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A Concordance of Self-reported and Performance-based Assessments of Mobility as a Mortality Predictor for Older Mexican Americans

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Abstract

AIM—To assess the efficacy in mortality prediction of a concordance of performance-based (timed 10-foot walk {POMA}) and self-rated (reported ability to walk across a small room with no help from people or devices {ADL}) assessments of mobility for Mexican Americans aged 75 and over.

Methods—Longitudinal study of 2069 subjects aged 75 years and older from the Hispanic Established Population for the Epidemiological Study of the Elderly (EPESE) Wave 5 (2004–06 ~ 2006–01) and Wave 6 (2007–02 ~ 2008–02). Sociodemographic variables, performance-based (timed 10-foot walk) and self-rated assessments (reported ability to walk across a small room without any people or device's help) of mobility, and mortality data were obtained.

Results—The ADL/POMA concordance assessment revealed a prevalence of the “positively concordant” group (completed the walk and reported being able to walk, ADL and POMA both positive), followed by the “pessimist,” “optimist,” and “negatively concordant” groups at 80.09%, 10.50%, 3.78%, and 5.63% respectively. Logistic regression analyses showed that “negatively concordant” was a critical mortality predictor (OR=4.80; 95% CI =2.59 – 8.90) followed by

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Disclosure statement

All of the authors declare no financial or other potential conflict of interest.

“pessimist” (OR=1.94; 95% CI=1.12 – 3.36) as compared to the reference group, “positively concordant.”

Conclusion—The ADL/POMA concordance is an effective predictor of mortality for older Mexican Americans in the Hispanic EPESE.

Keywords

POMA (Performance-Oriented Mobility Assessment); ADL (Activities of Daily Living); performance-based assessments; self-rated assessments; mortality; older Mexican Americans

INTRODUCTION

How best to measure physical impairments could prove a primary issue in gerontology given that older adults tend to judge their well-being in terms of their independence. Measurements of physical disability include performance-based and self-reported assessments, both of which supply valid results, despite their contrasting methods, according to previous researchers.¹⁻⁴ Further, these two types of measurement have yielded results that help predict cognitive impairment, depression, and self-efficacy.⁵ In general, performance-based (Performance-Oriented Mobility Assessment, POMA) and self-reported assessments (Activities of Daily Living, ADL) of mobility are strong predictors of health related events, especially disability and mortality.⁶

Performance-based assessments of physical impairments provide a direct standard of the physical capability of respondents, with trained personnel directly observing and measuring walking, transferring, and other basic daily life activities using specially designed equipment. Performance-based assessments include an objective and realistic standard known as performance-oriented mobility assessments (POMA). POMA consists of standing with one's feet together side by side, or one in front of the other, without losing balance; standing on one leg for a particular period; sitting down and getting up from a chair repeatedly; and bending over and picking up an object such as a pencil.⁷ Further, POMA assesses grip strength using a dynamometer, and times walking across a measured distance.⁷

By contrast, self-rated assessments of disability rely on the reports of the respondents themselves. Older adults are asked, “Do you need help from another person or special equipment or a device for walking across a small room?” Respondents judge themselves and answer according to their own standards without a test walk. Other basic activities of daily living (ADL) assessed include bathing, grooming, dressing, eating, getting from bed to a chair, and using the toilet.⁸ One limitation of self-rated assessments is a potential discord between beliefs about abilities to perform physically and actual capabilities.³ Thus, self-rated assessments of physical impairments could be considered subjective.

