ORIGINAL RESEARCH

# "Worth the Walk": Culturally Tailored Stroke Risk Factor Reduction Intervention in Community Senior Centers

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***Background*—**Racial/ethnic minority older adults have worse stroke burden than non-Hispanic white and younger counterparts. Our academic-community partner team tested a culturally tailored 1-month (8-session) intervention to increase walking and stroke knowledge among Latino, Korean, Chinese, and black seniors.

***Methods and Results*—**We conducted a randomized wait-list controlled trial of 233 adults aged 60 years and older, with a history of hypertension, recruited from senior centers. Outcomes were measured at baseline (T0), immediately after the 1-month intervention (T1), and 2 months later (T2). The primary outcome was pedometer-measured change in steps. Secondary outcomes included stroke knowledge (eg, intention to call 911 for stroke symptoms) and other self-reported and clinical measures of health. Mean age of participants was 74 years; 90% completed T2. Intervention participants had better daily walking change scores than control participants at T1 (489 versus −398 steps; mean difference in change=887; 97.5% CI, 137–1636), but not T2 after adjusting for multiple comparisons (233 versus −714; mean difference in change=947; 97.5% CI, −108 to 2002). The intervention increased the percent of stroke symptoms for which participants would call 911 (from 49% to 68%); the control group did not change (mean difference in change T0–T1=22%; 99.9% CI, 9–34%). This effect persisted at T2. The intervention did not affect measures of health (eg, blood pressure).

***Conclusions*—**This community-partnered intervention did not succeed in increasing and sustaining meaningful improvements in walking levels among minority seniors, but it caused large, sustained improvements in stroke preparedness.

***Clinical Trial Registration*—**URL: http://www.clinicaltrials.gov. Unique identifier: NCT02181062. **(*J Am Heart Assoc*. 2019;8: e011088. DOI: 10.1161/JAHA.118.011088.)**

**Key Words:** aging • Community-based participatory research • minority health • walking

The racial/ethnic minority population aged >65 years is expected to more than triple between 2012 and 2050.[1] Stroke risk increases with age, and stark racial/ethnic disparities exist in stroke risk burden, incidence, and outcomes. Latino, Asian, and blacks have elevated risk of stroke incidence or stroke mortality compared with non-Latino whites.[2–4] Behavioral interventions could reduce racial/ethnic disparities in stroke outcomes by decreasing risk factors and increasing knowledge of symptoms that should trigger urgent response.[5]

One major, modifiable risk factor for stroke is physical inactivity.[6–8] Physical activity independently reduces stroke risk and decreases other cardiovascular risk factors such as hypertension, hyperlipidemia, and obesity.[9,10] Walking is accessible, low cost, and the most popular form of exercise for US adults (including minority older adults).[11,12] Still, less

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Accompanying Data S1 and Tables S1 through S3 are available at https://www.ahajournals.org/doi/suppl/10.1161/JAHA.118.011088

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## Clinical Perspective

### What Is New?

- We tested a new low-cost intervention using in-house case managers at community senior centers to administer an 8-session, 1-month, culturally tailored behavioral intervention to black, Latino, Chinese, and Korean-American seniors.
- The intervention caused short-term improvements in changes in daily steps, but the improvements were small and unfortunately not sustained 2 months after the intervention; however, this same intervention was successful in causing sustained improved stroke knowledge, specifically increased reported intention to call 911 in response to stroke symptoms.
- This is the first study to improve stroke knowledge specifically among older Chinese and Korean Americans.

### What Are the Clinical Implications?

- Because stroke knowledge is particularly low among racial/ethnic minorities, improved stroke knowledge and preparedness among racial/ethnic minorities might shorten delays between stroke symptoms and receipt of medical care for stroke.
- Though there are many factors contributing to disparities in stroke outcomes, whether this intervention's sustained improvement of stroke knowledge and preparedness among ethnic/racial minority seniors can help reduce stroke outcome disparities warrants further investigation.
- This low-cost, easily generalizable community-partnered intervention successfully increased stroke preparedness, but did not cause sustained improvements in walking behavior; whether other low-cost interventions can cause sustained improvements in walking behavior is an important area of investigation.

than one third of Americans aged 75 years and older meet federal activity guidelines,[4] and racial/ethnic minorities and immigrants tend to be especially sedentary.[13,14] Previous pedometer interventions, including culturally tailored interventions among older racial/ethnic minority adults, have had promising results increasing walking,[10,15] but interventions that require hiring trained staff are challenging to sustain.

Gaps in stroke knowledge may also contribute to stroke disparities; racial/ethnic minority groups tend to know less about stroke than non-Latino white adults.[16,17] For example, stroke awareness/preparedness (ie, ability to identify and respond to stroke symptoms) is lower across racial/ethnic minorities,[18,19] including Asians,[20] and older adults.[17] Among patients hospitalized for stroke, Asians, Latinos, and black women have lower rates of 911 utilization than their white counterparts.[21] Increasing stroke knowledge in these communities could improve treatment response time and promote self-efficacy to change personal behavior to decrease stroke risk.

This study tested the effectiveness of a potentially sustainable, culturally tailored, 1-month intervention to increase walking and stroke knowledge among Latino, Korean, Chinese, and white seniors. The intervention provided stroke education and drew on motivational psychology theories to increase self-efficacy and the perceived benefits of walking. Strong community partnership enabled cultural tailoring of the intervention curriculum,[22] which can increase the impact of health interventions.[12,23] To facilitate long-term sustainability, the intervention focused on training in-house case managers at community senior centers to administer the program.

The primary aim was to test whether the intervention increased walking in this high-risk population. As secondary aims, we examined whether the intervention improved stroke knowledge, self-efficacy, positive beliefs about exercise, and clinical health indicators such as blood pressure. We also explored effects on other health-relevant outcomes, including quality of life.

## Methods

### Study Design and Participants

"Worth the Walk" was a single-blind, randomized, controlled trial (RCT). The full protocol was published previously,[24] and Data S1 summarizes minor protocol changes. This community-partnered participatory research project aimed to be sustainable, including 4 Los Angeles community-based, senior service organizations primarily serving Latino, Korean, Chinese, and black older adults. At least 2 case managers at each organization completed full-day trainings and demonstrated proficiency to facilitate intervention sessions. The intervention became part of regular senior center programming with the intention that it could continue beyond the funded study period.

Researchers and site staff collaborated to recruit 2 sequential cohorts for each racial/ethnic group (Table S1). Site staff made presentations at the senior centers and invited interested seniors to complete screening interviews with trained bilingual research staff. Inclusion criteria included self-reported history of hypertension, age 60 years or older, and ability to walk (assistive devices allowed) and to sit in a class setting. Subjects had to self-identify as 1 of the 4 racial/ethnic demographic groups, communicate in that ethnic-specific language (English, Spanish, Mandarin Chinese, or Korean), and be available to attend all study sessions.

Approximately 1 week after screening, eligible seniors participated in on-site, 1-on-1 data collection interviews. Trained bilingual research staff collected interview data at

baseline (T0), after the 1-month intervention (T1), and 2 months after the intervention concluded (T2; 3 months after baseline). Participants enrolled from October 2014 through May 2016; the last follow-up data collection sessions ended September 2016. The University of California, Los Angeles institutional review board approved the trial design, and participants provided written informed consent before data collection. Study data are available from the corresponding author upon request.

## Randomization and Blinding

After T0 data collection, participants were randomized to 1 of 2 study arms: immediate intervention or wait-list control. Participants were randomized using the Research Electronic Data Capture (REDCap) web application permuted block randomization, with randomized block sizes stratified by sex and race/ethnicity. Data collection staff were blind to assignment.

