

# Pilot Test of an Attribution Retraining Intervention to Raise Walking Levels in Sedentary Older Adults

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**OBJECTIVES:** To pilot test a new behavioral intervention to increase walking in sedentary older adults.

**DESIGN:** Pre-post community-based pilot study.

**SETTING:** Three senior centers in greater Los Angeles.

**PARTICIPANTS:** Forty-six sedentary adults aged 65 and older.

**INTERVENTION:** At four weekly 1-hour group sessions held at the senior centers, a trained health educator applied a theoretically grounded, standardized “attribution retraining” curriculum developed by a multidisciplinary team of investigators. Participants were taught that becoming sedentary is not inevitable with aging and that older adults should attribute being sedentary to modifiable attributes rather than to old age. A 1-hour exercise class including strength, endurance, and flexibility training followed each weekly attribution retraining session.

**MEASUREMENTS:** Change from baseline in steps per week recorded using a digital pedometer was measured after 7 weeks. Age expectations (measured using the Expectations Regarding Aging-38 survey, a previously tested instrument on which higher scores indicate that the participant expects high functioning with aging and lower scores indicate that the participant expects physical and mental decline) and health-related quality of life were measured using in-person interviews.

**RESULTS:** Mean steps per week increased from 24,749 to 30,707, a 24% increase—equivalent to 2.5 miles (2-sided *t*-test  $P = .002$ ). Age expectation scores increased 30% ( $P < .001$ ), and the changes in age expectations and steps per week correlated (correlation coefficient = 0.39,  $P = .01$ ). Participants experienced improved mental health-related quality of life ( $P = .049$ ) and reported less difficulty with activities of daily living ( $P = .04$ ). More than 50% of

participants reported improvements in pain, energy level, and sleep quality.

**CONCLUSION:** In this small pre-post community-based pilot study, a structured attribution retraining curriculum accompanied by a weekly exercise class was associated with increased walking levels and improved quality of life in sedentary older adults. Attribution retraining deserves further investigation as a potential means of increasing physical activity in sedentary older adults. *J Am Geriatr Soc* 55:1842–1846, 2007.

**Key words:** exercise; intervention studies; attitude toward aging; aged; community medicine

Eliminating sedentary lifestyle in middle-aged and older adults offers one of the greatest opportunities to reduce morbidity and mortality in the United States.<sup>1</sup> Unfortunately, most interventions aimed at inducing older adults to initiate and maintain recommended levels of physical activity succeed for only a modest percentage of participants.<sup>2,3</sup> Decreasing sedentary lifestyles in older Americans remains one of our greatest public health challenges.

To induce regular physical activity, several theoretical models have been applied, with varying degrees of success across different populations and behaviors. Diverse in their approaches and scope, these theoretical models have provided the foundation for a range of physical activity interventions, yet there remains no consensus regarding which combination of theories is the best at promoting physical activity in older adults.<sup>4–6</sup> Additional age-appropriate theoretical models that serve as the basis for interventions to increase and sustain physical activity in older adults are required.

With this imperative in mind, a multidisciplinary team of investigators presents a new theoretically grounded behavioral intervention developed specifically to address the common phenomenon in older adults of attributing inactivity to old age. Based on observational data showing that older adults who have low age expectations (expects physical and mental decline with aging) and attribute age-associated conditions to old age are more likely to be

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sedentary,<sup>7</sup> this team hypothesized that it might be possible to raise physical activity levels in sedentary older adults by intervening to raise age expectations through attribution retraining (e.g., teaching older adults not to attribute being sedentary to old age but rather to expect to be physically active at all ages). The specific aim of this brief report is to present results from a pilot test of a community-based intervention applying attribution retraining in combination with an exercise class to increase walking in sedentary older adults.

