The California Active Aging Community Grant Program: Translating Science Into Practice to Promote Physical Activity in Older Adults

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ABSTRACT

Background: *Attempts to study the translation of evidence-based physical activity interventions in community settings are scarce.* ***Purpose:*** *This project was an investigation of whether 13 diverse local lead agencies could effectively implement a choice-based, telephone-assisted physical activity promotion program for older adults based on intervention models proven efficacious in research settings.* ***Methods:*** *At baseline, participants developed their own physical activity programs through an individualized planning session based on preference, health status, readiness to change, and available community resources. Thereafter, participants received regular telephone calls over a 1-year period from a trained staff member or volunteer support buddy. Additional program components consisted of health education workshops, newsletters, and group-based physical activities. Self-report data on caloric expenditure due to all and moderate or greater intensity physical activities were collected from 447 participants (M age = 68 ± 8.6 years).* ***Results:*** *A significant increase ($p \leq .0001$) from baseline to midintervention and intervention endpoint was observed for total weekly caloric expenditure (Mdn change = 644–707 kcal/week) and moderate or greater weekly caloric expenditure (Mdn change = 149–265 kcal/week), as well as for weekly physical activity duration and frequency. These changes were observed in participants across all sites.* ***Conclusions:*** *The increases in weekly caloric expenditure were commensurate with findings from several previous randomized clinical trials. The utilization of community agency staff and volunteers receiving basic training to implement essential program components proved feasible. Very favorable levels of program satisfaction expressed by community staff, volunteer support buddies, and participants, combined with the significant increases in physical activity, warrant further dissemination of the intervention model.*

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INTRODUCTION

Despite the well-known health benefits of physical activity, national data demonstrate that persons over the age of 50 form the least physically active segment of the population (1,2). For the purpose of better promoting the concept of active aging to older adults, it is critical that program designers both identify physical activity interventions that have proven successful in

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well-controlled research and determine their effectiveness in as many applied settings as possible (3–5). However, even when such research is identified, systematic attempts by the scientific community to translate and disseminate these successful programs are sorely lacking (4–7).

In considering interventions that would be applicable to community-based entities desiring to promote physical activity in older adults, one highly feasible approach is a choice-based, telephone-assisted model. Cognitive-behavioral telephone-assisted approaches developed and evaluated by research scientists at Stanford University have been successful in several randomized clinical trials comparing various types, formats, and intensities of physical activity (8–10). A choice-based, telephone-assisted approach was proven effective in the Community Healthy Activities Model Program for Seniors (CHAMPS), a physical activity promotion program for older adults developed by researchers at the University of California, San Francisco, in collaboration with Stanford researchers. This approach helped participants choose their own physical activity regimens based on preferences, health status, readiness to change, and other factors (11,12). The CHAMPS model included other intervention components (e.g., monthly group workshops, newsletters, and functional fitness assessments) that provided participants with information, social support, and opportunities for skill building (12). The telephone-assisted model has proven effective in terms of significantly improving physical activity adherence rates (8,9,13), cardiovascular fitness (8,10,14), coronary risk profile (8,14), psychological outcomes (10), and quality of life (9,10,15) in middle-aged and older-aged adults. Combining personal choice with telephone assistance and other supportive components has also been successful in significantly increasing physical activity (11,12,15) and psychological outcomes (16) in older adults.

A choice-based, telephone-assisted model is ideal for engaging community dwelling, functionally independent older adults who prefer to engage in physical activity and exercise outside of the traditional structured group- or class-based program (17–20). Many traditional group-, class-, or setting-based programs also do not typically incorporate behavior change strategies designed to assist older adults with real and perceived barriers to being physically active. Practical programmatic advantages to the choice-based, telephone-assisted intervention model include not only greater convenience and flexibility than that found in group-based classes for participants but also reduced need for transportation, specialized equipment, and facility space. However, there has been a call to test the effectiveness of such a model in more diverse settings and communities (3,7,12).

This article describes the ability of 13 local lead agencies to effectively implement the choice-based, telephone-assisted intervention model in their communities. Physical activity and stage of readiness to change outcomes of over 400 older adult participants are presented. Results from the process evaluation of this study provide information regarding the reproducibility of the intervention model outside of the controlled research setting and the potential modifications required for community-based organizations to successfully implement the program.

