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Effectiveness of a Group Exercise Class vs. Home Exercise Program as a Follow-up to Physical Therapy for Older Adults with High Fall Risk

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ABSTRACT

This quasi-experimental study compared the results of a traditional model of physical therapy (PT) care to a PT wellness model known as GroupHab. The traditional model included discharge from PT with a home exercise program (HEP) to be self-administered with or without the addition of a community-based exercise program. The wellness model included participation in a PT-designed and supervised group exercise program (GroupHab class) in an outpatient clinical setting following discharge from PT. Independent t-tests were used to compare the number of falls, exercise frequency, and exercise duration between the two groups. A repeated measures, analysis of variance (RM-ANOVA) compared changes in balance confidence scores both within and between groups, and a multivariate analysis of variance (MANOVA) analyzed group differences across multiple quality of life ratings using the SF-20. All data were analyzed at the 0.05 alpha level using SPSS 24 statistical software. Our results showed a significantly greater reduction in recurrent falls among the GroupHab wellness group compared to the HEP group ($t=2.811$, $p=0.009$). The resulting odds ratio for subsequent falls was 2.2 among HEP participants and 0.2 among GroupHab participants. Exercise adherence was also greater for those who participated in the GroupHab class. They documented greater exercise frequency ($t=-3.253$, $p=0.002$) and more exercise minutes ($t=-7.188$, $p<0.001$) than those who participated in the HEP. When comparing changes in the participants' balance confidence, we found an average increase of 5% among GroupHab participants compared to a 6% decrease among HEP participants ($F=16.877$, $p<0.001$, $power=0.981$). Although our multivariate analysis of the SF-20 scores revealed no significant difference overall ($F=0.768$, $p=0.73$), the univariate analyses showed significantly greater improvements among GroupHab participants in selected areas of physical function. These results suggest that at-risk older adults who are discharged into a functionally-based group exercise class are less likely to experience recurrent falls and are more likely to have more confidence in their balance than those who are discharged with a standard HEP and/or use of community-based exercise classes.

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1. Introduction

Demographic projections have created an urgent need for changes in our approach to health care in the United States and elsewhere to stem the population health problems affecting older adults. In the U.S., longer lifespans are expected to dramatically increase this segment of the population^[1] to approximately 20% by the year 2030.^[2] Of this number, 85% will be managing a chronic health condition, and 60% will be managing two or more conditions.^[2] Previous research has clearly established a relationship between these multiple co-morbidities, as well as the medications used to treat them, and the rise in unintentional falls among older adults. According to the National Council on Aging, every 11 minutes an older adult in the U.S. visits an emergency room for a fall-related injury, and every 19 minutes, an older adult dies from a fall.^[3] Each year, approximately one-third of adults aged 65 years or older will fall and two-thirds of these individuals will fall repeatedly.^[3] Falls continue to be a leading cause of injury-related death in this age group as well as a major cause of disabling injuries such as hip fractures and head trauma which increase the risk of early death.^[3] Many people who fall, even those who are not injured, develop a fear of falling.^[4] This fear tends to limit their physical activities which further reduces their strength, balance, and mobility, thus increasing their susceptibility to falling^[4].

Regular physical activity (PA) is one of the most important things older adults can do for their health. There is strong evidence to support the prophylactic effect of regular PA on fall risk as well as many other age-related health problems.^[2,5] However, many older adults avoid PA for a variety of reasons including physical limitations, lack of expert guidance and support, and inadequate information on available programs.^[6,7] Even with exercise programs that are free or low cost (e.g., Silver Sneakers, Enhance Fitness) older adults are attending in very low numbers,^[7] and those who are most vulnerable do not utilize these services at all^[7].

The combination of falls and lack of PA creates a huge economic burden that includes the cost for emergency care, hospitalizations, rehabilitation, and long-term care. In the United States, treatment for this population accounts for 66% of the country's health care budget.^[2] In 2015, the estimated medical costs attributable to fatal and nonfatal falls was approximately \$50 billion.^[7] Nonfatal falls resulted in Medicare costs of approximately \$28.9 billion, Medicaid costs of \$8.7 billion, and \$12 billion in private insurance claims.^[7] Overall medical spending for fatal falls was estimated to be \$754 million,^[8] excluding

the costs associated with rehabilitation and long-term care. In addition to the sheer number of older adults who die or experience a disabling injury from a fall, these staggering costs further support the need to find more effective fall prevention strategies for at-risk older adults.

