An Evidence-Based Program to Reduce Fall-Related Risk Among Older Adults: A Comparison of Program Efficacy by Ethnicity

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Abstract

Despite rapid growth among the Hispanic population in the United States, seniors within this ethnic group are typically underrepresented in evidence-based programs. The purpose of this study is to examine the relative efficacy of A Matter of Balance/Volunteer Lay Leader Model (AMOB/VLL), an eight session fall risk prevention program, for non-Hispanic White and English-speaking Hispanic participants on key study outcomes. Data were collected from 1,233 seniors enrolled in AMOB/VLL in Texas. Compared to non-Hispanic White participants, a significantly larger proportion of Hispanic participants were younger ($\chi2=50.23$, df=3, $p<0.001$), had less than a high school education ($\chi2=200.31$, df=2, $p<0.001$), and resided in less affluent areas. From baseline to post-intervention, significant improvements in falls efficacy (t=-9.13, df=167, $p<0.001$), days limited from usual activity (t=1.99, df=164, p=0.049), and unhealthy mental days (t=2.51, p=0.013) were seen among Hispanic participants. Significant improvements among non-Hispanic White participants were observed for falls efficacy (t=-15.90, df=868, $p<0.001$). Although significant improvements were found for each ethnic group, the magnitude of improvement among Hispanic participants exceeded that of non-Hispanic Whites in some aspects. Identifying participant characteristics and positive outcomes specific to Hispanics can inform strategies to maximize program reach and effectiveness among this vulnerable and underserved population.

Keywords: Aging; Ethnicity; Hispanic; Evidence-based programs; Fall risk prevention

Introduction

In recent years, health promotion efforts have encompassed objectives to reduce racial and ethnic health disparities in the United States (U.S. Department of Health and Human Services, 2010). Disparities in health access, quality of care and a myriad of health outcomes persist despite increased attention to these issues (Agency for Healthcare Research and Quality, 2007). Thus, ethnic diversity is an important factor to be considered in the planning and implementation of public health research and interventions. This is especially important given the rising number of minorities in the United States, and projections of traditional "minority" populations to become "majority" populations within forthcoming decades, even among older adults (U. S. Census Bureau, 2008). Systematic efforts to narrow gaps in prevention and health care quality and access for disadvantaged racial and ethnic minorities are essential to address these public health challenges.

The Hispanic population in the United States

The Hispanic population is the largest and fastest growing minority group in America, and over half of the total U. S. population growth in the past decade was attributed to increases among this subgroup (Humes, Jones, &

Ramirez, 2010). Currently, there are an estimated 50.5 million Hispanic individuals comprising 16.3% of the American population and 37.6% of residents in the state of Texas (U. S. Census Bureau, 2010). The Hispanic population is expected to increase to more than 127 million (29% of the population) in the U.S. by the year 2050 (Passel & Cohn, 2008). Similarly, the older Hispanic population is projected to grow at a much faster rate relative to non-Hispanic whites, which may have significant implications for aging-related policies and services (Cummings, Hernandez, Rockeymoore, Shepard, & Sager, 2011). Influences of this changing demographic will be especially true in Texas, a state which holds the top ten counties in America with the highest majority of Hispanic residents (U. S. Department of Commerce, 2008). Health disparities between Hispanic and non-Hispanic White (NHW) populations are well documented. The National Health Care Disparities Report from 2008 stated "these disparities are due to differences in access to care, provider biases, poor provider-patient communication, poor health literacy, and other factors" (Agency for Healthcare Research and Quality, 2007).

The magnitude of falls among older adults

Despite recognition of ethnic disparities, ethnicity and related factors are often not considered when implementing fall risk prevention programs for older adults. Falls among older adults are a major concern due to the serious threat of injury and death. An estimated one out of three older adults fall each year (Centers for Disease Control and Prevention [CDC], 2008). Falls among seniors increase with age and are the leading cause of injury deaths and nonfatal injuries for adults ages 65 years and older (Centers for Disease Control and Prevention, 2006a, 2006b; Nachreiner, 2007). Injurious falls can lead to hospitalization, nursing home placement, restricted physical activity, a decline in functioning, and reduced levels of quality of life (Avdic, 2004; Bialoszewski, 2008; Horton, 2007; Nachreiner, 2007). Falls are also associated with various morbidities, limited mobility, and decreased ability to perform daily activities and function independently (CDC, 2008; Stevens & Sogolow, 2005). Known risk factors for falls include being older, female, of lower socioeconomic status, having chronic illness, taking mood stabilizers, living alone, and dementia (Avdic, 2004; Horton, 2007; Iinattiniemi, 2009; Weeks, 2007).

