a set of management issues for consideration. These should be interpreted with caution for 2 reasons. First, research findings from a small number of studies are rarely conclusive enough to support sweeping recommendations. Second, managers and policymakers deal with a host of other inputs into decision-making besides scientific research (eg, resource constraints, organizational mission).

1. *Document and expand partnerships and coalitions to promote physical activity.* Partnerships were extremely important in these pilot evaluations. Increasingly in the literature, effective approaches to partnership building (often via coalitions) are being documented.^{9,37,43–47} Future NPS programs to promote physical activity should better apply the partnership model of health promotion.
2. *Apply principles of social marketing to enhance program effectiveness.* Social marketing involves the use of marketing to design and implement programs to promote socially beneficial behavior change.⁴⁸ While many of the pilot projects used elements of marketing techniques, a more formal reliance on social marketing is likely to enhance the effectiveness of some programs.
3. *Institutionalize evidence-based strategies to promote active visits.* Evidence-based approaches to public health are fundamental for enhancing quality of life.^{49,50} As these findings are confirmed and replicated, the NPS management should consider steps to operationalize actions, strategies, and policies so that evidence-based approaches to promoting active park use become a larger part of the mission of the parks system. In part, managers should look for efficient ways to incorporate evidence-based strategies (eg, making promotion of active visits a part of ongoing programs). A related issue for management involves understanding how much programs can be generalized to various parks versus being specific to the unique qualities of a particular setting.

Conclusion

Participation in outdoor recreation provides a range of potential benefits. These include: health improvement from physical activity; spiritual well-being; an increase in self-esteem; mental restoration; and an appreciation for the natural environment.^{11,12,30,51–54} While the parks in this pilot evaluation are already providing many

important opportunities, enhancement and replication of the programs described in this report have the potential for even greater benefits. The NPS and participating investigators should take steps to disseminate and build on these findings among academicians and practitioners in public health, leisure science, recreation, parks management, and education.

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