## Intervention Group

Trained site case managers facilitated 8, 1-hour intervention sessions, held twice-weekly over 1 month, promoting walking and stroke knowledge to reduce risk burden. The curriculum content combined aspects of social cognitive theory and attribution theory to motivate change in walking behavior.[25–27] Sessions 6 and 7 were culturally tailored to each racial/ethnic group to enhance relevance and impact, using insight gained from collaboration with racial/ethnic-specific community action boards and 12 previously conducted focus groups.[22] Additional curriculum information is available in Data S1. Participant retention was encouraged through attendance monitoring and telephone reminders.

## Wait-List Control Group

During the data collection period, groups received the same frequency of contact from research staff (eg, both groups received reminder calls to wear pedometers) and the same incentives (pedometer and $75 total honoraria). The wait-list control groups received the intervention after final (T2) data collection.

## Outcome Assessments

Survey instruments were forward- and back-translated into Spanish, Korean, and Chinese. All black participants and 3 Latino participants completed the interview in English; all other Latino participants completed the interview in Spanish. Korean- and Chinese-American participants were interviewed in Korean or Mandarin Chinese, respectively. Data were collected by trained interviewers by REDCap on iPads.

### *Primary outcome: mean daily steps*

After the screening, all participants were instructed to wear a (provided) Fitbit Zip pedometer[28] daily until T2 to record "normal everyday walking levels"; both intervention and control group participants continued to use the pedometer until the T2 follow-up appointment. At each interview, data were downloaded from the previous 7 days. Research staff telephoned participants reminding them to wear their pedometers. Research staff computed mean daily steps when at least 3 days of data were recorded in the week preceding each interview; only days with over 50 steps were included.

### *Secondary self-reported health outcomes*

The study adapted the Stroke Action Test,[29] which measures intended response to descriptions of stroke and other disease symptoms (ie, intent to call 911 immediately versus less urgent responses). Specifically, *stroke preparedness* was defined as the percent of 17 descriptions of stroke symptoms for which participants reported they would call 911 immediately (eg, sudden facial weakness, sudden trouble seeing in 1 eye, or sudden arm weakness). Participants were also asked to list 3 risk factors associated with stroke. An adapted chronic disease self-efficacy scale assessed confidence in one's ability to exercise and do different tasks and activities managing stroke risk.[30] Outcome expectations for exercise were measured through agreement with statements such as "exercise makes me feel better physically."[31]

### *Secondary clinical health outcomes*

Seated systolic and diastolic blood pressure were measured with a standard protocol using automated devices (Omron HEM-907XL; Omron Healthcare, Inc Hoofddorp, Netherlands). Three measurements were taken with a 5-minute rest between each; we analyzed the average.[32] Researchers measured height twice (cm) at baseline and weight twice (kg) at each time point. We used these averages to create body mass index scores at each time point. At T0 and T2, fingerpricks provided capillary blood samples for CardioChek Lipid Panel test strips to measure nonfasting cholesterol and dried blood spots for glycated hemoglobin and C-reactive protein assays conducted by the University of Washington Department of Laboratory Medicine (Seattle, WA). The CardioChek provided measures of total cholesterol and high-density lipoprotein cholesterol, which were used to calculate non-high-density lipoprotein cholesterol.[33] For each dried blood spots assay, linear regression equations were used to convert the directly measured analyte into a blood-equivalent (for % glycated hemoglobin) value or a plasma-equivalent (for C-reactive protein) concentration.

### *Exploratory outcomes*

At each interview, participants completed the Medical Outcomes Study 12-item Short Form[34] to assess health-related quality of life, the 9-item Patient Health Questionnaire to assess depressive symptomology,[35] and a survey of current limitations in activities of daily living[36] to assess disability. At T0 and T2, participants reported healthcare utilization (number of physician visits and nights in a hospital) in the previous 3 months.

## Statistical Analysis

We justified the planned sample size of 240 participants in the published study protocol.[24] We conducted intention-to-treat analyses evaluating differences in change scores from T0 to T1 and T2.[37] To control for multiple comparisons, Bonferroni adjustments were applied to significance thresholds (eg, $P<0.025$ for the 2 primary steps/day analyses and $P<0.0018$ for the remaining 27 secondary and exploratory outcome analyses).

When change-score differences were observed between groups, we also examined the pre/post change score for each group. To preserve intention to treat, we used the multiple imputation by chained equations (MICE) procedure in Stata/IC (version 15.1; StataCorp LP, College Station, TX) to fill in missing values for both continuous and binary outcomes (50 imputation sets). To test robustness of these change-score analysis results, we also conducted sensitivity analyses (with comparable Bonferroni-adjusted significance thresholds) using: (1) ANCOVA models predicting the postintervention outcomes adjusting for the baseline level of the outcome and (2) repeated-measures mixed-effects modeling for outcomes measured across each of the time points.

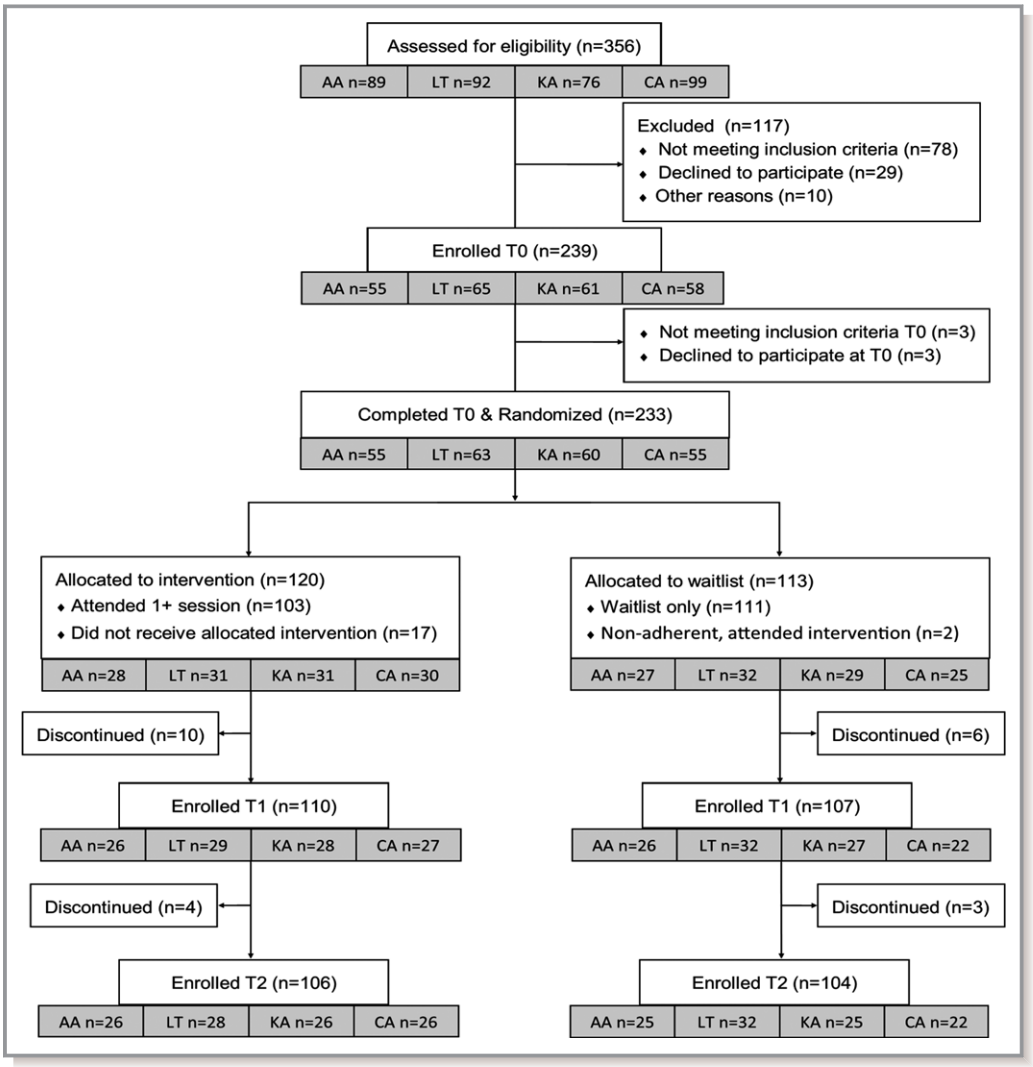


**Figure 1.** CONSORT flow diagram. AA indicates African American; CA, Chinese American; KA, Korean American; LT, Latino; T0, baseline; T1, immediately postintervention; T2, 2 months postintervention.