Fear of falling as a risk for falls

Despite a multitude of well-documented clinical, behavioral, and environmental risk factors (Stevens, 2005), the fear of falling may in fact be among the most influential risks for falling (Tennstedt, 1998; Tinetti, Mendes de Leon, Douchette, & Baker, 1994; Tinetti, Richman, & Powell, 1990; Vellas, Wayne, Romero, Baumgartner, & Garry, 1997). As a risk factor for falls, the fear of falling has been recognized in studies among older adults who have fallen and those who have never experienced a fall (Maki, Holliday, & Topper, 1991; Silverton & Tideiksaar, 1989). Although seemingly intuitive that a fear of falling would prevent falls by making individuals more cautious and aware of their surroundings, studies indicate being fearful of falls actually increases the risk that an older adult will experience a fall (Tennstedt, 1998; Tinetti, Richman, & Powell, 1990). The rationale behind this relationship is that individuals who are afraid of falling will intentionally avoid activities in which they perceive a fall is likely to occur (Murphy & Tickle-Degnen, 2001). Restricting engagement in daily activities and physical activity as exercise, may lead to postural changes and muscular atrophy (Maki, Holliday, & Topper, 1991), which may, in turn, negatively influence a person's strength and balance and result in a fall (Vellas et al., 1997). Thus, targeting seniors who reported fear of falling and associated activity restriction for community-based interventions to reduce fear of falling may increase levels of intended activities, mobility, and social functioning (Tennstedt, 1998).

Risks of falls and related sequelae can be reduced with added attention to evidence-based fall risk prevention strategies that are sensitive to socio-cultural differences in the underlying causes/circumstances related to falls. However, little research has been done to determine the extent to which evidence-based programs aiming

to prevent fall-related risk among elders are also effective when disseminated into multi-ethnic settings.

This study aimed to evaluate the contributions of ethnic variation in the efficacy of the Texas roll-out of A Matter of Balance/Volunteer Lay Leader model (AMOB/VLL), an evidence-based program intended to reduce the fear of falling and fall-related risk factors among community-dwelling older adults. The purposes of this study are to: (1) identify characteristics of participants who enrolled in the Texas AMOB/VLL; (2) assess changes in health indicators from baseline to post-intervention; and (3) compare the program's efficacy for non-Hispanic White versus Hispanic participants.

Methods

Study Design: A Matter of Balance/Volunteer Lay Leader Model

The original Matter of Balance is an evidence-based fall risk prevention program based on social cognitive learning principles, which includes exercises designed by a physical therapist (Tennstedt, 1998). This group-based program was designed to reduce the fear of falling and improve other fall-related indicators. First documented in a randomized trial delivered by healthcare professionals, the intervention showed positive outcomes including increased activity levels and reduced levels of falling-related fear (Tinetti, Richman, & Powell, 1990). AMOB/VLL was developed as a translational effort to replicate the intervention on a grand-scale; its contents are delivered by trained lay leaders rather than health professionals (Healy, 2008). Instead of targeting clinical outcomes like falls, AMOB/VLL focuses on modifying factors associated with falls including behaviors, attitudes, and environmental aspects that increase fall-related risk among older adults (Partnership for Healthy Aging, 2009).

The AMOB/VLL was a community-based intervention designed to be delivered through the aging services network. The program consisted of eight, two-hour sessions that could be conducted either once a week for eight weeks or twice a week for four weeks. Program duration was selected at the discretion of the delivery site, although the majority of sites implemented the program over an eight-week period (97%). By design, AMOB/VLL session order and content remained consistent between the eight-week and four-week program implementation. The overall program objective is to reduce fall-related disability by increasing physical activity and improving participants' confidence to prevent and/or manage falls. The goal of AMOB/VLL is to instill adaptive beliefs such as greater perceived control, greater confidence in one's abilities, and a more realistic assessment of failures. Early sessions focus on diminishing the fear of falling and encouraging participants to adopt the mindset that falls are preventable. Later program sessions assist participants to change their environments to reduce fall-related risk factors and learn exercises to increase strength and balance (Area Agency on Aging of the Capital Area, 2009; Graafmans et al., 1996; Stevens & Dellinger, 2002).

The curriculum includes lectures, group discussions, mutual problem solving, role-play activities, exercise training, assertiveness training, and home assignments. Intervention processes are designed to change behavior with a focus on building fall self-efficacy and setting realistic goals for increasing activity (Partnership for Healthy Aging, 2009). The curriculum addresses individual and environmental needs of participants (e.g., participants are taught goal setting and problem solving and given suggestions for environmental modifications to improve safety in home-settings). In this study, the program was delivered in English; however, it is also available in Spanish. More information about AMOB/VLL (and the Spanish version) can be found online at http://www.mmc.org/mh_body.cfm?id=432.