METHODS

Program Sites

Thirteen local lead agencies were selected as Active Aging Community Grant Program sites based on their experience in providing wellness-related services to older adults, experience in recruiting and managing volunteers, adequate organizational infrastructure, and the ability to provide a $10,000 in-kind contribution as a match to grant dollars ($15,000 over an 18-month period). The 13 lead agencies included 5 community nonprofit organizations, 3 city departments (park and recreation, community services, aging services), 2 health and fitness organizations, 2 local hospitals, and 1 county department of public health. Six agencies served primarily White residents, 3 served residents of mixed race and ethnicity, 3 served Latino residents, and 1 served African American residents. Nine agencies were located in urban settings, and 4 were located in rural areas. The 13 lead agencies were also located in seven distinct geographical regions of the state—southern, southern desert, central coast, central valley, northern central valley, bay area, and northern regions.

Intervention

The project described in this article represented the first large-scale application of a choice-based, telephone-assisted intervention model in diverse community settings. As such, it was deemed impractical to include control or comparison sites to replicate earlier research designs. However, process evaluation procedures were incorporated to determine whether the intervention could be translated effectively into practice to achieve similar results among older adults as found in the randomized clinical trials.

Lead agency staff received 16 hr of training on the benefits of and barriers to physical activity, the intervention model, behavior change principles, recruitment strategies, motivational strategies, screening and assessment methods, volunteer selection criteria, telephone follow-up protocol, optional program components, and program evaluation procedures. After training, lead agency staff at each site instituted a 6-month participant recruitment phase by using outreach and marketing strategies best suited to their community. Recruitment strategies included fliers posted at community sites frequented by older adults; direct mailings; telephone calls to older adults; paid and unpaid newspaper, radio, and television ads; information distributed at senior health fairs; and presentations to various community groups. Sites were encouraged to recruit persons who were (a) age 50 and older, (b) community dwelling (i.e., not living in an assisted living or skilled nursing facility), (c) sedentary or irregularly active (defined as performing endurance activities an average of two times or fewer per week or 2 hr or less per week in the past 30 days), and (d) without medical complications contraindicating regular unsupervised physical activity (e.g., unstable angina, uncontrolled hypertension).

Each participant initially completed a personal information questionnaire covering several demographic variables as well as

a 16-item health questionnaire adapted from the Physical Activity Readiness Questionnaire (21). Each site addressed the presence of health conditions with physician clearance policies and procedures suited to its agency and community. Informed consent and waiver forms and procedures approved by site-specific legal counsel and human subject review boards were also implemented with each participant.

Once approved for the program, the participant met with a site staff member for 20 to 30 min to develop a physical activity plan with goals tailored to the participant's preferences, needs, abilities, resources, and stage of readiness to change. Participants determined the types of physical activity they were interested in; when, where, how long, and how often they wanted to do the activity; and with whom (if anybody) they wanted to be active. Although each participant developed a personalized program to increase his or her physical activity level, the long-term physical activity goal was at least 30 min of moderate-intensity activity on most days of the week (22,23). Given that participants were generally sedentary or irregularly active, verbal and written guidelines on gradual progression and exercise safety were provided.

Thereafter, participants received regularly scheduled telephone calls over a period of 1 year from a "support buddy," who primarily provided social support, evaluation of barriers to physical activity, positive reinforcement, and revised goal setting. Persons serving as support buddies included older adult volunteers, health *promotores*, student interns, and lead agency staff. Regardless of who served as a support buddy, each was chosen based on his or her motivation and listening skills, time availability, and commitment to a physically active lifestyle. Persons serving as support buddies received 4 to 8 hr of training on the benefits of physical activity, guidelines for safe physical activity, barriers to being physically active, telephone follow-up protocol and procedures, and techniques to facilitate behavior change.

The follow-up telephone protocol included one call per week during the 1st month, one call every 2 weeks during Months 2 through 4, and one call per month during Months 5 through 12. If a participant could not be reached for a regularly scheduled call in five attempts, the support buddy then waited until the next regularly scheduled time to contact the person. As circumstances arose, the support buddy contacted the person more or less frequently. Such circumstances included difficulty in overcoming barriers, vacations, and seasonal employment. The designed call procedures enabled conversations to be completed in about 10 to 15 min, although the time varied based on individual circumstances.

During training, other components mentioned for possible inclusion in the intervention were health education workshops, newsletters, group-based social and physical activities, and functional fitness assessments (12). Each site independently determined whether or not it would offer any of these components based on available resources.

Process Evaluation

At the completion of the intervention, surveys were administered to, and interviews were conducted with, lead agency staff to document which program components were implemented, the number of volunteer support buddies involved, the challenges that were encountered during program implementation, solutions to challenges, and accomplishments. Surveys were also administered to volunteers and participants to determine their satisfaction with and insights into various aspects of the program. A 5-point Likert scale was used to quantify volunteer and participant responses, from 1 (*do not agree*), to 3 (*somewhat agree*), to 5 (*strongly agree*).