POMA can be considered a more objective observation of functional disability given that ADL measures are relatively affected by culture, language, and sociodemographic characteristics.⁹⁻¹¹ Still, ADL could provide a better assessment of disability given that it allows respondents to consider a given physical limitation a disability based on their own subjective perceptions within their own sociocultural contexts.¹²

Although much research has assessed the relationship between performance-based assessments of functional disability and self-rated disability measurements, few studies have sought to compare these two measurements directly given their distinct standards and measurement methods. Therefore, rather than directly comparing the two, assessing a concordance between them could be an alternative way to compare their effectiveness, such as in their ability to predict mortality. Based on previous research, walking disability has been chosen as the area in which to assess the concordance between performance-based and self-reported measurements because it is the only question that the POMA and ADL scales have in common.¹³

Moreover, few studies have compared performance-based and self-reported assessments of mobility in terms of their ability to predict mortality among older adults, older Mexican Americans in particular. Previous research involving Mexican Americans aged 65 and over has suggested that these two measurements of physical disability related to walking tend to be generally concordant but to offer different predictions: performance-based mobility disability as a predictor of mortality and self-assessment of walking impairments as a predictor of the disablement process.¹³

The objective of the present research was to assess the concordance in mortality prediction of POMA (timed 10-foot walk) and ADL (reported ability to walk across a small room without help) for Mexican Americans aged 75 and over. We also investigated the relationships between self-rated versus performance-based walking assessments as predictors of mortality. We hypothesized that as an objective measure of physical function, performance-based assessment of mobility would better predict mortality. However, we reasoned that self-reported assessments of mobility could show a comparable ability to predict mortality.

METHODS

Study Population

Data from baseline to Wave 5 (2004–2005) and Wave 6 (2007) of the Hispanic Established Population for the Epidemiological Study of the Elderly (EPESE) were used in the analysis. The Hispanic EPESE was originally a longitudinal study of 3,050 Mexican Americans aged 65 and over residing in southwestern states (Texas, New Mexico, Colorado, Arizona and California). The sample population was selected from these five southwestern states using area probability sampling procedures beginning in 1993 to make the study generalizable to the approximately 500,000 older Mexican Americans residing in the southwest.¹⁴ Its measures included activities of daily living (ADL), performance-based assessments (POMA), and socio-demographic information beginning in Wave 5, relying upon face-to-face interviews to gather this information.

Measures

Mortality—Mortality information was derived from Wave 5 to Wave 6 of the Hispanic EPESE, categorized by survival status as a dependent variable. All sample participants were

alive at Wave 5 (2004–2005), and mortality status was assessed in Wave 6 (2007–02 ~ 2008–02) in 2007.

Performance-based and Self-reported Measurements — Walking Disability—

Walking disability was chosen as the point of concordance between performance-based and self-reported measurements because it was the only question that the POMA and ADL scales had in common. Due to the differences in the respective standards of POMA and ADL, there is no way to compare these two precisely. The performance-based standard continuously measures time, speed, and strength; by contrast, the self-reported disability assessment elicits such categorical self-assessments as “need help,” “don’t need help,” or “unable to do.” Therefore, in order to establish the categorical concordance variable, this analysis centers its comparison on the POMA question indicating whether the respondent completed the walk or refused.

ADL/POMA Concordance—Table 1 shows the figures for ADL and POMA from the Hispanic EPESE Wave 5 (2004–2005). The three possible answers for ADL were “cannot walk,” “can walk with other’s or device’s help,” and “can walk.” A dichotomous division was derived from the “can walk” and “cannot walk” categories. POMA respondents were similarly divided into two categories: “completed walk” and “could not complete walk.” The “could not complete walk” category included those who had attempted but failed to complete the timed 10-foot walk due to severe physical impairment.

Based on these two measurements we discerned the association between ADL and POMA, defining their concordance according to four categories: “positively concordant,” “optimist,” “negatively concordant,” and “pessimist,” as shown in Table 2.¹³ Optimists were those who reported being able to walk, but could not actually complete the walk. Pessimists were those who completed the walk although they had reported themselves unable to do so. Positively concordant people were those who completed the walk and reported being able to walk, so that ADL and POMA were positive. “Negatively concordant” respondents were those who were unable to complete the walk and correctly reported that inability. Thus, both measurements were negative.¹³ Table 2 represents the ADL and POMA Concordance Categories.

