Abstract

Introduction

Targeting of evidence-based programs can be improved by knowing who benefits least and most. We examined pretest predictors of increased physical activity among participants enrolled in Active for Life.

Methods

Participants (N = 1,963) from 9 community-based organizations took part in a 6-month telephone-based or a 20-week group-based behavioral physical activity program and completed a pretest survey; 1,335 participants returned posttest surveys. Interactions tested whether increases in physical activity differed over time, according to baseline characteristics.

Results

In the telephone-based program, participants who were younger and less active at pretest and those who had higher pretest social support showed greater intervention effects. In the group-based program, younger participants, those less active at pretest, women, Hispanics/Latinos, heavier participants, and those who reported more health conditions and osteoporosis showed greater intervention effects.

Conclusions

Participant response to the 2 programs varied by age, baseline activity level, and other factors. For 6 of the 8 variables associated with differential outcomes, the least active group improved the most, which suggests that the programs worked especially well for participants most in need. Participants who were older than 75 years (both groups) and those who reported lower physical activity social support (in the telephone-based program) on entry did not respond as well and may require alternative or more intensive intervention strategies.

Introduction

Most older adults (aged 65 and older) have a chronic health condition, and 50% have 2 or more (1). By 2030 a 25% increase in health care expenditures is expected because of the population increase in older adults (1). Many age-related chronic health conditions are caused by lifestyle factors. Physical activity can reduce disease burden and disability and enhance quality of life in older adults (2), but physical activity level declines with age (3,4).

In the previous 2 decades, more has been learned about how to effectively increase participation in physical activity. Reviews of physical activity interventions with older adults report favorable outcomes for interventions that use behavioral strategies and theories and comparable outcomes for supervised home-based and class or group formats (5-8). However, little is known about differences in response to interventions. Furthermore, few programs deemed effective in randomized trials are disseminated to community settings (9). We know little about how these interventions might work in real-world settings (10). Population-level changes in physical activity are likely to
occur only when effective interventions are translated for widespread use in community settings (11).

The Active for Life (AFL) initiative examines the translation of 2 efficacious, theory-based (12-14) physical activity programs to community settings (15,16). The theories used are Social Cognitive Theory and the Transtheoretical Model. Social Cognitive Theory (12) emphasizes the reciprocal interactions between the person, environment, and behavior. Key intervention components of this theory include increasing self-efficacy or confidence in overcoming barriers to behavior change and enhancing self-regulatory skills such as goal-setting, self-monitoring, problem-solving, and self-reward. The Transtheoretical Model (14) posits that people make changes gradually and in stages and that a person’s readiness for behavioral change should be used to guide the types of intervention strategies delivered. A previous study demonstrated the effective translation of the interventions tested in AFL into community settings with an effect size similar to that of the original efficacy studies but with a more representative sample (15,16). Our purpose was to examine whether intervention effects for these 2 programs differed by the following pretest characteristics of the sample: demographic factors, health-related variables, psychosocial characteristics, and initial physical activity levels. AFL’s size and sample diversity allow for these types of predictor analyses. Knowing the characteristics of participants who benefit most and least from an intervention has programmatic implications (17,18). Understanding differential predictors can also help match people with intervention or treatment options (19).

**Methods**

**Program overview**

AFL is a 4-year initiative, described in detail elsewhere (15,16) (www.activeforlife.info), that evaluated the 2 evidence-based behavioral programs we studied. As implemented in AFL, Active Choices (AC) is a 6-month program developed by Stanford University and delivered through a face-to-face orientation followed by up to 8 one-on-one telephone counseling calls (20-23). Active Living Every Day (ALED), developed by The Cooper Institute and Human Kinetics, Inc., is a 20-week program delivered in small groups (24,25). Participants meet weekly and are encouraged to provide support and share successes and challenges. Nine lead organizations at 12 sites were funded to participate in AFL (Table 1) (15,16).

**Participants**

During the entire AFL initiative, each lead organization was expected to recruit 900 participants for a study total of 8,100. Recruitment strategies were tailored by sites to their communities and targeted adults aged 50 years or older. All sites used the same screening instruments and enrolled those who were underactive (engaged in physical activity ≤2 days per week and <120 minutes per week) and free of serious medical conditions or disabilities that required higher levels of supervision on the basis of the site’s individualized risk management plan, as described elsewhere (15,16). Although the revised Physical Activity Readiness Questionnaire (PAR-Q) was administered at each site, only 2 sites required medical clearance in response to a positive PAR-Q. All physical activity participants with a positive PAR-Q, however, were encouraged to discuss physical activity with their health care provider.

**Design and procedure**

Comparable comprehensive preprogram and post-program surveys were administered to all year 1 participants (approximately 100 per site) and to the first 100 participants per site in years 3 and 4. Comprehensive surveys were administered only to the first 100 participants in the later years because we deemed this number to be an adequate sample size for detecting change over time and because it reduced site burden. We report data for participants who completed the comprehensive surveys in years 1 and 3. Data for participants in years 2 and 4 are not included. Surveys were not collected in year 2, and adaptations to the original ALED program model were tested in year 4.

All participants completed an informed consent form approved by the institutional review boards of the 2 participating universities (an evaluation team and the national program office) and by the review boards or legal departments of the 9 lead organizations. Participants completed a brief demographic questionnaire and were given the pretest survey and a postage-provided envelope addressed to the evaluation team. For ALED, posttest surveys were sent to the site and administered in 1 of the 2 last sessions or they were sent directly to participants 2 weeks before completion of their program. For AC, all posttest surveys

---

The opinions expressed by authors contributing to this journal do not necessarily reflect the opinions of the US Department of Health and Human Services, the Public Health Service, the Centers for Disease Control and Prevention, or the authors’ affiliated institutions. Use of trade names is for identification only and does not imply endorsement by any of the groups named above.

2 Centers for Disease Control and Prevention • www.cdc.gov/pcd/issues/2009/jan/07_0244.htm
were sent directly to participants 2 weeks before completion of their program. Postage-paid envelopes addressed to the evaluation team were included. Each participant who returned a survey entered a drawing for a $20 gift card to a local retail store (a 1 in 25 chance). Because of input from a local oversight board, 1 AC site did not participate in the gift card incentive beyond the first year.

Measures

We collected data on age, sex, race, Latino ethnicity, and years of education. Participants self-reported height and weight to compute body mass index (BMI) (26), rated their health from poor to excellent, and indicated whether they had ever been told by a health professional they had diabetes, hypertension, arthritis, coronary heart disease (ie, self-report of angina, coronary heart disease, or a heart attack), or osteoporosis (27).

Physical activity self-efficacy was measured with a 5-item scale in which participants rated their confidence in being able to regularly be physically active when faced with common barriers (α = .87) (28). Social support from friends and family was measured with the 5-item scale (each with a 4-point response scale) developed for the US Women’s Determinants Study (29), which used questions derived from the commonly used but significantly longer scale developed by Sallis et al (α = .70) (30). Participants also completed the widely used 10-item Center for Epidemiological Studies Depression Scale (31-33) by rating the frequency with which they experienced symptoms of depression during the past week (α = .82). Finally, participants completed the 4-item version of the Perceived Stress Scale (34,35), a briefer form of an extensively used questionnaire that was designed to measure the degree to which situations in one’s life are appraised as stressful (α = .69). All psychosocial variables were calculated as continuous variables and were also categorized into tertiles.

The Community Healthy Activities Model Program for Seniors (CHAMPS) questionnaire, a 41-item self-report measure of physical activity, was the primary outcome measure (36). It includes activities of all intensity levels typically undertaken by older adults for exercise, recreation, and daily living. The CHAMPS questionnaire has strong psychometric properties, including demonstrated validity (37), test-retest reliability (37), and sensitivity to change (22,23,36,38,39). We derived the minutes per week spent in moderate-intensity and vigorous-intensity physical activity (MVPA). Physical activity level was also categorized into tertiles. We used a secondary 3-item measure from the Behavioral Risk Factor Surveillance System (BRFSS) (27) to assess participation, frequency, and duration of moderate-intensity physical activity to classify participants as sedentary, underactive, or regularly active (40).