Outcomes

Outcomes of primary interest were estimated calories expended per week in physical activity and the estimated number of hours per week and frequency per week of these physical activities. These measures of physical activity were obtained using the self-report CHAMPS Physical Activity Questionnaire for Older Adults. The reliability, construct validity, and sensitivity of this instrument have been described (24,25). The CHAMPS questionnaire contained questions about the frequency and duration of over 30 different physical activities in a typical week during the last 4 weeks (25). To accommodate Latino/Hispanic participants, a Spanish-language version was developed. A few additional activities specific to Hispanic culture were added to the questionnaire as a result of extensive pilot testing. These activities were added to the English questionnaire for comparability.

For frequency, hours, and calories expended per week (kcal/week), two outcome measures were derived based on (a) physical activities of moderate or greater intensity (MOD+; metabolic equivalent value of ≥ 3.0) and (b) all specified physical activities that included activities of light intensity in addition to moderate or greater intensity (total caloric expenditure).

Stage of readiness to change physical activity behavior was measured by a standard method (26). The stage of readiness to change has five ordered categorical levels: precontemplation, contemplation, preparation, action, and maintenance (27).

Outcome data were gathered at three intervals: baseline, midintervention, and the completion of the intervention. Although the majority of participants completed their assessments at 6 and 12 months, the range varied for the two postbaseline data collection points on the part of some participants, reflecting an ongoing enrollment process used by the local lead agencies. This circumstance illustrates the constraints imposed in conducting program evaluation in the community as opposed to doing so in research settings.

Missing Data

Individuals with incomplete forms were contacted by mail and follow-up telephone calls from local staff and state-level evaluators. In sum, 33% of the individuals had some data collected in this manner on a CHAMPS questionnaire from at least one of the three assessments to yield complete questionnaires. There were 33 participants (7%) missing only 1 of the 29 activities needed to calculate total caloric expenditure, 20 of whom were missing an activity needed for the MOD+ calculation. Therefore, we imputed data for these individuals. For those who listed an average weekly frequency for the activity with the

missing duration, the median time given by others reporting the same frequency of the activity was used as the imputed number of hours. If no frequency was stated, the median activity duration from all study participants was used.

Data Analysis

The Wilcoxon signed rank test was used to test for differences between baseline and the two follow-up assessments for physical activity outcomes. Due to the skewed distribution of the caloric expenditure outcomes, the calorie expenditures (kcal) were transformed to the natural logarithm scale. To enable the logarithm transformation, 1 kcal was added to the expenditure in assessments in which 0 kcal were reported; 11 individuals reported zero total caloric expenditure, and 165 individuals reported zero MOD+ caloric expenditure during at least one of the assessments.

To assess baseline demographic and health history variables as predictors of change over time of caloric expenditure, repeated-measures random effects models were used (28). All analyses were carried out using SAS PROC MIXED and other SAS procedures. A two-sided *p* value less than .05 was considered statistically significant. Given the use of nonparametric statistics and the transformation applied, the median is reported as the descriptive measure of central tendency. Results from separate analyses excluding and including imputed hours of activity and retrospectively gathered data were consistent. Thus, the procedures for handling the missing data did not appear to confound the results.

RESULTS

Process Evaluation

Table 1 indicates the number of older adults officially approved for participation, number of participants lost during follow-up, and the program components implemented across the 13 sites. The number of persons officially approved for participation at each site ranged from 20 to 82. The rate of loss during follow-up ranged from 0% to 48% across the sites. Each lead agency offered health education workshops (attendance optional) on topics such as how to exercise safely, nutrition, physical activity resources, fall prevention, medication management, yoga, tai chi, and proper footwear for exercise. In combination with these workshops or at other times, 12 sites organized social events such as holiday parties, birthday celebrations, and recognition ceremonies. Over the 12-month intervention, the number of health education sessions and social gatherings ranged from 1 to 60 and from 1 to 10 per site, respectively.

Ten sites developed newsletters that were mailed to participants between 1 and 12 times during the 12-month intervention. Newsletters typically featured physical activity tips, personal success stories, calendar of upcoming events, listing of community physical activity resources, and information on other health topics pertinent to older adults. Eight sites created and/or supported a variety of group-based physical activities (e.g., tai chi, aerobics, and general conditioning classes and walking groups) in response to interest expressed by some participants who preferred these as a physical activity option. Across sites, the number of group-based sessions ranged from 15 to 156 over the 12-month intervention.

On their own initiative, four sites supplemented telephone support with periodic face-to-face visits either in the participant's home or at another venue (e.g., community clinic). Face-to-face visits were most common to sites working with ethnic, minority, and/or non-English-speaking participants. Across the four sites, 3 to 12 face-to-face visits were conducted per month during the intervention. However, complete data were not available indicating the total number and what percentage of participants at these sites actually experienced face-to-face contact.

