Fear of Falling Avoidance Behavior Is Associated With Balance and Dynamic Gait Performance in Community-Dwelling Older Adults: A Cross-sectional Study

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ABSTRACT

Background and Purpose: Fear of falling (FoF) is highly prevalent in community-dwelling older adults and is associated with low health-related quality of life (QoL). Low QoL is associated with increased health care utilization and is a predictor of future falls, but few studies have examined the relationship between high-level balance and dynamic gait performance and QoL in community-dwelling older adults. The purpose of this cross-sectional study was to determine whether there is a relationship between FoF avoidance behaviors, balance confidence, performance on measures of high-level mobility, and QoL in community-dwelling older adults. The secondary purpose was to determine whether older adults who fall have a different QoL than older adults who have not fallen in the past year.

Methods: Eighty-nine community-dwelling older adults (76.33 ± 6.84 years, 54 female, 34 fallers) completed the World Health Organization Quality of Life-BREF (WHOQOL-BREF), Activities-specific Balance Confidence Scale (ABC), Fear of Falling Avoidance Behavior Questionnaire (FFABQ), Functional Gait Assessment (FGA), and Community Balance and Mobility Scale (CB&M). Correlation and multiple regression analyses were calculated to determine the relationship between the outcome measures and domains on the WHOQOL-BREF.

Results and Discussion: Significant correlations were observed between the WHOQOL-BREF physical health domain and the ABC, FFABQ, FGA, and CB&M (ρ = 0.524, −0.509, 0.348, and r = 0.423, respectively), the WHOQOL-BREF psychological domain and the ABC (ρ = 0.284) and FFABQ (ρ = −0.384), and the WHOQOL-BREF environment domain and the ABC (ρ = 0.343) and FFABQ (ρ = −0.406). No correlations were found between WHOQOL-BREF domain scores and a history of falls.

Conclusions: Performance-based outcome measures that measure high-level mobility such as the CB&M and FGA, and patient-reported outcome measures for balance confidence and FoF avoidance behavior such as the ABC and FFABQ, are correlated with the physical health QoL domain on the WHOQOL-BREF. The ABC and FFABQ are correlated with psychological and environment QoL. Fall history was not correlated with QoL. Interventions to decrease FoF or improve high-level mobility may improve QoL in community-dwelling older adults.

Key Words: balance, falls, older adults, outcome measures, quality of life

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INTRODUCTION

The World Health Organization (WHO) defines quality of life (QoL) as an "individual's perception of their position in life within the context of the culture and value system in which they live and in relation to their goals, expectations, standards, and concerns."[1(p28)] Health-related QoL is inconsistently defined, but generally refers to QoL in the context of health and disease in the domains of physical, mental, emotional, and social functioning.[1]

Quality of life in older adults is correlated with overall health and health care utilization. Lower scores on health-related QoL measures have been associated with higher 30-day and 1-year hospitalization rates,[2] readmissions,[3] and mortality.[3] Many factors influence QoL in older adults. Henchoz et al[4] identified 7 domains that older adults considered essential to their QoL. Health and mobility were

rated second only to feeling safe as the most important factors contributing to older adults' overall QoL. Self-reported difficulty with mobility, such as walking 100 m or climbing stairs, has been associated with lower perceived QoL.[5] Older adults with higher body mass index (BMI)[6-8] and those who take more medications[6] also report lower QoL.

Few studies have examined the relationship between physical performance and QoL in community-dwelling older adults. Research has demonstrated that scores on performance-based outcome measures are associated with QoL. Individuals with faster Timed Up and Go (TUG) times,[9,10] longer walking distances on the 6-minute walk test,[10] and stronger handgrip strength[9] have better health-related QoL as measured by Euro Quality of Life-5D (EQ-5F). Slower gait speed is associated with low mental component scores on the Medical Outcomes Study Short Form-36 (SF-36), a multidimensional measure of QoL.[7]

In addition to gait speed and endurance, balance performance appears to be an indicator of overall QoL and is associated with the domains of physical health, psychological health, environment, autonomy, and social participation on the WHO Quality of Life-OLD.[11] Low scores on the Fullerton Advanced Balance Scale are associated with lower physical and mental component scores on the SF-36.[7] However, no studies have examined the relationship between higher-level balance or gait performance and QoL in community-dwelling older adults. The ability to perform high-level balance or gait tasks such as balancing with a narrowed base of support, turning, picking objects up off the ground while walking, walking backward, or walking while turning the head may influence QoL.