Covariates—Sociodemographic variables included age ($\leq 80 = 0$, $> 80 = 1$), gender (men=0, women=1), years of formal education (continuous), nativity (US-born=0, Mexico-born=1), language of interview (English=0, Spanish=1), marital status (married=0, not married=1), annual household income ($\geq \$15,000 = 0$, $< \$15,000 = 1$), and living arrangements (living alone=0, living in a household with two or more people=1).

Statistical Analysis

The Statistical Analysis System (SAS: SAS Institute Inc., Cary, NC) version 9.2 was used in this analysis. The selected alpha level for statistical significance was .05. Descriptive statistics examined the concordance between performance-based and self-reported measurements for Mexican Americans aged 75 and over. A logistic regression analysis was used to determine whether a concordance between performance-based and self-rated

assessments of mobility disability was associated with mortality status at Wave 6 after adjusting for age and gender, education, nativity, language of interview, marital status, annual household income, and living arrangements.

Hypothesis

We hypothesized that the negatively concordant and optimistic respondents would have higher mortality (reference = positively concordant). We reasoned that a concordance between performance-based and self-reported measurements in predicting mortality would provide further information about the validity of these assessments for older populations. Therefore, we hypothesized that a concordance between these two measurements should be an apt predictor of mortality. Moreover, we hypothesized that as an objective measure of physical function, performance-based assessment of mobility would perform better in predicting mortality than self-reported measurements, but that self-reported measurements might perform better than expected, and could be comparable in predictive ability to the performance-based assessment.

RESULTS

Table 3 represents the overall sample characteristics of the Hispanic EPESE Wave 5 by gender (2004–2005). Of the 2,069 participant interviews, 1,742 were conducted in person and 327 (15.8%) were conducted via proxy, typically by a close family member. Mean age was 81.9, 38.5% men, 61.5% women. Approximately 44% were foreign-born, and about 80% were interviewed in Spanish. Two thirds of the men were married as compared to only 27.3% of the women. Years of education and household income were quite low. Finally, 34.4% of the women and 18.2% of the men reported living alone. In addition, Table 3 shows the numbers and percentage of subjects who reported limitations in ADL and in POMA by gender. Significant differences emerged by gender in both ADL and POMA results, with women significantly more likely to report ADL and POMA limitations than men.

Table 4 represents the frequency of ADL/POMA concordance descriptive statistics of Hispanic EPESE Wave 5 (2004–2005). The respective prevalence of the “positively concordant” (completed the walk and reported being able to walk, ADL and POMA both positive), “pessimist” (completed the walk but reported being unable), “optimist” (reported being able to walk, but could not actually complete the walk), and “negatively concordant” (neither completed the walk nor reported being able to do so) groups were 80.09%, 10.50%, 3.78%, and 5.63% respectively. Respondents unable to complete the POMA were excluded from the concordance analyses.

Table 5 shows the logistic regression of mortality (Wave 5–6) prediction for POMA, ADL Limitation, and the POMA/ADL Concordance. All Models were adjusted for age and gender, education, nativity, language of interview, marital status, household income, and living arrangements. Model 1 showed an odds ratio of POMA as a predictor of mortality of 2.46 (95% CI= 1.43 – 4.23). Model 2 showed an odds ratio of ADL as a predictor of mortality of 3.69 (95% CI= 2.68 – 5.08). In Model 3, where POMA and ADL limitations were combined, the predictive odds ratio of POMA was non-significant at 1.65 (95% CI= 0.91 – 2.98) while that of ADL was significant at 2.40 (95% CI= 1.48 – 3.88). In Model 4,

the ADL/POMA concordance, “negative concordant” emerged as a critical predictor of mortality (OR=4.80; 95% CI =2.59 – 8.90) followed by “pessimist” (OR=1.94; 95% CI=1.12 – 3.36) as compared to the reference group of “positively concordant.” However, the mortality predictive odds ratio of “optimist” was small and non-significant. (OR=0.59; 95% CI=0.14 – 2.52).