**Table 1.** Demographic and Baseline Health Characteristics

| | Total (N=233) | Intervention (n=120) | Control (n=113) |
|---|---|---|---|
| Demographics | | | |
| Age, y | 73.9 (0.4) | 74.1 (0.6) | 73.6 (0.6) |
| Female, N (%) | 161 (69.1) | 82 (68.3) | 79 (69.9) |
| Black, N (%) | 55 (23.6) | 28 (23.3) | 27 (23.9) |
| Latino, N (%) | 63 (27.0) | 31 (25.8) | 32 (28.3) |
| Chinese American, N (%) | 55 (23.6) | 30 (25.0) | 25 (22.1) |
| Korean American, N (%) | 60 (25.8) | 31 (25.8) | 29 (25.7) |
| Did not complete high school, N (%) | 97 (41.6) | 43 (35.8) | 54 (47.8) |
| Baseline health status | | | |
| Mean steps/day | 4934 (209) | 4548 (292) | 5343 (301) |
| Stroke preparedness | 0.51 (0.02) | 0.49 (0.03) | 0.54 (0.03) |
| Inactivity as stroke risk factor, N (%) | 49 (21.0) | 26 (21.7) | 23 (20.4) |
| Disease and exercise self-efficacy | 7.6 (0.1) | 7.6 (0.2) | 7.6 (0.2) |
| Outcome expectations for exercise | 1.8 (0.3) | 1.8 (0.5) | 1.8 (0.5) |
| Systolic BP, mm Hg | 124.9 (1.2) | 122.9 (1.5) | 127.0 (2.0) |
| Diastolic BP, mm Hg | 66.3 (0.7) | 65.7 (1.0) | 67.0 (1.1) |
| BMI, kg/m$^2$ | 28.4 (0.4) | 28.2 (0.6) | 28.6 (0.6) |
| Proportion no ADL limitations | 0.74 (0.03) | 0.67 (0.04) | 0.82 (0.04) |
| Katz comorbidity index score | 2.0 (0.1) | 2.1 (0.2) | 1.8 (0.2) |
| Non HDL cholesterol, mg/dL | 121.1 (3.0) | 118.1 (4.4) | 124.3 (4.0) |
| % HbA1c (whole-blood equivalent) | 6.0 (0.1) | 6.0 (0.1) | 5.9 (0.1) |
| Log CRP (plasma equivalent) | 0.06 (0.04) | 0.02 (0.06) | 0.11 (0.06) |
| Physical-health–related QOL | 42.1 (0.7) | 41.1 (0.9) | 43.3 (0.9) |
| Mental-health–related QOL | 50.3 (0.7) | 49.8 (0.9) | 50.8 (0.9) |
| Depressive symptomology | 4.9 (0.4) | 5.3 (0.6) | 4.4 (0.5) |
| Visits to physician in past 3 mo | 2.3 (0.1) | 2.6 (0.2) | 2.0 (0.1) |
| Total nights in hospital in past 3 mo | 0.3 (0.1) | 0.5 (0.2) | 0.2 (0.1) |

Mean (SE), unless otherwise specified. ADL indicates activities of daily living; BMI, body mass index; BP, blood pressure; CRP, C-reactive protein; HbA1c, glycated hemoglobin; HDL, high-density lipoprotein; QOL, quality of life.

## Results

Of the 356 people screened, 23% were ineligible, 12% declined or were otherwise unable to participate, and 233 completed T0 and were randomized (120 intervention, 113 control; Figure 1). Participant demographics are described in Table 1; 95% of Latino and all Chinese- and Korean-American participants were immigrants. Ninety percent of randomized participants completed T2. Participants who discontinued the study did not differ from those who completed T2 on sociodemographic or clinical characteristics.

At T0, participants randomized to the intervention tended to have fewer daily steps, more disability, and more physician visits than those in the control arm. Groups were comparable on all remaining outcome measures (Table 1). Pedometer adherence did not differ between the intervention and control groups at any time point: Overall, 62% had valid data for 7 days at baseline, and 10% had less than 3 days. Fifty-eight percent of participants randomized to the intervention attended 7 or 8 sessions; 77% attended at least 50% of the scheduled classes, and 14% did not attend any sessions.

Intention-to-treat analyses evaluating differences in change scores showed that the intervention group had better walking change scores than the control group at T1 (Table 2). At T2, the difference was not statistically significant (Table 3). ANCOVA sensitivity analyses (Table S2) and the repeated-measures mixed-effects sensitivity analyses (Table S3) produced identical conclusions. Pre/post mean walking change scores for the intervention group alone were not statistically significant (Tables 2 and 3): mean increase of 489 steps at T1, 95% CI (−13 to 990); 233 steps at T2, 95% CI (−508 to 973; Figure 2).

Change-score analyses showed that the intervention improved stroke preparedness. The intervention group indicated that they would call 911 for 49% of presented stroke symptoms at T0. The intervention group's stroke preparedness increased to 68% at T1 and was 66% at T2, whereas stroke preparedness did not change in the control group (Tables 2 and 3). Sensitivity analyses produced identical conclusions (Tables S2 and S3).

**Table 2.** Change in Study Outcomes From Baseline (T0) to Immediately After Intervention Completed (T1)

| Outcome | Change From Baseline Unadjusted Mean [95% CI] | | Intervention Regression Coefficient Predicting Change | |
|---|---|---|---|---|
| | Intervention | Control | b [95% CI] | *P* Value |
| Primary | | | | |
| Steps/day | 489 [−13 to 990] | −398 [−834 to 38] | 887 [233–1540] | 0.008 |
| Secondary, self-reported | | | | |
| Stroke preparedness | 0.19 [0.13–0.25] | −0.02 [−0.07 to 0.02] | 0.22 [0.15–0.29] | <0.001 |
| Inactivity as stroke risk factor* | 0.2 [0.1–0.3] | 0.1 [0.03–0.20] | 0.4 [−0.2 to 0.9] | 0.161 |
| Self-efficacy | 0.30 [0.02–0.58] | −0.1 [−0.4 to 0.2] | 0.37 [−0.02 to 0.77] | 0.063 |
| Exercise outcome expectations | −0.1 [−0.200 to <0.001] | 0.02 [−0.06 to 0.11] | −0.12 [−0.25 to 0.01] | 0.072 |
| Secondary, clinical | | | | |
| Systolic BP | −1.2 [−4.5 to 2.0] | −2.8 [−6.2 to 0.6] | 1.5 [−3.2 to 6.2] | 0.52 |
| Diastolic BP | −0.7 [−2.6 to 1.2] | −2.1 [−3.9 to −0.4] | 1.4 [−1.2 to 4.1] | 0.27 |
| BMI | −0.02 [−0.16 to 0.13] | 0.05 [−0.07 to 0.16] | −0.06 [−0.25 to 0.12] | 0.50 |
| Exploratory | | | | |
| Physical-health–related QOL | −1.0 [−2.7 to 0.6] | −2.1 [−3.7 to −0.5] | 1.1 [−1.2 to 3.3] | 0.35 |
| Mental-health–related QOL | −0.1 [−1.9 to 1.7] | 0.2 [−1.4 to 1.7] | −0.2 [−2.6 to 2.2] | 0.86 |
| Depressive symptomology | 0.3 [−0.6 to 1.2] | 0.3 [−0.6 to 1.1] | 0.02 [−1.2 to 1.2] | 0.98 |
| ADL category* | 0.05 [−0.16 to 0.25] | 0.12 [−0.05 to 0.29] | −0.01 [−0.58 to 0.57] | 0.98 |