Balance confidence may also be related to QoL. Self-reports of poor balance and difficulty walking are associated with lower QoL in the physical health domain of the WHO Quality of Life-BREF (WHOQOL-BREF) in community-dwelling older adults.[12] For example, older adults with knee osteoarthritis with low balance confidence scores on the Activities-specific Balance Confidence Scale (ABC) have lower scores on the SF-36, suggesting a lower perceived health-related QoL.[13] Low QoL is also associated with future falls.[2]

Fear of falling is associated with QoL in community-dwelling older adults. Community-dwelling older adults who report that they have no fear of falling score higher on the domains of physical functioning, social functioning, and role performance on the SF-36 than individuals who report being moderately fearful or very fearful of falling.[14] Conversely, individuals who experience fear of falling report lower levels of QoL.[15] This relationship remains true even when adjusting for other factors such as fall history, age, gender, and fall risk[16] and regardless of the tool used to measure health-related QoL.[17] To date, no studies have examined the relationship between performance on high-level mobility tasks and QoL in community-dwelling older adults. The purpose of this study was to determine whether there was a relationship between fear of falling avoidance behavior, balance confidence, performance on measures of high-level mobility, and QoL in community-dwelling older adults. The secondary purpose of the study was to determine whether older adults who fall differ in their QoL compared with older adults who have not fallen in the past year.

METHODS

Study Design and Participants

This cross-sectional study included ambulatory community-dwelling older adults. Participants were recruited between October and December 2019 via posted flyers and verbal invitations at retirement community wellness centers, service organizations, libraries, churches, senior social groups, and in the waiting room of a physical therapy clinic.

Participants were included if they were 65 years or older, lived independently, were able to stand without assistance for at least 1 minute, were able to ambulate 20 m without an assistive device or with a single-point cane only, and scored at least 23/30 on the Montreal Cognitive Assessment (MoCA).[18] Participants were excluded if they could not understand written or verbal instructions in English, had a lower extremity orthopedic injury such as a fracture or surgery within the past 4 months, had a history of a neurologic disorder or peripheral neuropathy, had self-reported unstable angina or uncontrolled cardiovascular problems, or had pain in any body segment greater than 5 on a 10-point verbal analog scale (0 = "no pain," 10 = "worst pain imaginable"). Participants who reported a diagnosis of diabetes were screened for sensory impairment from peripheral neuropathy using Semmes-Weinstein monofilament testing.[19] The 5.07/10-g monofilament was applied 4 times to the dorsum of the great toe of each foot and held for 1 second while participants had their eyes closed. Participants indicated the presence of the monofilament by saying, "yes." Participants were excluded if they were unable to perceive the monofilament on 5 or more trials.

The institutional review boards at Rocky Mountain University of Health Professions and the University of Puget Sound approved the studies. Data collection took place in a university gait laboratory, a church fellowship hall, and a community center. A sample size estimation was conducted using G-Power 3.1.9.2 (Heinrich-Heine-Universitat Dusseldorf, Dusseldorf, Germany) for a multiple regression analysis.[20] Using an odds ratio of 2.44 for falls in the previous year,[21] prevalence of falls of 0.35,[22] 0.80 power, an α level of .05, and an estimated attrition rate of 20%, the sample size needed was 89 participants.

Procedures

After volunteers were screened for eligibility and provided written informed consent, a researcher collected demographic information and a patient-reported fall history. The number of total falls and falls requiring medical attention in the past 12 months were recorded. Participants then completed the ABC, Fear of Falling Avoidance Behavior Questionnaire (FFABQ), and WHOQOL-BREF. Next,

an examiner administered the Community Balance and Mobility Scale (CB&M) and Functional Gait Assessment (FGA). The tests were performed in the participants' low-heeled shoes, and a safety walking belt was worn around the waist in case of a loss of balance during testing. A roll of a die determined the order of testing. The CB&M was performed first when an even number was rolled, and the FGA was performed first when an odd number was rolled. The test items were administered in their published order.[23,24] All testing took place in 1 session and took approximately 1 hour. Seated rest periods were allowed at any point that the participant wished.

All examiners were trained by the primary investigator to administer the outcome measures. Training included evaluating video-recorded mock participants to facilitate discussion and agreement on evaluation criteria.