DISCUSSIONS

The objective of the present research was to assess the utility in mortality prediction of a concordance between performance-based and self-rated assessments for Mexican Americans aged 75 and older. Participants who were negatively concordant or pessimists tended to die earlier as compared to their positively concordant counterparts. We also compared self-rated versus performance-based walking assessments as predictors of mortality. We hypothesized that as an objective measure of physical function, performance-based assessment of mobility would perform better in predicting mortality. However, we also reasoned that self-reported assessment of mobility would show a better-than-expected and perhaps comparable ability to predict mortality.

Previous research showed that performance-based assessments are good predictors of major health outcomes such as disability^{9, 15, 16} and mortality.¹⁷ Moreover, past research has indicated that the performance-based measure of walking might be a better mortality predictor than ADL for older Mexican Americans aged 65 and over.¹³ On the other hand, Alexander and colleagues¹⁸ concluded that self-reported measurements of walking ability are a main predictor not only of functional mobility, but also of overall functional mobility performance. Reuben and his colleagues, using the Established Populations for Epidemiologic Studies of the Elderly (EPESE), found that including both ADL and POMA assessments better predicts mortality risk in community-dwelling older adults than either method alone.¹⁹ However, this analysis suggested that self-reported measurements of walking are a better and alternative predictor of mortality among older Mexican Americans aged 65 and over. Further, the ADL/POMA concordance measure revealed that participants who were negatively concordant and pessimists had higher mortality odds ratios than those who were positively concordant.

Performance-based and self-reported measurements of disability are related in terms of indicating degree of impairment.¹³ Previous research has shown that performance-based and self-reported assessments are highly positively correlated with each other for the older population.^{1, 3–4, 20–22} Other well-documented research has similarly shown that performance-based and self-rated assessments of physical limitations are concordant.^{5, 9, 23–26}

Despite their obvious differences, performance-based and self-reported assessments may be used together or separately. Before performance-based assessments were well developed, physical impairments in older adults were measured based on self-rated assessments of various activities of daily living.¹² Self-rated assessments have been preferred because they are easier to administer and collect and are less expensive and time-consuming than performance-based measures.²³ In addition, performance-based measurements are not better

at measuring IADL (Instrumental Activities of Daily Living) than self-rated assessments.²⁷ However, performance-based assessments provide more accurate measurement, although they are more time-consuming and expensive and necessitate special equipment and training.

This study has certain limitations. First, there were 341 cases (16.48%) missing from the sample population. Respondents who refused to try the timed 10-foot walk due to severe physical impairments constituted 93 (27.27%) of those 341 missing cases. Thus, other effects and outcomes may have been present in this undocumented portion of the population. Second, in this study mortality status was assessed after only two-and-a-half years (2004–2004 ~ 2007). Subsequent studies could examine a longer follow-up period given that the Hispanic EPESE is an ongoing longitudinal study. Third, both self-reported and performance-based assessments of mobility are linked to cognitive impairment, depression, and self-efficacy. Subsequent studies should examine cognitive impairment, depression, and their relationship to self-efficacy measurements.

Measuring mobility is a key aspect of gerontology since mobility problems can predict disability and health.¹⁶ For older adults, physical mobility limitations increase the risk of morbidity and mortality as well as dependence on others.^{28, 29} The ability or inability to walk a short distance without help may predict future disability and mortality.³⁰ Both performance-based and self-rated assessments show efficacy in mortality prediction,³¹ and each measure conveys useful information about mobile functioning in older adults.

Comparing the performance of the two measurements in predicting mortality could provide further information as to the validity of these assessments for this population and could show whether a more easily administered measure such as ADL could be an acceptable alternative to relatively less easily applicable performance-based measures such as POMA. However, a direct empirical comparison is impossible given the differences in the standards of the two methods. Therefore, a concordance of these two measurements may be useful in predicting future disability, hospitalization risk and mortality in the older population, particularly in the clinical setting, and could be helpful in long-term care and preventive support for older adults in nursing homes by informing preventive intervention decisions.