Intervention regression coefficient reflects mean difference between intervention and control conditions in level of change from T0 to T1. Models use regression with imputed values. ADL indicates activities of daily living; BMI, body mass index; BP, blood pressure; QOL, quality of life.
*Ordinal logistic regression.

The intervention did not affect other secondary or exploratory outcomes (likelihood of listing inactivity as a stroke risk factor, self-efficacy, outcome expectations for exercise, blood pressure, body mass index, health-related quality of life, depressive symptomology, and disability). The intervention also did not change biomarkers (non-high-density lipoprotein cholesterol, glycated hemoglobin, and C-reactive protein) or healthcare utilization at T2 (Tables 2 and 3).

## Discussion

In this older, racial/ethnic minority sample, intervention participants had better short-term walking change scores than control-group participants. The effect was small and not sustained. The intervention caused large, sustained improvements in stroke preparedness. It had no effect on the remaining secondary and exploratory outcomes.

Immediately postintervention, the intervention group walked relatively more compared with the control group. Sensitivity analyses provided strong convergent support for this group difference, though the effect size was below the minimal clinical important difference for steps observed in specific disease states (the pulmonary rehabilitation minimal clinical important difference lies between 600 and 1100 steps/day).[38] The observed intervention effect was partly attributed to a downward trend in the control group. Given that the control group walked more than the intervention group at baseline, we cannot rule out the possibility that the observed intervention effect on steps may partially reflect regression to the mean. Participants were able to see their pedometer step counts, which may have acted as an intervention on its own for all participants and, based on novelty, may have promoted more walking than usual at baseline for participants in both arms of the study. Participants receiving the intervention may have maintained their initial level of enthusiasm whereas control participants may have decreased their walking in the absence of the intervention.

There are several possible explanations for the modest and unsustained success of this intervention on the primary outcome (steps). Although previous randomized, controlled trials using pedometers have increased daily walking, these randomized, controlled trials were typically longer in duration than this 1-month active intervention and/or excluded participants who used assistive devices.[10,15,25] Our short and inclusive study protocol promoted generalizability, but may have dampened effect size; it is possible that the intervention might have succeeded in increasing steps if it

**Table 3.** Change in Study Outcomes From Baseline (T0) to 2 Months After Intervention Completed (T2)

| Outcome | Change From Baseline Unadjusted Mean [95% CI] | | Intervention Regression Coefficient Predicting Outcome | |
|---|---|---|---|---|
| | Intervention | Control | b [95% CI] | *P* Value |
| Primary | | | | |
| Steps/day | 233 [−508 to 973] | −714 [−1264 to −164] | 947 [27–1867] | 0.044 |
| Secondary, self-report | | | | |
| Stroke preparedness | 0.18 [0.12–0.24] | −0.03 [−0.07 to 0.02] | 0.20 [0.13–0.28] | <0.001 |
| Inactivity as stroke risk factor* | 0.07 [−0.03 to 0.17] | 0.05 [−0.04 to 0.15] | 0.07 [−0.52 to 0.66] | 0.83 |
| Self-efficacy | 0.23 [−0.08 to 0.55] | −0.36 [−0.67 to −0.04] | 0.59 [0.15–1.03] | 0.009 |
| Exercise outcome expectations | −0.11 [−0.20 to −0.02] | −0.01 [−0.11 to 0.08] | −0.10 [−0.23 to 0.03] | 0.137 |
| Secondary, clinical | | | | |
| Systolic BP | −1.7 [−5.1 to 1.8] | −3.8 [−7.0 to −0.6] | 2.1 [−2.6 to 6.9] | 0.38 |
| Diastolic BP | −1.2 [−3.2 to 0.8] | −2.7 [−4.5 to −0.9] | 1.43 [−1.3 to 4.1] | 0.29 |
| BMI | −0.14 [−0.33 to 0.05] | −0.01 [−0.20 to 0.18] | −0.13 [−0.40 to 0.14] | 0.35 |
| Non-HDL cholesterol | 1.7 [−7.2 to 10.7] | −10.0 [−19.5 to −0.4] | 11.7 [−1.6 to 25.0] | 0.083 |
| HbA1c | −0.10 [−0.28 to 0.07] | 0.02 [−0.11 to 0.15] | −0.12 [−0.34 to 0.09] | 0.26 |
| logCRP | −0.03 [−0.12 to 0.07] | −0.01 [−0.13 to 0.11] | −0.02 [−0.17 to 0.13] | 0.81 |
| Exploratory | | | | |
| Physical-health–related QOL | 0.6 [−1.0 to 2.1] | 0.3 [−1.4 to 2.0] | 0.3 [−2.0 to 2.5] | 0.82 |
| Mental-health–related QOL | −0.8 [−2.5 to 1.0] | −0.3 [−2.2 to 1.6] | −0.4 [−3.0 to 2.1] | 0.73 |
| Depressive symptomology | −0.4 [−1.2 to 0.4] | 0.02 [−0.9 to 0.9] | −0.38 [−1.57 to 0.81] | 0.53 |
| ADL category* | 0.1 [−0.1 to 0.4] | 0.2 [0.1–0.4] | −0.1 [−0.7 to 0.4] | 0.66 |
| Physician visits | −0.3 [−1.0 to 0.3] | −0.1 [−0.4 to 0.2] | −0.2 [−0.9 to 0.5] | 0.54 |
| Nights in hospital | 0.01 [−0.6 to 0.6] | −0.1 [−0.4 to 0.2] | 0.1 [−0.6 to 0.8] | 0.84 |

Intervention regression coefficient reflects mean difference between intervention and control conditions in level of change from T0 to T2. Models use regression with imputed values. Bonferroni adjustments for multiple comparisons mean the primary steps/day significance threshold is $P<0.025$ and the significance threshold for the remaining secondary and exploratory outcomes is $P<0.0018$. ADL indicates activities of daily living; BMI, body mass index; BP, blood pressure; CRP, C-reactive protein; HbA1c, glycated hemoglobin; HDL, high-density lipoprotein; QOL, quality of life.
*Ordinal logistic regression.

had been of longer duration. Though we worked closely with our community action boards to make all program materials understandable to people with low health literacy, it is possible that we failed in this regard and the intervention might have been successful in a population with higher levels of formal education. In addition, pedometer nonadherence was a big problem; pedometers allow assessment of behavior unbiased by self-report, but because participants did not wear them consistently, this added noise to the data and decreased our ability to detect an intervention effect.