Ten sites used older adults as support buddies. Five sites used student interns, and 4 sites used paid lead agency staff as

TABLE 1
Number of Older Adults Officially Approved for Participation and the Intervention Components Implemented Across Active Aging Community Grant Program Sites

Site	*Participants Recruited (Lost During Follow-Up)*	*Health Education Workshops*	*Social Events*	*Newsletter*	*Exercise Classes*	*Face-to-Face Visits for Some Participants*
1	72 (6)	X	X	X		
2	21 (9)	X		X	X	X
3	82 (10)	X	X	X	X	
4	25 (3)	X	X	X	X	
5	52 (11)	X	X	X		
6	31 (15)	X	X		X	X
7	69 (16)	X	X	X	X	
8	23 (1)	X	X	X	X	
9	24 (0)	X	X	X	X	
10	38 (5)	X	X	X		
11	46 (22)	X	X	X	X	X
12	51 (0)	X	X			X
13	20 (2)	X	X			

support buddies in addition to volunteers. One site working with Spanish-speaking participants utilized paid health *promotores* as support buddies.

In response to open-ended survey questions, the most often mentioned challenges by local lead agency staff representing each site were recruitment of participants, recruitment of volunteers, and organizing the paperwork pertaining to the formal evaluation process. Typically mentioned solutions to these challenges were perseverance, using a variety of marketing methods to attract participants and volunteers, and hiring part-time staff or student interns to assist with paperwork. Listed accomplishments included observing improvements in participants' functional capacity and overall outlook on life, enhanced partnerships with other community agencies and organizations, increased knowledge of lead agency staff about promoting physical activity to older adults, and leveraging participation in the program to attract other grant funds.

Surveys were received from 69 of 97 persons serving as support buddies (71% response rate). The average number of participants assigned to support buddies was 6.2 ± 7.4. The wide variability reflected two paid lead agency staff each assigned to 30 to 45 participants. Unpaid volunteer support buddies were generally assigned 3 to 6 participants. Support buddies spent an average of 4.0 ± 3.5 hr per month making telephone contact with participants. The most often mentioned challenges by volunteers were difficulty in making telephone contact with participants and with participants not meeting their goals. Across the sites, between 25 and 150 phone calls per month were completed, although data were not available to determine the percentage of regularly scheduled telephone contacts successfully completed.

Support buddies indicated they mostly or strongly agreed that the training workshops were helpful (4.3 ± 0.9), that they knew more about physical activity and changing behavior as a result of being a support buddy (4.1 ± 1.1), that the telephone calls helped participants to become active (3.9 ± 1.1), that the participants were thankful for the telephone calls (4.4 ± 0.8), and that they would tell a friend to volunteer in a similar program (4.1 ± 1.1).

Program surveys were received from 324 participants (72% response rate), with responses listed in Table 2. Very favorable responses were received with regard to monthly workshops, volunteers being viewed as supportive, recommending the program to a friend, and participating in the program again. Slightly lower yet still favorable responses were noted for the program helping the person to overcome barriers to being active, increased knowledge about physical activity, helpful newsletters, and positive impact of telephone calls. Participants only somewhat agreed that they were able to achieve their physical activity goals, were able to do more things since starting the program, and preferred to do physical activity in a group setting. Of interest, 284 of these participants responded to the question about the health education workshops, indicating 88% of these respondents attended this type of group-based activity. If all nonresponders were assumed to not have participated in this program component, then approximately 64% of the total sample attended such workshops.

TABLE 2
Participant Responses to Satisfaction Questionnaire

Health education workshops I attended were helpful.	4.1 ± 0.9
My time as a participant has been enjoyable.	4.1 ± 1.0
The program helped me to overcome barriers to being physically active.	3.5 ± 1.2
Since becoming a participant I know more about how to keep physically active.	3.7 ± 1.1
The phone calls and/or face-to-face visits I received have helped me to become active.	3.6 ± 1.3
The program newsletters I received were helpful.	3.8 ± 1.1
The volunteer assigned to me was supportive.	4.0 ± 1.3
I would tell a friend to become a participant in a program like this.	4.1 ± 1.2
I was able to achieve my physical activity goals during the program.	3.3 ± 1.3
I am able to do more things I want to do since starting the program.	3.2 ± 1.2
I prefer to do physical activity in a group setting.	3.1 ± 1.4
I would participate in the program again.	4.0 ± 1.3

Note. n = 324. The 5-point scale ranged from 1 (*do not agree*), to 3 (*somewhat agree*), to 5 (*strongly agree*).

