Measuring the Value of Program Adaptation: A Comparative Effectiveness Study of the Standard and a Culturally Adapted Version of the Arthritis Self-Help Program

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Abstract *Background:* Arthritis remains an important public health problem. *Questions/Purposes:* This study aims to determine the effects of an adapted (vs. the original) Arthritis Self-Help Program (ASHP) among older adults. Specifically, this study sought to determine (1) whether the adapted ASHP improved attendance, retention, and adherence with the use of self-management exercises, and (2) if the original ASHP's beneficial outcomes were maintained following program adaptation. *Patient and Methods:* Individuals age ≥ 60 with self-reported arthritis were recruited from eight New York City senior centers. Participants were assessed at baseline to assess their demographic and clinical status and at 6 and 24 weeks to

ascertain study outcomes using validated measures. *Results:* Two-hundred-one participants (64 non-Hispanic African Americans, 86 Hispanics, and 51 non-Hispanic Whites) enrolled. Participants in the adapted (vs. original) ASHP had better average attendance in the six session program (4.7 vs. 3.2 classes attended, $p < 0.01$) and program retention (93% vs. 74%, $p < 0.01$). Adherence with use of the self-management exercises (number of days using endurance, stretching, and relaxation exercises) was similar in both groups. Significant positive physical/psychosocial outcomes were documented in both the adapted and original program. *Conclusion:* The adapted ASHP improved program attendance and retention while maintaining improvements in physical and psychosocial functions. These results support future efforts to employ controlled designs to quantify the benefits of adapted evidence-based programs to ensure that adaptation maintains program effectiveness.

Level of Evidence: Therapeutic Study Level II.

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Introduction

Evidence-based interventions (EBI) represent a valuable tool for health promotion programming. When implemented with fidelity, EBIs have a demonstrated record of producing beneficial outcomes in the target population. However, differences in the culture, language, age, and socioeconomic status among population subgroups can operate as barriers to successful program implementation [21, 38]. Adaptation of EBIs to meet the needs of new target populations has been proposed as a solution to this problem. In diverse populations, adaptation may produce more effective programs than the original EBIs while also encouraging a sense of local ownership because the program is culturally tailored [10, 18]. For these reasons, adaptation of EBIs is common and guidelines have been developed to facilitate the adaptation process [9, 11, 20].

Despite the arguments in favor of adaptation of EBIs for health promotion and claims that adapted programs can increase adherence and uptake by new target populations [10, 18], there is a surprising lack of studies that actually compare an adapted program to the original program. As program adaptation can be both time and labor intensive [20], understanding the value of adapting EBIs for use in new target populations is critically important. In a recent systematic review of 37 studies that undertook adaptations of evidence-based health promotion programs [20], 73% of the studies conducted uncontrolled pilot evaluations of the newly adapted program, but none examined the effectiveness of the adapted versus original program in the target population.

The absence of controlled studies evaluating adapted versus unadapted programs has two implications. First, the benefits of program adaptation remain inadequately defined, despite claims that adapted programs are better received by participants. Second, although it is often assumed that program adaptation increases both the reach and utility of EBIs while maintaining their effectiveness, some advocates of program fidelity argue that program adaptation can threaten an EBI's effectiveness [8, 12]. Therefore, it is of critical importance to evaluate the effectiveness of adapted programs using controlled research designs to ascertain whether there is maintenance of (or possibly loss in) a program's effectiveness. The current study is one of the first to compare an adapted (vs. original) program, using a well-established chronic disease self-management program as a test model.

We employed a community-based participatory research (CBPR) approach to adapt the Arthritis Self-Help Program (ASHP) for use by community-dwelling older adults with diverse arthritis-related disorders [34]. The ASHP has been studied extensively and found to improve participants' ability to self-manage pain and other arthritis-related symptoms [17, 29]. Despite this evidence base, it is estimated that Arthritis Foundation-sponsored programs have reached few US adults with arthritis, particularly minority individuals [6, 37]. Moreover, studies have demonstrated significant problems with program retention [19, 32, 45]. We modified the ASHP for optimal use by two minority groups (older non-Hispanic African Americans and older Hispanics) because of established disparities in the management of pain as a function of race/ethnicity [15, 46] and recognized cultural differences in pain management preferences [1, 3, 5, 41, 44, 47].

The goal of the current study was to test the hypotheses that adapting the ASHP through active collaboration with key stakeholders would improve program attendance, retention, and adherence to self-management exercises while maintaining the program's beneficial effects [6, 17, 26, 29, 30, 37, 40]. To the best of our knowledge, this is the first controlled study to examine the effects of an adapted chronic disease self-management program in direct comparison to the original program.

Materials and Methods

Community partners involved in this study included the New York City (NYC) chapter of the Arthritis Foundation,

a NYC-based elder service agency advocacy organization, and eight multi-service senior centers in NYC, each predominantly serving one race/ethnicity group (non-Hispanic African American, Hispanic, or non-Hispanic White). Collectively the eight centers have an average weekly attendance of 900 older persons. Participant recruitment was conducted by both center and research staff and varied by site but included on-site question and answer sessions with research personnel, flyer postings, and individual counseling with center staff. To enroll, participants had to be 60 years of age or older, have a self-identified arthritis or arthritis-related disorder (e.g., osteoarthritis and back pain), and be fluent in Spanish or English.