Sample

The AMOB/VLL program was disseminated in Texas through local Area Agencies on Aging (AAA) and other community-based organizations to reach low-income, English-speaking seniors from diverse ethnic backgrounds. Data collected by lay leaders at

local AAAs throughout Texas from 3,092 participants attended the program between September 2006 and October 2009. Participants were recruited through AAA and other community-based organizations (e.g., senior centers, faith-based organizations, residential facilities) from 19 of 28 AAA regions across Texas. Participation in this study was voluntary. Given the goal of reducing barriers for reaching a large number of seniors, authorization of medical clearance was not required. Rather, participants were provided safety tips for exercise and encouraged to review the Exercise and Screening for You (EASY) Tool (http://www.easyforyou.info), which contains information about symptoms and circumstances necessitating contact with a healthcare provider (Smith, Ory, Ahn, Bazzarre, & Resnick, 2011). Participants signed consent forms and could withdraw from the study at any time. Identifying information was kept confidential with results only being reported at the aggregate level. Institutional Review Board approval was obtained at Texas A&M University. This study analyzed data collected from a subsample of 1,233 older participants who completed baseline and post-intervention questionnaires. When comparing demographic characteristics of those who completed the baseline assessment to those who completed assessments at both time points, participant completing both assessments had significantly fewer chronic conditions. No significant variation based on ethnicity was observed. The rate of successful completion (i.e., those attending five or more of the eight program sessions) among participants who completed baseline and post-intervention questionnaires was 95.5%. More detailed information about the Texas dissemination of AMOB/VLL and associated content can be found elsewhere (Partnership for Healthy Aging, 2009; Ory, Smith, Wade, Mounce, Wilson, & Parish, 2010; Ory, Smith, Wade, Wright, & Parish, 2010).

Data Collection

Participants were surveyed using similar instruments at baseline (i.e., at the beginning of the first session) and post-intervention (i.e., at the conclusion of the eighth session). The instruments differed in that the baseline instrument included six demographic measures required by the National Council on Aging (NCOA), which were omitted in the post-intervention instrument. The questionnaire took participants approximately 15 minutes to complete. The questionnaire was developed by public health and aging experts affiliated with the Administration on Aging Evidence-based Prevention Program (National Council on Aging, 2009). Items were selected from existing measures; however, the instrument was not tested for reliability or validity prior to this study.

Measures

This study included two types of variables: demographic characteristics of the participants measured at baseline; and variables hypothesized to be influenced by the intervention (i.e., intervention variables measured at baseline and post-intervention). Demographic characteristics of participants utilized in this study were age (i.e., treated as a continuous variable based on the participant's birth date), sex (i.e., scored 0 if male, and 1 if female), ethnicity (i.e., scored 0 if the participant is non-Hispanic White (NHW), and 1 if Hispanic), education (i.e., scored 1 if the highest level of education received by the participant was less than high school, 2 if graduated high school, and 3 if more than a high school education), number of chronic conditions (i.e., based on the number of self-reported chronic conditions), percent of the population residing the participant's ZIP code area over age 65 years (i.e., geocoded based on the participant's residential ZIP code, scored as a ratio to the overall population in that ZIP code), and median household income of the population residing in the participant's ZIP code area (i.e., geocoded based on the participant's residential ZIP code).

The baseline and post-intervention variables utilized in this study were the Falls Efficacy Scale score (α=0.878; i.e., composite score of five 4-point Likert-type scale items, ranging from 5 to 20, individual items scored 1 for "not sure at all," and 4 if "absolutely sure" that the respondent could prevent or manage falls) (Powell & Myers, 1995; Tinetti, Richman, & Powell, 1990), number of days limited from

usual activities (i.e., continuous score based on the number of reported days limited from their usual activities in the previous 30 days) (Centers for Disease Control [CDC], 2000), and the number of mental days not good (i.e., ranging from 0 to 30 based on the number of self-reported days the participant had bad mental health in the previous 30 days) (CDC, 2000).

Statistical Tests Used

All statistical analyses were performed using Stata SE version 11.2 (College Station, 2009). Frequencies and percentages were calculated for participant personal characteristics and intervention variables of interest. Study variables were compared by participants' self-reported ethnicity (i.e., between NHW and Hispanic participants) using Pearson's chi-square tests for categorical variables and independent sample t-tests for continuous variables. To assess the efficacy of the intervention, average variable scores were compared from baseline and post-intervention using a series of paired sample t-tests. For each dependent variable, comparisons were made independently for NHW participants, Hispanic participants, and all participants combined.