## METHODS

### Theoretical Model: Attribution Theory

Weiner's attribution theory of achievement motivation is based upon the premise that individuals explain successes and failures using causal attributions that can be classified into three dimensions: (1) locus of causality (internal or external), (2) stability (stable or unstable), and (3) controllability (controllable or uncontrollable).<sup>8</sup> According to this theory, attributions that are stable and uncontrollable are especially detrimental to motivation. For example, a student who attributes poor test performance to stable and uncontrollable lack of aptitude would be unlikely to change behavior, but one who attributes poor performance to not studying hard enough (unstable and controllable) would be more likely to successfully change his or her behavior. Attribution retraining techniques, therefore, are designed to encourage people to reject stable and uncontrollable attributions and instead adopt unstable and controllable explanations for failure.<sup>9</sup> Attribution retraining interventions have been applied in the field of education with encouraging results; several short-term interventions using attribution retraining have increased motivation and academic performance.<sup>10</sup>

Given the large body of empirical work illustrating that attributing health problems to old age is a common phenomenon in older adults,<sup>11,12</sup> attribution theory emerged as a naturally appropriate theoretical framework for a behavioral intervention in older adults. Several empirical studies have demonstrated an association between having low perceptions of aging and poor health outcomes.<sup>13-15</sup> Furthermore, having low age expectations is strongly associated with low physical activity levels in older adults,<sup>16</sup> suggesting that intervening to raise older adults' age expectations and discourage them from attributing being sedentary to old age (a stable and uncontrollable attribute) could present an important opportunity to increase physical activity in older adults. For this behavioral intervention, the team designed an intervention (described in greater detail below) using attribution retraining in a group-mediated cognitive-behavioral format. This format was selected because of substantial evidence supporting its efficacy as a framework for behavioral change (alone or in combination with other theoretical models).<sup>2,17-20</sup>

### Study Design

The pilot test was a nonblinded pre-post investigation. Outcome data were measured 7 weeks after the start of the 4-week intervention. The purpose of the pilot test was to determine whether this intervention could succeed in rais-

ing walking levels in older adults, to assess the feasibility of conducting a trial of the intervention, and to obtain preliminary data and estimate the effect size to be able to estimate recruitment and sample size requirements for a randomized trial of the intervention. The University of California at Los Angeles Office for the Protection of Human Subjects approved the research protocol.

### Participant Recruitment and Enrollment

Participants were recruited from three senior centers in the greater Los Angeles region. In collaboration with community partners, bilingual project staff screened interested participants using a standardized screening protocol. To be eligible for the study, potential participants had to be aged 65 and older. Exclusion criteria were already engaging in 20 minutes or more of moderate intensity (or greater) physical activity at least 3 days a week, inability to communicate verbally in English or Spanish (because of lack of language skills, hearing impairment, or other disability), inability to sit and participate in a 1-hour discussion session, inability to walk (the use of assistive devices was not an exclusion criterion), unavailability to attend an orientation session and four subsequent weekly sessions, and inability or unwillingness to provide the name of a physician who had seen the potential participant in the previous 6 months and consent for project staff to contact this physician.

A letter from the study team was faxed to each potentially eligible participant's physician describing the intervention. Participants whose physician faxed a reply card indicating that the potential subject had a medical contraindication were not eligible. Eligible participants were invited to attend an orientation session at the senior center, at which point staff gave each participant a pedometer with instructions on its use and collected baseline data. Data collection occurred between May and July 2003.

### Intervention

The attribution retraining involved 4 weekly 1-hour group sessions of eight to 14 participants and was conducted in the senior centers. Each session consisted of a facilitated discussion led by a trained health educator. Using a standardized curriculum developed by the multidisciplinary team of investigators, facilitators taught participants that becoming sedentary is not an inevitable part of aging and that failure to be physically active should be, to the greatest extent possible, attributed to controllable causes rather than to old age. Facilitators encouraged participants to set individualized verbal and written "promises" for increasing their physical activity by increasing the number of steps they take each day and helped the group problem-solve together to find solutions to the problems limiting participants' ability to fulfill their promises. Facilitators provided verbal reinforcement that being sedentary should not be attributed to old age and that all participants should expect to be physically active when aging. A 1-hour physical activity class taught by a certified instructor followed each discussion session. The fitness class identical that developed for the Lifetime Fitness Program (now called EnhanceFitness<sup>®</sup>) administered by Senior Services of Seattle/King County, which includes strength, endurance, and flexibility training

and is designed to be safe for seniors with a wide range of physical abilities.

### Measurements

The Digiwalker (Yamax DW-500, New Lifestyles, Inc., Kansas City, MO) pedometer is a small electronic monitor that measures vertical accelerations and, when worn over the hip at waist level, calculates the number of steps taken with an accuracy within 3% of direct observation, substantially better than self-report.<sup>21,22</sup> Participants were instructed to wear their pedometer at all times other than sleeping, bathing, or swimming. To minimize the effect of the pedometer itself as a motivational tool, the pedometer cover was taped shut so that participants could not see the recorded number of steps. One week after the orientation session, when participants came to their intervention session (and at each subsequent weekly session), research staff removed the tape from the pedometer cover, copied the number of steps recorded over the previous week, and reset the pedometer to zero. Participants were not shown their step recordings until the study had been completed.