Statistical analyses

We conducted separate analyses for AC and ALED because the programs differed in length, mode of delivery, and characteristics of participants. Primary analyses examined whether changes from pretest to posttest in MVPA hours per week (as reported on the CHAMPS questionnaire) differed by pretest predictors (ie, time x predictor interactions). We conducted a separate repeated-measures analysis of covariance that tested each time x predictor interaction. In analyses that did not include the variables of sex, race/ethnicity, education, health rating, and BMI, these variables were entered as covariates because of their known association with MVPA. Site clustering was accounted for by using SAS version 9 (SAS Institute Inc, Cary, North Carolina). MVPA was positively skewed at pretest and somewhat skewed at posttest but was normalized with a square-root transformation.

We conducted 2 additional sets of analyses to better understand each potential predictor variable, consistent with the approach recommended elsewhere (18). Statistical significance was set at \( P < .05 \). First, we examined the percentage who met recommendations of the Centers for Disease Control and Prevention (CDC)-American College of Sports Medicine (ACSM) (determined by using the BRFSS physical activity questions) in association with each predictor variable at pretest and posttest, controlling for the same covariates as in the primary analyses. We then tested whether the percentage meeting recommendations changed differentially by each predictor variable over time (time x predictor interaction), controlling for covariates.

Results

Description of the sample

A total of 841 participants in year 1 and another 1,122 participants in year 3 completed pretest surveys. Of these,
72 participants in year 1 (8.6%) and 137 participants in year 3 (12.2%) withdrew from the program or the program and evaluation. Posttest surveys were returned by 613 participants in year 1 (72.9%) and 730 participants in year 3 (65.1%). Eight participants were excluded from all analyses because of unusable data for the primary outcome. The final sample was 1,955 (881 AC and 1,074 ALED participants; Table 2).

The following sample characteristics were associated with lower postsurvey response rates: younger age, nonwhite race/ethnicity, lower educational attainment, not being married or partnered, having diabetes or coronary heart disease, poorer self-rated health, higher physical activity social support, lower physical activity self-efficacy, higher depressive symptoms, higher perceived stress, and lower physical activity level (data not shown). We found no statistically significant differences for sex, BMI, number of health conditions, or the presence of hypertension, arthritis, stroke, or osteoporosis.

Predictors of physical activity

We calculated adjusted square-root minutes per week of MVPA at pretest and posttest for each level of the predictor variable, effect sizes, and P values for the change analyses (Table 3). For AC, younger participants and those with higher pretest social support and physical activity showed greater increases in physical activity (all P values < .05). Hispanic/Latino participants, those with fewer health conditions, and those without coronary heart disease were also more likely to show greater increases in physical activity, although these interactions did not reach significance (P < .10).

For ALED, younger participants, women, Hispanic/Latino participants, those with higher pretest BMI and more health conditions, those reporting osteoporosis, and those reporting lower pretest physical activity showed greater increases in physical activity (all P values < .05). ALED participants with more than a high school education and those with hypertension were also more likely to increase physical activity, but these interactions did not reach significance (P < .10).

Percentage meeting CDC-ACSM recommendations

We determined the percentage of participants who met CDC-ACSM recommendations at pretest and posttest (for categorical variables) and odds ratios and 95% confidence intervals (for all variables) (Table 4 and Table 5). Because the program targeted underactive and sedentary participants, only posttest findings are described here. For AC, participants who had fewer pretest health conditions, were free of arthritis and coronary heart disease, had more positive self-rated health at pretest, and reported higher pretest physical activity were significantly more likely to meet physical activity recommendations at posttest. For ALED, participants who had higher levels of education, higher pretest social support, higher pretest self-efficacy, lower pretest perceived stress, and higher pretest physical activity were significantly more likely to meet physical activity recommendations at posttest.

The next set of analyses examined whether the change in the percentage meeting CDC-ACSM recommendations from pretest to posttest (as measured by BRFSS physical activity questions) differed by each predictor variable after controlling for potential confounders (ie, time x pretest predictor interactions). For AC, significant time x pretest predictor interactions indicated that younger participants (P = .03), those with fewer health conditions (P = .03), and those without coronary heart disease (P = .005) showed the largest increases in intervention effects (data not shown.) For ALED, time x pretest predictor interactions indicated that younger participants (P = .03), those with higher levels of education (P = .05), those with higher BMIs (P = .003), and those with lower physical activity levels at pretest (as measured by the CHAMPS questionnaire) (P = .007) showed the largest intervention effects (data not shown). No other interactions reached significance.

Discussion

Although examining data to determine which population segments do better or worse with behavioral interventions (19) is critical, few studies have adequate sample sizes and diversity to allow such analyses. AFL recruited a large sample of midlife and older adults that showed diversity in demographic, health, and psychosocial characteristics. Seventeen baseline variables were examined as potential predictors of change in physical activity. Eight variables predicted differential outcomes in the primary analyses; of these, 6 groups that were initially less active showed larger increases in physical activity. These results are encouraging and suggest that when the 2 behaviorally oriented physical activity programs were
implemented in real-world settings, most midlife and older adults responded favorably to both, and no groups were adversely affected.

Primary analyses based on the CHAMPS questionnaire revealed that most participants achieved similar levels of posttest physical activity. Several groups that were initially less active showed larger intervention gains over time. Thus, the interventions worked best in those for whom they were designed, the groups that were initially less active. We noted 2 exceptions to this pattern. Participants in the oldest age group (AC and ALED) and those with lower levels of pretest social support (AC) showed significant and substantial but smaller increases in physical activity than did their counterparts.

BRFSS analyses indicated relatively few pretest differences. We found a substantial number of posttest differences, however, that were generally consistent with the literature on the correlates of physical activity (41). Despite significant posttest differences, all groups made substantial improvements over time. Furthermore, no groups were harmed by either intervention, which is a very important finding given the limited exclusion criteria and large sample (19).

The pattern of results differed for the 2 physical activity measures. Both measures were sensitive to change. Because the CHAMPS questionnaire uses response-option categories for duration, analyses were based on the estimated mean minutes per week of physical activity. In contrast, analyses using the BRFSS questions examined percentage of participants meeting physical activity recommendations. Thus, the 2 instruments report different outcomes (minutes vs percentage meeting criterion) and the results, while different, are not necessarily in conflict.

Results were reported separately by program because the programs differed in recruitment strategies, organizational characteristics, types of populations enrolled, length (20 weeks vs 6 months), and mode of delivery. Thus, they could conceivably have different outcome predictors. The findings were similar; both programs generally produced the largest increases in physical activity for participants who were younger and initially less active. The oldest age group may have faced greater chronic and acute health burden, we relied on self-reported data. The primary study outcome (physical activity as measured by CHAMPS) correlated moderately with objective physical activity measures, objective measures of physical functioning, and quality of life in other studies (36,37). Third, participants who returned posttest surveys differed from those who did not, and posttest surveys differed from those who did not, and posttest survey response rates were lower than ideal, particularly for the AC program. The evidence base for

increases in physical activity as a result of the program, their level of physical activity was maintained during the 5- to 6-month intervention period.

When we compared program differences, AC produced larger intervention effects among participants with higher levels of pretest physical activity social support. Individuals with low levels of social support may need to be identified at study entry and given additional support. ALED produced larger intervention gains among women, Latinos/Hispanics, overweight and obese participants, and those with osteoporosis, to the degree that posttest differences in physical activity were eliminated or greatly reduced for these subgroups. These participants may be particularly amenable to this type of instructional group-based approach, which, in contrast to the typical exercise programs offered in many communities, focused on behavioral skills to increase lifestyle physical activity. We are not implying that these types of participants are inappropriate for telephone-supervised home-based programs, because all groups benefited from both programs and posttest differences between programs were modest. The differing populations enrolled in ALED and AC limit the types of direct comparisons and interpretations that can be made.

Predictor analyses can uncover useful findings that inform practice. For example, overweight people assigned to a group-based exercise program in 1 study were the least likely to be successful 2 years later (42). Less educated people who were assigned to a telephone-supervised, home-based exercise program and who were less stressed and less fit at baseline had the greatest probability of success by the second year. As noted earlier, however, few studies have presented these types of analyses.