The original ASHP consists of 6 weekly classes (lasting two hours each) and accommodates up to 15 participants per class [24, 39]. Information about core program elements has been previously published [28]. English- and Spanish-language versions exist. The standard Spanish-language version, implemented at the sites serving Hispanic participants, was previously adapted for use by non-elderly, Spanish-speaking individuals [26, 39]. The Spanish program differs from the English program in two ways: (1) each class devotes roughly 15 to 20 min of time to exercise practice and (2) participants are given two instructional compact discs (CDs), one providing instruction on exercises and the other on relaxation techniques.

For program adaptation, we employed the Model for Program Adaptation through Community Engagement (MPACE) [11]. MPACE uses concepts drawn from CBPR to guide program adaptation. Specifically, MPACE generates and synthesizes reactions and suggestions for change from actual program participants drawn from the population for which the program is intended. Program adaptation is based on: (1) exposing participants to the complete original EBI, (2) collecting participant and instructor feedback after each session through individual interviews, and (3) conducting focus groups with participants and instructors at the end of the program. Systematic and comprehensive data collection from program participants and instructors, as well as senior center directors generated a pool of recommendations on which program changes were based.

A full description of the adaptation process and specific program adaptations has been reported elsewhere [34]. In brief, the adapted versions of the ASHP include the same method of delivery, session structure, and core modules as the standard programs, but a number of adaptations were made [34]. Both the English and Spanish versions were adapted by augmenting existing materials about diet and nutrition, medication usage, meditation, and sustainability of individual program gains. Additional adaptations to the Spanish-language program included adding a low-literacy guide to the course, whereas changes to the English-language program included adding exercise practice during class and providing participants with exercise and relaxation practice CDs. While the adaptations led to the programs being similar, more time was devoted to in class exercise practice in the Spanish-language (vs. English-language)

program. In addition, the Spanish version educated participants about how health care is delivered in the USA and by whom, and they received information about how to access medical care.

Attendance and adherence outcomes measures included the number of sessions attended by each participant. Dropout rates, defined as attending two or fewer sessions and failing to complete a follow-up questionnaire, were also determined. Research assistants contacted individuals by telephone who missed more than one consecutive class to inquire about whether they planned to continue with the program and, if not, to learn about their reason(s) for dropping out.

Adherence with ongoing use of self-management strategies taught in the classes constituted another primary outcome. The classes provide instruction in and reinforce continued use of self-management strategies for pain reduction, including stretching, endurance, and relaxation exercises. Adherence was measured by asking participants to estimate the number of days per week they employed the exercises (0–7 days for each type) as a means of managing their pain. Use of the strategies was measured at baseline and 6 weeks via in-person interviews. As continued use of the strategies can decline over time [2, 13, 19, 23, 42, 43], research staff telephoned participants 24 weeks after enrollment to determine how many days in the last week they practiced the exercises.

To assess physical and psychosocial outcomes participants completed a self-administered, 37-item assessment tool (at baseline and 6-week follow-up) developed by the Arthritis Foundation [14, 27]. Demographic measures include age, gender, race/ethnicity, educational level, and living situation. The instrument includes questions regarding participants' pain etiologies (osteoarthritis, rheumatoid arthritis, other), pain duration (less than 5 years, 5–9 years, or 10 or more years), perceived health status (very good, good, fair, or poor) [27], medical comorbidities (e.g., asthma, diabetes mellitus, and hypertension), and level of activity limitation using the ten-item SF-36 physical function scale [7]. In the current study, only eight of the ten SF-36 items were retained for analysis because two items (participating in strenuous activities like running or in moderate physical activities like bowling) were found to confuse participants in pre-implementation testing and judged by the project's Steering Committee (which oversaw all aspects of the adaption process) to be outside the scope of normal activities for most urban dwelling, older adults.

Outcomes in the Arthritis Foundation instrument include number of days (range=0–14) of pain experienced, average pain intensity (0–10) [36], and mood change (1–5) in the past two weeks, as well as level of tension during the past 30 days (0–20) [31]. The instrument contains a five-item set of questions that inquire about participants' reasons for not exercising (e.g., exercise is not fun); affirmative responses were summed to create a summary score (0–5). Four questions about confidence self-managing pain and arthritis symptoms are asked, each using a 10-point response scale (0=not at all confident to 10=extremely confident) [25].

These four items were summed to provide an overall estimate (0–40) of a participant's perceived confidence to self-manage pain and other arthritis-related symptoms successfully. Other questions include change (over the past 2 weeks) in arthritis symptoms (1–5), health limitations (0–16), which captures the extent to which a person's health limits their ability to do certain activities of daily living, fatigue (0–10), and stiffness (0–10) [33]. The physical and psychosocial outcomes were assessed at 6 weeks only.

