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Physical Activity Preserve an Adequate Balance Profile in Active Hispanic-Latino Older Adults Participating in a Community Center

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ABSTRACT

Background: Prior research has examined fall risks in the elderly Caucasian population, though research on this topic in the elderly Latino population is still emerging. This inquiry investigates whether there are distinct balance characteristics in the active elderly Latino population and whether demographic factors and lifestyle choices influence these characteristics.

Methods: A total of 25 active participants who partake in Zumba and aqua aerobic classes at a community center participated in this study, with an average age of 71.6+/-7.2. A screening assessment tool (SAT) was administered to obtain demographic data. The Activities-specific Balance Confidence (ABC) scale and Mini-BESTest (MBT) were utilized to assess participants' balance.

Results: The most prevalent comorbidities in the group include high blood pressure (76%) and arthritis (64%). The average scores include 86.4% on the ABC, 1.5 points on the MBT items on a 0-2 grading scale, and 14.6 seconds on the TUG cognitive task. A significant positive correlation between the number of medications and the number of comorbidities was identified (r=0.448, p=0.025).

Conclusion: The acceptable balance scores among our participants surmise that engaging in physical activities improves perceived balance and balance performance, despite the prevalence of comorbidities or medication usage. Implementing fall prevention programs and balance assessments in community centers and clinicians explaining the importance of physical activity programs to both patients and physicians are strategies that can reduce the risk of falls in any elderly ethnic group.

Keywords: Active, Elderly Latino Population, Activities-specific Balance Confidence (ABC) scale, Mini BESTest (MBT), Balance.

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INTRODUCTION

Reports indicate that each year, one out of four older adults experiences a fall [1]. The expenditure on tending to injuries related to falls was over $50 billion in 2015 and is only increasing with our aging population [2]. There is a high frequency of falls and fall-related trauma in both active and sedentary older adults, although the reasons for falls may differ between these groups [3]. Factors leading to increased risk of falling include increased age, being female, gait abnormalities, and impaired balance, along with reduced muscular strength, cognitive deficits, diminished visual acuity, and the use of certain medications [3,4].

A notable additional factor that increases fall risks belongs to or descending from specific ethnic groups; most notable are older Latino adults, as they have a higher risk of falling than the non-Latino population.

The Latin population in the United States comprises 18.5% of the total population and is expected to increase to 30% by 2050 [5]. A study conducted in 2013 by Hanlin et al. revealed that of a sample of Latino older adults, 52% had fallen in the past year [6]. Of the older adults surveyed, 81% fear falling again, with more than half (52%) having had five out of ten risk factors for falling [6].

Aging leads to increased incidence rates of developing health conditions, such as heart disease, diabetes, and a decline in neuromuscular system functions. However, exercise can improve the cardiovascular, musculoskeletal, and neurological health of older adults by decreasing blood pressure and improving strength, balance, mood, and sleep [7]. The American College of Sports Medicine and American Heart Association have issued exercise guidelines specifically for older adults, including recommendations for aerobic and strength training activities at intensities relative to the individual's current fitness level and workouts that improve or maintain flexibility [8]. Balance coaching for older adults at risk for falls is also recommended, as the deficits mentioned above are associated significantly with increased fall risk in community-dwelling older adults [9].

Many clinical assessment tools can detect balance deficits in older adults; one exemplary tool is the Activities-Specific Balance Confidence (ABC) Scale. It is both reliable and valid in measuring balance confidence in older adults [10]. With this, the ABC scale is responsive to change and can distinguish between various levels of functional mobility in community-dwelling older adults, those who are institutionalized, as well as older adults who already engage in regular physical activity, as this can improve their balance with the incorporation of balance-specific training [11,12]. However, normative data for perceived confidence in one's balance in relation to everyday activities (ABC scale) for active older adults has yet to be established; therefore, any such data specific to the active older Latino population remains nonexistent.

The Mini Balance Evaluation Systems Test, or Mini-BESTest, is another recommended clinical balance assessment tool in the active older adult population [13]. A correlation has been found between increased age and significantly lower scores on the Mini-BESTest, alongside gait speed and grip strength in male and female active older adults [13]. To date, no established norms for the Mini-BESTest have been established for the active older adult population.