Loss of Participants During Follow-Up

There were 548 participants who completed the CHAMPS questionnaire at baseline. During the 1-year follow-up, there were 447 individuals (82% of total original sample) who provided information on the outcomes of major interest, with 243 providing information at all three assessments. Reasons for loss of 101 participants during follow-up included failure to respond to five written reminders sent via mail (63%), inability to reach (15%), personal request to discontinue program (13%), death (5 persons; 5%), and health (4%). Personal requests to discontinue the program originated from a perceived lack of time, change in health status, and relocation. Additional analyses determined that participants lost during follow-up were more likely to be African American and employed full-time. Subsequent investigation indicated that none of the deaths were affiliated with participation in the program.

Sample Characteristics

The age range for the sample of 447 participants was 48 to 90 years (M = 68 ± 8.6 years). The mean body mass index was 28.3 ± 5.6 m/kg^2 (range = 17.4–50.2 m/kg^2), indicating the group was overweight. As seen in Table 3, at the time they entered the intervention, the majority of the participants were female, White, high school graduates, married, and retired, and they self-reported an existing medical condition or symptom. However, the sample also included a reasonable percentage of Latino/Hispanic (25%) and African American (9%) older adults.

Type of Activity

The most frequently reported physical activities were household work, walking for errands, gardening, leisure walking, brisk

TABLE 3
Baseline Sample Characteristics

Variable	*M (SD) or %*
Age (years)	67.9 (8.6)
Body mass index (m/kg^2)	28.3 (5.6)
Medical conditions	
Hypertension	42.0
Heart condition	13.3
Psychiatric	6.7
Lung disease	8.8
Diabetes	11.9
Fracture (hip/spine)	4.1
Any condition	57.9
Medical symptoms	
Chest pain	6.8
Dizziness	11.5
Shortness of breath	15.2
Sharp pain (thigh/calf)	6.4
Doctor limit on physical activity	6.4
Any symptom	30.9
Female	78.3
Race	
African American	9.0
Asian	2.3
Caucasian	58.4
Hispanic	25.1
Other	1.8
Declined to state	3.4
Education	
≤ Eighth grade	13.5
Some high school	4.5
High school graduate	15.5
Some college	36.0
College graduate	12.8
Some postgraduate	14.4
Declined to state	3.2
Marital status	
Divorced/Separated	17.3
Married	47.5
Never married	4.3
Widowed	27.0
Declined to state	3.9
Living arrangements	
Alone	38.0
Residential facility	2.1
With family	53.1
Other	4.1
Declined to state	2.7
Working status	
Employed	20.9
Unemployed	7.9
Retired/No work	49.2
Retired/Work	17.7
Declined to state	4.3
Household income	
< 10K	17.9
10–19.99K	20.3
20–29.99K	13.7
30–39.99K	5.7
40–50K	6.1
> 50K	10.6
Declined to state	25.7

Note. $n = 447$.

walking, and stretching. These six activities accounted for 70% to 80% of the total frequency and duration observed for physical activity at each data collection period.

Changes in Total Physical Activity

There was a significant difference in estimated total caloric expenditure between baseline and midintervention ($n = 297$, *Mdn* change = 644 kcal/week, $p < .0001$) and baseline and intervention endpoint ($n = 391$, *Mdn* change = 707 kcal/week, $p < .0001$) but no significant difference between midintervention and intervention endpoint ($n = 243$, *Mdn* change = 75 kcal/week, $p = .1$). A similar pattern was observed for weekly duration and frequency of total physical activity (see Table 4). Results from the random effects model indicated that a typical 65-year-old averaged a 3.2% increase per month in total caloric expenditure. A negative correlation existed between the baseline level and amount of change in total caloric expenditure of individuals recruited across and within intervention sites. This suggests that individuals who started with lower baseline total caloric expenditure tended to increase their caloric expenditure more than those who started with higher baseline total caloric expenditures. Age was the only other significant predictor of change in total caloric expenditure, with persons older than 65 exhibiting slightly but significantly greater change than persons younger than 65.

Change in MOD+ Physical Activity

There was a significant increase in estimated MOD+ caloric expenditure between baseline and midintervention ($n = 298$, *Mdn* change = 149 kcal/week, $p < .0001$) and baseline and intervention endpoint ($n = 395$, *Mdn* change = 265 kcal/week, $p < .0001$), with no further increase between midintervention and intervention endpoint ($n = 235$, *Mdn* change = 0 kcal/week, $p = .06$). A similar pattern was observed for both weekly duration and frequency of MOD+ physical activity (see Table 4).

The random effects model for MOD+ caloric expenditure demonstrated that the typical 65-year-old participant experienced a 7% increase per month in MOD+ caloric expenditure across the 12-month period. There was a negative correlation between the two random effects for baseline level and change in MOD+ caloric expenditure, suggesting that those with lower baseline MOD+ caloric expenditure changed more over time than those with higher baseline values. There were no other significant predictors of change in MOD+ caloric expenditure.

