Health-Related Quality of Life in Older Adults at Risk for Disability

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Background: The number of older adults living in the United States continues to increase, and recent research has begun to target interventions to older adults who have mobility limitations and are at risk for disability. The objective of this study is to describe and examine correlates of health-related quality of life in this population subgroup using baseline data from a larger intervention study.

Methods: The Lifestyle Interventions and Independence for Elders-Pilot study (LIFE-P) was a randomized controlled trial that compared a physical activity intervention to a non-exercise educational intervention among 424 older adults at risk for disability. Baseline data (collected in April–December 2004, analyzed in 2006) included demographics, medical history, the Quality of Well-Being Scale (QWB-SA), a timed 400-m walk, and the Short Physical Performance Battery (SPPB). Descriptive health-related quality of life (HRQOL) data are presented. Hierarchical linear regression models were used to examine correlates of HRQOL.

Results: The mean QWB-SA score for the sample was 0.630 on an interval scale ranging from 0.0 (death) to 1.0 (asymptomatic, optimal functioning). The mean of 0.630 is 0.070 lower than a comparison group of healthy older adults. The variables associated with lower HRQOL included white ethnicity, more comorbid conditions, slower 400-m walk times, and lower SPPB balance and chair stand scores.

Conclusions: Older adults who are at risk for disability had reduced HRQOL. Surprisingly, however, mobility was a stronger correlate of HRQOL than an index of comorbidity, suggesting that interventions addressing mobility limitations may provide significant health benefits to this population.

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Introduction

Impaired mobility, with mobility defined as the ability to walk safely and independently,[1] has been shown to predict subsequent broader disability involving independent daily living activities.[2,3] Using these findings, researchers identified a subgroup of older adults that are at risk for developing disability.[4–7] These older adults are characterized by a sedentary lifestyle and impaired mobility. They walk more slowly and have reduced strength and balance. They are considered "at risk for disability" because they have reduced mobility, but can still perform daily living activities.

Mobility and daily living are important elements of the broader concept of health-related quality of life (HRQOL)[8,9] and most measures of generic HRQOL include questions about mobility.[10–13] The HRQOL of older adults is usually described in association with specific diseases, demographic characteristics, and/or healthy epidemiologic samples,[14–16] but few, if any, studies describe the HRQOL of older adults who share functional limitations. The objective of this study is to describe and examine correlates of HRQOL in older adults considered at risk for disability.

Methods

This article describes baseline questionnaire data (collected April–December 2004, analyzed in 2006) from all Lifestyle

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Interventions and Independence for Elders-Pilot (LIFE-P) study participants. The study has been described in detail elsewhere.[17,18]

Clinical Trial

The LIFE-P study is a multisite, randomized controlled trial (RCT) in which older adults (aged 70 to 89) at risk for disability were assigned to either a physical activity or a successful aging intervention, both lasting 12 months. The physical activity intervention consisted of a structured exercise program focused on walking supplemented with behavioral counseling.[19] The successful aging intervention consisted of educational meetings not expected to impact the main study outcomes. The goal of the LIFE-P study was to obtain key design benchmarks in preparation for a larger study of the efficacy of physical activity for preventing disability in this population.

Participants

Participants were 424 older adults considered at risk for disability, which is defined as having a Short Physical Performance Battery (SPPB) score of <10.[4,6] Other inclusion criteria were age 70 to 89 years, sedentary lifestyle (not actively participating in a formal exercise program within the past 3 months), and ability to complete a 400-m walk within 15 minutes. Exclusion criteria included history of significant or recent comorbidity. Comprehensive inclusion and exclusion criteria are given elsewhere.[20] Participants were recruited from four communities in geographically diverse areas of the United States (Pittsburgh, Winston-Salem, Dallas, and Palo Alto) using a variety of recruitment strategies.[20]

Measures

Demographic. Participants completed baseline demographic questionnaires.

Comorbidity index. The index of comorbidity is the sum of yes (1) or no (0) self-report responses for 10 prevalent comorbidities: hypertension, heart attack, heart failure, stroke, cancer, diabetes, broken hip, arthritis, liver disease, and lung disease. To verify reported comorbidities, participants provided evidence of prescribed medications or the exact name of medications. Only 5.4% (39/725) of "yes" responses could not be verified. These responses were coded as "possible" comorbidity and given a value of 0.5. A maximum likelihood (SAS Proc MIXED) approach was used to estimate the comorbidity index from observed responses for cases (18/424=1.9%) with missing data.