The Arthritis Foundation used in this study asked participants: “Which one or more of the following would you say is your race or ethnicity?” where options included: American Indian or Alaskan Native; Asian, Hawaiian, or other Pacific Islander; Black or African American; Hispanic or Latino/Latina; White; and Others. Thus, data were not collected on participants' race *and* ethnicity status. The above categories were not seen as problematic by the community steering committee, which included senior center directors, activity coordinators, and ASHP instructors. The three targeted racial and ethnic categories are referred to in this article as: (1) non-Hispanic White, (2) non-Hispanic African American, and (3) Hispanic. Consultation with steering committee members confirmed that this was the correct mapping for the vast majority of the study population.

Three senior centers served as primary community partners throughout the project; each provides services to one of the three target race/ethnicity groups. These three centers implemented the adapted ASHP. A comparison senior center in each of the partner centers' respective neighborhoods was selected for implementation of the standard ASHP course. In addition to similar neighborhood location, control sites were also matched on race/ethnicity of clients served. After offering the original ASHP one time at two of the control centers (one serving Hispanic and the other serving non-Hispanic White clients), the two centers felt they would not be able to recruit additional individuals with arthritis. Two additional control centers (also matched on neighborhood and client race/ethnicity) were identified and agreed to host the standard ASHP course.

Each course (adapted and standard) was implemented nine times (18 courses total; three times consecutively with different groups of participants within each race/ethnicity group) between September 2009 and December 2010. A target sample size of 200 (100 in each arm) was selected for practical purposes based on the resources available for program implementation, data collection, and data analysis. All classes offered as part of either the adapted or standard program were taught by Arthritis Foundation certified instructors. The instructors implementing the adapted ASHP took part in the adaptation process and were very knowledgeable about the tailored elements of the program [35]. The study was approved by the local institutional review board.

Descriptive statistics were calculated for all independent and dependent variables. The equivalence of socio-demographic and health background variables was examined by regarding these variables, for this purpose only, as dependent variables in a model with treatment (standard

versus adapted), participant race/ethnicity (non-Hispanic African American, Hispanic, and non-Hispanic White), and their interaction as the independent variables. We gave this focus to race/ethnicity because of its importance in our earlier work [4, 35] and because each of the participating centers provided services to a mostly homogenous population of older persons from one of the three target race/ethnicity groups (non-Hispanic African American, Hispanic, or non-Hispanic White).

We also assessed for possible differences in individuals depending on whether they completed or dropped out of the program. Dropout status was defined as participating in two or fewer sessions and not completing the follow-up assessment. The sociodemographic and health variables were further examined as dependent variables in a model that included treatment, dropout status, and the interaction of these two variables.

In the main analyses, all outcome variables were analyzed in a general linear mixed model that included fixed classification factors for race/ethnicity (non-Hispanic African American, Hispanic, non-Hispanic White), treatment (standard versus adapted), time (baseline versus follow-up), and the interactions of these three factors, and courses (i.e., 18 courses that were administered) and individuals as levels of a random classification factor. The error structure was compound symmetry, after examination of alternative structures. The model also included seven additional variables specified a priori: participants' age, sex, education, pain type (osteoarthritis versus other causes of pain), duration of pain, health limitations, and number of comorbidities. For the exercise practice outcomes (i.e., stretching, endurance, and relaxation), there are measurements at three time points (baseline, follow-up at 6 weeks, and follow-up at 24 weeks). For these outcomes, the classification factor for time had three levels. The test of treatment effects is from the test of the treatment-by-time interaction; and for specific race/ethnic groups a contrast for treatment-by-time partitioned from the ethnicity–treatment–time interaction.

There are virtually no missing data on independent variables in the model. Missing data on outcomes occur primarily at time 3 (24 weeks). All observations on dependent variables (all cases with any data) are used in the analysis through the maximum likelihood estimation in the mixed model.

In separate models we examined participants' sex, age, education, pain type, pain duration, health limitations, and comorbidities as dependent variables as a function of treatment and dropout status (defined as 1–3 sessions attended and no follow-up data). There were no significant treatment-by-dropout status interactions, and we concluded that attrition posed no issues in the main analyses.

Results

A total of 284 individuals (out of 900 older adults regularly attending the eight centers) expressed interest in the programs; all 284 were screened and found eligible to

participate (see Fig. 1). Eighty-three individuals (29% of eligible individuals) declined participation for various reasons, including scheduling conflicts, illness, and caregiver commitments. Two-hundred-one individuals enrolled; 105 took part in the adapted ASHP while 96 participated in the standard ASHP. All 201 participants completed a pre-course assessment instrument; however, 25 did not attend any classes.

Table 1 describes the participants who enrolled in the adapted and original ASHP. The groups were largely equivalent, with the exception that participants in the adapted ASHP group had more years of education (13.5 vs. 11.8; $p < 0.01$) and slightly better perceived health status (2.5 vs. 2.8; $p < 0.05$).