In conclusion, the concordance of performance-based and self-rated assessments derived in this study showed that Mexican Americans aged 75 and over who were negatively concordant or pessimists were much more likely to die as compared to subjects who were positively concordant. Moreover, self-reported assessments of mobility showed a better-than-expected and comparable ability to predict mortality as compared to performance-based walking assessments.

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Table 1

Comparisons between POMA and ADL Questions of the Hispanic EPESE

	Questions
POMA	Now we are going to observe how you normally walk. If you use a cane or other walking aid and would feel more comfortable with it, then you may use it. a. Completed: (1) Yes (2) No (9) Refused (.) Missing /NA
ADL	At the present time, do you need help from another person or special equipment or a device for. a. Walking across a small room (1) Need Help (2) Don't Need Help (3) Unable to do (9) Refused

Table 2

ADL/POMA Concordance

		ADL	
		Can walk	Cannot walk
POMA	Completed walk	Positively concordant	Pessimist
	Could not complete walk	Optimist	Negatively concordant

Table 3

Sociodemographic characteristics of Hispanic EPESE subjects at Wave 5, 2004–2005 by gender (N=2069)

	Men (%) N=797(38.5%)	Women (%) N=1272 (61.5%)	Total (%) N=2069 (100%)
Age (mean±SD)	81.8 ± 4.8	82 ± 5.3	81.9 ± 5.2
Country of Birth			
US born	436 (54.7)	722 (56.8)	1158 (56.0)
Foreign born	361 (45.3)	550 (43.2)	911 (44.0)
Language of Interview			
English	147 (18.4)	261 (20.5)	408 (19.7)
Spanish	650 (81.6)	1011 (79.5)	1661 (80.3)
Marital Status ***			
Married	532 (66.6)	347 (27.3)	879
Not Married	265 (33.4)	925 (72.7)	1190
Years of Education (mean±SD)	4.8 ± 4.1	5.0 ± 4.0	4.9 ± 4.0
Household Income ***			
< 15,000	470 (67.0)	848 (78.2)	1318 (63.7)
15,000	232 (33.0)	237 (21.8)	469 (36.3)
Living Alone ***			
Yes	146 (18.3)	437 (34.4)	583 (28.2)
No	651 (81.7)	835 (65.6)	1486 (71.8)
ADL Limitation ***			
Walking across a small room	172 (21.6)	380 (30.0)	552 (27.7)
POMA Limitation *			
Completed the walk	45 (7.3)	104 (10.9)	149 (9.5)

Note:

'N' varies due to missing data. Chi-square and analysis of variance were used. SD=standard deviation; ADL = activities of daily living; POMA = performance-oriented mobility assessment.

* p < 0.05,

** p <0.01,

*** p<0.001

Table 4

ADL/POMA Concordance Descriptive from Hispanic EPESE WAVE 5, 2004–2005 (N=1562)

		Self-reported assessments (ADL)	
		Can walk	Cannot walk
Performance-based assessments (POMA)	Completed walk	Positively concordant 1251 (80.09%)	Pessimist 164 (10.50%)
	Could not completed walk	Optimist 59 (3.78%)	Negatively concordant 88 (5.63%)

Table 5

Logistic Regression of Mortality (Wave 5–6) on categories of POMA, ADL Limitation, and POMA/ADL Concordance.

	Model 1 N=1407 OR (95% CI)	Model 2 N=1783 OR (95% CI)	Model 3 N=1407 OR (95% CI)	Model 4 N=1407 OR (95% CI)
POMA limitation	2.46 (1.43 – 4.23)		1.65 (0.91 – 2.98)	
ADL limitation		3.69 (2.68 – 5.08)	2.40 (1.48 – 3.88)	
ADL/POMA Concordance				
positive concordant				1.00
pessimist				1.94 (1.12 – 3.36)
optimist				0.59 (0.14 – 2.52)
negative concordant				4.80 (2.59 – 8.90)

All Models: Controlled for age and gender, education, nativity, language of interview, marital status, annual household income, and living arrangement; **ADL** = activities of daily living; **POMA** = performance-oriented mobility