Baseline and post-intervention score differences were analyzed utilizing three linear random intercept models with covariates using the Stata procedure, xtmixed, with random intercepts at two levels: class level and participant level. Random effects models use a feasible estimator that considers the intraclass correlations among measures collected from participants in the same class and measures of the same participant at different time intervals (Wooldridge, 2003) while allowing for interaction between baseline and post-intervention score differences and variables of interest. Using this statistical procedure allows for different intercepts among classes and individuals, but constrains the slopes to be the same across units. The slopes were estimated as fixed effects because the estimates of the variances for random slopes for all three outcome variables were very small (<0.0001). Random intercept models consider that reported outcome variables (e.g., Falls Efficacy Scores) for a study participant, (i), vary at different time points (j), which differs by individuals in the current study (Rabe-Hesketh & Skrondal, 2008; Stata Press, 2009). All the variances of random intercepts at both class and participant levels (except the class level for bad mental health days) were significantly different from 0, justifying our use of mixed random effects models.

In these regression models, two additional variables were included. The Baseline to Post variable examines the efficacy of the intervention from baseline to post-intervention for all participants. The Ethnicity x Time Interaction variable compares the rate of change in scores (i.e., interaction or change in slope) from baseline to post-intervention between NHW and Hispanic participants. This variable was specifically calculated by the investigators to identify differences in program efficacy from baseline to post-intervention by ethnicity.

Results

Sample

Personal characteristics of study participants are presented in Table 1. The study population included 1,233 older adults. Of these participants, 1,027 self-identified as NHW (83.3%) and 206 self-identified as Hispanic (16.7%). The majority of NHW participants were age 75 years or older (70.4%), female (80.6%), had more than a high school education (66.1%), and had two or more chronic conditions (54.3%). The majority of Hispanic participants were between the ages of 65 and 75 years (74.2%), female (83.8%), had a high school education or less (66.2%), and had two or more chronic conditions (58.9%). A

Table 1

Personal Characteristics and Intervention Variables

	Non-Hispanic White (n = 1,027)	Hispanic (n = 206)	Total (n = 1,233)	X2 or t	p
Age				50.23	< 0.001
Under 65 years	64 (6.8%)	31 (17.0%)	95 (8.4%)		
65 - 74 years	216 (22.8%)	69 (37.9%)	285 (25.2%)		
75 - 84 years	472 (49.8%)	66 (36.3%)	538 (47.7%)		
85+ years	195 (20.6%)	16 (8.8%)	211 (18.7%)		
Sex				1.16	0.281
Male	191 (19.5%)	32 (16.2%)	223 (18.9%)		
Female	791 (80.6%)	166 (83.8%)	957 (81.1%)		
Education				200.31	< 0.001
Less Than High School	77 (7.6%)	91 (44.6%)	168 (13.8%)		
High School Graduate	268 (26.3%)	44 (21.6%)	312 (25.5%)		
More Than High School	673 (66.1%)	69 (33.8%)	742 (60.7%)		
Residential Rurality				23.46	< 0.001
Urban	891 (93.4%)	152 (82.6%)	1043 (91.7%)		
Rural	63 (6.6%)	32 (17.4%)	95 (8.4%)		
Number Chronic Conditions				3.49	0.322
0	104 (10.9%)	18 (10.0%)	122 (10.8%)		
1	332 (34.8%)	56 (31.1%)	388 (34.2%)		
2	284 (29.8%)	50 (27.8%)	334 (29.5%)		
3+	234 (24.5%)	56 (31.1%)	290 (25.6%)		
Household Income				105.50	< 0.001
Less than $15,000	186 (23.1%)	106 (61.3%)	292 (29.8%)		
$15,000 - 24,999	219 (27.1%)	31 (17.9%)	250 (25.5%)		
$25,000 - 49,999	225 (27.9%)	25 (14.5%)	250 (25.5%)		
$50,000 - 75,000	104 (12.9%)	11 (6.4%)	115 (11.7%)		
More than $75,000	73 (9.1%)	0 (0.0%)	73 (7.5%)		
Percent Population Over 65 Years				47.95	< 0.001
1% to 9%	342 (36.2%)	25 (13.7%)	367 (32.5%)		
10% to 19%	532 (56.3%)	153 (83.6%)	685 (60.7%)		
20% or More	71 (7.5%)	5 (2.7%)	76 (6.7%)		
Median Income of Area Population	$47,616.25 (±19769.89)	$33,828.58 (±12327.68)	$45,381.40 (±19437.12)	9.10	< 0.001
Falls Efficacy Scale					
Baseline Average	14.45 (±3.59)	13.18 (±4.19)	14.25 (±2.88)	3.95	0.001
Post-Intervention Average	16.35 (±2.77)	16.20 (±3.38)	16.33 (±2.88)	0.94	0.345
Days Limited From Usual Activity					
Baseline Average	2.17 (±5.87)	3.21 (±6.46)	2.34 (±5.97)	-3.00	0.003
Post-Intervention Average	1.95 (±5.43)	2.02 (±5.38)	1.96 (±5.42)	-0.68	0.498
Unhealthy Mental Days					
Baseline Average	2.78 (±2.35)	3.38 (±7.13)	2.87 (±2.47)	-1.68	0.094
Post-Intervention Average	2.55 (±6.22)	2.09 (±5.28)	2.50 (±2.11)	-0.05	0.962