Attendance and retention were significantly better among individuals who participated in the adapted (vs. original) ASHP. The average number of sessions attended was higher (4.7 vs. 3.2; $p < 0.01$), and the percentage of dropouts was lower (7% vs. 26%; $p < 0.01$) in the group enrolled in the adapted (vs. original) program. There were no significant between group differences in these outcomes with respect to race/ethnicity group. Exit interviews found that reasons for dropping out varied but included lack of interest in the program after attending several sessions, time constraints, and illness. There were no significant differences between dropouts and completers on sociodemographic and health variables at baseline.

Of the 148 participants assessed at week 6, 116 (78%) were re-interviewed by phone or in person 18 weeks later and asked about their adherence to ongoing use of the stretching, endurance, and relaxation exercises. Table 2 shows the original ASHP outcomes presented as adjusted changes scores (that is, differences of least squares means, which are adjusted for all other variables in the model) stratified by treatment (original vs. adapted) status. Change scores shown in the rightmost column indicate that both the original and adapted programs produced significant results (in the expected directions) on all outcome measures. Participants reported significant increases in their weekly use of the stretching, endurance, and relaxation exercises. These increases were noted for both treatment groups. Comparisons of the original versus adapted program within race/ethnicity groups revealed no significant differences. Two non-significant trends were noted, however, in days practicing endurance exercises in non-Hispanic Whites (increase of 0.07 days in the original vs. 2.08 days in the adapted program; $p = .08$) and days practicing relaxation techniques in non-Hispanic African Americans (increase of 1.57 in the original vs. 3.21 in the adapted program; $p = .09$).

The adapted program appeared to have produced improved physical and psychosocial outcomes. Table 3 shows other outcomes presented as adjusted change scores (differences of least squares means) stratified by treatment status. Change in scores shown in the rightmost column indicates that both the original and adapted programs produced significant results (in the expected directions) on almost all outcome measures. Significant reductions in pain intensity occurred in both the original and adapted groups (change score = -1.41 and -1.31 ; both p values of < 0.01).

Fig. 1. Flow diagram.

Between-group comparisons revealed a significant effect on psychological well-being; participants in the adapted (vs. original) program reported greater reductions in depressed mood (-0.89 vs. -0.41 ; $p < 0.05$). Assessing for differences in program effect (original vs. adapted) within each race/ethnicity group revealed few significant differences (data not shown). In most cases, the largest change scores occurred in the Hispanic group. However, comparisons by race/ethnicity (Hispanic vs. non-Hispanic African American and Hispanic vs. non-Hispanic White) revealed no significant differences with respect to treatment effect.

Discussion

In prior work [34], we adapted the original ASHP in an effort to optimize its utility and potential reach and impact. The current study was undertaken to ascertain whether the adapted program would improve retention and adherence while yielding equivalent outcomes relative to the original ASHP in the three target populations.

Two key limitations in the research design should be noted. First, senior centers were not randomly assigned to treatment conditions. In future research, randomized controlled designs should be employed. Second, because

the centers and the instructors were not blind to the treatment (i.e., the adapted program), we cannot be certain that modifications to the ASHP alone were responsible for the improved attendance and retention outcomes. Furthermore, two aspects of the research topic and setting should be kept in mind when attempting to generalize these findings. First, outcomes for participants who received the adapted ASHP are presented as one group, when in reality there were two adapted programs, the English- and Spanish-language versions. Changes made to the original English- and Spanish-language programs resulted in adapted programs that are more similar than the programs were in their original form, as much of the adaptation recommendations were applied to both curricula and an exercise component was added to the English-language program. Comparisons of outcomes for Hispanic, non-Hispanic White, and non-Hispanic African American participants yielded few significant differences and no general trends (results not shown), suggesting that the original and adapted versions of the English- and Spanish-language programs were similarly effective in the populations in which they were delivered. Second, several characteristics of the sample may have increased the likelihood of the program's success. Participants' education levels were relatively high. Participants also had high baseline rates of stretching,

Table 1 Characteristics of study population

	All (N=201)	
	Adapted program (n=105)	Original program (n=96)
Demographic		
Age (mean (SD))	75.5 (8.79)	73.3 (8.82)
Female (n (%))	85 (81.4)	74 (77.1)
Years of education (mean (SD))	13.5 (3.46)**	11.8 (3.98)
Lives alone (n (%))	66 (64.7)	69 (71.9)
Pain		
Reports osteoarthritis as cause of pain (n (%))	52 (54.2)	43 (44.8)
Pain duration in years (mean (SD))	7.8 (5.68)	7.7 (5.79)
Perceived health/limitation status		
Perceived health status ((1–4) ^a ; mean (SD))	2.5 (0.75)*	2.8 (0.66)
Health limitation ((0–16) ^b ; mean (SD))	9.3 (4.50)	8.4 (4.25)
Medical comorbidities		
High blood pressure (n (%))	37 (35.2)	37 (38.5)
Diabetes (n (%))	16 (15.2)	24 (25.0)
Heart disease (n (%))	10 (9.5)	14 (14.6)
Asthma (n (%))	15 (14.3)	12 (12.5)
Number of medical comorbidities (mean (SD))	1.5 (0.89)	1.6 (1.14)