Health care professionals, such as physical therapists, can aid older adults in decreasing their risk of falling by developing individualized fitness programs to address their health and exercise needs, as older adults with a history of falling have significantly reduced occurrences of falls following the full adherence to a customized exercise program [14]. In creating these plans, one should bear in mind that there is a benefit to exercising in a community setting. Many older adults report increased motivation and enjoyment from this form of physical activity, which increases their adherence to an exercise program. Community exercise programs offer an effective, low-cost solution to improving balance and many other factors that affect mobility function in community-dwelling older adults [15]. Cultural unity and health provider assistance also boost older adult participation in exercise activities. Additional reports from older Latino adults indicate that participating in group exercise classes and discussing their health with professionals were preferred methods of receiving health-related education regarding reducing their fall risk [6,16].

Taking all of the reported benefits of exercises to prevent falls and injuries into account, there is an increasingly dire need for older Latino adults to have the ability to access affordable community resources that address fall prevention. Additionally, it is unknown whether these community programs implement exercises that lead to improvements in balance in community-dwelling older adults for those individuals who already have an active lifestyle.

Therefore, upon taking all that has been mentioned above, this study's primary aim is to depict the perceived (ABC scale) and measured (Mini-BESTest) balance of older Latino active adult partakers of exercise programs at a community center. The secondary aim of this study is to distinguish the factors that influence balance among this high-risk population.

METHODS

This study was approved by the Research Ethics Committee of the University of Puerto Rico Medical Sciences Campus (protocol #B1510117). It was conducted in the Complejo Deportivo Carcaño Alicea in Bayamon, Puerto Rico. Individuals were recruited through word of mouth and were referred by the staff of the Community Center.

Participants

A total of 26 individuals (5 male and 20 female) volunteered to be subjects in this study, with an average age of 71.6 +/- 7.2 years old. The participants were relatively physically active, as they participated in Zumba and aqua aerobics twice a week at the community center. The demographic data for this particular group is depicted in Table 1.

Table 1: Demographic data of all participants

Characteristics	Study Participants n = 25
Age	71.6+/-7.2 years
Gender	Male = 5; Female = 20
Height (inches)	63.7+/3.3
Weight (pounds)	164.4+/-37.8
BMI (kg/m^2)	28.3+/-4.7
Dominant Hand	Left = 4; Right = 20; N/A = 1
Number of medication	2.5+/-1.4
Common comorbidities and number/percent of participants with the diagnosis	High Blood Pressure (19/76%) Arthritis (16/64%) Diabetes Type 2 (9/36%) Thyroid (9/36%) Osteoporosis (6/24%)

Subject Criteria

Participants had to be between the ages of 60-90 years old and have the ability to ambulate, with or without assistive equipment. The exclusion criteria for the subjects were: BMI>40, severe balance problems, ulcers or history of ulcers, absence of sensation in inferior extremities, including amputations, having cardiopulmonary disease, history of chronic pain or illness, and surgery in the low back or lower extremities in the past year.

To determine if the participants met the criteria and were safe to partake in this study, a screening assessment tool (SAT) was utilized. The SAT is a selection tool, not a questionnaire; therefore, general medical information was collected from physical activity, blood pressure, comorbidities, and medications. This screening assessment will serve as a further means to understanding the medical profiles of the participants.

Procedures

Before participating in the study, each participant read and signed an informed consent document after being informed of all risks, discomfort related to their involvement in this study, and their rights. Following this, anthropometric measures were taken, after which a member of the research team demonstrated each of the tasks the subjects would be performing in this study.

Balance Assessment

Balance was measured by the Activities-specific Balance Confidence (ABC) Scale and the Mini-BESTest (MBT).

1. The Activities-specific Balance Confidence (ABC) Scale is a 16 question self-reporting assessment designed to evaluate the level of confidence in accomplishing different activities without the participant losing their balance or becoming unsteady. Participants self-rate the chosen tasks with percentages ranging from 0% to 100%; a rank of 0% means the participant has no confidence in performing the task without falling, whereas a rank of 100% equates to the participant having confidence in executing the tasks with little to no difficulty.

2. The Mini-BESTest (MBT) was also performed to assess dynamic balance. The MBT has a total possible score of 28 across the following 14 tasks:

1) sit to stand, 2) rise to toes, 3) stand on one leg, 4) forward compensatory stepping correction, 5) backward compensatory stepping correction, 6) lateral compensatory stepping correction, 7) stance with feet together, eyes open, and on a firm surface, 8) stance with feet together, eyes closed, and on a foam surface, 9) inclination with eyes closed, 10) changing gait speed, 11) walking with horizontal head turns, 12) walking with pivot turns, 13) stepping over obstacles, and 14) a timed up and go with a dual 3-meter walk task.

