An Evidence-Based Exercise Program Implemented in Congregate-Meal Sites

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Abstract

**Background:** This study examined the feasibility of implementing the EnhanceFitness® Program (formerly Lifetime Fitness Program), an evidence-based exercise program at congregate-meal sites which generally serve low income older adults. **Methods:** A twelve-week aerobic and strength training exercise program was held at senior centers three times a week. **Results:** The mean age of the 31 participants was 73.5 years ± 6.7 years (60-86). Participant’s compliance with attending the exercise class was 74%. Paired t-tests were used to evaluate change after the intervention. Three out of six components of the Senior Fitness Test, increased significantly after the exercise intervention (p<0.003). Three out of the eight self-reported health concepts of the SF-36 demonstrated significant improvement after the exercise intervention (p<0.003). **Conclusion:** These data indicate that an evidence-based exercise program can be successfully implemented in this population.

**Keywords:** aerobic training, strength training, physical function, low income older adults
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One of the major health objectives for 2010 is to increase physical activity in the older adult population, particularly those with low income and education. Physical activity programs promote good health and fitness, however; accessibility, availability, type, and cost of physical activity programs are all deterrents listed by older adults. Recent research has determined that a 78% increase in the number of physical activity programs is needed to meet public health goals. Therefore, agencies that serve older adults, such as senior centers, need to find ways to promote physical activity programs. Senior centers are the primary site for congregate-meal programs which serve approximately 1.9 million older adults in the United States. These older adults have a greater risk of chronic disease burden, functional limitations, and disability due to poor health and lifestyles. Exercise programs rarely reach low socioeconomic older adults, which have the greatest need. A previous study has demonstrated that targeting congregate-meal sites would be an effective way to promote physical activity in older adults.

The Elderly Nutrition Program can be used to increase awareness of the importance of physical activity. Exercises done at the table in conjunction with the congregate-meal, indicate that the percent of participants that felt exercise was unsafe was reduced by one-third and those having knowledge of the public health recommendations on physical activity was increased to two-thirds. Congregate-meal sites can provide an opportunity to bring physical activity to low socioeconomic status adults. Approximately 35% of congregate-meal participants have an income below poverty and 27% are from minority populations.

The purpose of this study was to evaluate the feasibility of implementing an evidence-based exercise program in two senior centers targeting clients of the Title III congregate-meal program and examine the effects of the exercise program on
community-dwelling adults age 60 and over. We hypothesized that the participants would have at least 70% compliance with the twelve-week aerobic and strength training program and improve functional fitness and self-reported health status.

Methods

Study Design and Participants

In a longitudinal study, community-dwelling men and women ages 60 and older from two senior centers in the vicinity of the University of Georgia were recruited to participate in the exercise program with no concurrent control group. The senior centers that were selected had sufficient physical space to carry out the exercise program and the directors of the senior centers were in agreement with the research study.

Eligibility was determined using a medical profile and physician clearance as required by the Institutional Review Board. Exclusion criteria included: poorly controlled or unstable cardiovascular disease, heart failure, uncontrolled arrhythmias, severe and symptomatic aortic stenosis, uncontrolled casual blood glucose >200 mg/dl, inability to follow directions or keep appointments, uncontrolled hypertension, leg or arm amputation, excessive alcohol intake (more than three drinks per day), or life expectancy less than one year. Prior to entering the study, the participants signed an informed consent form approved by the University of Georgia’s Institutional Review Board (IRB), Medical College of Georgia’s Human Assurance Committee, Department of Human Resources’ IRB and the Athens Community Council on Aging Review Board.

Outcome Measures

Self-reported Health Status. The Medical Outcomes Study 36-Item Short Form Health Survey (SF36) was used to assess the general health, functioning, and quality of life of the participants. The SF36 consists of eight health concepts: vitality, role-physical,
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role-emotional, physical function, mental health, general health, bodily pain, and social functioning. The reliability of health concepts generally exceeds 0.80. Normative values for the eight health concepts based on gender, age, and chronic conditions are used for comparative data reported in this study. Scores range from 0 to 100, with 0 reflecting poorer self-rated health status. The SF36 self-reported health survey provided supplemental information that was not obtained through observation.