At baseline and at 4 and 7 weeks after the start of the intervention, trained bilingual staff conducted in-person interviews. Age expectations were measured using the Expectations Regarding Aging (ERA)-38 survey, a previously tested instrument on which higher scores indicate that the participant expects high functioning with aging and lower scores indicate that the participant expects physical and mental decline.<sup>23</sup> Health-related quality of life was measured using the Medical Outcomes Study 12-item Short Form Survey (SF-12) and by asking participants how many of 13 activities of daily living (ADLs) they could do without difficulty. Responses to the SF-12 were used to compute Physical and Mental Component Summary scores using standardized weights based upon a mean of 50 and a standard deviation of 10 in the general U.S. population, with higher scores indicating better health status.<sup>24</sup> Participants were also asked whether they felt that the intervention had contributed to changes in pain, mood, or sleep.

### Analysis

The primary outcome was change from baseline in steps per week recorded by the digital pedometer 7 weeks after initiation of the 4-week intervention. Changes in scores from

baseline to 7-week follow-up were examined using two-sided *t*-tests.

### RESULTS

Of the 94 screened participants, 57 (61%) met inclusion criteria for the pilot study. Of these, 51 (89% of those screened) came to a subsequent enrollment session and provided written informed consent to participate. Forty-six seniors (90% of enrollees) completed the study. Mean age of the pilot participants was 77, 89% were female, and 65% self-identified as Latino and 33% as non-Latino white. Of completers, overall class attendance exceeded 98%. Of the five participants who dropped out, four cited health problems unrelated to the intervention (e.g., pneumonia requiring hospitalization), and one left town for personal reasons.

Table 1 shows the mean steps per week at baseline and 7 weeks after the first session. Based on a conservatively low estimate of gait length taken from a sample of older adults recruited from hospitals,<sup>25</sup> the observed mean increase in steps at 7 weeks (5,959) can be estimated to represent approximately 2.5 miles per week.

Because it was hypothesized that the attribution re-training intervention would increase walking levels through a causal pathway of improving age expectations, whether the intervention influenced age expectations and whether improvements in age expectations correlated positively with improvements in walking levels were also examined in an exploratory fashion. As shown in Table 1, the intervention raised ERA-38 scores 30% (0.8 standard deviations). The unadjusted correlation between change in ERA-38 scores and change in steps per week was 0.36 (95% confidence interval = 0.08–0.59, *P* = .01).

Table 1 also shows the measures of quality of life at baseline and 7 weeks after the start of the 4-week intervention. As illustrated, the mental composite score of the SF-12 increased approximately one third of a standard deviation, from 52.1 to 55.3 (*P* = .049), and there was a statistically significant decrease in the number of ADL impairments reported.

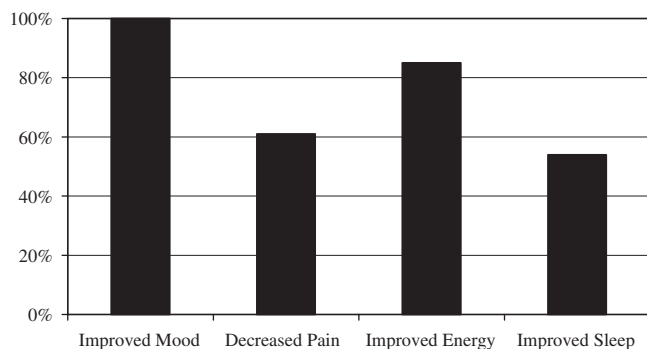
At 7 weeks after the first session, 100% of the 46 completers reported that the program had been enjoyable. As shown in Figure 1, 100% reported that, because of the program, their mood improved, 61% reported that the

**Table 1. Primary Outcome Data**

Outcome	Baseline	7 weeks	Effect Size, %	P-value*
	Mean ± Standard Deviation			
Steps per week over previous week	24,749 ± 15,963	30,708 ± 19,390	24	.002
Expectations Regarding Aging-38 score <sup>†</sup>	30.7 ± 14.1	40.1 ± 16.4	30	<.001
Medical Outcomes Study 12-item Short Form Survey				
Mental Component Summary	52.1 ± 8.5	55.3 ± 7.9	11	.049
Physical Component Summary	43.6 ± 10.4	44.2 ± 9.7	2	.67
Number of activity of daily living impairments	0.93 ± 1.7	0.59 ± 1.1	N/A	.04

\* Pooled two-sided *t*-test comparing mean at baseline with mean at 7-week follow-up.