*Means and standard deviations reported for continuous variables

larger proportion of Hispanic participants in this sample were younger ($\chi 2$ =50.23, df = 3, $p < 0.001$), less educated (X2 = 200.31, df = 2, $p < 0.001$), resided in areas considered to be rural ($\chi 2$ = 23.46, df =1, $p < 0.001$) and less affluent ($\chi 2$ = 105.50, df = 4, $p < 0.001$). Changes in Intervention-Related Health Indicators

Changes in intervention variable values from baseline to post-intervention were evaluated to determine the efficacy of AMOB/VLL in different sub-populations. Paired sample t-tests were used to measure mean differences in baseline and post-intervention observations for NHW participants, Hispanic participants, and all participants combined. Table 2 provides detailed information pertaining to the paired t-tests for self-reported falls efficacy, days limited from usual activity, and days mental health not good in the previous 30 days. Among NHW participants, results showed the average scores for self-reported falls efficacy increased significantly from baseline to post-intervention (t = -15.90, df = 868, $p < 0.001$). Among Hispanic participants, average scores for self-reported falls efficacy increased significantly from baseline to post-intervention (t = -9.13, $p < 0.001$). Average scores for self-reported days limited from usual activity (t = 1.99, df = 164, p = 0.049) and days of bad mental health in the previous 30 days (t = 2.51, df = 163, p = 0.013) significantly decreased from baseline to post-intervention. Among all participants combined, results showed average scores for self-reported falls efficacy increased significantly from baseline to post-intervention (t = -18.22, df = 1036, $p < 0.001$).

Table 2

Paired Sample T-Tests

	Baseline	Post-Intervention	t	p
Falls Efficacy Scale				
Non-Hispanic White	14.45 (±3.59)	16.35 (±2.77)	-15.90	< 0.001
Hispanic	13.18 (±4.19)	16.20 (±3.38)	-9.13	< 0.001
Total	14.25 (±2.88)	16.33 (±2.88)	-18.22	< 0.001
Days Limited from Usual Activity				
Non-Hispanic White	2.17 (±5.87)	1.95 (±5.43)	1.02	0.347
Hispanic	3.21 (±6.46)	2.02 (±5.38)	1.99	0.049
Total	2.34 (±5.97)	1.96 (±5.42)	1.80	0.072
Unhealthy Mental Days				
Non-Hispanic White	2.78 (±2.35)	2.55 (±6.22)	0.94	0.347
Hispanic	3.38 (±7.13)	2.09 (±5.28)	2.51	0.013
Total	2.87 (±2.47)	2.50 (±2.117)	1.79	0.074

Linear Random Intercept Regression Models

To determine the impact of AMOB/VLL on changes in falls efficacy, the number of days limited from usual activities, and the number of mental days not good (i.e., treated as dependent variables), three independent linear random intercept regression models were performed using participants' personal characteristics as covariates. Beta coefficients for personal characteristics indicate differences in dependent variable scores at baseline based on participant personal characteristics. Beta coefficients for the interaction terms estimate differences in change rates of the dependent variables scores for participants with different characteristics. Tables 3, 4, and 5 provide details pertaining to these analyses based on the aforementioned dependent variables.

When examining the overall change from baseline to post-intervention, participants reported an average improvement of 2.02 points on the falls efficacy score ($z = 15.34$, $p < 0.001$).