Mobility/physical functioning. Each person completed a timed 400-m self-paced walk without assistance or assistive devices.[21,22] Physical functioning was measured using the SPPB,[5] which assesses three areas of performance: balance, chair stands, and a 4-m self-paced walk. Trained observers assign a categorical score to each area of function ranging from 0 (inability to complete the test) to 4 (highest performance level). A summary score ranging from 0 to 12 is calculated by summing the three subscale scores.

Grip strength was measured using an adjustable, hydraulic dynamometer (Jamar Hand Dynamometer, Fred Sammons, Inc.). The best performance of two trials was selected for each side, and the average of the left and right hand were used for analysis. Predictive validity has been shown for both disability[23] and mortality.[24]

Health-related quality of life. HRQOL was assessed using the Quality of Well-Being Scale-Self-Administered (QWB-SA).[13,25] The QWB-SA is a generic measure of HRQOL that combines preference-weighted values for symptoms and functioning.[26] Scores range from 0 (death) to 1.0 (asymptomatic, optimum functioning).[27] The measure has been used in multisite National Institutes of Health clinical trials[28–30] and for people with various medical conditions.[31–36]

Statistical Analysis

Descriptive statistics reported include means with standard deviations and proportions where appropriate. Linear regression analysis was used to examine correlates of HRQOL. Independent variables were entered into the models in three blocks, with QWB-SA scores as the dependent variable. Initially, age, education, gender, ethnicity, and marital status were entered and retained if $p<0.15$. Education (no college versus college or more), ethnicity (white versus non-white) and marital status (married versus non-married) were converted to binary coding. Next, the comorbidity index was tested and retained ($p<0.15$). Finally, the 400-m walk time, three SPPB subscales, and average grip strength were entered and variables were retained if $p<0.05$.

Results

Mean baseline scores are presented in Table 1. There were no missing data for the QWB-SA and other health variables. Table 2 presents QWB-SA scores for a variety of samples from published studies. However, the samples differ on factors often related to HRQOL (age, gender).

Regression analyses examining correlates of HRQOL are presented in Table 3. Ethnicity was the only demographic variable retained. The comorbidity index and ethnicity variable tested in the second block were both retained. Of the functional variables entered in the third and final block, the 400-m walk time, SPPB balance subscale, and SPPB chair stand subscale were retained. The correlation between the 400-m walk and the gait speed subscale was substantial ($r=-0.55$, $p<0.0001$).

Discussion

The mean QWB-SA score for a sample of older adults considered at risk for disability was lower than a mean score found for healthy older adults[37] Although these samples differ slightly, this difference (0.704 – 0.634=0.07) is substantial, and well beyond the minimally clinically important difference (MCID) of 0.03 estimated for the QWB-SA.[41,42]

The decrement of 0.07 is more than the amount attributed to a variety of diseases including colitis, migraine, arthritis, stroke, ulcer, asthma, and anxiety.[14] Thus, declining mobility may have a greater negative

Table 1. Participant demographics and descriptive statistics

Variable	Mean (standard deviation) or %
Age (*n*=424)	76.77 (4.24)
QWB-SA score (*n*=424)	0.634 (0.099)
Total SPPB score (*n*=424)	7.52 (1.42)
SPPB balance test (*n*=424)	2.97 (1.07)
SPPB chair stand (*n*=424)	1.36 (0.83)
SPPB gait speed (*n*=424)	3.19 (0.74)
400-m walk time 9 (*n*=424)	8.17 (1.89)
Comorbidity index (number of conditions) (*n*=424)	1.71 (1.14)
Grip strength (*n*=399)	25.2 (8.8)
Gender (*n*=424)	
Female	68.9%
Education (*n*=423)	
No college	30.0%
College	45.8%
Postgraduate	21.2%
Other	3.0%
Ethnicity (*n*=423)	
White	74.3%
Black	18.2%
Hispanic	4.7%
Other	2.8%
Income (*n*=354)	
<$25,000	34.2%
$25,000–$49,999	26.9%
≥$50,000	22.4%
Missing	16.5%
Marital status (*n*=423)	
Married	39.4%
Widowed	40.8%
Divorced	14.9%
Never married	3.8%
Other	1.1%

QWB-SA, Quality of Well-Being-Self-Administered scale; SPPB, Short Physical Performance Battery.

impact on HRQOL than many distinct disease states. In this sample, mobility function was related to HRQOL independent of a comorbidity index. This finding highlights the level of impairment in this subpopulation, and underscores the need to develop effective interventions for older adults at risk for disability regardless of the diseases they may or may not have.[2,6] It is also important to note that the three mobility variables (400-m walk time, the balance SPPB subscale, and the chair stands SPPB subscale) accounted for unique aspects of HRQOL. This finding provides evidence that mobility is multidimensional.