Several limitations should be considered when interpreting our findings. First, AFL used a quasi-experimental study design with no control group, which prohibited us from conducting true moderator analyses (19) and limited causal inferences. Second, to reduce site and participant burden, we relied on self-reported data. The primary study outcome (physical activity as measured by CHAMPS) correlated moderately with objective physical activity measures, objective measures of physical functioning, and quality of life in other studies (36,37). Third, participants who returned posttest surveys differed from those who did not, and postsurvey response rates were lower than ideal, particularly for the AC program. The evidence base for
the types of people who did not return surveys may not be as strong as for those who did. Finally, these types of exploratory analyses should be considered as hypothesis-generating as opposed to hypothesis-testing. Exploratory analyses such as these can identify potential differences in response to the intervention (19). The objective of exploratory research is to develop or refine questions or hypotheses that subsequently require more rigorous testing.

Despite these limitations, this study has a number of strengths, including the large, diverse sample of midlife and older adults and diverse participating community organizations. Relative to the older US population, AFL oversampled African Americans but had similar rates of Latinos and Asians (1). AFL was similar to the older US population in terms of chronic health conditions and health ratings, although our participants were somewhat more likely to report their health as good and somewhat less likely to report it as fair/poor or excellent/very good (43). Participants were more likely to be obese than the older US population (43). Although participants had higher educational levels than the older US population (43), they were less educated than participants in the AC and ALED randomized trials. Our study provides useful information that is generally not reported in the literature regarding predictors of increased physical activity.

In this translational research project, 8 of 17 pretest characteristics were associated with differential outcomes over time. Six of the groups that showed the largest increases in physical activity were least active at pretest, suggesting that the programs worked especially well for those in most need. People older than 75 and those with lower levels of social support at study entry may need more focused or intensive intervention approaches to achieve comparable improvements. Furthermore, longer or more intensive programs may be needed to aid continued increases in physical activity for those who are less educated, less self-efficacious, more stressed, less active, and have more chronic illnesses at program entry.

Acknowledgments

The AFL initiative is funded by the Robert Wood Johnson Foundation. CDC provided additional funding for data analyses. The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the Robert Wood Johnson Foundation, CDC, or other institutions affiliated with the authors.

We gratefully acknowledge the many participants who took part in the AFL program and evaluation. We also acknowledge the involvement and contribution of staff from the following organizations involved in AFL: Berkeley Public Health Department, Blue Shield of California, Church Health Center, Council on Aging of Southwestern Ohio, FirstHealth of the Carolinas, Greater Detroit Area Health Council, Human Kinetics Inc, Jewish Council for the Aging of Greater Washington, Kaiser Permanente-Colorado, The OASIS Institute, San Mateo County Health Department, Texas A&M University System, University of South Carolina, and the YMCA of Metropolitan Chicago. We thank the National Advisory Committee for its valuable contributions to AFL. Finally, we thank the coalitions, partnering organizations, and advisory boards at each of the sites for their meaningful contributions to and support of the program.

Author Information

Corresponding Author: Sara Wilcox, PhD, Department of Exercise Science, Arnold School of Public Health, 921 Assembly Street, PHRC, 3rd Floor, University of South Carolina, Columbia, SC 29208. Telephone: 803-777-8141. E-mail: swilcox@sc.edu.

Author Affiliations: Marsha Dowda, Department of Exercise Science, University of South Carolina, Columbia, South Carolina; Andrea Dunn, Klein-Buendel, Golden, Colorado; Marcia G. Ory, Texas A&M Health Science Center, College Station, Texas; Carol Rheuma, Prevention Research Center, University of South Carolina, Columbia, South Carolina; Abby C. King, Stanford Prevention Research Center and Stanford School of Medicine, Stanford, California.

References

1. Centers for Disease Control and Prevention. The state of aging and health in America 2007. Whitehouse Station (NJ): The Merck Company Foundation; 2007. http://www.cdc.gov/aging/saha.htm. Accessed June 20, 2007.
2. American College of Sports Medicine. Position stand. Exercise and physical activity for older adults. Med Sci...
Sports Exerc 1998;30(6):992-1008.
3. US physical activity statistics, 2005. Atlanta (GA): Centers for Disease Control and Prevention. http://apps.nccd.cdc.gov/PASurveillance/DemoComparev.asp. Accessed November 13, 2007.
4. US Department of Health and Human Services. Physical activity and health: a report of the Surgeon General. Atlanta (GA): National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, US Department of Health and Human Services; 1996.
5. Conn VS, Valentine JC, Cooper HM. Interventions to increase physical activity among aging adults: a meta-analysis. Ann Behav Med 2002;24(3):190-200.
6. King AC, Rejeski WJ, Buchner DM. Physical activity interventions targeting older adults. A critical review and recommendations. Am J Prev Med 1998;15(4):316-33.
7. van der Bij AK, Laurant MG, Wensing M. Effectiveness of physical activity interventions for older adults: a review. Am J Prev Med 2002;22(2):120-33.
8. Conn VS, Minor MA, Burks KJ, Rantz MJ, Pomeroy SH. Integrative review of physical activity intervention research with aging adults. J Am Geriatr Soc 2003;51(8):1159-68.
9. Green L, Daniel M, Novick L. Partnerships and coalitions for community-based research. Public Health Rep 2001;116 Suppl 1:20-31.
10. Glasgow RE, Lichtenstein E, Marcus AC. Why don’t we see more translation of health promotion research to practice? Rethinking the efficacy-to-effectiveness transition. Am J Public Health 2003;93(8):1261-7.
11. Dzewaltowski DA, Estabrooks PA, Glasgow RE. The future of physical activity behavior change research: what is needed to improve translation of research into health promotion practice? Exerc Sport Sci Rev 2004;32(2):57-63.
12. Bandura A. Social foundations of thought and action: a social cognitive theory. Englewood Cliffs (NJ): Prentice-Hall; 1986.
13. Prochaska JO, Marcus BH. The transtheoretical model: applications to exercise. In: Dishman RK, editor. Advances in exercise adherence. Champaign (IL): Human Kinetics; 1994:161-218.
14. Prochaska JO, DiClemente CC, Norcross JC. In search of how people change. Applications to addictive behaviors. Am Psychol 1992;47(9):1102-14.
15. Wilcox S, Dowda M, Griffin SF, Rheaume C, Ory MG, Leviton L, et al. Results of the first year of Active for Life: translation of 2 evidence-based physical activity programs for older adults into community settings. Am J Public Health 2006;96(7):1201-9.
16. Wilcox S, Dowda M, Leviton LC, Bartlett-Prescott J, Bazzarre T, Campbell-Voytal K, et al. Active for Life: final results from the translation of two physical activity programs. Am J Prev Med 2008;35(4):340-51.
17. Baron RM, Kenny DA. The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. J Pers Soc Psychol 1986;51(6):1173-82.
18. Bauman AE, Sallis JF, Dzewaltowski DA, Owen N. Toward a better understanding of the influences on physical activity. The role of determinants, correlates, causal variables, mediators, moderators, and confounders. Am J Prev Med 2002;23(2 Suppl 1):5-14.
19. Kraemer HC, Wilson GT, Fairburn CG, Agras WS. Mediators and moderators of treatment effects in randomized clinical trials. Arch Gen Psychiatry 2002;59(10):877-83.
20. King AC, Haskell WL, Young DR, Oka RK, Stefanick ML. Long-term effects of varying intensities and formats of physical activity on participation rates, fitness, and lipoproteins in men and women aged 50 to 65 years. Circulation 1995;91(10):2596-604.
21. King AC, Bauman K, O’Sullivan P, Wilcox S, Castro C. Effects of moderate-intensity exercise on physiological, behavioral, and emotional responses to family caregiving: a randomized controlled trial. J Gerontol 2002;57(1):M26-36.
22. King AC, Pruitt LA, Phillips W, Oka R, Rodenburg A, Haskell WL. Comparative effects of 2 physical activity programs on measured and perceived physical functioning and other health-related quality of life outcomes in older adults. J Gerontol 2000;55(2):M74-83.
23. Stewart AL, Mills KM, Sepsis PG, King AC, McLellan BY, Roitz K, et al. Evaluation of CHAMPS, a physical activity promotion program for older adults. Ann Behav Med 1997;19(4):353-61.
24. Dunn AL, Marcus BH, Kampert JB, Garcia ME, Kohl HW III, Blair SN. Reduction in cardiovascular disease risk factors: 6-month results from Project Active. Prev Med 1997;26(6):883-92.
25. Dunn AL, Marcus BH, Kampert JB, Garcia ME, Kohl HW III, Blair SN. Comparison of lifestyle and structured interventions to increase physical activity and cardiorespiratory fitness: a randomized trial. JAMA 1999;281(4):327-34.
26. Expert Panel. Executive summary of the clinical
guidelines on the identification, evaluation, and treatment of overweight and obesity in adults. Arch Intern Med 1998;158(17):1855-67.