Table 3

Improvements in Falls Self Efficacy Scores from Baseline to Post-Intervention
(# of classes=160; # of participants = 912)

	β	S. E.	z	p>|z|	95% CI	
Ethnicity	-1.57	0.33	-4.80	<0.001	-2.21	-0.93
Time	2.02	0.13	15.34	<0.001	1.77	2.28
Ethnicity x Time Interaction	0.99	0.34	2.88	0.004	0.32	1.67
Age	-0.08	0.01	-7.61	<0.001	-0.10	-0.06
Sex	-0.60	0.21	-2.81	0.005	-1.01	-0.18
Less Than High School Education						
Graduated High School	-0.43	0.31	-1.39	0.165	-1.03	0.18
More Than High School Education	0.15	0.29	0.53	0.596	-0.41	0.72
Rurality	-0.94	0.34	-2.78	0.005	-1.61	-0.28
No Chronic Conditions						
1 Chronic Condition	-1.06	0.32	-3.28	0.001	-1.69	-0.42
2 Chronic Conditions	-1.17	0.33	-3.57	<0.001	-1.81	-0.53
3+ Chronic Conditions	-1.73	0.33	-5.22	<0.001	-2.38	-1.08
Population Median Income	0.00	0.00	-1.02	0.308	0.00	0.00
% Population Over 65 Years	-0.03	0.02	-1.20	0.229	-0.07	0.02
Constant	23.05	1.03	22.42	<0.001	21.03	25.06
Random effects parameters	Estimate		S. E.		95% CI	
σ_1 (class level)	0.40		0.18		0.16	0.98
σ_2 (participant level)	1.62		0.11		1.43	1.85
σ_e (residual)	2.49		0.06		2.37	2.62
Intraclass Correlation						
ρ_1 (class level)	0.02					
ρ_2 (participant level)	0.31					

Personal characteristics were examined to determine AMOB/VLL influences on participants' reported falls efficacy at baseline, holding all else constant. Subgroup differences were observed. Those who were Hispanic ($\beta = -1.57$, $z = -4.80$, $p < 0.001$), older ($\beta = -0.08$, $z = -7.61$, $p < 0.001$), female ($\beta = -0.60$, $z = -2.81$, $p = 0.005$), and reported more chronic conditions reported significantly smaller falls efficacy scores at baseline. However, the rate of falls efficacy score change from baseline to post-intervention for Hispanic participants was 0.99 points ($z = 2.88$, $p = 0.004$) higher, which indicates a significant increase in falls efficacy from baseline at a rate greater than their NHW counterparts.

Personal characteristics were examined to determine AMOB/VLL influences on participants' days limited from usual activities in the previous 30 days at baseline, holding all else constant. Compared to those with no chronic conditions, participants with three or more chronic conditions reported more days limited

from usual activities (β = 1.57, z = 2.34, p = 0.019) at baseline. No other statistically significant relationships were identified in this model.

Personal characteristics were examined to determine AMOB/VLL influences on the participants' number of reported bad mental health days in the previous 30 days at baseline,holding all else constant. Participants who were older (β = -0.07, z = -3.10, p = 0.002) and those with a high school education (β = -1.55, z = -2.26, p = 0.024) reported significantly smaller number of reported bad mental health days at baseline.

Discussion

Summary of Findings

Findings from this study indicate AMOB/VLL provides partial support for AMOB/VLL as an efficacious evidence-based program to reduce fall-related risk among NHW and extends findings to Hispanic older adults in Texas. From baseline to post-intervention, Hispanic participants who enrolled in the intervention reported increases in falls efficacy and reductions in days limited from usual activities and days of bad mental health.

Table 4

Improvements in Days Limited from Usual Activity from Baseline to Post-Intervention
(# of classes=160; # of participants = 912)

	β	S. E.	z	p>|z|	95% CI	
Ethnicity	0.98	0.67	1.47	0.142	-0.33	2.28
Time	-0.13	0.26	-0.48	0.632	-0.64	0.39
Ethnicity x Time Interaction	-1.05	0.69	-1.53	0.126	-2.40	0.30
Age	-0.01	0.02	-0.42	0.677	-0.05	0.03
Sex	-0.25	0.43	-0.58	0.563	-1.10	0.60
Less Than High School Education						
Graduated High School	-0.43	0.63	-0.69	0.492	-1.67	0.80
More Than High School Education	-0.70	0.59	-1.18	0.239	-1.85	0.46
Rurality	0.75	0.71	1.06	0.289	-0.64	2.13
No Chronic Conditions						
1 Chronic Condition	0.26	0.65	0.40	0.688	-1.02	1.54
2 Chronic Conditions	0.37	0.66	0.56	0.576	-0.93	1.67
3+ Chronic Conditions	1.57	0.67	2.34	0.019	0.25	2.88
Population Median Income	0.00	0.00	-0.52	0.604	0.00	0.00
% Population Over 65 Years	0.02	0.04	0.34	0.731	-0.07	0.10
Constant	3.33	2.10	1.59	0.113	-0.79	7.46
Random effects parameters	Estimate		S. E.		95% CI	
σ_1 (class level)	0.93		0.33		0.47	1.85
σ_2 (participant level)	3.40		0.22		3.00	3.86
σ_e (residual)	4.97		0.13		4.73	5.23
Intraclass Correlation						
ρ_1 (class level)	0.02					
ρ_2 (participant level)	0.33					