The most important finding in terms of addressing stroke disparities outcomes is that the intervention increased intention to call 911 in response to stroke symptoms immediately after the intervention and 2 months later. Stroke awareness is of very strong medical interest, and it is a strength of this study that the successful educational component of the intervention was low cost and community based. Though there are many factors contributing to stroke disparities, increasing behavioral intent to call 911 has been identified as an important potential means to reduce stroke disparities.[39] Although intent to call 911 will not always result in behavior changes, population-level increases in symptom recognition and intent to call 911 is still a desirable outcome; knowledge is a necessary, but not sufficient, condition for improving outcomes.[20] Our finding matches past interventions' success sustaining increased stroke preparedness in black and Latino general populations[40,41] and extends this success to older adults and Korean and Chinese Americans.

The intervention aimed to improve knowledge of stroke risk factors and emphasized the importance of exercise in preventing stroke, so it was surprising that the intervention did not increase participants' likelihood of reporting physical inactivity as a stroke risk factor in open-ended questioning. The open-ended versus closed choice question structure may explain this.[17] Another possibility is that pre-existing beliefs could inhibit thinking about *lack* of exercise as a stroke risk

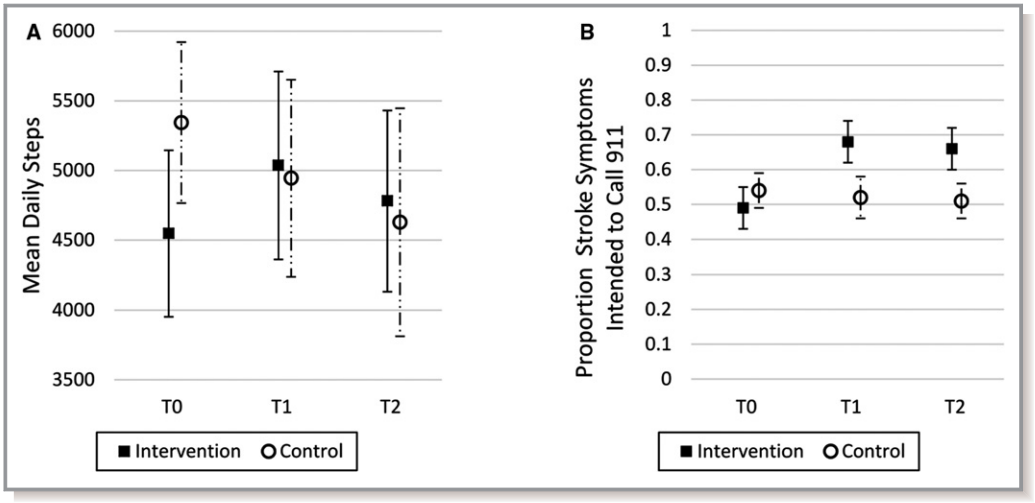


**Figure 2.** Outcomes with significant intervention effects at each time point, separated by intervention and control group. Bars represent 95% CIs. **A**, Mean steps per day. **B**, Stroke preparedness.

factor; some Chinese, Latino, and Korean Americans in focus groups believed that overly strenuous exercise could cause stroke.[22] Moreover, participants may not report *lack* of exercise as a risk factor, but still know that moderate exercise can help prevent stroke.

Cultural tailoring using a community-partnered approach promoted long-term sustainability; 2 sites continued the program beyond the end of the study period. Nonetheless, the concept of cultural tailoring is complex, with no single "black culture" or "Korean-American culture" etc; it would be inappropriately presumptuous to generalize findings from this nonrepresentative sample to all members of each minority group across the nation. Additional research is needed to test whether the culturally tailored interventions generalize to US-born Latino, Korean, and Chinese Americans or beyond Los Angeles, and whether cultural tailoring specifically improved efficacy. We cannot determine whether observed differences between study-arm participants were attributed to the actual content of the intervention versus the increased "attention" given to the intervention-arm participants; future research should examine this by building in a stronger attention-control condition.

## Summary

This low-cost intervention, well integrated into ongoing community programming, corresponded with small but better walking change scores immediately postintervention and successfully caused large improvements in stroke preparedness in this older racial/ethnic minority sample. Further study should assess whether this approach can successfully decrease racial/ethnic disparities in stroke and associated detrimental outcomes.

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## Disclosures

None.

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# SUPPLEMENTAL MATERIAL

**Data S1.**

## Supplemental Methods

### Study Design Additional Detail

*Recruitment and enrollment timeline.* See Table S1.

*Randomization.* For each racial/ethnic cohort, the study coordinator (D.A.) created randomization tables using permuted block randomization with randomized block sizes, stratified by gender. For each cohort, a designated research staff member, unblinded to facilitate intervention coordination and scheduling with the community sites, uploaded these tables to the Research Electronic Data Capture (REDCap) web application and used the REDCap randomization feature to assign participants to conditions. All research staff collecting data were blind to condition assignment.

### Measurement Additional Detail

*Daily steps.* We chose to count pedometer step data as valid only on days when participants had at least 50 steps that day. The median expected daily steps for older individuals with disabilities from a previous publication was 1,214 steps per day,[1] so very low number of steps could be valid data in this sample. Yet, even if someone was virtually bedbound on a given day, we would expect them to still walk more than 50 steps. We ran sensitivity analyses with the observed data by testing whether results differed if we used a different lower limit step threshold (e.g., 100 or 600 steps per day) for data to be considered valid and included in the calculated mean daily steps. The conclusions from change score analyses using a 50, 100, or 600 daily step threshold did not differ, nor did the ANCOVA or repeated-measures mixed-effects model sensitivity analyses.

We decided to compute mean daily steps only when at least three valid days of data were recorded within the 7 days prior to the interview because (as stated in the Results section) overall 62% of participants had valid data for 7 days at baseline, and 10% had less than 3 days. Limiting the analyses to the 62% of participants with 7 days of valid data would undermine generalizability and external validity by focusing on the most compliant participants. Although we imputed missing data, we still wanted to minimize the proportion of imputed data. By instead calculating the mean daily steps for participants with at least three valid days of data, we only needed to impute 10% of the step data at baseline.

*Self-efficacy.* An adapted chronic disease self-efficacy scale combined all items from the Self-Efficacy to Exercise Regularly subscale of the Self-Efficacy to Perform Self-Management Behaviors scale and three items from the Self-Efficacy to Manage Disease in General scale (which assessed confidence in one's ability to do different tasks and activities to prevent stroke, reduce need to see a doctor, and do things other than take medication to manage stroke risk).[2] Cronbach's alphas range 0.88 to 0.91 across time points.

*ADL categorization***.** The raw ADL scores were generated based on participant reported difficulties with walking, bathing, dressing one's upper body, dressing one's lower body, transferring from bed to chair, going to the bathroom, eating, and grooming. Participants were asked if they had difficulty in the past month in each domain and were scored 0 = no difficulty, 1 = difficulty but no help, or 2 = needed help; final scores could range from 0 to 16. The multiple imputation model would not converge when treating ADL scores as continuous, so we recoded the continuous data into a categorical variable; 0 = no limitations, 1 = scored 1 to 2 (roughly equivalent to one limitation), 2 = scored 3 to 4 (roughly equivalent to two limitations), 3 = scored 5 to 6 (roughly equivalent to three limitations), 4 = scored 7 to 16 (roughly equivalent to more than three limitations).

*Blood pressure.* Blood pressure was measured with the Omron HEM-907XL. Left arm bicep circumference was measured for each participant to determine the appropriate cuff size. Once the cuff was placed, participants sat quietly for five minutes prior to the first measurement. Three measures were taken, with a five minute rest between. The three measures were summarized for analysis by taking the average of the closest measurements (i.e., the average of the two closest measurements, or all three measurements if they were equidistant).