Physical therapy, or physiotherapy, (PT) is considered an effective means of improving a patient's strength and balance which seem to have a mitigating effect on falls among older adults. PTs also have the expertise to counsel individuals with specific health conditions on how to incorporate PA safely in their daily routine. However, the current medical model of PT consists of a short-term "bolus" of treatment followed by discharge with a home exercise program (HEP) and/or recommendations to participate in some community-based activity program. If these individuals do not continue to exercise, they quickly lose the functional gains made in PT and begin to decline physically within a few months of discharge.^[7,9,10] Barriers to exercise adherence include lack of interest, poor health, inclement weather, depression, fear of falling, and low expectations for positive outcomes.^[7] These barriers are similar to the ones that prevent older adults from participating in any type of PA^[6] and further support the ineffectiveness of the current model. Lack of adherence to the HEP post-discharge and the resulting functional regression typically increases one's risk for balance loss, mobility limitations, and recurrent falls. These complications often require additional bouts of PT treatment or permanent, institutionalized care^[11].

As the number of older Americans requiring skilled, supervised exercise continues to grow, it is expected to surpass^[13] the number of physical therapists who have the skill to meet their healthcare needs.^[14] This combination creates a need for more efficient and effective systems to deliver exercise programs to older adults. Numerous studies have shown that older adults who routinely participate in a group exercise class demonstrate improvements in their balance, strength, endurance, and functional activity. This study differs from previous studies in that it focuses on a population of older adults with known balance impairments who have already completed a formal course of PT and compares the outcomes of two follow-up interventions: (1) a PT-led exercise group (GroupHab) and a self-monitored HEP. The GroupHab wellness approach is an alternative to the current medical model of care in that it emphasizes the PT's role as the facilitator of PA in older adults with the goal of preventing falls and reducing the financial burden associated with traditional health care.

2. Methods

GroupHab Physical Therapy is a privately-owned physical

therapy practice in South Carolina (USA) that provides a unique model of PT-designed and supervised group exercise classes. The classes provide post-discharge options for maintaining the functional gains made during PT treatment, as well as solutions for individuals wanting to exercise to stay strong and healthy, under the guidance of a licensed PT who has extensive experience working with geriatric clients. A multi-component exercise program consisting of aerobic, strengthening, balance, and flexibility techniques is recommended to prevent falls among frail older adults [15-19]. Thus, the GroupHab class included all four of these exercise components. Different classes target specific functional levels which are recommended by a PT based on a patient's abilities at the time of discharge. Participation in these classes is tailored and individualized with the goal of maximizing each participant's potential. The GroupHab option is encouraged for all individuals who have reached their PT discharge goals but may struggle to maintain their functional gains using a traditional HEP. These individuals are typically older adults who are managing multiple chronic conditions and find it difficult to exercise at home, or in a community-based setting, without the benefit of some skilled supervision.

The GroupHab intervention took place in an outpatient clinic as part of a series of exercise classes that fall under two broad categories: Wellness Classes and Specialty Classes. Wellness Classes include all four major types of exercise (i.e., aerobics, strengthening, balance, and flexibility) while Specialty Classes omit aerobic exercise and focus on the other aspects of wellness (i.e., YogaHab, CoreHab, JointHab). Classes are held Monday through Friday with different classes offered throughout the day. Class sizes vary from 3 to 12 participants each, last 60 minutes, and utilize tempo-appropriate music and simple exercise equipment (e.g., dumbbells, therabands, balance tools). Class instruction is provided by a PT or a physical therapist assistant (PTA) who has been trained and certified to provide the GroupHab Wellness classes. For this study, only those patients who were specifically recommended by the PT attended classes that were selected to meet their functional capabilities.

This study included 56 participants who ranged from 55 to 93 years of age with a mean age of 76 years in both groups. The GroupHab class included 7 men (25%) and 21 women (75%); the HEP group included 9 men (32%) and 19 women (68%). All participants had completed a standard course of physical therapy including balance exercise, gait training, strengthening, and fall risk education. In addition, all had a history of falls, repeated falls, and unsteady gait. Upon discharge from PT, each person was given the choice of attending a GroupHab exercise

class in the same clinic or an HEP to be performed at home or in conjunction with a community-based exercise class. Thus, this study represents a quasi-experimental design because participants were not randomly assigned to their intervention groups. The study was approved by the Human Subjects Committee at Anderson University, Anderson, SC.