27. Behavioral Risk Factor Surveillance System, 2005 survey questions. Centers for Disease Control and Prevention, 2005. Atlanta (GA): Centers for Disease Control and Prevention. http://www.cdc.gov/brfss/questionnaires/english.htm. Accessed March 16, 2007.

28. Marcus BH, Selby VC, Niaura RS, Rossi JS. Self-efficacy and the stages of exercise behavior change. Res Q Exerc Sport 1992;63(1):60-6.

29. Eyler AA, Brownson RC, Donatelle RJ, King AC, Brown D, Sallis JF. Physical activity social support and middle- and older-aged minority women: results from a US survey. Soc Sci Med 1999;49(6):781-9.

30. Sallis JF, Grossman RM, Pinski RB, Patterson TL, Nader PR. The development of scales to measure social support for diet and exercise behaviors. Prev Med 1987;16(6):825-36.

31. Kohout FJ, Berkman LF, Evans DA, Cornoni-Huntley J. Two shorter forms of the CES-D (Center for Epidemiological Studies Depression) depression symptoms index. J Aging Health 1993;5(2):179-93.

32. Irwin M, Artin KH, Oxman MN. Screening for depression in the older adult: criterion validity of the 10-item Center for Epidemiological Studies Depression Scale (CES-D). Arch Intern Med 1999;159(15):1701-4.

33. Radloff LS. The CES-D scale: a self-report depression scale for research in the general population. App Psych Measure 1977;1:385-401.

34. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. J Health Soc Behav 1983;24(4):385-96.

35. Pbert L, Doerfler LA, DeCosimo D. An evaluation of the perceived stress scale in 2 clinical populations. J Psychopathol Behav Assess 1992;14(4):363-75.

36. Stewart AL, Mills KM, King AC, Haskell WL, Gillis D, Ritter PL. CHAMPS physical activity questionnaire for older adults: outcomes for interventions. Med Sci Sports Exerc 2001;33(7):1126-41.

37. Harada ND, Chiu V, King AC, Stewart AL. An evaluation of 3 self-report physical activity instruments for older adults. Med Sci Sports Exerc 2001;33(6):962-7.

38. Stewart AL. Community-based physical activity programs for adults age 50 and older. J Aging Phys Act 2001;9(Supplement):S71-91.

39. Stewart AL, Verboncoeur CJ, McLellan BY, Gillis DE, Rush S, Mills KM, et al. Physical activity outcomes of CHAMPS II: a physical activity promotion program for older adults. J Gerontol 2001;56(8):M465-7.

40. Pate RR, Pratt M, Blair SN, Haskell WL, Macera CA, Bouchard C, et al. Physical activity and public health. A recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine. JAMA 1995;273(5):402-7.

41. Trost SG, Owen N, Bauman AE, Sallis JF, Brown W. Correlates of adults’ participation in physical activity: review and update. Med Sci Sports Exerc 2002;34(12):1996-2001.

42. King AC, Kiernan M, Oman RF, Kraemer HC, Hull M, Ahn D. Can we identify who will adhere to long-term physical activity? Signal detection methodology as a potential aid to clinical decision making. Health Psychol 1997;16(4):380-9.

43. National Center for Health Statistics. Data Warehouse on Trends in Health and Aging. National Center for Health Statistics. Atlanta (GA): Centers for Disease Control and Prevention. http://www.cdc.gov/nchs/agingact.htm. Accessed November 13, 2007.
Tables

Table 1. Active for Life Lead Organizations, United States, 2003-2006

| Lead Organization                                                                 | Type of Organization                                           |
|-----------------------------------------------------------------------------------|---------------------------------------------------------------|
| **Active Choices**                                                                |                                                               |
| Blue Shield of California (BSC), Woodland Hills, California                       | Statewide nonprofit health plan                               |
| Church Health Center, Memphis, Tennessee                                           | Faith-based health and community development organization     |
| San Mateo County Health Department, San Mateo, California (additional site at the | County and city public health departments                     |
| Berkeley Public Health Department, Berkeley, California)                          |                                                               |
| YMCA of Metropolitan Chicago, Chicago, Illinois                                   | Nonprofit service organization                                |
| **Active Living Every Day**                                                       |                                                               |
| Council on Aging of Southwestern Ohio, Cincinnati, Ohio                           | Aging network organization in partnership with county health  |
|                                                                                 | district and hospital system                                  |
| FirstHealth of the Carolinas, Pinehurst, North Carolina                           | Nonprofit health care delivery system                         |
| Greater Detroit Area Health Council, Detroit, Michigan                             | Regional, membership-based health coalition addressing cost, quality and access to health care |
| Jewish Council for the Aging of Greater Washington, Rockville, Maryland           | Nonprofit human service organization                           |
| The OASIS Institute, St. Louis, Missouri (additional sites in Pittsburgh,        | National nonprofit adult learning organization               |
| Pennsylvania, and San Antonio, Texas)                                            |                                                               |

Table 2. Pretest Characteristics of Participants by Program — Active for Life Multisite Study, United States, 2003-2006

| Characteristic | Active Choices (N = 881) | Active Living Every Day (N = 1,074) | P Valuea |
|----------------|--------------------------|-------------------------------------|----------|
| Age, y, %      |                          |                                     |          |
| 50-64          | 43.7                     | 28.8                                | <.001    |
| 65-74          | 35.0                     | 37.6                                |          |
| ≥75            | 21.3                     | 33.6                                |          |

Abbreviations: CHAMPS, Community Healthy Activities Model Program for Seniors; BRFSS, Behavioral Risk Factor Surveillance System.

a P values indicate whether differences in the baseline characteristics of Active Choices and Active Living Every Day participants were significant based on t tests for continuous variables and χ² for categorical variables.

(Continued on next page)
Table 2. (continued) Pretest Characteristics of Participants by Program — Active for Life Multisite Study, United States, 2003-2006

| Characteristic                        | Active Choices (N = 881) | Active Living Every Day (N = 1,074) | P Value^{a} |
|---------------------------------------|--------------------------|-------------------------------------|-------------|
| **Race/ethnicity, %**                 |                          |                                     | <.001       |
| Non-Hispanic white                    | 41.8                     | 62.8                                |             |
| Black or African American             | 36.4                     | 30.4                                |             |
| Hispanic/Latino                       | 14.5                     | 4.6                                 |             |
| Asian                                 | 4.9                      | 0.7                                 |             |
| American Indian/Alaska Native         | 0.1                      | 0.2                                 |             |
| Reporting 2 groups                    | 1.1                      | 0.4                                 |             |
| Other                                 | 0.8                      | 0.6                                 |             |
| Missing                               | 0.3                      | 0.3                                 |             |
| **Sex, %**                            |                          |                                     | .05         |
| Women                                 | 79.1                     | 82.5                                |             |
| Men                                   | 20.9                     | 17.5                                |             |
| **Education level, %**                |                          |                                     | <.001       |
| No formal education                   | 0.6                      | 0                                   |             |
| Grades 1-8                            | 6.0                      | 2.7                                 |             |
| Grades 9-11                           | 7.2                      | 7.4                                 |             |
| High school/General Educational Diploma | 20.0                 | 28.6                                |             |
| Some college                          | 29.4                     | 31.5                                |             |
| College graduate                      | 33.5                     | 29.1                                |             |
| Missing                               | 3.4                      | 0.7                                 |             |
| **Annual income, $, %**               |                          |                                     | .03         |
| <30,000                               | 54.3                     | 46.7                                |             |
| 30,000-59,999                         | 24.5                     | 23.6                                |             |
| ≥60,000                               | 15.1                     | 18.3                                |             |
| Missing                               | 6.1                      | 11.4                                |             |

Abbreviations: CHAMPS, Community Healthy Activities Model Program for Seniors; BRFSS, Behavioral Risk Factor Surveillance System.