*Blood collection and assays.* All blood-based assays were conducted using specimen collected from capillaries via finger prick. Prior to collection, research staff ensured participants were well-hydrated. Heating pads were placed around the hand for 5-10 minutes to promote blood flow. Participants' fingers were pricked with a blue BD Contact-Activated Lancet and the first drop wiped away. The goal was to collect a minimum of 3 spots on a Whatman 903 Protein Saver card. The cards were air-dried overnight and then stored at -70C in sealed Ziploc bags with desiccant packs until assay.

Lipids were measured using the CardioChek PA analyzer. Following the dried bloodspot collection, research staff collected 40 ul of capillary blood in pipettes and applied it to the CardioChek Lipid test strip. The specimen was immediately analyzed and results entered in REDCap. Research staff did prick an additional finger if the first did not yield enough specimen. When measurements were out of range, the highest or lowest in range value in the corresponding direction was substituted to retain information.

Dried blood spots were analyzed for Hemoglobin A1c and C-reactive protein at the University of Washington Department of Laboratory Medicine. Dried blood spot (DBS) quality control (QC) samples and DBS assay calibrators created by the University of Washington Department of Laboratory Medicine (UW Lab Med; Seattle, WA) were sealed in Ziploc bags with desiccant packs and stored at -70°c. A BSD700 Semi-Automated Dried Sample Puncher (BSD Robotics, Brisbane, QLD, Australia) was used to punch a single 3.2mm (1/8in) diameter disc from each DBS sample into a deep-96 well microtiter plate well (Greiner Bio-One, Monroe, North Carolina). Separate microtiter plates were filled with DBS discs for each analyte of interest. The plates were either immediately assayed or were sealed (CapMat, Greiner Bio-One) and stored at 70°c. Microtiter plates were warmed to room temperature (RT) prior to assaying.

The hemoglobin A1c (HbA1c) assay used to measure the percentage of glycosylated hemoglobin (%HbA1c) in the DBS was performed on an automated ion-exchange high-performance liquid chromatography system (Variant II HPLC Hemoglobin A1c Testing System, Bio-Rad, Hercules, CA). HbA1c buffer (Wash/Diluent Reagent, Bio-Rad) was added to each microtiter plate well and the plate then sealed and vigorously shaken for 1 hour on a Delfia microplate shaker (PerkinElmer, Waltham, MA) to reliquefy the dried blood. The reliquefied blood was transferred to a sample vial containing Wash/Diluent Reagent, gently agitated for approximately 30 seconds and then analyzed. A buffer gradient of increasing ionic strength was applied by the HPLC to separate hemoglobins based on their ionic interactions with the cation exchange cartridge resin. Hemoglobins, identified by 415nm absorbance and the time of passage through a filter photometer flow cell, were displayed as chromatogram curves. Curve integration was used to quantify the HbA1c and total HbA areas and %HbA1c then calculated from the ratio of the HbA1c:total HbA areas adjusted by the calibration curve slope and intercept (Variant II Clinical Data Management Software, Bio-Rad).

DBS HbA1c QC samples were constructed by pipetting 75µl aliquots of blood with known %HbA1c values onto Whatman No. 903 filter paper (GE Healthcare, Pittsburgh, PA) and drying for 4 hours at RT (UW Lab Med). Assay acceptability was determined by comparing the %HbA1c concentrations of QC samples (Lyphochek Bilevel Diabetes Control, Bio-Rad) and DBS QC samples at the beginning, middle, and end of each assay run against established values. Acceptability of the analysis of each sample was determined by examining the chromatogram for proper form, absence of interfering peaks, acceptable total area, and %HbA1c value within the analytical measurement range (AMR).

The HbA1c assay AMR was 3.1% to 18.5% per established limits (Bio-Rad). The within-assay CV was 2.5% and between-assay CV was 2.9%. The %HbA1c values of DBS samples analyzed by the DBS assay correlated with the %HbA1c values of DBS-matched liquid blood samples (Pearson R = 0.98) and were linearly related (blood %HbA1c value = 2.245 + DBS direct %HbA1c value X 1.378). The linear regression equation was used to convert the directly measured %HbA1c value of each WTW DBS into a blood-equivalent (B-E) %HbA1c value.

The DBS high-sensitivity C-reactive protein (CRP) Assay used a sandwich ELISA (BC-1119, Biocheck, Foster City, CA). CRP Sample Diluent (Biocheck) was added to each microtiter well containing a DBS disc and the plate was then sealed and gently shaken for 1 hour on a Delfia microplate shaker (PerkinElmer) to reliquefy the dried blood and elute CRP. An aliquot of the eluate was transferred to an ELISA microtiter plate (Biocheck) pre-coated with an anti-CRP monoclonal antibody (mAb) that recognized and bound CRP (solid phase immobilization). CRP Enzyme Conjugate Reagent (Biocheck) containing anti-CRP Ab coupled to peroxidase (enzyme-linked antibody) was then added to each well to sandwich CRP between the solid phase and enzyme-linked antibodies. The plate was gently shaken at RT for 45 minutes and then washed 5 times with di/ddH2O. TMB Reagent containing H2O2 (Biocheck) was added, and the reaction of H2O2, cleaved by the peroxidase, with TMB was stopped after 20 minutes by addition of Stop Solution (Biocheck). The absorbance of each well at 450nm, measured by a plate reader (Synergy HT, BioTek), was directly proportional to the CRP concentration. A 5-parameter calibration curve, constructed by plotting the absorbance of the calibrators against the assigned CRP concentrations (Gen 5 Software, BioTek), was used to convert the absorbance of each sample into a DBS direct CRP concentration.

DBS CRP assay calibrators were constructed from pooled human plasma with a negligible CRP concentration (UW Lab Med) spiked with CRP concentrate (Cell Sciences, Canton, MA) and serially diluted with negligible CRP plasma to the desired final concentrations. DBS QC samples were constructed from a separate pool of human plasma, either undiluted (high CRP concentration QC sample) or diluted with negligible CRP plasma (medium CRP concentration QC sample and low CRP concentration QC sample). Each calibrator and QC sample solution was mixed with a constant volume of washed human erythrocytes (UW Lab Med), pipetted in 75µl aliquots onto Whatman No. 903 filter paper (GE Healthcare) and dried for 4 hours at RT. Acceptability of an assay was determined by comparing the CRP concentrations of the QC samples with the established values.

The CRP assay LLOD was 0.035mg/L, within-assay imprecision (CV) was 8.1% and between-assay imprecision was 11.0%. The CRP concentrations of DBS samples analyzed by the DBS assay correlated (Pearson R = 0.99) with the CRP concentrations of paired plasma samples determined by analysis on an automated chemistry analyzer (UniCel DxC 800 Synchron Clinical System, Beckman Coulter, Miami, FL) and were linearly related (DBS direct CRP concentration = 0.370 + plasma CRP concentration X 1.077). The linear regression equation was used to convert the directly measured CRP concentration of each WTW DBS into a plasma-equivalent (P-E) CRP concentration.

*Healthcare utilization.* Participants also reported number of visits to the emergency room (ER) and number of times they had an overnight stay in the hospital in the past 3 months, but these outcomes were not included in the manuscript because of challenges with multiple imputation model convergence (see "Relevant Deviations from the Previously Published Protocol" below). Outcomes such as total nights in the hospital in the past 3 months had limited distribution ranges. For example, at baseline 217 participants (94% of

the observed sample) spent 0 nights in the hospital in the past 3 months; the remaining 6% ranged from 1 to 14 nights in the hospital.