The HEP included standing exercises, sit-to-stand strengthening, and static standing balance maneuvers to be performed near a supportive surface such as the kitchen counter or sturdy chair. These individuals were instructed to complete this program daily, striving for at least 3x/week. Supplemental community programs available in the area included: Matter of Balance, Silver Sneakers, free exercise at the local senior center, senior exercise classes led by group exercise instructors at the senior center, YMCA water exercise classes, Life Center hospital program ("Exercise is medicine"), and meeting with a nurse and/or personal trainer. Those who chose to participate in the GroupHab class received a recommendation from their discharging PT for a specific exercise class based on their current functional level. Participants were encouraged to attend at least three classes a week and other specialty classes as desired. Actual attendance varied from one to five times a week. Participants were encouraged to continue the classes to maintain their level of health and wellness indefinitely; however, for the purpose of this study, participants had to attend classes for at least three months post-discharge. Although the cost of classes was \$100/month, GroupHab sponsorship was offered to individuals who felt that this cost was a barrier to attending.

To measure the effectiveness of each program, both groups were given a multi-item survey to fill out at time of discharge from PT and again three months later. The survey packet included data related to the number of post-discharge falls, activity levels, confidence in balance ability, and quality of life within that three-month time period. The three-month, post-discharge time frame was based on recommendations from a previous study which investigated adherence of older adults with a home exercise program [11].

The following dependent variables were used to assess program outcomes:

(1) Incidence of Falls - Participants were asked if they had experienced a fall in the three months since discharge and to indicate whether medical attention had been required as a result of the fall.

(2) Exercise Adherence and Time - Participants reported the frequency, average daily duration of exercise (in minutes), and type of exercise performed at the end of the three-month exercise period. If they had not been active,

they were asked to describe the barriers they encountered.

(3) Balance Confidence - Participants completed the Activities-specific Balance Confidence (ABC) Scale at the start of the intervention period and three months later. This scale is a 16-item self-report measure of balance confidence in performing various activities without losing balance or experiencing a sense of unsteadiness. Items are rated on a scale from 0 - 100 with a score of zero representing no confidence and a score of 100 representing complete confidence in task completion. The ABC Scale has been shown to have good test-retest reliability and internal consistency among “community-dwelling” older adults [20] with no significant difference between men and women [20] and no correlation between age and ABC scores [20].

(4) Quality of Life - Participants completed the 20-Item Short Form Health Survey (SF-20) at the end of the intervention period. Item categories in this survey include physical functioning, role functioning, social functioning, mental health, and pain. The SF-20 has good validity and test-retest reliability among older adults living at home [21,22].

Independent t-tests were used to compare the number of falls, exercise frequency, and exercise duration between exercise groups. A repeated measures, analysis of variance (RM-ANOVA) compared changes in ABC scores both within and between groups, and a multivariate analysis of variance (MANOVA) analyzed group differences in multiple quality of life ratings (from the SF-20). All data were analyzed at the 0.05 alpha level using SPSS 24 statistical software.

3. Results

The results of the independent t-tests demonstrated a significantly greater reduction in subsequent falls among GroupHab participants compared to those who performed the self-administered HEP ($t=2.811, p=0.009$). One GroupHab participant experienced a single fall while eight HEP participants experienced a total of 23 falls (see Figure 1). The resulting odds ratio for subsequent falls was 2.2 among HEP participants and 0.2 among GroupHab participants. This indicates a two-fold increase in fall risk among HEP participants and a reduced fall risk (approximately 80%) among GroupHab participants. Exercise adherence was also greater for those who participated in the GroupHab classes. They recorded greater exercise frequency ($t= -3.253, p=0.002$) and more exercise minutes ($t= -7.188, p<0.001$) compared to HEP participants. The intervention groups also differed significantly on changes in their balance confidence (see Figure 2). GroupHab participants’ ABC scores improved by an average of 5%,

while mean scores of HEP participants’ scores decreased by 6% ($F=16.877, p<0.001, \text{power}=0.981$). Although our multivariate analysis of the SF-20 scores revealed no significant difference overall ($F=0.768, p=0.73$), the univariate analyses showed significantly greater improvements among GroupHab participants in four components of the SF-20 including “bending, lifting, stooping” ($F=7.862, p=0.007, \text{power}=0.786$), “walking one block” ($F=4.7-6, p=0.035, \text{power}=0.567$), “bodily pain” ($F=6.099, p=0.017, \text{power}=0.679$) and “feeling bad lately” ($F=4.589, p=0.037, \text{power}=0.557$).