^{a} P values indicate whether differences in the baseline characteristics of Active Choices and Active Living Every Day participants were significant based on \(t\) tests for continuous variables and X\(^2\) for categorical variables.

(Continued on next page)
### Table 2. (continued) Pretest Characteristics of Participants by Program — Active for Life Multisite Study, United States, 2003-2006

| Characteristic                          | Active Choices (N = 881) | Active Living Every Day (N = 1,074) | P Value<sup>a</sup> |
|----------------------------------------|--------------------------|-------------------------------------|---------------------|
| Marital status, %                      |                          |                                     |                     |
| Married or partnered                    | 40.6                     | 42.7                                | <.001               |
| Divorced                               | 24.6                     | 17.5                                |                     |
| Widowed                                | 21.5                     | 29.8                                |                     |
| Separated                              | 3.6                      | 1.6                                 |                     |
| Never married                          | 8.5                      | 7.9                                 |                     |
| Missing                                | 1.1                      | 0.5                                 |                     |
| Body mass index (BMI), mean (SD), kg/m² (n = 1,307) | 30.6 (7.2)              | 29.5 (6.6)                          | <.001               |
| Integrated BMI level, %                |                          |                                     |                     |
| Underweight (≤18.5 kg/m²)              | 0.1                      | 0.8                                 |                     |
| Normal weight (18.6-24.9 kg/m²)        | 22.2                     | 22.6                                | NA                 |
| Overweight (25.0-29.9 kg/m²)           | 28.9                     | 33.8                                |                     |
| Obese (≥30 kg/m²)                      | 47.0                     | 38.5                                |                     |
| Data missing                           | 1.7                      | 4.2                                 |                     |
| Health conditions, %                   |                          |                                     |                     |
| 0-1                                    | 45.5                     | 43.4                                | .33                 |
| ≥2                                     | 54.3                     | 56.5                                |                     |
| Missing                                | 0.2                      | 0.1                                 |                     |
| Participants with chronic conditions, %|                          |                                     |                     |
| Diabetes (n = 1,316)                   | 25.2                     | 19.7                                | .004                |
| Hypertension (n = 1,323)               | 57.1                     | 56.6                                | .78                 |
| Arthritis (n = 1,325)                  | 54.8                     | 55.4                                | .98                 |
| Coronary heart disease (n = 1,324)     | 13.2                     | 15.2                                | .22                 |
| Stroke (n = 1,317)                     | 5.3                      | 6.2                                 | .40                 |
| Osteoporosis (n = 1,317)               | 18.4                     | 21.4                                | .11                 |

Abbreviations: CHAMPS, Community Healthy Activities Model Program for Seniors; BRFSS, Behavioral Risk Factor Surveillance System.

<sup>a</sup> P values indicate whether differences in the baseline characteristics of Active Choices and Active Living Every Day participants were significant based on t tests for continuous variables and X² for categorical variables.

(Continued on next page)
Table 2. (continued) Pretest Characteristics of Participants by Program — Active for Life Multisite Study, United States, 2003-2006

| Characteristic                                      | Active Choices (N = 881) | Active Living Every Day (N = 1,074) | P Valuea |
|-----------------------------------------------------|--------------------------|-------------------------------------|----------|
| Health rating, %                                     |                          |                                     |          |
| Excellent                                            | 4.7                      | 4.5                                 | .21      |
| Very good                                            | 19.3                     | 21.7                                |          |
| Good                                                 | 48.1                     | 50.5                                |          |
| Fair                                                 | 24.0                     | 20.0                                |          |
| Poor                                                 | 2.8                      | 2.3                                 |          |
| Missing data                                         | 1.1                      | 1.0                                 |          |
| Psychosocial and behavioral factors, mean (SD)       |                          |                                     |          |
| Social support for physical activity (possible range: 5-20) (n = 1,307) | 13.7 (3.1)               | 13.2 (3.0)                          | .003     |
| Self-efficacy (possible range: 5-35) (n = 1,306)     | 20.8 (7.1)               | 19.1 (8.0)                          | <.001    |
| Depressive symptoms (possible range: 0-30) (n = 1,322) | 6.4 (5.2)                | 5.9 (5.1)                           | .03      |
| Perceived stress (possible range: 0-16) (n = 1,307)  | 4.6 (3.1)                | 4.8 (3.2)                           | .27      |
| Moderate and vigorous physical activity (CHAMPS), h/wk (n = 1,335) | 2.8 (3.9)               | 2.4 (3.7)                           | .02      |
| Physical activity level based on BRFSS physical activity measure, % |                          |                                     |          |
| Sedentary                                            | 42.6                     | 42.3                                | .03      |
| Underactive                                          | 45.3                     | 42.3                                |          |
| Regularly active                                     | 10.9                     | 14.9                                |          |
| Data missing                                         | 1.2                      | 0.6                                 |          |

Abbreviations: CHAMPS, Community Healthy Activities Model Program for Seniors; BRFSS, Behavioral Risk Factor Surveillance System.

a P values indicate whether differences in the baseline characteristics of Active Choices and Active Living Every Day participants were significant based on t tests for continuous variables and X² for categorical variables.
Table 3. Adjusted Pretest and Posttest Means for Square Root of Minutes per Week of Moderate-Intensity to Vigorous-Intensity Physical Activity, by Pretest Variables, Active for Life Multisite Study, United States, 2003-2006

| Pretest Variable | Active Choices | Active Living Every Day |
|------------------|----------------|------------------------|
|                  | Pretest Mean<sup>a</sup> | Posttest Mean<sup>a</sup> | Effect size (d)<sup>b</sup> | P Cat<sup>c</sup> (Δ) | P Contin<sup>d</sup> (Δ) | Pretest Mean<sup>a</sup> | Posttest Mean<sup>a</sup> | Effect size (d)<sup>b</sup> | P Cat<sup>c</sup> (Δ) | P Contin<sup>d</sup> (Δ) |
| Age, y           |                |                        |                        |                        |                        |                        |                        |                        |                        |                        |
| 50-64            | 9.47           | 16.48                  | .81                    | <.001                   | <.001                   | 8.78                    | 16.12                  | .87                     | <.001                   | <.001                   |
| 65-74            | 10.36          | 15.82                  | .59                    | <.001                   | <.001                   | 9.29                    | 15.99                  | .79                     | <.001                   | <.001                   |
| ≥75              | 9.71           | 12.78                  | .38                    | <.001                   | <.001                   | 9.01                    | 12.97                  | .44                     |
| Sex              |                |                        |                        |                        |                        |                        |                        |                        |                        |                        |
| Women            | 8.37           | 13.85                  | .64                    | .55                     | NA                      | 7.91                    | 14.31                  | .77                     | .003                    | NA                      |
| Men              | 11.05          | 17.10                  | .65                    |                        |                        | 1.84                    | 14.74                  | .40                     |
| Race/ethnicity   |                |                        |                        |                        |                        |                        |                        |                        |                        |                        |
| White            | 9.09           | 14.06                  | .56                    | .07                     | NA                      | 8.30                    | 14.05                  | .67                     | .01                     | NA                      |
| Black/African American | 10.83   | 16.33                  | .62                    |                        |                        | 9.62                    | 15.48                  | .72                     |
| Hispanic/Latino  | 8.86           | 17.20                  | 1.07                   |                        |                        | 7.05                    | 17.70                  | 1.42                    |
| Other            | 9.70           | 15.53                  | .67                    |                        |                        | 10.83                   | 13.26                  | .26                     |
| Education        |                |                        |                        |                        |                        |                        |                        |                        |                        |                        |
| Less than high school | 8.41       | 14.58                  | .79                    | .66                     | NA                      | 8.45                    | 13.24                  | .57                     | .07                     | NA                      |
| High school/GED  | 10.31          | 15.24                  | .58                    |                        |                        | 9.30                    | 14.39                  | .61                     |                        |                        |
| More than high school | 10.58      | 16.27                  | .64                    |                        |                        | 9.95                    | 16.53                  | .76                     |
| Body mass index, kg/m<sup>2</sup> | | | | | | | | | | |
| <25.0            | 11.65          | 16.12                  | .51                    | .24                     | .55                     | 10.22                   | 15.05                  | .55                     | .10                     | .02                     |
| 25.0-29.9        | 10.33          | 16.56                  | .67                    |                        |                        | 9.82                    | 15.87                  | .67                     |
| ≥30.0            | 9.64           | 15.51                  | .71                    |                        |                        | 7.58                    | 14.29                  | .86                     |
| No. of health conditions | | | | | | | | | | |
| 0-1              | 10.70          | 17.09                  | .71                    | .07                     | NA                      | 9.23                    | 14.37                  | .58                     | .02                     | NA                      |
| ≥2               | 9.09           | 14.05                  | .59                    |                        |                        | 8.39                    | 15.06                  | .79                     |
| Diabetes         |                |                        |                        |                        |                        |                        |                        |                        |                        |                        |
| No               | 10.33          | 16.14                  | .66                    | .46                     | NA                      | 9.04                    | 14.86                  | .67                     | .22                     | NA                      |
| Yes              | 8.47           | 13.58                  | .64                    |                        |                        | 8.59                    | 15.37                  | .85                     |

Abbreviations: NA, not applicable; BMI, body mass index.