Outcome Measures

World Health Organization Quality of Life-BREF

The WHOQOL-BREF is a 26-item patient report outcome measure available in 19 languages and has been validated cross-culturally.[25] The English version of the scale was used for this study. The measure is not reported to have ceiling or floor effects and has good internal consistency, construct validity, discriminant validity, and test-retest reliability in individuals ranging in age from 12 to 97 years.[25] The domains assessed by the WHOQOL-BREF are presented in Table 1. There is no aggregate score for the measure; questions 1 and 2 are reported independently, and the transformed score for each domain is calculated using the following formula:

$$\text{Transformed score} = [(\text{Actual raw score} - \text{lowest possible raw score})/\text{possible raw score range}] \times 100$$

Fear of Falling Avoidance Behavior Questionnaire

The FFABQ is a 14-item patient report outcome measure used to assess an individual's avoidance behavior due to fear of falling.[26] Total scores range from 0 (high fear avoidance behavior) to 56 (no fear avoidance behavior). The FFABQ is valid and reliable (intraclass correlation coefficient [ICC] = 0.812) in community-dwelling older adults.[26]

Activities-specific Balance Confidence Scale

The ABC is a patient report outcome measure used to measure the degree of balance confidence in household and community activities.[27] A minimum score of 0% indicates no confidence; a maximum score of 100% indicates complete confidence. The ABC has excellent test-retest reliability ($r = 0.92$),[27] and is a valid measure of balance confidence in community-dwelling older adults.[28] A cut-off score of 67% suggests an increased risk for falls.[29]

Community Balance and Mobility Scale

The CB&M is a 13-item performance measure used to assess dynamic balance and mobility.[23] The item scores are summed for a total score of 0 to 96. Higher scores indicate better mobility. The CB&M is valid and reliable (ICC 0.95-0.97) when used with community-dwelling older adults.[30] A cut-off score of 45 or less may identify community-dwelling older adults with a history of 2 or more falls.[30]

Functional Gait Assessment

The FGA is a valid performance-based measure to assess balance during gait.[24,28] Scores range from 0 to 30; higher scores indicate better balance during gait. The ABC has good construct validity and excellent reliability (ICC = 0.93) when used with community-dwelling older adults.[28] A cut-off score of 22 or less on the FGA suggests a risk for future falls for community-dwelling older adults.[28]

Statistical Analysis

Statistical analyses were performed with IBM SPSS Statistics version 25.0 (IBM Corporation, Armonk, New York). Descriptive statistics were reported for the total sample and were stratified by fallers and nonfallers. Preliminary analyses were performed to ensure the assumptions of normality and equal variance were met. If the significance value was greater than .05 in Levene's Test for Equality of Variances, equal variances were assumed. χ^2 tests for independence were calculated to determine whether sex, residence (own or rent a home vs independent living facility), and use of an assistive device differed between fallers and nonfallers. Independent t tests were calculated to determine whether fallers and nonfallers were different in age, BMI, number of prescribed medications, MoCA score, CB&M score, and WHOQOL-BREF physical health, psychological, and

Table 1. Item Description for World Health Organization Quality of Life-BREF

Domain	Number of Items	Raw Score Range	Transformed Score Range
Overall quality of life (Question 1: "How would you rate your quality of life?")	1	1-5	Not transformed
Overall health-related quality of life (Question 2: "How satisfied are you with your health?")	1	1-5	Not transformed
Physical health	7	7-35	0-100
Psychological health	6	6-30	0-100
Social relationships	3	3-15	0-100
Environment	8	8-40	0-100

social relationships domain scores. Mann-Whitney *U* tests were calculated to determine whether there were differences between fallers and nonfallers in the number of over-the-counter medications, total falls, falls requiring medical attention, ABC score, FFABQ score, FGA score, and transformed WHOQOL-BREF environment domain score. Mann-Whitney *U* tests were used because assumption of normality was not met. χ^2 tests for independence were calculated to determine whether there were differences between the scores of fallers and nonfallers for question 1 and question 2 on the WHOQOL-BREF.

Multiple regression analyses were used to determine whether there was a relationship between total scores on the FGA, CB&M, ABC, and FFABQ, and age, and each domain score of the WHOQOL-BREF. Pearson product moment correlation coefficients were calculated to determine whether there were independent correlations between age or CB&M score and the WHOQOL-BREF physical health, psychological, and social relationships domains. Spearman correlation coefficients were calculated to determine whether there were independent correlations between the number of falls in the past 12 months, ABC score, or FFABQ score and the WHOQOL-BREF physical health, psychological, and social relationships domains. Spearman correlation coefficients were calculated to determine whether there were independent correlations between age, falls, or outcome measures and the WHOQOL-BREF environment domain. Spearman correlation coefficients were used to determine whether there was a relationship between age, number of falls in the past 12 months, or scores on the FGA, CB&M, ABC, and FFABQ and responses to questions 1 and 2 on the WHOQOL-BREF. After using a Bonferroni correction to reduce the risk of a type I error for multiple comparisons, the adjusted significance level for all correlation tests was set at .008. All of the correlation analyses were 2-tailed. The correlation effect sizes were evaluated as small (0.10-0.29), medium (0.30-0.49), or large (≥0.5).[31]