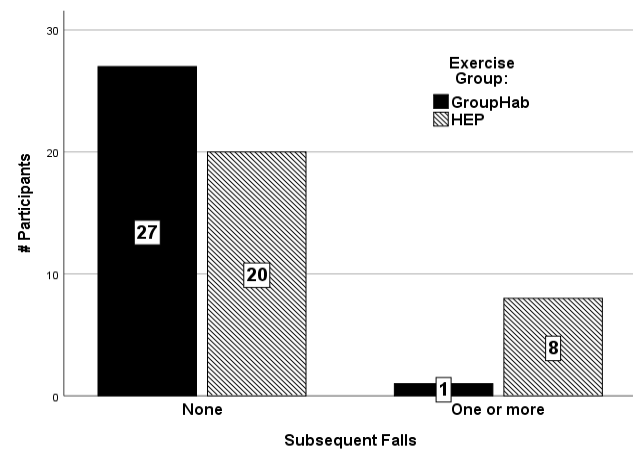


Figure 1. Comparison of recurrent falls among participants in the wellness class (GroupHab) vs. home exercise program (HEP)

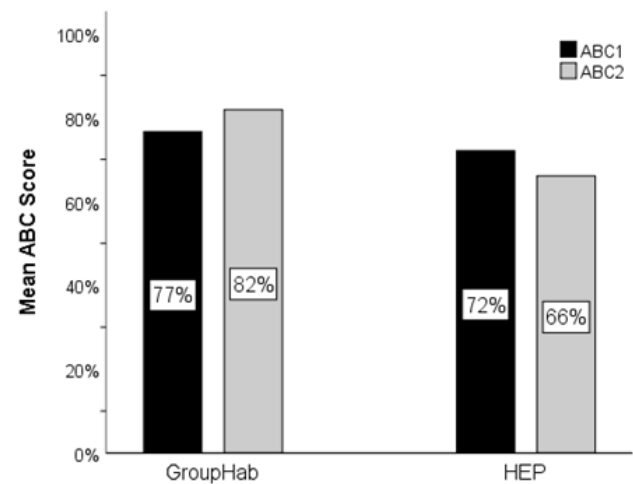


Figure 2. Comparison of changes in ABC scores (over 3 months) between groups

4. Discussion

Despite ample evidence to support the benefits of community-based exercise classes for older adults [2], more frail,

at-risk individuals avoid participation due to fear of not being able to keep up, fear of falling, and lack of support from healthcare providers.¹⁷ However, our results indicate that a wellness approach to group exercise led by a PT with expertise in working with a geriatric population, can successfully overcome these barriers and have a mitigating effect on subsequent fall risk. In addition, this alternative model of physical therapy, including the PT-designed and supervised exercise classes used in this study, appears to provide older adults with a greater opportunity to continue progressing after their discharge from rehab, as opposed to regressing. Past recommendations that have resulted from international initiatives such as the *Exercise and Physical Activity and Aging Conference* (ExPAAC) have emphasized the need to tailor such exercise programs to each person's functional level and use a variety of progressive exercise approaches to keep seniors actively engaged^[23]. These strategies were incorporated successfully into the GroupHab class which yielded better outcomes than a traditional HEP including fewer reported falls, greater exercise times and frequency, improved balance confidence, and improvements in several quality of life ratings. Not only was the PT able to design the classes to fit the needs and capabilities of each participant, but she was able to closely monitor participants and progress them as needed. Previous research has demonstrated that exercise programs for older adults are often "under-dosed" due to fear of overstressing weak muscles, painful joints, or an inefficient cardiopulmonary system; thus, they select an intensity that meets the needs of participants who are functioning at the lowest activity level^[15,16]. As with many HEP programs that begin at a relatively low level, these programs are frequently abandoned by participants who become bored and perceive that the program is not making a difference in their functional mobility. Because PTs have first-hand knowledge of their clients' medical history and functional capabilities, they are better able to safely challenge and motivate older adults in a progressive manner. Furthermore, the social support that occurs in group exercise classes may contribute to increased exercise adherence, self-efficacy, and improvements in quality of life^[8,17,24]. For those individuals who are isolated at home due to the coronavirus pandemic or other reasons, this type of program can easily be adapted to a virtual format.

5. Conclusion

By using an alternative delivery of physical therapy for aging adults that includes a post-discharge continuum of care which has a wellness focus, we were able to successfully improve balance confidence, exercise time and adherence, and reduce the number of recurrent falls.

In addition to improved physical mobility outcomes, a cost-effective, PT-led intervention in a group setting may provide better social support that can improve the older adult's perceptions of his or her quality of life^[17].

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