The QWB-SA is only one of many generic HRQOL instruments and includes questions about mobility so a correlation is not surprising. Although the QWB includes mobility items, the QWB-SA assesses 59 symptoms that usually have a larger impact on scores than mobility or other function-related questions.

In contrast to other published studies,[43–45] white participants had lower QWB-SA scores than non-whites (0.627 vs 0.652). However, African Americans and other ethnic groups have reported higher satisfaction with physical function than white participants elsewhere.[46] Although interesting, the difference of 0.025 is below the minimally clinically important difference of the QWB-SA,[41,42] and differences in QWB-SA scores by race/ethnicity have not been found elsewhere. Unexpectedly, gender and age were not significantly related to QWB-SA scores. Typically, HRQOL scores are lower for women and decrease with older age.[14,38,47–49] However, the study sample had a restricted range of ages and mobility levels.

Our results are cross-sectional and subsequently limit causal inference. Also, the inclusion and exclusion criteria used in the LIFE-P trial limit generalizability. Therefore, study results should be interpreted appropriately. Replicating the findings with other measures of HRQOL and mobility is important because the measures used differ from other measures of the same constructs.

In summary, QWB-SA scores for older adults at risk for disability were below those of a sample of healthy

Table 2. Comparison of current study results with mean QWB-SA scores and descriptors for other disease samples

Sample characteristics	*n*	Age	% women	QWB-SA mean (standard deviation)
Healthy older adults[37]	301	74.7	59	0.704 (0.099)
Adults at risk of developing diabetes[38]	3234	51.2	68	0.681 (0.108)
Family medicine outpatients[31]	562	46.7	57	0.651 (0.134)
Older Adults w/ mobility limitations (current study)	424	76.8	69	0.634 (0.099)
Migraineurs (days without headaches)[25]	89	42.2	87	0.628 (0.149)
Cancer patients in Germany (prostate, benign prostatic hyperplasia, colon, rectal)[39]	275	66.3	0	0.619 (0.150)
Cataract patients (directly before surgery)[36]	233	72.5	40	0.595 (0.134)
Type 1 diabetes[34]	784	34.5	55	0.572 (NA)
Emphysema patients[40] (before pulmonary rehabilitation)	1218	67.0	39	0.571 (0.114)
Type 2 diabetes[34]	1257	57.6	49	0.547 (NA)
Rheumatology patients[31]	334	55.1	84	0.516 (0.130)
Migraineurs (days with headache)[25]	89	42.2	87	0.492 (0.157)
Major depressive disorder—outpatients[33]	19	43.6	37	0.479 (0.112)
Major depressive disorder—inpatients[33]	39	46.7	15	0.383 (0.118)

NA, not available; QWB-SA, Quality of Well-Being-Self-Administered scale.

Table 3. Hierarchical regression analysis results: variables associated with QWB-SA scores at baseline assessment

Parameter	Estimate	Standard error	*f* value	*p* value	Total R^2	R^2 change
Step 1—Demographics					0.0109	0.0109
Intercept	0.642	0.044	499.52	**<0.0001**		
White	−0.028	0.010	6.30	**0.0124**		
Step 2—Comorbidity					0.0413	0.0304
Comorbidity index	−0.011	0.004	8.35	**0.0041**		
Step 3—Mobility					0.1280	0.0867
400-m walk time	−0.008	0.003	17.64	**<0.0001**		
SPPB balance	0.010	0.004	5.42	**0.0205**		
SPPB chair stands	0.020	0.006	12.82	**0.0004**		

Note: All $p<0.05$ are bolded.
QWB-SA, Quality of Well-Being-Self-Administered scale; SPPB, Short Physical Performance Battery.

older adults, providing evidence that the HRQOL of this segment of older adults may benefit from intervention. Although much of the variance in HRQOL was unexplained, mobility variables were stronger correlates than comorbidity. Taken together with past research, which has demonstrated that loss of mobility predicts loss of independence, mortality, and nursing home admission,[7] it is clear that interventions that can preserve or improve mobility in older adults could produce increases in both quantity and quality of life.

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