<sup>†</sup> Range 0 to 100, with higher scores indicating expecting high physical and mental functioning with aging and lower scores indicating expecting physical and mental decline.



**Figure 1.** Percentage of participants reporting intervention-induced improvements in four domains.

amount of chronic pain experienced on an average day decreased, 85% reported that the program contributed to improving their energy level, and 54% reported that the program contributed to improvement in sleep quality. None of the participants experienced adverse events related to the intervention.

## DISCUSSION

In this pre-post pilot study of 46 older adults recruited at community-based senior centers, a 4-week multifaceted attribution retraining intervention succeeded in increasing mean steps per week, measured 7 weeks after the first session. The intervention also increased age expectations, and these outcomes were positively correlated. The intervention was well tolerated, safe, and enjoyable, and participants reported subjective improvement in mood, pain, energy, and sleep. These preliminary yet compelling findings suggest that attribution retraining should be rigorously tested as a potential means of increasing physical activity in sedentary older adults.

Older persons frequently attribute health problems to old age. The novel feature of this behavioral intervention is that it draws upon the rich literature and empirical work from the field of motivational psychology (attribution theory and attribution retraining) and applies these tools to a health behavior intervention developed specifically for older adults by targeting age attributions. This approach is distinct from applying theoretical frameworks that were developed and tested with young and middle-aged persons.<sup>19</sup> As determined previously,<sup>19</sup> combining group-mediated cognitive-behavioral interventions with exercise programs is an innovation in physical activity research in older adults that has demonstrated encouraging success in a series of randomized efficacy trials, including the Cardiovascular Health and Activity Maintenance Program<sup>26</sup> and Shaping Active Living in the Elderly.<sup>27</sup> Recently, pre-post analysis ( $P = .10$ ) of results from the first year of the Active Living Every Day program has indicated that a 20-week group-mediated cognitive-behavioral intervention in five community-based settings ( $n = 421$ ) showed a trend toward significantly increasing moderate and vigorous physical activity;<sup>28</sup> whether incorporating attribution retraining into these and other future group-mediated cognitive-behavioral interventions might enhance their effectiveness at the level of translation is an area open to exploration.

Limitations of this pilot study include the small sample size, the nonrandomized design, lack of a true control group, and the short duration of observation. Furthermore, the multifaceted nature of the intervention made it impossible to determine whether the attribution retraining itself, the social contact, or even the weekly exercise class was the driving force behind the behavior change. Because there is no evidence that a weekly exercise class or social contact alone can cause even short-term sustained behavioral change, it is likely that the attribution retraining was a critical component of the intervention. Whether this is true should be tested, along with the efficacy and sustainability of the intervention, in a community-based randomized trial.

Although the finding that increases in age expectations correlated with increases in steps per week is consistent with the hypothesis that increased age expectations act as a mediator between the intervention and increased walking, the directionality of the relationship cannot be proven with this study design. Larger studies with more-frequent data collection points should attempt to determine to what extent age expectations drive physical activity, versus whether increasing physical activity causes people to raise their age expectations. It will also be important in future attribution retraining trials to measure self-efficacy for physical activity in order to explore the relationship between age attribution, self-efficacy, and increased physical activity.

It is also important to note that this new behavioral intervention is not a “top down” environmental or policy intervention; this team concurs with those who have advocated that, given the health risks of sedentary lifestyle, environmental and person-level approaches should both be used to increase physical activity in older adults.<sup>29</sup> Whether environmental interventions might incorporate attribution retraining to improve health behaviors in older adults, for example through the media, is also an exciting area of health policy that anti-ageism groups such as the International Longevity Institute have begun to address.<sup>30</sup>

In conclusion, an intervention combining attribution retraining with a weekly exercise class raised walking levels and improved quality of life in sedentary older adults in this small pre-post community-based pilot study. Attribution retraining deserves further investigation as a potential means of increasing physical activity in sedentary older adults.

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