* Means are adjusted for site clustering, sex, race/ethnicity, education, health rating, and body mass index (BMI).

† Effect sizes (d = (posttest mean – pretest mean)/pretest standard deviation) use adjusted pretest and posttest means and unadjusted pretest standard deviation. Age, BMI, social support, self-efficacy, depression, stress, and physical activity were treated as continuous variables in change analyses (P contin); however, physical activity data and P values for the categorical (P cat) analyses are also reported to aid interpretations.

‡ P Cat (Δ) refers to P values for change in physical activity (time x pretest predictor interaction) in instances where the predictor variable was categorical.

§ P Contin (Δ) refers to P values for change in physical activity (time x pretest predictor interaction) in instances where the predictor variable was continuous.

The effect size for the lowest tertile of physical activity could not be computed because the standard deviation (and thus the denominator for the effect size) for that group is zero (ie, all participants in that group reported 0 hours/week of moderate-intensity to vigorous-intensity physical activity).

(Continued on next page)
Table 3. (continued) Adjusted Pretest and Posttest Means for Square Root of Minutes per Week of Moderate-Intensity to Vigorous-Intensity Physical Activity, by Pretest Variables, Active for Life Multisite Study, United States, 2003-2006

| Pretest Variable       | Active Choices |          |          | Active Living Every Day |          |          |          |
|------------------------|----------------|----------|----------|-------------------------|----------|----------|----------|
|                        | Pretest Mean<sup>a</sup> | Posttest Mean<sup>a</sup> | Effect size (d)<sup>b</sup> | P Cat<sup>c</sup> (Δ) | Posttest Mean<sup>a</sup> |          |          |
|                        |                  |          |          |                          |          |          |          |
| Hypertension            | No              | 9.87     | 15.39    | .62                     | .83      | NA       | .61      | .07      | NA       |
|                        | Yes             | 9.41     | 15.10    | .67                     | NA       |          | .75      |          |          |
| Arthritis               | No              | 9.68     | 16.02    | .73                     | .09      | NA       | .62      | .18      | NA       |
|                        | Yes             | 9.44     | 14.46    | .58                     | NA       |          | .76      |          |          |
| Coronary heart disease  | No              | 9.91     | 15.83    | .68                     | .07      | NA       | .70      | .44      | NA       |
|                        | Yes             | 8.32     | 12.09    | .48                     | NA       |          | .71      |          |          |
| Osteoporosis            | No              | 9.55     | 15.31    | .66                     | .66      | NA       | .64      | .02      | NA       |
|                        | Yes             | 9.58     | 14.92    | .63                     | NA       |          | .92      |          |          |
| Health rating           | Fair or poor    | 7.98     | 13.95    | .80                     | .59      | NA       | .85      | .63      | NA       |
|                        | Good            | 10.03    | 15.85    | .69                     | NA       |          | .69      |          |          |
|                        | Very good or excellent | 12.89 | 17.86    | .52                     | NA       |          | .67      |          |          |
| Social support          | Lowest 1/3       | 9.86     | 14.33    | .51                     | .11      | .007     | .69      | .68      | .12      |
|                        | Middle 1/3       | 10.50    | 15.75    | .63                     | .27      | .26      | .76      | .80      | .75      |
|                        | Highest 1/3      | 10.53    | 16.95    | .71                     | .27      | .26      | .68      | .80      | .75      |
| Self-efficacy           | Lowest 1/3       | 8.69     | 14.94    | .79                     | .27      | .26      | .83      |          |          |
|                        | Middle 1/3       | 10.49    | 15.96    | .65                     | .27      | .26      | .74      |          |          |
|                        | Highest 1/3      | 11.94    | 16.52    | .49                     | .27      | .26      | .60      |          |          |

Abbreviations: NA, not applicable; BMI, body mass index.

<sup>a</sup> Means are adjusted for site clustering, sex, race/ethnicity, education, health rating, and body mass index (BMI).

<sup>b</sup> Effect sizes (d = (posttest mean – pretest mean)/pretest standard deviation) use adjusted pretest and posttest means and unadjusted pretest standard deviation. Age, BMI, social support, self-efficacy, depression, stress, and physical activity were treated as continuous variables in change analyses (P contin); however, physical activity data and P values for the categorical (P cat) analyses are also reported to aid interpretations.

<sup>c</sup> P Cat (Δ) refers to P values for change in physical activity (time x pretest predictor interaction) in instances where the predictor variable was categorical.

<sup>d</sup> P Contin (Δ) refers to P values for change in physical activity (time x pretest predictor interaction) in instances where the predictor variable was continuous.

<sup>e</sup> The effect size for the lowest tertile of physical activity could not be computed because the standard deviation (and thus the denominator for the effect size) for that group is zero (ie, all participants in that group reported 0 hours/week of moderate-intensity to vigorous-intensity physical activity).
| Pretest Variable | Active Choices | | | | | | Active Living Every Day | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Pretest Mean<sup>a</sup> | Posttest Mean<sup>a</sup> | Effect size (d)<sup>b</sup> | P Cat<sup>c</sup> (Δ) | P Contin<sup>d</sup> (Δ) | Pretest Mean<sup>a</sup> | Posttest Mean<sup>a</sup> | Effect size (d)<sup>b</sup> | P Cat<sup>c</sup> (Δ) | P Contin<sup>d</sup> (Δ) |
| **Depressive symptoms** | | | | | | | | | | |
| Lowest 1/3 | 9.75 | 14.67 | .56 | .52 | .25 | 8.58 | 14.84 | .71 | .09 | .46 |
| Middle 1/3 | 10.31 | 16.02 | .64 | .52 | .25 | 9.73 | 14.84 | .58 | .09 | .46 |
| Highest 1/3 | 9.53 | 15.54 | .71 | .52 | .25 | 8.86 | 15.63 | .83 | .09 | .46 |
| **Perceived stress** | | | | | | | | | | |
| Lowest 1/3 | 10.14 | 14.75 | .51 | .36 | .39 | 8.25 | 14.43 | .72 | .69 | .95 |
| Middle 1/3 | 10.33 | 16.13 | .67 | .36 | .39 | 9.35 | 15.61 | .69 | .69 | .95 |
| Highest 1/3 | 10.50 | 16.38 | .68 | .36 | .39 | 9.65 | 15.31 | .68 | .69 | .95 |
| **Physical activity** | | | | | | | | | | |
| Lowest 1/3 | 0.16 | 10.71 | NA<sup>e</sup> | <.001 | <.001 | 0 | 9.20 | NA<sup>e</sup> | <.001 | <.001 |
| Middle 1/3 | 8.64 | 14.84 | 2.52 | <.001 | <.001 | 8.03 | 14.53 | 2.70 | <.001 | <.001 |
| Highest 1/3 | 19.32 | 20.13 | .14 | 19.08 | 20.50 | .26 | 19.08 | 20.50 | .26 | 19.08 | 20.50 | .26 |

Abbreviations: NA, not applicable; BMI, body mass index.

<sup>a</sup> Means are adjusted for site clustering, sex, race/ethnicity, education, health rating, and body mass index (BMI).

<sup>b</sup> Effect sizes (d = (posttest mean – pretest mean)/pretest standard deviation) use adjusted pretest and posttest means and unadjusted pretest standard deviation. Age, BMI, social support, self-efficacy, depression, stress, and physical activity were treated as continuous variables in change analyses (P contin); however, physical activity data and P values for the categorical (P cat) analyses are also reported to aid interpretations.