* $p < 0.05$, adapted versus original program comparison (significant level);

** $p < 0.01$, adapted versus original program comparison (significant level)

^a higher score indicates worse health status

^b Higher score indicates less activity limitation

Table 2 Number of days in past week doing endurance, stretching, and relaxation exercises at baseline, 6- and 24-week follow-up

	All (N=201)			
	Baseline (SE)	6 weeks (SE)	24 weeks (SE)	Δ score (24 weeks–baseline; p)
No. of days doing endurance exercises				
Original	2.98 (0.30)	3.89 (0.39)	4.60 (0.46)	1.61 (<.01)
Adapted	3.45 (0.27)	4.41 (0.30)	5.22 (0.31)	1.78 (<.01)
No. of days doing stretching exercises				
Original	2.44 (0.29)	4.01 (0.37)	3.97 (0.42)	1.54 (<.01)
Adapted	2.85 (0.26)	4.57 (0.29)	4.71 (0.29)	1.86 (<.01)
No. of days doing relaxation exercises				
Original	2.18 (0.29)	4.03 (0.38)	4.90 (0.43)	2.72 (<.01)
Adapted	2.27 (0.26)	4.21 (0.29)	5.33 (0.30)	3.07 (<.01)

The results are least squares means (first three columns) and differences of least square means (last column) estimated in a general linear mixed model that includes fixed classification factors for race/ethnicity (non-Hispanic African American, Hispanic, non-Hispanic White), treatment (standard versus adapted), time (baseline, 6 weeks, and 24 weeks), and the interactions of these three factors; covariates included participants' age, sex, education, pain type (osteoarthritis versus other causes of pain), duration of pain, health limitations, and number of comorbidities; and individuals as levels of a random classification factor. Least square means are adjusted for all variables in the model.

Table 3 Physical and psychosocial outcomes by treatment group

	All (N=201)		
	Baseline (SE)	6 weeks (SE)	Baseline–6 weeks change score (p)
Pain			
No. days w/ pain in past 2 weeks (0–14) ^a			
Original	8.75 (0.59)	7.23 (0.79)	–1.52 (0.02)
Adapted	10.22 (0.51)	8.35 (0.57)	–1.87 (<.01)
Pain intensity in past week (0–10) ^a			
Original	5.56 (0.30)	4.15 (0.39)	–1.41 (<.01)
Adapted	6.02 (0.27)	4.71 (0.29)	–1.31 (<.01)
Affective			
Mood change in past 2 weeks (1–5) ^a			
Original	2.67 (0.11)	2.26 (0.15)	–0.41 (<.01)
Adapted	2.65 (0.10)	1.76 (0.11)	–0.89 (<.01)*
Level of tension in past 30 days (0–20) ^b			
Original	12.02 (0.48)	12.63 (0.60)	0.61 (0.25)
Adapted	12.29 (0.43)	12.44 (0.47)	0.15 (0.79)
Self efficacy			
Confidence to self-manage pain/arthritis symptoms (0–40) ^b			
Original	26.45 (1.02)	30.09 (1.30)	3.64 (<.01)
Adapted	29.67 (0.90)	31.33 (0.99)	1.66 (0.05)
Confidence to complete activities of daily living despite pain (0–60) ^b			
Original	43.27 (1.61)	45.31 (2.03)	2.04 (0.26)
Adapted	46.41 (1.42)	52.06 (1.59)	5.65 (<.01)
Disability			
Current pain-related disability (0–24) ^a			
Original	10.15 (0.73)	8.63 (0.88)	–1.52 (0.03)
Adapted	11.04 (0.65)	9.02 (0.70)	–2.02 (<.01)
Current health limitation score (0–16) ^b			
Original	8.66 (0.26)	10.14 (0.35)	1.48 (<.01)
Adapted	8.98 (0.23)	9.83 (0.26)	0.85 (<.01)
Attitudes regarding exercise			
Reasons for not exercising (0–5) ^a			
Original	1.86 (0.20)	1.35 (0.26)	–0.51 (0.01)
Adapted	1.72 (0.18)	1.35 (0.19)	–0.37 (0.03)
Other symptoms			
Change in arthritis symptoms in past 2 weeks (1–5) ^a			
Original	2.86 (0.11)	2.27 (0.14)	–0.59 (<.01)
Adapted	2.83 (0.09)	2.13 (0.10)	–0.70 (<.01)
Level of fatigue in past week (0–10) ^a			
Original	4.24 (0.36)	3.59 (0.46)	–0.65 (0.06)
Adapted	4.55 (0.33)	3.83 (0.36)	–0.72 (0.04)
Level of stiffness in past week (0–10) ^a			
Original	4.90 (0.37)	3.58 (0.47)	–1.32 (<.01)
Adapted	5.31 (0.32)	4.28 (0.36)	–1.03 (0.01)

The results are least squares means (first 3 columns) and differences of least squares means (last column) estimated in a general linear mixed model that includes fixed classification factors for race/ethnicity (non-Hispanic African American, Hispanic, and non-Hispanic White), treatment (standard versus adapted), time (baseline, 6 weeks, and 24 weeks), and the interactions of these 3 factors; covariates included participants' age, sex, education, pain type (osteoarthritis versus other causes of pain), duration of pain, health limitations, and number of comorbidities; and individuals as levels of a random classification factor. Least squares means are adjusted for all variables in the model.