Table 5

Improvements in Unhealthy Mental Days from Baseline to Post-Intervention
(# of classes=160; # of participants = 912)

	β	S. E.	z	p>|z|	95% CI	
Ethnicity	0.36	0.70	0.51	0.608	-1.02	1.74
Time	-0.01	0.27	-0.05	0.958	-0.53	0.51
Ethnicity x Time Interaction	-1.12	0.70	-1.61	0.108	-2.49	0.24
Age	-0.07	0.02	-3.10	0.002	-0.12	-0.03
Sex	0.45	0.47	0.95	0.344	-0.48	1.38
Less Than High School Education						
Graduated High School	-1.55	0.69	-2.26	0.024	-2.89	-0.21
More Than High School Education	-1.17	0.64	-1.83	0.067	-2.42	0.08
Rurality	-0.78	0.71	-1.10	0.269	-2.16	0.60
No Chronic Conditions						
1 Chronic Condition	-0.19	0.71	-0.26	0.793	-1.58	1.20
2 Chronic Conditions	0.25	0.72	0.35	0.723	-1.15	1.66
3+ Chronic Conditions	1.21	0.73	1.67	0.095	-0.21	2.64
Population Median Income	0.00	0.00	0.68	0.496	0.00	0.00
% Population Over 65 Years	0.03	0.05	0.66	0.510	-0.06	0.12
Constant	8.36	2.26	3.71	<0.001	3.94	12.79
Random effects parameters	Estimate		S. E.		95% CI	
σ_1 (class level)	0.00		0.00		0.00	0.00
σ_2 (participant level)	4.10		0.20		3.73	4.52
σ_e (residual)	5.02		0.13		4.77	5.27
Intraclass Correlation						
ρ_1 (class level)	0.00					
ρ_2 (participant level)	0.40					

Results from this study also point to an important methodological principle when assessing the impact of efforts to reduce fall-related risk among multi-ethnic older participants. In addition to investigating absolute rates of change, it is instructive to begin with an examination of participant characteristics at baseline. Initiating the process by focusing on baseline health status provides valuable information pertaining to the characteristics of participants being recruited into the program. Utilizing geocoded data to geographically classify participants' neighborhood-based characteristics provides insight about communities adopting the program and service gaps requiring additional tailored recruitment efforts. Additionally, when baseline levels of health indicators are compared to the same health indicators post-intervention, investigators are better able to assess relative health-related program successes for different participant subgroups.

Despite Hispanic participants in this study entering the intervention with significantly less education and annual household incomes when compared to their NHW counterparts, the

majority of Hispanic participants had fewer chronic conditions and enrolled in the program on average 4 years younger than NHW participants. At baseline, Hispanic participants, on average, had lower falls efficacy, more days limited from usual activities, and more days of bad mental health than NHW; however, following the intervention Hispanics reported scores of relatively equal values as their NHW counterparts. In fact, paired t-test analyses revealed Hispanic participants benefited significantly in all three of the examined health indicators (i.e., increased falls efficacy and reductions in days limited from usual activity and bad mental health days) while NHWs significantly benefited in only one outcome (e.g., falls efficacy). Additionally, regression analyses revealed the rate of change in Hispanic participants from baseline to post-intervention was significantly better for falls efficacy relative to NHW participants. Findings show that despite being more educated and wealthier, NHW participants, although benefiting from AMOB/VLL, often did not benefit as greatly as their Hispanic counterparts in this area. A possible explanation of this significant difference may be that Hispanic participants were in better health than non-Hispanic white enrollees (i.e., the majority of older Hispanics were still relatively younger and reported suffering from fewer chronic condition). Conversely, the absence of significant improvements among NHW participants may indicate a "ceiling effect" whereas their health indicator scores were better than their Hispanic counterparts upon enrollment of the program and therefore could not improve significantly higher.