<sup>c</sup> P Cat (Δ) refers to P values for change in physical activity (time x pretest predictor interaction) in instances where the predictor variable was categorical.

<sup>d</sup> P Contin (Δ) refers to P values for change in physical activity (time x pretest predictor interaction) in instances where the predictor variable was continuous.

<sup>e</sup> The effect size for the lowest tertile of physical activity could not be computed because the standard deviation (and thus the denominator for the effect size) for that group is zero (ie, all participants in that group reported 0 hours/week of moderate-intensity to vigorous-intensity physical activity).
Table 4. Percentage of Active Choices Participants Who Met CDC-ACSM Recommendations (Based on BRFSS Questions) at Pretest and Posttest, by Pretest Variables, Active for Life Multisite Study, United States, 2003-2006

| Pretest Variable | Pretest % | Pretest OR (95% CI) | Pretest P | Posttest % | Posttest OR (95% CI) | Posttest P |
|------------------|-----------|---------------------|-----------|------------|---------------------|-----------|
| **Age, y**       |           |                     |           |            |                     |           |
| 50-64            | 10.7      | 1 [Reference]       | .08       | 35.0       | 1 [Reference]       | .07b      |
| 65-74            | 15.3      | 1.57 (0.90-2.74)    | .09       | 30.9       | 0.82 (0.51-1.32)    | .21       |
| ≥ 75             | 9.4       | 0.86 (0.43-1.73)    | .21       | 21.6       | 0.49 (0.26-0.91)    | .20       |
| **Sex**          |           |                     |           |            |                     |           |
| Women            | 10.8      | 1 [Reference]       | .44       | 30.5       | 1 [Reference]       | .59       |
| Men              | 12.7      | 1.24 (0.72-2.11)    | .45       | 27.8       | 0.87 (0.52-1.45)    | .21       |
| **Race/ethnicity** |         |                     |           |            |                     |           |
| Non-Hispanic white | 15.1     | 1 [Reference]       | .13       | 28.2       | 1 [Reference]       | .39       |
| Black/African American | 7.7 | 0.43 (0.21-0.87) | .13 | 22.0 | 0.72 (0.41-1.25) | .21 |
| Hispanic/Latino | 10.4      | 0.71 (0.29-1.73)    | .21       | 30.2       | 1.15 (0.56-2.34)    | .21       |
| Other            | 15.1      | 0.89 (0.39-2.05)    | .21       | 36.2       | 1.48 (0.67-3.25)    | .21       |
| **Education**    |           |                     |           |            |                     |           |
| Less than high school | 6.3  | 1 [Reference]       | .05       | 22.1       | 1 [Reference]       | .21       |
| High school/GED | 15.1      | 5.15 (1.38-19.23)   | .05       | 31.0       | 1.84 (0.72-4.74)    | .21       |
| More than high school | 14.0 | 4.47 (1.23-16.22) | .05 | 34.4 | 2.19 (0.90-5.30) | .21 |
| BMI              | NA        | 0.99 (0.95-1.02)    | .48       | NA         | 1.00 (0.97-1.03)    | .96       |
| **Health conditions** |       |                     |           |            |                     |           |
| 0 to 1           | 9.6       | 1 [Reference]       | .46       | 32.1       | 1 [Reference]       | .04c      |
| ≥ 2              | 11.4      | 1.20 (0.74-1.95)    | .46       | 23.2       | 0.64 (0.42-0.97)    | .21       |
| **Diabetes**     |           |                     |           |            |                     |           |
| No               | 13.8      | 1 [Reference]       | .08       | 28.8       | 1 [Reference]       | .72       |
| Yes              | 9.0       | 0.56 (0.29-1.06)    | .08       | 30.9       | 1.10 (0.65, 1.89)   | .21       |
| **Hypertension** |           |                     |           |            |                     |           |
| No               | 11.5      | 1 [Reference]       | .59       | 30.0       | 1 [Reference]       | .62       |
| Yes              | 12.8      | 1.15 (0.70-1.88)    | .59       | 28.0       | 0.90 (0.59-1.37)    | .21       |

Abbreviations: CDC-ACSM, Centers for Disease Control and Prevention-American College of Sports Medicine; BRFSS, Behavioral Risk Factor Surveillance System; OR, odds ratio; CI, confidence interval; GED, General Educational Development test; BMI, body mass index; CHAMPS physical activity, Community Healthy Activities Model Program for Seniors physical activity questionnaire.

a All percentages, ORs, and 95% CIs are adjusted for site clustering, sex, race/ethnicity, education, health rating, and BMI. Repeated measures analyses examining pretest to posttest changes (time x pretest predictor interactions) also controlled for site clustering, sex, race/ethnicity, education, health rating, and BMI.

b BMI, social support, self-efficacy, depressive symptoms, perceived stress, and physical activity were treated as continuous variables in change analyses; therefore, percentages that met recommendations are not reported.

c In the repeated measures analyses, a significant time x pretest variable interaction was found (ie, the intervention effect varied by levels of this pretest variable).

(Continued on next page)
Table 4. (continued) Percentage of Active Choices Participants Who Met CDC-ACSM Recommendations (Based on BRFSS Questions) at Pretest and Posttest, by Pretest Variables, Active for Life Multisite Study, United States, 2003-2006

| Pretest Variable       | Pretest % | Pretest OR (95% CI) | Pretest P | Posttest % | Posttest OR (95% CI) | Posttest P |
|------------------------|-----------|---------------------|-----------|------------|----------------------|------------|
| Arthritis              |           |                     |           |            |                      |            |
| No                     | 12.1      | 1 [Reference]       | .82       | 32.4       | 1 [Reference]        | .03        |
| Yes                    | 12.5      | 1.06 (0.65-1.71)    | <.001     | 23.4       | 0.63 (0.41-0.95)     | <.001      |
| Coronary heart disease |           |                     |           |            |                      |            |
| No                     | 11.4      | 1 [Reference]       | .15       | 31.4       | 1 [Reference]        | .04c       |
| Yes                    | 16.0      | 1.64 (0.84-3.18)    | .04c      | 19.6       | 0.48 (0.23-0.98)     | .04c       |
| Osteoporosis           |           |                     |           |            |                      |            |
| No                     | 11.8      | 1 [Reference]       | .33       | 29.4       | 1 [Reference]        | .44        |
| Yes                    | 14.9      | 1.33 (0.75-2.38)    | .07       | 28.3       | 0.82 (0.49-1.37)     | <.001      |
| Health rating          |           |                     |           |            |                      |            |
| Fair or poor           | 9.8       | 1 [Reference]       | .33       | 19.4       | 1 [Reference]        | .04        |
| Good                   | 10.1      | 1.07 (0.59-1.95)    | .00       | 32.2       | 2.09 (1.19-3.66)     | .04        |
| Very good or excellent | 14.0      | 1.53 (0.79-2.97)    | <.001     | 29.4       | 1.82 (0.96-3.44)     | <.001      |
| Social support<sup>b</sup> | NA        | 1.06 (0.97-1.14)    | .09       | NA         | 1.09 (0.99-1.20)     | .82        |
| Self-efficacy<sup>b</sup> | NA        | 1.06 (1.02-1.10)    | .003      | NA         | 1.03 (1.00-1.06)     | .07        |
| Depressive symptoms<sup>b</sup> | NA        | 1.01 (0.96-1.06)    | .07       | NA         | 1.00 (0.94-1.03)     | .54        |
| Perceived stress<sup>b</sup> | NA        | 1.03 (0.95-1.12)    | .43       | NA         | 1.01 (0.94-1.09)     | .76        |
| CHAMPS physical activity<sup>b</sup> | NA        | 1.07 (1.04-1.09)    | <.001     | NA         | 1.05 (1.02-1.07)     | <.001      |

Abbreviations: CDC-ACSM, Centers for Disease Control and Prevention-American College of Sports Medicine; BRFSS, Behavioral Risk Factor Surveillance System; OR, odds ratio; CI, confidence interval; GED, General Educational Development test; BMI, body mass index; CHAMPS physical activity, Community Healthy Activities Model Program for Seniors physical activity questionnaire.