* $p \leq 0.05$, adapted versus original program comparison (significant level)

^a Lower score indicates desirable outcome

^b Higher score indicates desirable outcome

endurance, and relaxation exercise. Recruitment occurred in the senior center setting where participants were already attending the centers for other reasons, such as receipt of noontime lunches or participating in health promotion activities. Given this degree of socialization, participants' may have been motivated to join a self-management program (relative to older adults who do not regularly socialize in this fashion). Taken together, our sample may have been poised to benefit from the ASHP more than less educated, less active, or socially isolated older adults.

Our results further suggest that the adapted program proved superior with regard to program attendance and retention. Participants in the adapted program attended an average of 1.5 more classes and were nearly four times less likely to dropout when compared with participants enrolled in the original ASHP. This finding suggests that the adapted program could measurably increase the reach of the program when implemented in centers serving older adults who reside in urban areas.

We further hypothesized that participants in the adapted program would also demonstrate improved adherence to ongoing use of the self-management activities (endurance, stretching, and relaxation exercises) taught in the classes. The adapted program appeared, however, to be no better than the original program in producing longer-term adherence (although trends that approached significance were encouraging and should be explored in future research). Furthermore, equivalent outcomes were found across a broad range of salient physical and psychosocial outcomes, including reduced levels of pain, stiffness, and perceived disability due to pain. If few significant differences were seen in the physical, psychosocial, and adherence outcomes, it is debatable whether or not improved class attendance confers any benefit to program participants. In a post hoc exploratory analysis we found some program effects to be associated with number of sessions attended, but no consistent pattern emerged (results not shown). However, improved attendance is certainly not harmful to participants and may provide benefits, such as additional exposure to program staff or peers who may provide support or connect participants to community resources that were not measured in the current study. Taken together, these results indicate that the modifications made to the original ASHP led to significantly improved attendance and program retention without compromising other important treatment outcomes.

The findings regarding modest improvement in participants' level of self-efficacy (with relative increases that spanned from 5% to 14%) warrant discussion. Given that the program's benefit is thought to be mediated through self-efficacy enhancement, this finding may be related to random error. Alternatively, older individuals with pain may struggle with ADLs for other reasons besides arthritis that minimize the opportunity for treatment gains in this domain.

To date, few studies have compared adapted vs. original EBIs. One randomized controlled pilot study examined the impact of a culturally adapted (vs. traditional) asthma management program in Hispanic and non-Hispanic African

American families and found that the adapted program was more effective at reducing emergency department visits [22]. In addition, a meta-analysis of studies examining the effects of culturally adapted mental health programs [16] found that adapted programs had medium-to-large treatment effects compared with traditional therapy programs, where outcomes ranged from attendance/attrition rates to symptom reduction. By contrast, one study [21] reported that five culturally adapted versions of the Strengthening Families Program, an evidence-based substance abuse prevention program, had worse outcomes (e.g., social competencies and family risk factors) relative to the original program, although program retention rates were greater for groups that received the adapted programs. Although increasing attention has focused on adapting evidence-based programs for use with specific populations as a means of improving program effectiveness and reach [10, 21], our findings along with those of related studies described above, indicate that the effect of program adaptation on outcome—both physical and psychosocial outcomes as well as attendance and adherence outcomes—is difficult to predict and can vary widely.

The findings of the present study underscore the need for research comparing adapted EBIs to their unadapted counterparts. Given that program adaptation is both time and labor intensive, organizations and practitioners should have realistic expectations about what the adaptation is capable of achieving. In the case of the adapted ASHP, physical, psychosocial, and adherence outcomes were comparable to the original program; the realized benefits of the adapted program were improved program attendance and retention, which could plausibly be attributed to the adapted program being more enjoyable to attend. A major issue in chronic disease self-management programs is getting participants to continue in the program and use the techniques that are taught once the course is over [2, 13, 19, 23, 32, 42, 43]. In the case of the adapted ASHP, the time and effort to undertake adaption may be seen as worthwhile to achieve the goals of better attendance and program retention. In other EBIs, this might not be the case.

To our knowledge, this study is the first to test an adapted version of an evidence-based arthritis self-management program against the unadapted original program. Participants in the adapted program attended significantly more classes and dropped out less than participants in the original program while experiencing the same significant improvements in physical and psychosocial outcomes associated with the ASHP. These findings validate the adapted version of the ASHP in its ability to improve attendance and program retention without compromising program effectiveness. Our findings also underscore the importance of comparing the outcomes of adapted EBIs with the unadapted original version in a controlled experiment to quantify any improvement that might justify adaptation and to establish that the adapted program does not compromise the efficacy of the EBI. Finally, the use of CBPR methods to adapt a program without compromising program effects provides support for the use of this model in future program adaptations.