Each task was graded on a 0-2 point ordinal scale, with 0 as severe, one as moderate performance, and two as normal performance.

Data Analysis

For all data analysis, SPSS version 25 was used as the statistical program for this study. A descriptive approach was employed for the demographic profile to identify the means and standard deviations for the ABC scale and MBT.

For the participants' medical histories, the distinct comorbidities and medications were categorized for correlation analysis. A Spearman's rank-order correlation was conducted to discern the relationships, if any, between the number of drugs, ABC scale total count, MBT overall score, and medical history.

RESULTS

The average scores for each item on the ABC scale, with a total average rating of 86.4%, are illustrated in Table 2. Participants assigned the lowest average confidence percentage to step on or off an escalator while holding an item (77.4%), followed by walking on ice (74.4%).

Table 2: ABC Scale Characteristics

Item Number	Activity	Score %
1	walk around the house	93
2	walk-up or downstairs	81.2
3	bend over and pick up a slipper from the front of a closet floor	84.8
4	reach for a small can off a shelf at eye level	91.4
5	stand on your tip toes and reach for something above your head	84
6	stand on a chair and reach for something	81.2
7	sweep the floor	93.6
8	walk outside the house to a car parked in the driveway	94.2
9	get into or out of a car	89.2
10	walk across a parking lot to the mall	92.2
11	walk up or down a ramp	89.4
12	walk in a crowded mall where people rapidly walk past you	87.4

13	bumped into by people as you walk through the mall	84.4
14	step onto or off of an escalator while you are holding onto a railing	86.4
15	step onto or off an escalator while holding onto parcels such that you cannot hold onto the railing	77.4
16	Walk on icy sidewalks	74.4
Total Average Score		86.4

The average score for each item in the MBT is demonstrated in Table 3, with an average of 14.6 seconds for the TUG dual cognitive test (item 14). The total average rating for all participants without the TUG score was 1.5 points on a 0-2 scale and 21 points on a 0-28 MBT grading scale.

Table 3: Mini BESTest Characteristics

Item Number	Activity	Score (0-2)
1	Sit-to-stand	2.0
2	Rise to toes	1.8
3	Standing on one leg Right: Left:	1.2
4	Compensatory stepping correction: forward	1.2
5	Compensatory stepping correction: backward	1.1
6	Compensatory stepping correction: lateral	1.0
7	Stance (feet together): eyes open, firm surface	2.0
8	Stance (feet together): eyes closed, foam surface	1.9
9	Inclined: eyes closed	1.6
10	Change in gait speed	1.9
11	Walk with head turns (horizontal)	1.2
12	Walk with pivot turns	1.4
13	Step over obstacles	1.6
14	Timed up & go (TUG) with dual-task (3m walk)	14.6 sec.
Average items without TUG: 1.5 points on a 0-2 scale, and 21 points out of 28 points total.		
Score: 0 = severe, 1 = moderate, 2 = normal		

The representation of Spearman's rank-order correlation results for this research can be seen in Table 4. The number of medications, ABC scale score, MBT score, and medical history was associated in this current study. There was a significant positive correlation linking the number of medications and the number of comorbidities, which was statistically significant (r=0.448, p=0.025). The SAT tool was utilized to categorize and identify the prevalence of comorbidities among our participants, with the most common comorbidities being high blood pressure (n=19), arthritis (n=18), and type 2 diabetes (n=9).

Table 4: Pearson Correlation among the balance tools and the number of comorbidities and medications

	MTB	ABC	Num. Co-morbidities	Number Meds
MTB Pearson Correlation Sig		0.13 0.95	-0.22 0.29	-0.057 0.79
ABC Pearson Correlation Sig	0.013 0.95		0.061 0.77	0.015 0.945
Num. Comorbidities Pearson Correlation Sig	-0.219 0.293	0.61 0.77		0.448 **0.025
Num. Meds Pearson Correlation Sig	-0.57 0.79	0.015 0.945	0.448 **0.025	

** correlation is significant at the 0.05 level. N = 25

DISCUSSION

This inquiry aims to identify balance factors in older Latino active adults through analyzing balance responses found in the Mini Balance Evaluation Systems Test (MBT) and Activities-Specific Balance Confidence (ABC) assessments. Balance appraisal was allocated into two distinct portions: the measured portion with the MBT and the self-perceived component utilizing the ABC scale. For the most part, this study's findings display no differential balance characteristics among Latino older adults, indicating a standard balance score and lower fall risk.