Functional Fitness. The Senior Fitness Test (SFT) was used to determine functional fitness using six assessment tests. The chair stand measure is the number of chair stands performed in 30 seconds. The arm curl assessment is the number of arm curls performed through a full range of motion during a 30 second time period. The 8-foot up-and-go test is the shortest time to rise from a seated position, walk 8-feet around a cone and return to the original position. The back scratch assessment is the distance between the middle fingers when one arm was placed behind the back and the other over the shoulder. The distance between the fingers was measured as a minus score if the fingers did not touch, a zero score if the fingers touched and the overlapping of the fingers as a plus score. The chair sit-and-reach measure is the distance between the extended fingers and the tip of the toe. The distance beyond the toe was measured as a plus score, a zero score if the fingers touched the toe and a minus score if the fingers did not touch the toe. The 6-minute walk test is the greatest distance covered in six minutes.

Exercise Intervention

The exercise program was held for 12 weeks at two senior centers in Newton (n=21) and Clarke (n=10) counties. EnhanceFitness® (formerly Lifetime Fitness Program) is an evidence-based exercise program designed by the researchers and specialists at the University of Washington and Group Health Cooperative. Prior to each session; blood
pressure was measured and recorded along with attendance. A participant was not allowed to exercise if their blood pressure was greater than 200 mm Hg systolic and/or 110 mmHg diastolic. The program focused on endurance, strength, posture, balance, and flexibility. Classes met three times a week led by certified exercise leaders with EnhanceFitness® training. Each class consisted of 7 to 10 minutes of warm-up, 20 minutes of aerobic conditioning, followed by 3 to 5 minutes of cool-down and then 20 minutes of strength training and ending with 8 to 10 minutes of stretching. Exercise intensity was monitored using Borg’s 6-20 self-rated perceived exertion (RPE) scale. Participants were asked to perform at an intensity of 12-13 ‘somewhat hard’ RPE for aerobic training and a RPE of 15-17 ‘hard’ for strength training using 4 upper body and 4 lower body muscle groups. Balance and flexibility exercises were included in the warm-up and cool-down segments. Participants were encouraged to attend all exercise classes (36 sessions); however, if sessions were missed, make-up sessions were offered. All participants exercised for two consecutive weeks before exit testing.

**Data Analysis**

All data were analyzed using the Statistical Package for the Social Sciences (SPSS® version 14.0, Chicago, IL). After checking for group differences between sites and finding there were none, the data was combined for analysis. Paired t-test pre-post was used to evaluate change after the twelve-week exercise program. A p-value of <0.003 was used to establish significance after Bonferroni correction (.05/14). Results are reported as mean ± standard deviation. Published normative data for the SF36 and the SFT were used for comparison.

**Results**
Seventy older adults demonstrated interest in the research study and completed a health screening. Twenty-nine volunteers were either ineligible by the health screening (7) or unable to obtain physician clearance (22) to participate in the study. Thirty-one of the 41 (76%) older adults, who entered, completed the study. Ten participants (24%), nine women and one man, dropped out of the study before completing baseline testing. Reasons for dropping out of the study were transportation issues (3), caregiving responsibilities (4), a car accident (1), and orthopedic problems (2).

The mean age of the participants was 73.5±6.7 years. Selected characteristics are provided in Table 1. Eighteen out of 31 (58.1%) participants had an annual income of less than 20,000 dollars. Participant’s compliance with attending the exercise class was 74% and 94% complied with the RPE recommendations for intensity. Participant’s satisfaction with the exercise class was 92%.

Previously reported data\textsuperscript{15} demonstrated that Continuous Scale Physical Functional Performance 10 item test (CS-PFP10) Total Score, Upper Body Flexibility Domain, Lower Body Strength Domain, Balance and Coordination Domain and Endurance Domain significantly improved after the 12 week intervention. Participants significantly improved on three out of six assessments of the Senior Fitness Test after the exercise intervention (Table 2).