Change in Light-Intensity Physical Activity

There were 165 individuals that recorded zero MOD+ caloric expenditure at a minimum of one evaluation period. Of those, 49 participants had zero MOD+ caloric expenditure at all assessments. These individuals also had less baseline caloric expenditure stemming from light-intensity activities (total minus MOD+ caloric expenditure). However, these participants significantly increased their light-intensity caloric expenditure between baseline and midintervention ($n = 116$, *Mdn* change = 368 kcal/week, $p = .0044$) and baseline and intervention endpoint (*n*

TABLE 4

Median and Median Change in Physical Activity-Related Total and Moderate Intensity or Greater (Mod+) Caloric Expenditure (Kcals/wk), Duration (Hours/wk), and Frequency (x/wk) at Baseline (B), Midintervention (Mi), and Intervention Endpoint (E)

Variable	*n*[a]	*25%*	*Median/Median Change (–/+)*	*75%*	*p*
Total kcals/wk					
B	446	829	1,767	3,341	
MI	298	1,263	2,317	3,835	
E	392	1,433	2,406	4,179	
MI–B	297	–312	+644	+1,513	< .0001
E–B	391	–298	+707	+1,774	< .0001
E–MI	243	–731	+75	+1,120	.10
Total hours/wk					
B	446	4	8.25	15	
MI	298	6.75	10.75	17	
E	392	6.5	11	18	
MI–B	297	–1.25	+2.75	+6.75	< .0001
E–B	391	–1.75	+3.00	+7.75	< .0001
E–MI	243	–3.75	+0.5	+5.25	.07
Total x/wk					
B	430	7	12	20	
MI	294	10	15	23	
E	363	11	17	24	
MI–B	283	–1	+3	+8	< .0001
E–B	350	–1	+4	+10	< .0001
E–MI	229	–3	+0.5	+5	.11
MOD+ kcals/wk					
B	447	0	502	1,493	
MI	298	152	841	1,902	
E	395	251	950	2,118	
MI–B	298	–162	+149	+902	< .0001
E–B	395	–127	+265	+1,169	< .0001
E–MI	246	–255	0	+612	.06
MOD+ hours/wk					
B	447	0	1.75	5.5	
MI	298	0.5	2.9	6.5	
E	395	1	3.5	7.5	
MI–B	298	–0.5	+0.5	+3	< .0001
E–B	395	–0.5	+1	+3.75	< .0001
E–MI	246	–1.25	0	+2	.07
MOD+ x/wk					
B	435	0	3	7	
MI	295	1	5	9	
E	371	2	5	9	
MI–B	285	–1	+1	+4	< .0001
E–B	361	0	+1.5	+5	< .0001
E–MI	235	–2	0	+3	.26

[a]Sample size varies between cells due to available data (e.g, for total kcals/wk MI–B, there were 297 participants with data at both assessments).

= 143, *Mdn* change = 481 kcal/week, $p < .0001$) but not between midintervention and intervention endpoint ($n = 94$, *Mdn* change = 0 kcal/week, $p = .33$).

Stage of Readiness to Change

At baseline, the distribution of participants among the five stages of readiness to change physical activity behavior was similar to that reported for younger populations (23). At baseline, 73% of all participants were in the precontemplation, contemplation, or preparation stage, indicating that the local lead agencies were highly successful in recruiting inactive and irregularly active older adults. The overall improvement rate (i.e., a positive change in stage of readiness) for participants initially in precontemplation, contemplation, preparation, and action was 80%, 94%, 63%, and 55%, respectively. In addition, 38% and 23% of participants starting in action and maintenance, respectively, exhibited relapse (i.e., shift to a lower stage of readiness) during the intervention.

DISCUSSION

The California Active Aging Community Grant Program represented the first systematic effort to implement in several community settings at once an intervention to increase physical activity in older adults based on proven research models. Challenges experienced with this large-scale translation endeavor included changes in lead agency staff, participant and volunteer recruitment, participant retention, intervention standardization, and data acquisition. Despite these challenges, the significant increases achieved in total and MOD+ physical activity caloric expenditure indicate that the choice-based, telephone-assisted behavior change model can be effectively delivered by diverse community agencies to older adults. The results are especially encouraging considering that the primary target groups recruited for participation were sedentary and irregularly active older adults, groups typically thought to be hard to reach and motivate (6,26).