Previous studies show that physical and mental health status are predictors of self-efficacy (Resnick et al., 2007). Although the current study did not document the falls history of participants, other researchers reported NHW seniors fall more than Hispanic seniors (Stevens & Dellinger, 2002) and may be subject to more related negative sequelae (Smith et al., 2009). Research and interventions addressing health disparities based on ethnicity typically target younger populations, with few exceptions (Bryant, Shetterly, Baxter, & Hamman, 2002; Mallonee, 2003; Reyes-Ortiz, Al Snih, Loera, Ray, & Markides, 2004). Thus, results of this study are encouraging because they allude to the efficacy of an evidence-based fall risk prevention program for older individuals from Hispanic backgrounds. AMOB/VLL shows great promise to reach and benefit elders with potentially poorer health care quality and accessibility. Hispanic participants differed from NHW participants in regard to education and income (i.e., often associated with limited access to health care), yet reported significant benefits resulting from the intervention.

Limitations

There were limitations associated with this study. Data collected from participants at baseline and post-intervention were self-reported. Some measures required the participant to recall occurrences within the previous week or month, which may have introduced recall bias. The results of this study should be viewed as more suggestive than definitive, although findings of benefits for the Hispanic subgroup is worthy of further pursuit. Health indicator scores for days limited from usual activity and bad mental health days may have been zero-inflated at baseline and post-intervention (e.g., participants may have entered and exited the program with no bad mental health days), which may have limited our ability to detect significant changes over the study period. The current study investigated outcomes from one intervention administered in one state; however, the included sample contained a large number of participants from a large geographically and demographically diverse state. Participation in the intervention was voluntary and therefore the study may have been subjected to self-selection bias. No comparison groups were utilized; however, this intervention has been researched previously and used successfully as an evidence-based program for seniors (Healy, 2008). Assessing the fidelity of the delivery of this intervention statewide was beyond the scope of this study; however, the study outcomes attest to the robustness of the

intervention's impact in community settings.

Implications for Research

Findings from this study have substantial implications for future research in public health, health disparities, and aging. First, data collection efforts should target a fuller range of Hispanic participants (and other racial minority participants) in an attempt to further investigate the effectiveness of evidence-based programs such as AMOB/VLL and identify the characteristics of participants who benefit most from the intervention. Considering there has been no study investigating the efficacy of AMOB/VLL solely among Hispanic participants, the authors recommend complementing the current findings by going beyond an initial comparison of the effectiveness of AMOB/VLL among NHW and Hispanic participants. Future research should include an examination of resulting health indicators both within ethnic groups (e.g. examining intervention outcomes between Hispanic participants of Mexican descent versus Puerto Ricans or other Hispanic subgroups; first versus second generation residents in the United States) and between other ethnic groups (e.g., African American participants). Additional comparisons within seemingly homogeneous groups and between obviously heterogeneous groups may provide a more nuanced examination of the influences of ethnicity, acculturation, perceived discrimination, familial interaction, social networks, and other factors on intervention outcomes. The authors recommend investigating variations in AMOB/VLL effectiveness based on 'matching' or 'racial/ethnic concordance' between program trainers and participants in future studies. Finally, the authors recommend the confirmation of currently used self-reported measures with clinical measures (e.g., timed get-up-and-go, stand-to-sits) to validate findings of this study.

Implications for Practitioners and Policy Makers

Implications of this study have substantial practical application and go beyond this specific evaluation effort. In an effort to broaden the appeal of this evidence-based program to reduce fall-related risk and tailor it to be more culturally appropriate, AMOB/VLL is now offered in Spanish. Spanish-led courses have yet to be widely disseminated in Texas; however, the capacity of Texas to deliver evidence-based programs for seniors to reach ethnically diverse participants (i.e., residents at the United States/Mexico border and in locations with higher density of Hispanics and more Spanish-speakers) is well-established and growing. Delivering AMOB/VLL in Spanish may yield more positive health outcomes for Hispanic participants. After English, Spanish is the language most often spoken among seniors in the United States, and four out of 10 elders speak it at home (He, Sengupta, Velkoff, & DeBarros, 2005). Also, delivering programs in Spanish may reveal more successful recruitment strategies accounting for differences in cultural and familial values and beliefs (Baker, Gottschalk, & Bianco, 2007; Mier, Ory, & Medina, 2009). Investigating differences in AMOB/VLL effectiveness for promoting health outcomes, preventing falls, and increasing enrollment for Spanish-speaking participants may lend valuable insight into other tailoring efforts to boost participation and benefit of evidence-based programs for the increasingly diverse population of seniors (Mier, et al., 2009).

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