Participants demonstrated improvement on seven out of the eight self-reported health concepts of the SF-36 after the exercise intervention (Table 3). Three of these health concepts (bodily pain, social functioning, and mental health) showed significant improvement (p<0.003) where bodily pain demonstrated the greatest improvement.

Discussion
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The purpose of this project was to translate research to practice using an evidence-based exercise program in senior centers with congregate-meal programs. The results of this study provide evidence of implementation feasibility and improved health and functioning for older adults participating in congregate meals program senior centers, supporting previous research in two congregate meals sites.8

Global health status of the participants was lower than the published norms on five of the eight health concepts. Participants improved health status with significant increases in three of the eight SF36 domains. Bodily pain, social functioning, and mental health scores demonstrated significant improvements. The improvement in bodily pain may indicate that the exercise intervention served as an analgesic, has been reported previously.16 The social functioning concept increased even though the senior centers had numerous activities on a daily basis, which has been observed in previous studies where exercise promoted interactions with others.16 Physical functioning and role-physical baseline scores were above the norms, which may explain the nonsignificant improvements in these domains. Vitality and general health baseline scores, both below the norms, showed nonsignificant improvements. In total, while prior to the study five health concepts were below the published norms, after the twelve week intervention only two were below the norms and these both showed significant improvements. These may be some of the mechanisms through which cost savings in health care have been shown by participants in Lifetime Fitness exercise programs.17

On the Senior Fitness Test five of the six tasks were below published norms at baseline. The participants had various functional levels. The improvements in chair stands can be attributed to the lower body strength exercises. The stretching during the warm-ups and cool-downs may have lead to the significant improvements in back scratch, and chair sit-and-reach. Even though the exercise program was a combination of
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aerobic and resistance training, there were less improvements in arm curls, 8-foot up-and-go, and the 6-minute walk. Most of the components of the Senior Fitness Test were below average or at the lower end of the normal range at the beginning of the study. Perhaps this is because the referent population was primarily Caucasian and highly educated\textsuperscript{18}, where as this population was 30\% African American and 60\% lower socioeconomic status. After the intervention, all but one of the components was in the average range (Table 2). The significant improvements in the CS-PFP10 test reported earlier are in agreement with the findings of the Senior Fitness Test.\textsuperscript{15} The CS-PFP10 total score (baseline 39.2±13.5; 12-weeks 45.7±15.1) improved more than 16\%. This improvement came principally in domains of mobility, where the Lower Body Strength domain (baseline 31.5±11.6; 12-weeks 37.1±14.1) improved 17.7\%; the Endurance domain (baseline 40.5±15.2; 12-weeks 47.9±16.5) improved 18.5\%, and the Balance and Coordination domain (baseline 39.7±14.9; 12-weeks 47.8±16.3 improved by 20\%. The Upper Body Strength (baseline 39.3±15.0; 12-weeks 42.5±16.8) and Flexibility (baseline 56.9±14.9; 12-weeks 61.5±14.4) domains improved by 8\%. These important insights help to understand the extent to which functional improvements are possible in just 12 weeks of a combined strength and aerobic fitness program.\textsuperscript{15} In summary, these participants truly needed and benefited from this program by improving to within the published norms for physical functioning on five of the six tasks of the Senior Fitness Test. Our results add to previous research that examined the EnhanceFitness program at numerous sites using some components of the Senior Fitness Test to evaluate physical function.\textsuperscript{19}