In the university-based research settings, experienced exercise scientists and health educators conducted key intervention components of program orientation, goal setting, and telephone support (8,9,11,12,16). Indeed, it has been suggested that a lack of professionally trained staff may affect how completely and appropriately such an intervention is implemented (4–6). The Active Aging Community Grant Program relied on lead agency staff, student interns, and community volunteers to conduct these essential program components after receiving between 4 and 24 hr of basic training. Most of the staff and volunteers had limited experience with physical activity promotion and virtually no experience with behavior change programs of any kind. That key behavior change ingredients were implemented with lead agency staff and community volunteers raises the likelihood that this intervention can be effectively implemented in other community settings with staff receiving basic training. The utilization of volunteers also reduces the funds needed to implement the program, making it attractive to community-based organizations with limited resources.

Nearly 58% of the participants in this project reported at least one medical condition at baseline. Yet, as indicated in program coordinator and participant surveys, all of the participants completed the program without any reported adverse events. This is likely due to the gradual increase in physical activity over time and the low-impact nature of the most common physical activities performed (e.g., walking, gardening). However, a note of caution is warranted for those who wish to engage older adults with greater frailty or complicated medical conditions in this type of community-based program with limited supervision. Under such circumstances, it may be prudent to have experienced health educators, exercise specialists, or allied health professionals conduct or closely monitor each component of the intervention. Indeed, research interventions targeting higher risk older adults have included these types of staff to deal with more complex health and functional status issues (12,14).

There was no attempt to standardize local outreach and recruitment methods, educational materials, health education workshops, social activities, newsletters, or referrals to community physical activity programs. Rather, the program sites were allowed to tailor these activities based on available resources and their constituencies' specific needs and interests. Indeed, the type and number of supportive components varied across sites (see Table 1), and the development of various group-based physical activities, the use of health *promotores*, and the inclusion of face-to-face visits were an example of the sites responding to their community's resources and participant's preferences. The most common supportive components implemented were health education workshops and newsletters. The local lead agencies had experience in organizing these types of activities and therefore found it relatively easy to incorporate these into the program.

Participants' levels of satisfaction with the program were highly favorable, particularly in regard to health education workshops and newsletters. It is certainly feasible that group-based activities such as the workshops partially contributed to the observed increase in physical activity. During group-based activities, lead agency staff and support buddies were able to interact face-to-face with participants. In combination with telephone support, the workshops and newsletters offered education, skill building, and social support for some participants. Social support interventions in community settings incorporating similar components have proven effective in increasing physical activity levels (3,12).

It is important to reiterate that each participant received regular telephone calls whether or not he or she attended group-based activities (e.g., health education workshops, social events, or exercise classes) or received a newsletter or face-to-face visits. Using the telephone to provide support and feedback to promote physical activity is unique given that community organizations traditionally offer only class-, group-, and/or setting-based physical activity educational programs and classes to older adults (7). Although there were no data indicating the percentage of successfully completed telephone calls, the reported total number of monthly phone calls completed and the average of 4 hr per month spent conducting telephone support indicate that the support buddies were diligent in fulfilling their responsibilities in making regular contact with participants.

Implementation of the telephone support protocol required careful planning and coordination. However, due to limited resources, there was no organized attempt to implement standard quality-control measures for follow-up telephone calls as done in research studies (7,11,12,16). Nevertheless, each site assigned a lead agency staff member or volunteer as a coordinator with responsibilities to supervise implementation of the follow-up telephone protocol by support buddies. Nine sites also held periodic group meetings with support buddies to discuss progress and challenges encountered with telephone support. Based on responses to the satisfaction surveys, the translation of this component of the intervention model into community settings appears to have proven reasonably effective for staff, volunteers, and participants. It is evident, however, that ongoing technical assistance for volunteer support buddies was essential and should be a part of future programs.

Limitations in this study include the use of self-reported physical activity, lack of a comparison sample, loss of 18% of

the original sample, and missing data. Of interest, the loss of 18% of the total sample is much less than the nearly 50% dropout rate noted for studies employing traditional group-based exercise programs (17). In addition, 10 of the 13 sites had dropout rates ranging from 0% to only 23%. In spite of the noted limitations, the magnitudes of increase in caloric expenditures for those for whom data were available are greater than or similar to those reported in research projects from which the intervention was adopted (see Table 5) (11,12,16). In addition, the median net increase in physical activity frequency in total (33%) and MOD+ caloric expenditure (50%) is greater than that noted for other social support interventions in community settings (20%) (3). The median net increase in physical activity duration in total (36%) and MOD+ caloric expenditure (57%) is also very similar to that observed in individually tailored behavior change (35%) and social support interventions (44%) in community settings (3). The types of physical activities undertaken by participants in this project are also nearly identical to those previously reported by older adults in a choice-based, telephone-assisted physical activity program (12).