RESULTS

Ninety-one individuals volunteered to participate in the study and were screened for inclusion. Two individuals with MoCA scores that were less than 23 points were excluded. Eighty-nine individuals met the inclusion criteria and agreed to participate in the study (54 female, 76 ± 7 years). Thirty-four individuals (38.20%) reported at least 1 fall in the 12 months before entering the study. Six individuals reported 1 fall that required medical attention. Table 2 shows participant characteristics.

Table 3 displays correlation coefficients for age, number of falls in the past 12 months, outcome measure variables, and participants' domain scores on the WHOQOL-BREF. There were large effect sizes for the correlations between the physical health domain score of the WHOQOL-BREF and the ABC and FFABQ scores. The effect sizes for the correlations between the outcome measures and the WHOQOL-BREF psychological and environmental domain scores were small to medium. The WHOQOL-BREF social relationships domain score was not correlated with any of the variables.

There were no concerns for multicollinearity; all of the variance inflation factors were below 10.[32] A multiple linear regression was calculated to predict the WHOQOL-BREF physical health domain score based on age, ABC score, FFABQ score, CB&M score, and FGA score. The model predicted 41.1% of the variance in the physical health domain score (R^2= 0.411, F = 11.560, $P < .001$). The CB&M score (β = 0.623, P = .005) and age (β = 0.401, P = .001) were significant predictors of the physical health domain score and accounted for 5.86% and 7.78% of the total variance in the score, respectively. The ABC score (β = 0.174, P = .127), FFABQ score (β = 0.220, P = .069), and FGA score (β = 0.209, P = .244) were not significant predictors. The study yielded a regression equation as follows:

WHOQOL-BREF physical health domain score = −10.54 + 0.62 (CB&M score) + 0.40 (age) + 0.127 (ABC) – 0.22 (FFABQ) − 0.21 (FGA).

A multiple linear regression was calculated to predict the WHOQOL-BREF psychological domain score based on age, ABC score, FFABQ score, CB&M score, and FGA score. The model predicted 21.5% of the variance in the physical health domain score (R^2= 0.215, F = 4.550, P = .001). FFABQ score (β = −0.431, P = .003) was the only significant predictor of the psychological domain score and accounted for 9.18% of the total variance in the score. Age (β = 0.145, P = .303), ABC score (β = 0.027, P = .205), CB&M score (β = 0.166, P = .794), and FGA score (β = 0.096, P = .642) were not significant predictors. The study yielded a regression equation as follows:

WHOQOL-BREF psychological domain score = 55.70 − 0.43 (FFABQ) + 0.03 (ABC) – 0.07 (CB&M) + 0.10 (FGA) + 0.15 (age).

A multiple linear regression was calculated to predict the WHOQOL-BREF environment domain score based on age, ABC score, FFABQ score, CB&M score, and FGA score. The model predicted 39.1% of the variance in the environment domain score (R^2= 0.391, F = 2.994, P = .016). FFABQ score (β = −0.374, P = .011) was the only significant predictor of the environment domain score and accounted for 26.3% of the total variance in the score. Age (β = 0.043, P = .765), ABC score (β = 0.088, P = .519), CB&M score (β = −0.001, P = .998), and FGA score (β = −0.063, P = .770) were not significant predictors. The study yielded a regression equation as follows:

WHOQOL-BREF environment domain score = 84.99 − 0.37 (FFABQ) + 0.09 (ABC) – 0.001 (CB&M) − 0.06 (FGA) + 0.43 (age).