Multiple Imputation Model Specification

Trace plots indicated that BMI imputations did not converge as well as other outcomes, even though only one person was missing BMI at baseline (T0). Thus, missing data was imputed from least to most missing, with the BMI variable imputed last to avoid negatively impacting the remaining data imputation. Education (whether or not completed high school), gender, ethnicity, cohort order, intervention condition, age, and the complete baseline data for health related quality of life (QOL), depressive symptomology, stroke risk factor knowledge, and number of physician visits were included in the model as complete auxiliary variables. The amount of missing data for each variable at each time point is presented in Table S2.

Relevant Deviations from the Previously Published Protocol

Due to time constraints during the interviews and participant difficulties remembering to bring medication lists, medication usage was discontinued as a measured outcome and was not analyzed.

Although the initial clinicaltrials.gov preregistration indicated LDL was the key cholesterol outcome of interest, the researchers shifted to non-HDL cholesterol prior to data analysis because it was difficult to ask participants to fast prior to measurement. Non-fasting LDL is not clinically meaningful, so researchers determined that a more appropriate measure would be non-HDL cholesterol (total cholesterol value – HDL cholesterol value).[3]

The multiple imputation with chained equations model would not converge when trying to impute number of emergency room visits or number of times participants had an overnight stay in the hospital in the past 3 months. Thus, these variables are not analyzed in the multiple imputation models but are still included in the complete case analyses in this data supplement.

Intervention Additional Curriculum Information

*Overview (consistent across all racial/ethnic groups)*

- Main teaching points

    1. Being physically active is an <u>expected part of life</u> that decreases our risk for stroke. We should continue being physically active throughout life, regardless of <u>age, physical ability or medical conditions.</u>
    2. Some stroke risk factors can’t be changed but there are several that can at any age.

3. Age alone doesn't cause stroke. Stroke risk should be attributed as much as possible to factors that are within a person's control.

- Key procedures
  - Promises: At the end of every other session, time was set aside for each participant to make a promise for the week (a specific thing that will be done before the next meeting to improve his or her stroke risk factors—e.g. walk for 15 minutes every other day) which the group leader wrote down on a flip chart. The promises needed to be realistic and attainable. Group leaders made a promise as well. At the beginning of every other session (starting with session 3), participants were encouraged by the facilitator to share how they did in carrying out their promises. Participants were encouraged to describe any challenges they faced (and did or did not overcome).
  - Reflection: At sessions 5, 6, 7, and 8, participants were asked to reflect on whether their beliefs about increasing physical activity as an expected part of aging have changed at all since the previous session. Previous research has shown that changes in attitude are more likely to be sustained if people reflect in a meaningful way on their changes in beliefs.

*Class Schedule and Objectives for Each Session.* Full curriculum information and materials in each language are available upon request.

- Session 1 : Why Walking is Worth It
  1. Introduce yourself and the participants to each other.
  2. Introduce stroke.
  3. Introduce the idea that being physically active and controlling stroke risk factors should be an expected part of normal aging and should continue at any age.
  4. Focus on physical inactivity as a risk factor and identify causes of being less physically active.
  5. Differentiate between causes of physical inactivity that are modifiable and causes that are not (like age).
  6. Teach that aging itself does not cause stroke or decreased physical activity.
  7. Make individual promises to improve stroke risk factors through increasing walking and physical activity.

- Session 2: What's Worth Looking Out For
  1. Introduce stroke warning signs.
  2. Reinforce the idea that preventing stroke and being physically active should be an expected part of normal aging and should continue at any age.
  3. Reinforce physical activity as a modifiable risk factor for stroke and the difference between modifiable and non-modifiable contributors to being less physically active.

4. Identify common changes with aging and teach that modifications can make activity once again possible.
5. Introduce diary and reminder to keep up with promises.

- Session 3: Worth the Talk: Me and My Doc
  1. Review promises and problem-solve on barriers to completion.
  2. Reinforce the idea that knowing stroke symptoms and being physically active are modifiable risk factors for stroke and should be an expected part of normal aging.
  3. Identify common challenges with communicating with your doctor.
  4. Problem solve solutions or ways to manage these challenges.
  5. Make new promises.

- Session 4: Taking Control, One Step at a Time
  1. Introduce blood pressure control.
  2. Reinforce the idea that preventing stroke and being physically active should be an expected part of normal aging and should continue at any age.
  3. Reinforce the idea that difficulty walking and controlling stroke risk should not be attributed to old age.
  4. Teach about importance of incremental goal setting.
  5. Problem solve on how to avoid feeling overwhelmed when trying to manage stroke risk.
  6. Reminder to keep up with promises.

- Session 5: It's Never Too Late To Make Walking (Fun and) Worth It
  1. Review promises and problem-solve on barriers to completion.
  2. Reflect in a meaningful way on whether expectations and beliefs about aging have changed.
  3. Teach that being unable to learn a new habit is not caused by aging.
  4. Problem-solve on how to establish an exercise or walking plan as a new habit.
  5. Make new promises.

- Session 6: (Culturally-relevant Class)

  - African American: Walking is Good for the Body (and Relieving Stress)
    1. Review stroke warning signs.
    2. Reflect in a meaningful way on whether expectations around aging and habit formation have changed.
    3. Teach about chronic emotional stress and stroke risk.
    4. Problem-solve on how walking can be used to reduce emotional stress and stroke risk.
    5. Teach that we have control over how we choose to cope with stress, and that walking is an excellent choice.

6. Reminder to keep up with promises.

- Chinese American: The "3 Highs:" High Blood Pressure, High Cholesterol, High Fat
    1. Review stroke warning signs and habit formation.
    2. Reflect in a meaningful way on whether expectations and beliefs about aging have changed.
    3. Teach about the "3 highs" and heredity as risk factors for stroke.
    4. Problem-solve on how to combat modifiable stroke risk factors.
    5. Reminder to keep up with aims.

- Korean American: Relieve Stress, Walk!
    1. Review stroke warning signs.
    2. Reflect in a meaningful way on whether expectations around aging and habit formation have changed.
    3. Teach about chronic emotional stress and stroke risk.
    4. Problem-solve on how walking can be used to reduce emotional stress and stroke risk.
    5. Teach that we have control over how we choose to cope with stress, and that walking is an excellent choice.
    6. Reminder to keep up with promises.

- Latino: Walking is Good for Health and Relieving Stress
    1. Review stroke warning signs.
    2. Reflect in a meaningful way on whether expectations around aging and habit formation have changed.
    3. Teach about chronic emotional stress and stroke risk.
    4. Problem-solve on how walking can be used to reduce emotional stress and stroke risk.
    5. Teach that we have control over how we choose to cope with stress, and that walking is an excellent choice.
    6. Reminder to keep up with commitments.

- Session 7: (Second culturally-relevant class, topic varied based on CAB recommendations)

    - African American: Walking Is Good for the Soul
        1. Review promises and problem-solve on barriers to completion.
        2. Reflect in a meaningful way on whether expectations and beliefs about aging have changed.
        3. Teach that pairing walking with a favorite routine activity and walking with others can help make exercise a new habit.

4. Problem-solve on ways to incorporate walking into your regular routine and also on ways to involve family and friends.
5. Make new promises.

- Chinese American: Family Matters
  1. Review aims and problem-solve on barriers to completion.
  2. Reflect in a meaningful way on whether expectations and beliefs about aging have changed.
  3. Teach that taking care of yourself does not mean you are selfish.
  4. Problem-solve on dealing with family-related challenges to exercise or self-care habits
  5. Make new promises.