Self-Perceived Balance (ABC scale)

The participants' ABC scores are within normative values for the elderly population. According to Myers and colleagues, an ABC score above 80% indicates highly functional and active older adults, which directly implies that our participants are reasonably physically active and have adequate balance confidence [11]. The lower scores for item 15 (stepping on and off an escalator without hand assistance) and item 16 (walking on ice) are coherent with the tasks' complex nature. The results for the two tasks mentioned above are contrary to items 1-14, which are considerably less challenging than items 15 and 16 for a fall to occur. Conditions 15 and 16 both require participants to maintain balance. Yet, at the same time, their sensory systems are challenged, particularly with altered proprioception while walking on ice and an altered vestibular input with a decrease in a base of support (no hand support on the railing) while on the escalator. Though these conditions were not enacted, participants could conceptualize the fall risk associated with these tasks.

The findings from this study corroborate those of another study in which item 16 was the most challenging task for older adults, as falling on a slippery surface might necessitate more medical attention compared to falling on a flat surface [17]. Furthermore, walking on ice often entails additional balance mechanisms, such as a more cautious gait pattern that involves a broad base of support and abducted arms to prevent a fall occurrence.

Measure Balance (Mini-BestTest)

The outcome of one study has indicated the capability of the Mini-BESTest (MBT) to foresee fall risks in those with Parkinson's disease, strokes, and vestibular disorders; however, limited research investigations have identified the ability of the MBT to recognize fall risks inactive older adults [18]. Considering that a score of 2 on the MBT is considered an acceptable performance, an average score of 1.5 in our participants indicates a lower possibility of falls and injuries among this older group of subjects. One limitation of our study was not grading the TUG task based on the MBT 0-2 grading scale, which hindered us from deriving a total MBT score. However, Shumway-Cook et al. proposed that a TUG dual-cognitive (counting back by threes while performing TUG) score higher than 15 seconds is indicative of fall risk with a prediction rate of 87% [19]. Thus, based upon Shumway-Cook's proposition, our participants are not particularly at risk of falling due to an average score of 14.5 seconds during the TUG dual-cognitive task (item 14); engaging in more dual-task activities with a balance component could improve TUG scores. A similar study identified that a score above or equal to 23 in the MBT indicates fall risk for people within 70 to 79 years [20]. Therefore, with the exclusion of item 14, an average MBT score of 21 and relatively good scores on the TUG in our participants alludes to our group not being at risk for falls.

It could be argued that the favorable ABC and MBT outcomes in our participants are due to their biweekly participation in Zumba and aqua aerobics at the community center, which can present as improved balance mechanisms and decreased fall risk. Prior investigations have queried whether aquatic exercises can reduce fall risk in older adults [21]. One study identified comparable results in ABC scores among higher functioning older adults for 12 months. In contrast, ABC scores among older adults residing in retirement homes declined 26 weeks [11]. Moreover, another study found that in comparison to non-fallers, fallers have slower reaction times, lower ABC scores, and lower BERG scores, which relate to the prediction of falls with 96% specificity and 89% sensitivity [22]. Accordingly, we infer that balance scores retrieved from specific balance assessments can be lower in sedentary older adults who are potential fallers or older adults who reside in environments that lack balance programs.

Comorbidities

The significant association between the number of medications and comorbidities in our outcomes is plausible given that the predominance of comorbidities necessitates the respective medications to mitigate or control the progression of these comorbidities. Though our participants have favorable scores on the balance measures, other factors aside from comorbidities and drugs could be responsible for the positive ratings. These other factors include exercise participation, social support, and perception of health. Engaging in Zumba and group water aerobics is ideal for social interaction, providing the prime environment for participants to motivate each other to advance in their fitness level. Likewise, health perception can play a pivotal role in health outcomes, based upon a study by Mossey and Shapiro. There was an increased risk of mortality in older adults with poor self-related health [23]. Though we did not administer any self-related health questionnaires in our group, our participants are aware of the health benefits related to engaging in community activities.