<sup>a</sup> All percentages, ORs, and 95% CIs are adjusted for site clustering, sex, race/ethnicity, education, health rating, and BMI. Repeated measures analyses examining pretest to posttest changes (time x pretest predictor interactions) also controlled for site clustering, sex, race/ethnicity, education, health rating, and BMI.

<sup>b</sup> BMI, social support, self-efficacy, depressive symptoms, perceived stress, and physical activity were treated as continuous variables in change analyses; therefore, percentages that met recommendations are not reported.

<sup>c</sup> In the repeated measures analyses, a significant time x pretest variable interaction was found (ie, the intervention effect varied by levels of this pretest variable).
Table 5. Percentage of Active Living Every Day Participants Who Met CDC-ACSM Recommendations at Pretest and Posttest, by Pretest Variables.a, Active for Life Multisite Study, 2003-2006

| Pretest Variable | Pretest % | Pretest OR (95% CI) | Pretest P | Posttest % | Posttest OR (95% CI) | Posttest P |
|------------------|-----------|---------------------|-----------|------------|---------------------|-----------|
| Age, y           |           |                     |           |            |                     |           |
| 50-64            | 16.1      | 1 [Reference]       | .40       | 48.1       | 1 [Reference]       | .36b      |
| 65-74            | 19.6      | 1.35 (0.86-2.12)    |           | 43.0       | 0.81 (0.56-1.17)    |           |
| ≥75              | 18.0      | 1.17 (0.73-1.86)    |           | 41.7       | 0.76 (0.51-1.14)    |           |
| Sex              |           |                     |           |            |                     |           |
| Women            | 17.6      | 1 [Reference]       | .63       | 41.2       | 1 [Reference]       | .20       |
| Men              | 18.2      | 1.12 (0.71-1.76)    |           | 47.3       | 1.30 (0.87-1.93)    |           |
| Race/ethnicity   |           |                     |           |            |                     |           |
| Non-Hispanic white | 13.9     | 1 [Reference]       | .44       | 36.0       | 1 [Reference]       | .33       |
| Black/African American | 14.6 | 1.08 (0.63-1.86) |           | 37.9       | 1.09 (0.72-1.63)    |           |
| Hispanic/Latino  | 17.9      | 1.48 (0.61-3.60)    |           | 46.5       | 1.55 (0.73-3.29)    |           |
| Other            | 25.2      | 2.28 (0.73-7.15)    |           | 56.8       | 2.40 (0.77-7.46)    |           |
| Education        |           |                     |           |            |                     |           |
| Less than high school | 18.6 | 1.00 (0.90-0.96) | <.001     | NA         | 0.93 (0.90-0.96)    | <.001     |
| High school/GED | 18.1      | 0.86 (0.42-1.73)    | .68       | 35.0       | 1 [Reference]       | .04b      |
| More than high school | 17.0 | 0.76 (0.39-1.51) |           | 51.7       | 2.16 (1.15-4.05)    |           |
| BMIb             | NA        | 0.93 (0.90-0.96)    | <.001     | NA         | 0.98 (0.96-1.01)    | .13b      |
| Health conditions|           |                     |           |            |                     |           |
| 0 to 1           | 19.5      | 1 [Reference]       | .20       | 49.3       | 1 [Reference]       | .15       |
| ≥2               | 17.2      | 0.78 (0.53-1.14)    |           | 43.9       | 0.80 (0.59-1.09)    |           |
| Diabetes         |           |                     |           |            |                     |           |
| No               | 17.3      | 1 [Reference]       | .63       | 44.9       | 1 [Reference]       | .73       |
| Yes              | 16.0      | 0.89 (0.54-1.46)    |           | 46.6       | 1.07 (0.71-1.61)    |           |
| Hypertension     |           |                     |           |            |                     |           |
| No               | 16.7      | 1 [Reference]       | .54       | 45.6       | 1 [Reference]       | .68       |
| Yes              | 18.3      | 1.12 (0.78-1.60)    |           | 44.0       | 0.94 (0.68-1.28)    |           |

Abbreviations: CDC-ACSM, Centers for Disease Control and Prevention-American College of Sports Medicine; OR, odds ratio; CI, confidence interval; GED, General Education Development test; BMI, body mass index; CHAMPS physical activity, Community Healthy Activities Model Program for Seniors physical activity questionnaire.

a All percentages, ORs, and 95% CIs are adjusted for site clustering, sex, race/ethnicity, education, health rating, and BMI. Repeated measures analyses examining pretest to posttest changes (time x pretest predictor interactions) also controlled for site clustering, sex, race/ethnicity, education, health rating, and BMI.

b In the repeated measures analyses, a significant time x pretest variable interaction was found (ie, the intervention effect varied by levels of this pretest variable).

c BMI, social support, self-efficacy, depressive symptoms perceived, stress, and physical activity were treated as continuous variables in change analyses; therefore, percentages that met recommendations are not reported.

(Continued on next page)
### Table 5. (continued) Percentage of Active Living Every Day Participants Who Met CDC-ACSM Recommendations at Pretest and Posttest, by Pretest Variables\(^a\), Active for Life Multisite Study, 2003-2006

| Pretest Variable | Pretest % | Pretest OR (95% CI) | Pretest P | Posttest % | Posttest OR (95% CI) | Posttest P |
|------------------|-----------|---------------------|-----------|------------|----------------------|-----------|
| **Arthritis**    |           |                     |           |            |                      |           |
| No               | 18.8      | 1 [Reference]       | .46       | 43.4       | 1 [Reference]        | .78       |
| Yes              | 17.0      | 0.88 (0.62-1.45)    |           | 44.9       | 1.05 (0.76-1.45)     |           |
| **Coronary heart disease** |           |                     |           |            |                      |           |
| No               | 17.2      | 1 [Reference]       | .19       | 44.8       | 1 [Reference]        | .72       |
| Yes              | 21.3      | 1.38 (0.85-2.25)    |           | 43.0       | 0.92 (0.57-1.47)     |           |
| **Osteoporosis** |           |                     |           |            |                      |           |
| No               | 18.2      | 1 [Reference]       | .50       | 44.2       | 1 [Reference]        | .87       |
| Yes              | 16.9      | 0.87 (0.57-1.31)    |           | 45.0       | 1.03 (0.70-1.52)     |           |
| **Health rating**|           |                     |           |            |                      |           |
| Fair or poor     | 16.8      | 1 [Reference]       | .01       | 44.9       | 1 [Reference]        | .24       |
| Good             | 16.5      | 1.02 (0.60-1.71)    |           | 44.4       | 0.98 (0.66-1.46)     |           |
| Very good or excellent | 24.9 | 1.80 (1.04-3.09) | | 51.6 | 1.32 (0.83-2.09) | |
| Social support\(^c\) | NA | 1.10 (1.04-1.17) | .06 | NA | 1.05 (1.00-1.11) | .05 |
| Self-efficacy\(^c\) | NA | 1.04 (1.01-1.06) | .003 | NA | 1.04 (1.02-1.06) | <.001 |
| Depressive symptoms\(^c\) | NA | 0.98 (0.94-1.02) | .38 | NA | 0.99 (0.96-1.03) | .74 |
| Perceived stress\(^c\) | NA | 0.95 (0.90-1.01) | .11 | NA | 0.93 (0.88-0.98) | .01 |
| CHAMPS physical activity\(^c\) | NA | 1.10 (1.08-1.12) | <.001 | NA | 1.05 (1.03-1.07) | <.001\(^b\) |

Abbreviations: CDC-ACSM, Centers for Disease Control and Prevention-American College of Sports Medicine; OR, odds ratio; CI, confidence interval; GED, General Education Development test; BMI, body mass index; CHAMPS physical activity, Community Healthy Activities Model Program for Seniors physical activity questionnaire.

\(^a\) All percentages, ORs, and 95% CIs are adjusted for site clustering, sex, race/ethnicity, education, health rating, and BMI. Repeated measures analyses examining pretest to posttest changes (time x pretest predictor interactions) also controlled for site clustering, sex, race/ethnicity, education, health rating, and BMI.

\(^b\) In the repeated measures analyses, a significant time x pretest variable interaction was found (ie, the intervention effect varied by levels of this pretest variable).

\(^c\) BMI, social support, self-efficacy, depressive symptoms perceived, stress, and physical activity were treated as continuous variables in change analyses; therefore, percentages that met recommendations are not reported.