The regression analysis for the WHOQOL-BREF social relationships domain was not statistically significant (R^2= 0.039, F = 0.672, P = .646). Results showed that age, ABC score, FFABQ score, CB&M score, and FGA score

Table 2. Participant Characteristics for 89 Community-Dwelling Older Adults

	Total Sample n (%) Mean ± SD	Nonfallers n (%) Mean ± SD	Fallers n (%) Mean ± SD	Comparison Statistic (*P* Value)
Age (range), y	76.33 ± 6.84 (65-93)	76.09 ± 7.28 (66-93)	76.71 ± 6.15 (65-88)	−0.410[a] (.683)
Sex				
Female	54 (60.67)	34 (61.82)	20 (58.82)	0.79[b] (.779)
Male	35 (39.33)	21 (38.18)	14 (41.18)	
BMI, kg/m^2	27.37 ± 5.04	27.36 ± 4.42	27.37 ± 5.98	−0.007[a] (.995)
Residence				
Own/rent home	88 (98.88)	54 (98.18)	34 (100)	0.625[b] (.429)
Independent living community	1 (1.12)	1 (1.82)	0 (0)	
Assistive device				
None	79 (88.76)	51 (92.73)	28 (82.35)	2.267[b] (.132)
Cane	10 (11.24)	4 (7.27)	6 (17.65)	
Number of prescribed medications	3.85 ± 3.12	3.98 ± 3.27	3.63 ± 2.87	0.511[a] (.611)
Number of over-the-counter medications	2.00 ± 2.57	2.11 ± 2.72	1.81 ± 2.32	841.500[c] (.834)
Falls in past 12 mo				
Total	1.10 ± 2.46	0 ± 0	2.88 ± 3.29	0.000[c] (<.001)
Injurious	0.07 ± 0.25	0 ± 0	0.17 ± 0.39	770.000[c] (.001)
MoCA score	26.90 ± 1.82	26.78 ± 1.83	27.09 ± 1.80	−0.772[a] (.442)
ABC score	86.98 ± 13.47	87.51 ± 13.32	86.13 ± 13.86	889.500[c] (.701)
FFABQ score	7.29 ± 9.69	5.44 ± 6.69	10.29 ± 12.74	807.000[c] (.274)
CB&M score	55.99 ± 24.47	58.33 ± 21.86	52.21 ± 28.14	1.083[a] (.284)
FGA score	24.12 ± 5.60	24.85 ± 4.81	22.94 ± 6.61	783.500[c] (.199)
WHOQOL-BREF Question 1	4.55 ± 0.66	4.65 ± 0.52	4.38 ± 0.82	790.50[c] (.151)
WHOQOL-BREF Question 2	3.74 ± 0.97	3.80 ± 0.97	3.65 ± 0.98	858.50[c] (.477)
WHOQOL-BREF physical health domain	75.52 ± 14.44	77.08 ± 14.01	73.00 ± 14.98	1.298[a] (.198)
WHOQOL-BREF psychological domain	77.06 ± 12.38	78.33 ± 1.80	75.00 ± 13.18	1.238[a] (.219)
WHOQOL-BREF social relationships domain	75.09 ± 17.43	76.67 ± 16.07	72.55 ± 19.41	1.084[a] (.281)
WHOQOL-BREF environment domain	89.40 ± 8.85	90.40 ± 9.18	87.78 ± 8.16	714.500[c] (.060)

Abbreviations: ABC, Activities-specific Balance Confidence Scale; BMI, body mass index; CB&M, Community Balance and Mobility Scale; FFABQ, Fear of Falling Avoidance Behavior Questionnaire; FGA, Functional Gait Assessment; MoCA, Montreal Cognitive Assessment; WHOQOL-BREF, World Health Organization Quality of Life-BREF.
[a]Independent *t* test.
[b]χ^2 test for independence.
[c]Mann-Whitney *U* test.

did not have an impact on older adults' social relationships domain score.

Statistically significant positive correlations were found between the response to the WHOQOL-BREF question 1 (overall satisfaction with life) and the ABC score ($\rho = 0.294$, $P = .005$, small effect size), CB&M score ($\rho = 0.285$, $P = .007$, small effect size), and FGA score ($\rho = 0.349$, $P = .001$, medium effect size). A statistically significant negative correlation was found between FFABQ score and the response to the WHOQOL-BREF question 1 ($\rho = -0.354$, $P = .001$, medium effect size). Responses to the WHOQOL-BREF question 1 were not correlated with age ($\rho = 0.025$, $P = .816$) or number of falls ($\rho = -0.153$, $P = .153$).