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Disclosures

Conflict of Interest: M. Carrington Reid, MD received personal fees from Endo Pharmaceuticals during the study. Emily K. Chen, Samantha J. Parker, Charles R. Henderson Jr., Karl Pillemer, Ph.D., have declared that they have no conflict of interest.

Human/Animal Rights: All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008 (5).

Informed Consent: Informed consent was obtained from all patients for being included in the study.

Required Author Forms Disclosure forms provided by the authors are available with the online version of this article.

References

1. Abraído-Lanza AF, Vásquez E, Echeverría SE. En las manos de Dios [in God's hands]: religious and other forms of coping among Latinos with arthritis. *J Consult Clin Psychol*. 2004; 72(1): 91-102.
2. Appelbaum KA, Blanchard EB, Hickling EJ, Alfonso M. Cognitive behavioral treatment of a veteran population with moderate to severe rheumatoid arthritis. *Behav Ther*. 1988; 19(4): 489-502.
3. Bates MS, Rankin-Hill L, Sanchez-Ayendez M. The effects of the cultural context of health care on treatment of and response to chronic pain and illness. *Soc Sci Med*. 1997; 45(9): 1433-1447.
4. Beissner K, Parker S, Henderson CR, Reid MC. Implementing a self-management program for back pain in New York City senior centers: Evidence for a possible race/ethnicity effect. *J Aging Phys Act*. 2012; 20: 246-265.
5. Bill-Harvey D, Rippey RM, Abeles M, Pfeiffer CA. Methods used by urban, low-income minorities to care for their arthritis. *Arthritis Rheum*. 2005; 2(2): 60-64.
6. Brady TJ, Kruger J, Helmick CG, Callahan LF, Boutaugh ML. Intervention programs for arthritis and other rheumatic diseases. *Health Educ Behav*. 2003; 30(1): 44-63.
7. Brazier JE, Harper R, Jones NM, et al. Validating the SF-36 health survey questionnaire: new outcome measure for primary care. *BMJ*. 1992; 305(6846): 160-164.
8. Calsyn R, Tornatzky LG, Dittmar S. Incomplete adoption of an innovation: The case of goal attainment scaling. *Evaluation*. 1977; 4: 128-130.
9. Card JJ, Solomon J, Cunningham SD. How to adapt effective programs for use in new contexts. *Health Promot Pract*. 2011; 12(1): 25-35.
10. Castro FG, Barrera M, Martinez CR. The cultural adaptation of prevention interventions: Resolving tensions between fidelity and fit. *Prev Sci*. 2004; 5(1): 41-45.
11. Chen EK, Reid MC, Parker SJ, Pillemer K. Tailoring evidence-based interventions for new populations: A model for program adaptation through community engagement. *Eval Health Prof*. 2013; 36(1): 73-92.
12. Elliott DS, Mihalic S. Issues in disseminating and replicating effective prevention programs. *Prev Sci*. 2004; 5(1): 47-53.
13. Ersek M, Turner JA, McCurry SM, Gibbons L, Kraybill BM. Efficacy of a self-management group intervention for elderly persons with chronic pain. *Clin J Pain*. 2003; 19(3): 156-167.
14. González VM, Stewart A, Ritter PL, Lorig K. Translation and validation of arthritis outcome measures into Spanish. *Arthritis Rheum*. 1995; 38(10): 1429-1446.
15. Green CR, Anderson KO, Baker TA, et al. The unequal burden of pain: Confronting racial and ethnic disparities in pain. *Pain Med*. 2003; 4(3): 277-294.
16. Griner D, Smith TB. Culturally adapted mental health intervention: A meta-analytic review. *Psychotherapy (Chic)*. 2006; 43(4): 531-548.
17. Hirano PC, Laurent DD, Lorig K. Arthritis patient education studies, 1987–1991: A review of the literature. *Patient Educ Couns*. 1994; 24(1): 9-54.
18. Kelly JA, Heckman TG, Stevenson LY, et al. Transfer of research-based HIV prevention interventions to community service providers: fidelity and adaptation. *AIDS Educ Prev*. 2000; 12(5 Suppl): 87-98.
19. Kerns RD, Rosenberg R. Predicting responses to self-management treatments for chronic pain: Application of the pain stages of change model. *Pain*. 2000; 84(1): 49-55.
20. Krivitsky L, Parker SJ, Pal A, Shengelia R, Reid MC. A systematic review of health promotion and disease prevention program adaptations: How are programs adapted? In: Wethington E, Dunifon R, eds. *Translational research for improving outcomes across the life course*. Washington, DC: American Psychological Association Press; 2012: 73-99.
21. Kumpfer KL, Alvarado R, Smith P, Bellamy N. Cultural sensitivity and adaptation in family-based prevention interventions. *Prev Sci*. 2002; 3(3): 241-246.
22. La Roche MJ, Koinis-Mitchell D, Gualdrón L. A culturally competent asthma management intervention: a randomized controlled pilot study. *Ann Allergy Asthma Immunol*. 2006; 96(1): 80-85.
23. Lindroth Y, Bauman A, Brooks PM, Priestley D. A 5-year follow-up of a controlled trial of an arthritis education programme. *Rheumatology*. 1995; 34(7): 647-652.
24. Lorig K. *Arthritis self-help course: Leader's manual and reference material*. The Arthritis Foundation: Atlanta; 1992.
25. Lorig K, Chastain RL, Ung E, Shoor S, Holman HR. Development and evaluation of a scale to measure perceived self-efficacy in people with arthritis. *Arthritis Rheum*. 1989; 32(1): 37-44.
26. Lorig K, Gonzalez VM, Ritter P. Community-based Spanish language arthritis education program: A randomized trial. *Med Care*. 1999; 37(9): 957-963.
27. Lorig K, Gonzalez V, Stewart A, Ritter P, Laurent D, Lynch J. *Outcome measures for health education and other health care interventions*. Thousand Oaks, CA: Sage Publications; 1996.
28. Lorig KR, Holman HR. Self-management education: history, definition, outcomes, and mechanisms. *Ann Behav Med*. 2003; 26(1): 1-7.
29. Lorig K, Lubeck D, Kraines RG, Seleznick M, Holman HR. Outcomes of self-help education for patients with arthritis. *Arthritis Rheum*. 2005; 28(6): 680-685.
30. Lorig K, Ritter PL, Plant K. A disease-specific self-help program compared with a generalized chronic disease self-help program for arthritis patients. *Arthritis Care Res*. 2005; 53(6): 950-957.
31. Meenan RF, Mason JH, Anderson JJ, Guccione AA, Kazis LE. AIMS2. The content and properties of a revised and expanded Arthritis Impact Measurement Scales Health Status Questionnaire. *Arthritis Rheum*. 1992; 35(1): 1-10.
32. Newman S, Steed L, Mulligan K. Self-management interventions for chronic illness. *Lancet*. 2004; 364(9444): 1523-1537.
33. Nicholas MK. The pain self-efficacy questionnaire: Taking pain into account. *Eur J Pain*. 2007; 11(2): 153-163.
34. Parker SJ, Chen EK, Pillemer K, et al. Participatory adaptation of an evidence-based, arthritis self-management program: Making changes to improve program fit. *Fam Comm Health*. 2012; 35(3): 236-245.