Persons of all ages exhibited increases in total caloric expenditure over time, with persons older than 65 exhibiting slightly greater gains compared to those of younger participants. There were no other significant predictors of change in caloric expenditure, suggesting that older adults from all program sites experienced significant improvements. The results also indicate that older adults of varying race/ethnicity; both genders; and differing categories of education, health, living arrangement, and work status responded favorably to the intervention. These findings may be partially attributable to the cognitive and behavioral strategies underlying the intervention (29–32). Individuals were encouraged to choose their own activities; the frequency, length, and intensity of the activity; and where and with whom they wanted to be active. Tailoring the program to the individual's circumstances, needs, and interests is suggested as a vital means for motivating previously sedentary persons to begin and maintain a physical activity program (3,6,29,31,32). As mentioned, many participants also likely benefited from other aspects, such as social support at monthly workshops or other group-based activities. Unfortunately, it was not possible from this project to determine specifically which aspects of the intervention contributed most to the observed changes in physical activity level. This was neither the intent of our study nor the intent in previous research studies from which the intervention model was based (11,12,16).

TABLE 5

Comparison of Changes in Caloric Expenditure in This Study and Previous Studies Involving Older Adults Participating in 1-Year Choice-Based, Telephone-Assisted Interventions

	Current Study	*Stewart et al. (12)*	*Stewart et al. (11)*	*King et al. (16)*
Change in MOD+ caloric expenditure (kcals/week)	+395	+487	—	—
Change in total caloric expenditure (kcals/wk)	+707	+687	+750	+411

Note. Dashes are data not reported.

The magnitude of change in caloric expenditures over time was modest yet meaningful from an individual and public health perspective. The median increase of 265 kcal/week in MOD+ physical activity is equivalent to adding approximately a 1-mile (i.e., about a 20-min) brisk walk 2 or 3 days per week to a person's physical activity routine. The median increase of 707 kcal/week in total physical activity is equivalent to adding two to three 1-mile brisk walks plus additional activities such as housework, gardening, and leisure walking. Indeed, the most frequently reported physical activities were housework, gardening, leisure walking, walking for errands, brisk walking, and stretching (range from one to three times per week).

Having sedentary or irregularly active older adults experience even minor increases in physical activity could have a profound impact on their health, functional capacity, and quality of life (23,33,34). Of interest, participants with lower baseline levels of total and MOD+ intensity caloric expenditure exhibited the largest increases in caloric expenditures over time (a result also reported previously by Stewart et al. [12]). Improvement rates observed for the participants starting in the precontemplation, contemplation, and preparation stages of readiness to change confirm the positive impact of the choice-based, telephone-assisted intervention on initially sedentary older adults.

Despite the relative success demonstrated by the intervention, there were many participants that recorded zero MOD+ caloric expenditure at one or more assessments. These persons had attributes representative of those traditionally associated with the highest rates of a sedentary lifestyle (e.g., racial/ethnic minority, lower education) (1,2). These persons also exhibited the lowest levels of light-intensity physical activity caloric expenditure, indicating that they were very sedentary entering the program. Regardless, participants with zero MOD+ caloric expenditure at one or more assessments did exhibit significant increases in light-intensity physical activity, demonstrating some improvement and progress toward the overall program goal. In fact, the increase in caloric expenditure due to light-intensity physical activity (369–481 kcal/week) resembles the increase (411 kcal/week) observed in sedentary older adults participating in light-intensity physical activity during a telephone-assisted intervention (16).

The lack of increase in MOD+ physical activity caloric expenditure in the most sedentary subgroup, the 18% overall rate of dropout, and the relapse to a lower stage of readiness to change noted in some participants indicate that certain older adults may require a more intensive or longer intervention to reap additional health benefits from physical activity. In addition, more in-depth training and ongoing supervision of staff and volunteers on the use of behavior change principles and strategies (e.g., relapse prevention) should be considered. The process evaluation survey yielded supportive information in that a common response from support buddies was the suggestion

for more practical training initially and ongoing technical assistance to improve effectiveness in telephone support procedures during program implementation.

In summary, the empirically supported choice-based, telephone-assisted physical activity promotion model was implemented in varying degrees by 13 community-based agencies. The utilization of community agency staff and volunteers receiving basic training to implement essential behavior change components (i.e., goal setting and telephone support) proved feasible. Most program sites included additional intervention components (e.g., group-based activities and newsletters), and these, coupled with ongoing telephone support, likely provided the knowledge, skills, and social support to help participants make positive changes in their physical activity levels (32). The significant increases in physical-activity-related total and MOD+ caloric expenditure, frequency, and duration observed in older adults of varying demographic characteristics and diverse geographical locations support the continued dissemination of this intervention model into additional communities. However, more initial and ongoing training for staff and volunteers on behavior change strategies is recommended to help decrease the number of older adults who experience relapse or discontinue participation during the program.

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