The type of comorbidities commonly found in our target population should be explored to understand the association between risk factors and fall risk. Reyes-Ortiz et al. (2004) reported the fall rates among older Mexican Americans to establish a baseline comparison to non-Hispanic Whites [24]. However, functional insufficiencies, arthritis, depressive indications, and diabetes were leading risk factors for falls in this Latino ethnic group [24]. Regardless, Reyes-Ortiz et al. substantiate previous research findings regarding fall risks increasing as the prevalence of risk factors increase, such as being a female increasing in older age as the age [1,6,13,24]. Comparably, most of our participants also have arthritis and hypertension, though the prevalence of pain related to arthritis did not result in any profound balance issues during the MBT.

Additionally, most of our participant's BMI would be classified as overweight, with an average of 28.3 kg/m^2, as seen in Table 1. A systematic review and meta-analysis by Neri et al. (2020)concluded that obesity could increase fall risk, though evidence regarding fall-related injuries is lacking [25]. Nevertheless, despite the interrelation between being at risk for falling and the number of comorbidities, our results indicate that engaging in physical activities and the other aforementioned positive factors can reduce fall risk despite the prevalence of comorbidities and medication use.

Comparing Fall Risk Between Ethnic Groups

Previous studies have widely explored fall characteristics in the Caucasian population, though research on this topic in the Latino population is still emerging. Rosario et al. reported on the perceived balance limitations in the Latino Hispanic population utilizing the ABC scale, in which researchers established an increased perceived balance difficulty alongside an increased risk of falls associated with postural instability in a younger Latino Hispanic group (age average of 58 years old) living with HIV [26]. Although HIV complications were responsible for the balance modifications, the ABC scale data highlighted possible balance issues among the Latino-Hispanic population [26]. Primarily, activities that required a combination of balance systems interplay, such as vestibular and proprioceptive, when getting on a moving escalator were underlined as the most challenging among the multitude of activities. The findings described above are relatively comparable to those documented in this current study involving an older Latino adult group.

To further contextualize the impact of ethnicity on the risk of

falling, it was found that older adults identifying as African American had fewer incidences of falls in comparison to non-Hispanic Whites [27]. However, with limited research being performed on the topic, the prevalence of falls in Latinos and non-Hispanic Whites is reportedly primarily parallel [27]. The current study proposes that additional research should be conducted to demarcate the incidence of falls in elderly Latinos to further aid in the prevention and reduction of associated risk factors and reduce the risk of falling.

CONCLUSION

The present work employed the ABC and MBT to recognize distinct balance characteristics in active older Latino populations. Although our participants had common risk factors for falls, such as arthritis and hypertension, our group had adequate balance scores due to participating in community fitness activities and other positive lifestyle factors. Aside from group exercise sessions, we urge community centers to offer fall prevention programs to at-risk populations.

We acknowledge that it is essential to recognize whether community programs and fall prevention programs can lessen the rate of falls and fall risks. A systematic review by Gillespie et al. established that group programs and home safety modifications can diminish falls and the risk of falling [28]. Nonetheless, multifactorial interventions (fall risk assessments followed by administering treatments to minimize fall risks) can ameliorate the frequency of falls, but not the risk of falling [28]. Gillespie et al. also deduce that exercise programs containing balance strength exercises, such as tai-chi, can effectively reduce the rate of falls and fractures [28]. Prospective studies should contemplate assembling both cross-sectional and longitudinal studies to analyze fall risk and incidents of falls inactive older Latinos who have undergone balance and fall prevention programs.

Moreover, further inquiries should address the participants' viewpoints regarding falls. Hanlin's comparable study discerned that language and education barriers seemed to hinder elderly Latino adults from understanding the importance of fall prevention programs to an alarming point. It was reported that a significant number of participants perceived that falls are unpreventable accidents [6].

Clinicians should discuss the common risk factors for falls with their patients and describe the benefits of participating in fall prevention programs. Additionally, explaining the rationale behind notifying their primary care providers about ways to reduce falls through shifting or eliminating medications, when appropriate, would be beneficial. In a study on physicians' perceptions regarding fall prevention in older adults, physicians acknowledged that there is limited time to mention fall prevention programs during check-ups. Physicians who do not accept Medicare are less likely to refer patients to home safety modifications [29]. Therefore, physical therapists and other applicable health providers should emphasize the importance of balance prevention programs to their physicians. Additional studies should investigate other community centers delivering activities other than Zumba and water aerobics to discern if and how these activities reduce the risk of falling among older Latino adults. Adding a balance tool or measurement system in senior community centers can also help comprehend the activities' impact on balance and how different activities can enhance the quality of life of seniors in their communities.

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