35. Parker SJ, Vasquez R, Chen EK, Henderson CR, Pillemer K, Reid MC. A comparison of the Arthritis Foundation Self-Help Program across three race/ethnicity groups. *Ethn Dis*. 2011; 21(4): 444–450.
36. Ritter PL, González VM, Laurent DD, Lorig KR. Measurement of pain using the visual numeric scale. *J Rheumatol*. 2006; 33(3): 574–580.
37. Sharpe PA. Community-based physical activity intervention. *Arthritis Care Res*. 2003; 49(3): 455–462.
38. Solomon J, Card JJ, Malow RM. Adapting efficacious interventions advancing translational research in HIV prevention. *Eval Health Prof*. 2006; 29(2): 162–194.
39. Stanford Arthritis Center. *Curso de manejo personal de la artritis: Manual de los instructores [Arthritis Self-Management Course: Leader's Manual]*. Palo Alto: Stanford Arthritis Center; 1995.
40. Superio-Cabuslay E, Ward MM, Lorig KR. Patient education interventions in osteoarthritis and rheumatoid arthritis: A meta-analytic comparison with nonsteroidal antiinflammatory drug treatment. *Arthritis Rheum*. 1996; 9(4): 292–301.
41. Thomas VJ, Rose FD. Ethnic differences in the experience of pain. *Soc Sci Med*. 1991; 32(9): 1063–1066.
42. Turk DC, Rudy TE. Neglected topics in the treatment of chronic pain patients—relapse, noncompliance, and adherence enhancement. *Pain*. 1991; 44(1): 5–28.
43. Van Baar ME, Dekker J, Oostendorp RAB, Dijk D, Voorn TB, Bijlsma TWJ. Effectiveness of exercise in patients with osteoarthritis of hip or knee: Nine months' follow up. *Ann Rheum Dis*. 2001; 60(12): 1123–1130.
44. Villarruel AM. Mexican–American cultural meanings, expressions, self-care and dependent-care actions associated with experiences of pain. *Res Nurs Health*. 1995; 18(5): 427–436.
45. Warsi A, LaValley MP, Wang PS, Avorn J, Solomon DH. Arthritis self-management education programs: A meta-analysis of the effect on pain and disability. *Arthritis Rheum*. 2003; 48(8): 2207–2213.
46. Won A, Lapane K, Gambassi G, Bernabei R, Mor V, Lipsitz LA. Correlates and management of nonmalignant pain in the nursing home. *J Am Geriatr Soc*. 1999; 47(8): 936–942.
47. Zhang J. *Illness management strategies among Chinese immigrants living with arthritis [Dissertation]*. Calgary: University of Calgary; 1998.