To our knowledge, this is one of the first studies reported to implement an evidence-based exercise program with a focus on congregate-meal sites. The exercise program helped the senior center to meet the health needs of the older adults while
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adding to the programming needs of the senior center. The senior centers integrated the EnhanceFitness® Program into their daily scheduling, indicating that this program may have some degree of sustainability. In order to facilitate sustainability a staff person from both senior center sites received the EnhanceFitness® Training and the weights used for this research project were donated to the senior centers. The exercise program at the site in Newton County is still continuing with at least 50 participants. Loss of the trained staff member at the other site resulted in exercise programming being interrupted however with a new exercise leader and the weights provided from this research project, exercise programming continues in that senior center as well. While, EnhanceFitness® provides a participant fee structure to help facilitate coverage of the costs of the program, neither of the sites in this study opted to charge participants following the research project. EnhanceFitness® originally implemented in senior centers, is currently being adopted and delivered in community organizations such as YMCA in over 20 states. Instructor trainings and information are available on the World Wide Web at www.projectenhance.org.

Survey data indicate that congregate-meal site users prefer physical activity programs to be offered once a week\(^8\), however in the present research program, when offered three days a week, participants’ attendance was over 70% and participants’ satisfaction was over 90%. The adherence to the EnhanceFitness® program was demonstrated by having more than 80% of the participants continue the program after the completion of the research study and other older adults join the classes. This study supports that the EnhanceFitness® program is feasible and sustainable in senior centers.

There are many barriers to exercise such as lack of transportation and high facilities cost. While transportation to the facility was provided for individuals of the congregate-meal program, 10% were still lost to this study due to transportation.
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problems. Since the exercise program was offered at the local senior center, older adults did not have the burden of having to pay for gym memberships. Therefore, the barriers of accessibility, availability and cost were minimized by bringing the exercise program to the older adults. However, the requirement for a physician to sign a medical clearance reduced the potential enrollment by 31.4% therefore reducing sample size. While the American College of Sports Medicine recommendations do not require a physician clearance for moderate exercise the requirement imposed by the IRBs can be a significant influence over the selection of research participants in implementing exercise programs.\textsuperscript{20}

While a control group may have provided a stronger research design, the purpose of demonstrating feasibility and efficacy of implementing an evidence-based exercise program in a congregate-meal site meets the goal to provide a meaningful venue for translating research to practice. A control group was not needed to demonstrate how well the EnhanceFitness® Program could be implemented in congregate-meal site.

There were thirteen congregate-meal sites in the vicinity of the university that could have implemented the exercise program, yet only two sites were willing to participate. The majority of the sites did not have adequate space and the directors of the sites were not interested in the program. Therefore, the sample size and diversity of the population was limited. Thirty-one percent (22 of 70) who volunteered were unable to get physician’s clearance required by the University of Georgia Institutional Review Board. This limits the generalizability of this study. More evidence-based exercise programs are needed to increase physical activity in the older adult population.

In summary, this research indicates that in two Georgia counties congregate-meal sites are appropriate for implementing evidence-based exercise programs and generate good attendance. The combination of aerobic and strength exercises are efficacious improving global health and physical function. This study demonstrates that older adults
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will participate in exercise programs if they are both accessible and affordable.

Additionally, an evidence-based program provides an excellent opportunity to integrate exercise into the daily activities of senior centers.

Acknowledgements

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References


Table 1 Selected Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Frequency</th>
<th>Percent</th>
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<tbody>
<tr>
<td><strong>Gender</strong></td>
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<tr>
<td>Male</td>
<td>4</td>
<td>12.9%</td>
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<tr>
<td>Female</td>
<td>27</td>
<td>87.1%</td>
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<tr>
<td><strong>Ethnicity</strong></td>
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<tr>
<td>Caucasian</td>
<td>21</td>
<td>67.7%</td>
</tr>
<tr>
<td>African American</td>
<td>10</td>
<td>32.3%</td>
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<tr>
<td><strong>Education</strong></td>
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<tr>
<td>Did not complete high school</td>
<td>15</td>
<td>48.4%</td>
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<tr>
<td>Completed high school</td>
<td>8</td>
<td>25.8%</td>
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<tr>
<td>Some college education</td>
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<td>16.1%</td>
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<td>Postgraduate</td>
<td>3</td>
<td>9.7%</td>
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<tr>
<td><strong>Annual Income</strong></td>
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</tr>
<tr>
<td>5,000 - 10,000</td>
<td>9</td>
<td>29%</td>
</tr>
<tr>
<td>10,001 - 20,000</td>
<td>9</td>
<td>29%</td>
</tr>
<tr>
<td>Above 20,001</td>
<td>4</td>
<td>13%</td>
</tr>
<tr>
<td>Choose not to answer/Do not know</td>
<td>9</td>
<td>29%</td>
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Table 2  Senior Fitness Test Scores