- Korean American: Family Matters
- Latino: Family Matters
- *Note*: Even though the session title and objectives were the same for the Latino, Korean, and Chinese American sessions, the individual scenarios were tailored to the cultural group and varied based on CAB recommendations.

- Session 8: My Time to Shine
  1. Review progress with promises and problem-solve on barriers to completion.
  2. Reflect in a meaningful way on whether expectations and beliefs about aging have changed.
  3. Reinforce the idea that being physically active should be an expected part of normal aging and should continue at any age.
  4. Reinforce the idea that difficulty walking should not be attributed to old age.
  5. Identify good things about getting older.
  6. Problem solve on how to maintain an exercise or walking plan.
  7. Make new promises.

**Table S1. Dates and Sites Enrolled.**

| Racial/Ethnic Group | Cohort 1 | Cohort 2 |
|---|---|---|
| African American | Oct. to Nov. 2014, Site 1 | March to April 2015, Site 1 |
| Latino American | Feb. 2015, Site 2 | July to Aug. 2015, Site 3 |
| Korean American | Sept. to Oct. 2015, Site 2 | Feb. to March 2016, Site 2 |
| Chinese American | March to April 2016, Site 4 | April to May 2016, Site 4 |

Due to lead staff turnover at the organization recruiting Latino participants, the second Latino cohort was conducted at another project site. Although Site 2 hosted both Latino and Korean American cohorts, the interventions were specific and separate for each racial/ethnic group.

**Table S2. Sensitivity Analysis 1: ANCOVA Results from Multiple Imputation.**

| | T1 | | T2 | |
|---|---|---|---|---|
| Outcome | Intervention b [95% CI] | *p* value | Intervention b [95% CI] | *p* value |
| Primary: Steps/day | 805 [159 to 1450] | .015 | 712 [-169 to 1593] | .112 |
| Secondary, self-report | | | | |
| Stroke preparedness | 0.20 [0.13 to 0.27] | <.001 | 0.18 [0.11 to 0.25] | <.001 |
| Inactivity as stroke risk factor* | 0.5 [-0.1 to 1.0] | .102 | 0.1 [-0.5 to 0.8] | .69 |
| Self-efficacy | 0.4 [0.01 to 0.7] | .046 | 0.6 [0.2 to 1.0] | .005 |
| Exercise outcome expectations | -0.1 [-0.2 to -0.002] | .046 | -0.1 [-0.2 to 0.01] | .088 |
| Secondary, clinical | | | | |
| Systolic BP (mmHg) | -0.6 [-4.6 to 3.4] | .77 | 0.2 [-4.0 to 4.4] | .93 |
| Diastolic BP (mmHg) | 0.9 [-1.4 to 3.3] | .44 | 1.0 [-1.5 to 3.5] | .45 |
| BMI ($kg/m^2$) | -0.1 [-0.3 to 0.1] | .49 | -0.1 [-0.4 to 0.1] | .34 |
| Non HDL cholesterol (mg/dl) | N/A | | 8.6 [-3.1 to 20.2] | .147 |
| % HbA1c | N/A | | -0.1 [-0.3 to 0.1] | .39 |
| Log CRP (plasma equivalent) | N/A | | -0.1 [-0.2 to 0.1] | .41 |
| Exploratory | | | | |
| Physical health related QOL | 0.4 [-1.7 to 2.5] | .74 | -0.5 [-2.6 to 1.6] | .66 |
| Mental health related QOL | -0.6 [-2.8 to 1.6] | .58 | -0.8 [-3.2 to 1.5] | .49 |
| Depressive symptomology | 0.4 [-0.7 to 1.5] | .51 | -0.01 [-1.1 to 1.0] | .99 |
| ADL category** | 0.2 [-0.4 to 0.9] | .49 | 0.1 [-0.5 to 0.8] | .70 |
| Physician visits*** | N/A | | -0.1 [-0.3 to 0.1] | .42 |
| Nights in hospital*** | N/A | | 1.1 [-0.4 to 2.7] | .155 |

All models control for baseline levels of the outcome. Unless otherwise specified, all models use multiple regression and present the unstandardized regression coefficient. Bonferroni adjustments for multiple comparisons mean the primary steps/day significance threshold is $p < .025$ and the significance threshold for the remaining secondary and exploratory outcomes is $p < .0018$. *Logistic regression model. **Ordinal logistic regression model. ***Negative binomial regression model.

**Table S3. Sensitivity Analysis 2: Repeated-Measures Mixed-Effects Results from Multiple Imputation.**

| | Intervention x T1 | | Intervention x T2 | | Overall Estimated Slope [95% CI] | | | |
|---|---|---|---|---|---|---|---|---|
| Outcome | b (SE) | *p* | b (SE) | *p* | Intervention | *p* | Control | *p* |
| Primary: Steps/day | 717 (313) | .022 | 817 (404) | .043 | 26 [-174 to 225] | .80 | -249 [-431 to -67] | .007 |
| Secondary, self-report | | | | | | | | |
| Stroke preparedness | 0.22 (0.03) | <.001 | 0.20 (0.04) | <.001 | 0.03 [0.02 to 0.05] | <.001 | -0.01 [-0.02 to 0.01] | .39 |
| Inactivity as stroke risk factor[a] | 0.5 (0.5) | .31 | 0.1 (0.5) | .88 | | | | |
| Self-efficacy | 0.4 (0.2) | .067 | 0.6 (0.2) | .008 | | | | |
| Exercise outcome expectations | -0.1 (0.1) | .043 | -0.1 (0.1) | .116 | | | | |
| Secondary, clinical | | | | | | | | |
| Systolic BP (mmHg) | 1.5 (2.3) | .51 | 2.1 (2.4) | .37 | | | | |
| Diastolic BP (mmHg) | 1.4 (1.3) | .29 | 1.4 (1.4) | .30 | | | | |
| BMI ($kg/m^2$) | -0.1 (0.1) | .49 | -0.1 (0.1) | .36 | | | | |
| Exploratory | | | | | | | | |
| Physical health related QOL | 1.1 (1.2) | .37 | 0.3 (1.1) | .82 | | | | |
| Mental health related QOL | -0.2 (1.2) | .86 | -0.4 (1.3) | .73 | | | | |
| Depressive symptomology | 0.02 (0.6) | .98 | -0.4 (0.6) | .52 | | | | |

We did not test ADL category as an outcome because there is no ordinal logistic option within mi estimate. Other outcomes not included in the table were not measured at each time point. Bonferroni adjustments for multiple comparisons mean the primary steps/day significance threshold is $p < .025$ and the significance threshold for the remaining secondary and exploratory outcomes is $p < .0025$. Overall estimated slopes (i.e., change over time) are based on analyses treating time in months as continuous (T0=0, T1=1, T2=3); they are only presented if the overall Intervention x Time interaction was significant at $p < .05$ for steps/day and $p < .005$ for the remaining outcomes (Bonferroni adjusted significance threshold).

**Supplemental References:**


1. Tudor-Locke C, Washington TL, Hart TL. Expected values for steps/day in special populations. *Prev. Med.* 2009;49:3-11
2. Lorig KR, Stewart A, Ritter P, Gonzalez VM, Laurent DD, Lynch J. *Outcome mesures for health education and other health care interventions*. Thousand Oaks, CA: Sage Publications; 1996.
3. Baruch L, Chiong VJ, Agarwal S, Gupta B. Discordance of non-HDL and directly measured LDL cholesterol: Which lipid measure is preferred when calculated LDL is inaccurate? *Cholesterol*. 2013;2013:1-6