<table>
<thead>
<tr>
<th>Senior Fitness Test Scores</th>
<th>Baseline (M ± SD)</th>
<th>12-weeks (M ± SD)</th>
<th>p-value</th>
<th>Normal range * Women/men</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arm Curls (number in 30 secs)</td>
<td>13.3±5.2</td>
<td>14.9±6.1</td>
<td>0.059</td>
<td>12-17/14-21</td>
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<td>Chair Stands (number in 30 secs)</td>
<td>8.9±4.9</td>
<td>12.2±5.5</td>
<td>0.001</td>
<td>10-15/12-17</td>
</tr>
<tr>
<td>Back Scratch (inches)</td>
<td>5.3±7.9</td>
<td>0.12±6.7</td>
<td>0.002</td>
<td>4.0-1.0/8.0-1.0</td>
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<tr>
<td>Chair Sit and Reach (inches)</td>
<td>4.40±3.1</td>
<td>1.7±2.3</td>
<td>0.001</td>
<td>1.0-4.0/3.0-3.0</td>
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<tr>
<td>8-foot up and go (secs)</td>
<td>8.8±7.9</td>
<td>6.5±4.3</td>
<td>0.009</td>
<td>7.1-4.9/6.2-4.4</td>
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<tr>
<td>6-min walk (yards)</td>
<td>447.1±153.1</td>
<td>452.3±148</td>
<td>0.708</td>
<td>480-615/545-680</td>
</tr>
</tbody>
</table>

Significant was designated as p=<0.003

M±SD = Mean ± Standard Deviation

*11
### Table 3  SF36 scores

<table>
<thead>
<tr>
<th>SF-36 Scores†</th>
<th>Baseline (M ± SD)</th>
<th>12-weeks (M± SD)</th>
<th>p-value</th>
<th>Norms *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Functioning</td>
<td>74.8±24.8</td>
<td>77.1±21.9</td>
<td>0.296</td>
<td>69.38</td>
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<tr>
<td>Role-Physical</td>
<td>74.2±33.8</td>
<td>79.0±36.0</td>
<td>0.545</td>
<td>64.54</td>
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<tr>
<td><strong>Bodily Pain</strong></td>
<td><strong>32.5±18.8</strong></td>
<td><strong>57.5±27.1</strong></td>
<td><strong>0.001</strong></td>
<td><strong>68.49</strong></td>
</tr>
<tr>
<td>General Health</td>
<td>60.2±11.4</td>
<td>69.2±20.2</td>
<td>0.081</td>
<td>62.56</td>
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<tr>
<td>Vitality</td>
<td>56.6±9.3</td>
<td>63.5±17.7</td>
<td>0.076</td>
<td>59.94</td>
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<tr>
<td><strong>Social Functioning</strong></td>
<td><strong>48.4±5.3</strong></td>
<td><strong>77.0±26.2</strong></td>
<td><strong>0.001</strong></td>
<td><strong>80.61</strong></td>
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<tr>
<td>Role-Emotional</td>
<td>92.5±22.3</td>
<td>89.2±30.3</td>
<td>0.620</td>
<td>81.44</td>
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<td><strong>Mental Health</strong></td>
<td><strong>62.7±11.0</strong></td>
<td><strong>77.2±16.6</strong></td>
<td><strong>0.000</strong></td>
<td><strong>76.87</strong></td>
</tr>
</tbody>
</table>

†Range = 0 to 100 with 100 being better

M±SD = Mean ± Standard Deviation

Significant was designated as p=<0.003

*10