A statistically significant positive correlation was found between the response to the WHOQOL-BREF question 2 (health-related QoL) and the ABC score ($\rho = 0.307$, $P = .003$, medium effect size). A statistically significant negative correlation was found between the response to the WHOQOL-BREF question 2 and the FFABQ score ($\rho = -0.288$, $P = .006$, small effect size). Responses to question 1 and question 2 were also significantly correlated

Table 3. Correlation Coefficients for the World Health Organization Quality of Life-BREF Domain Scores Amongst 89 Community-Dwelling Older Adults

	Physical Health Domain Score, Coefficient (*P* Value)	Psychological Domain Score, Coefficient (*P* Value)	Social Domain Score, Coefficient (*P* Value)	Environment Domain Score, Coefficient (*P* Value)
Age	$r = 0.054$ (.615)	$r = 0.066$ (.540)	$r = 0.021$ (.844)	$\rho = -0.037$ (.734)
Number of falls in past 12 months	$r = -0.164$ (.125)	$r = -0.154$ (.150)	$r = -0.127$ (.236)	$\rho = -0.244$ (.021)
ABC score	$\rho = 0.524$ (<.001[a])	$\rho = 0.284$ (.007[a])	$\rho = 0.103$ (.337)	$\rho = 0.343$ (.001[a])
FFABQ score	$\rho = -0.509$ (0.001[a])	$\rho = -0.384$ (<.001[a])	$\rho = -0.137$ (.199)	$\rho = -0.406$ (.001[a])
FGA score	$\rho = 0.348$ (.001[a])	$\rho = 0.229$ (.031)	$\rho = 0.079$ (.461)	$\rho = 0.198$ (.063)
CB&M score	$r = 0.423$ (<.001[a])	$r = 0.204$ (.055)	$r = 0.081$ (.450)	$\rho = 0.235$ (.027)

Abbreviations: ABC, Activities-specific Balance Confidence Scale; CB&M, Community Balance and Mobility Scale; FFABQ, Fear of Falling Avoidance Behavior Questionnaire; FGA, Functional Gait Assessment.
[a]Denotes statistical significance at $P < .008$.

with each other ($\rho = 0.500$, $P < .001$, large effect size). Responses to question 2 on the WHOQOL-BREF were not correlated with age ($\rho = 0.169$, $P = .114$) or the number of falls in the past 12 months ($\rho = -0.064$, $P = .550$).

DISCUSSION

Our participants reported high satisfaction in all domains measured by the WHOQOL-BREF and overall satisfaction with life and satisfaction with their health. We found significant correlations between scores on the performance-based outcome measures and overall life satisfaction for community-dwelling older adults. Individuals who scored higher on the CB&M and FGA reported higher levels of life satisfaction. Scores on the patient-reported outcome measures were also significantly correlated with overall life satisfaction. Individuals who reported high balance confidence on the ABC or low fear avoidance behavior on the FFABQ reported higher levels of life satisfaction.

To our knowledge, this is the first study to examine the relationships between scores on high-level mobility performance-based outcome measures and overall QoL in this population. Previous studies have demonstrated a weak association or no association between physical performance measures and QoL in community-dwelling older adults. However, the performance measures used may not have been sensitive enough to detect subtle changes in balance and mobility in this population. Alexandre et al[33] examined the relationship between performance-based tests and QoL in community-dwelling older adults. Participants completed the Functional Reach Test (FRT), TUG, single-leg stance, and 6-minute walk test. They reported no correlations between the performance-based outcome measures and scores on the WHOQOL-BREF. However, their results indicated a ceiling effect for the balance and mobility tests, as the average scores for the FRT and TUG exceeded norms and cut-off scores for each measure. In our study, we measured physical function with outcome measures that assess higher-level balance and gait tasks and found a positive relationship between scores on the outcome measures and all domains of QoL except social relationships.

Our study also demonstrated that community-dwelling older adults who score higher on the CB&M and FGA report higher satisfaction with health and higher QoL scores for the physical health domain of the WHOQOL-BREF. In contrast, Bjerk et al[15] measured functional performance using the Berg Balance Scale (BBS), gait speed, and 30-second sit-to-stand test and correlated these measures with health-related QoL. The only correlations they found were between gait speed and BBS scores and the physical component scale of the SF-36. Other studies have shown that gait speed[7] and patient-reported locomotion function[5] are positively correlated with health-related QoL.

Interventions to improve physical function in community-dwelling older adults may improve QoL.[34] Our results suggest that QoL should be considered when providing physical interventions for community-dwelling older adults with low scores on the FGA or CB&M. Future research should examine whether interventions to improve performance on high-level mobility tasks will improve QoL in community-dwelling older adults.

Previous studies have reported a relationship between falls and health-related QoL. Stenhagen and colleagues[35] reported lower health-related QoL scores in community-dwelling older adults with a history of at least 1 fall compared with those who had not fallen, and that trend remained after a 6-year follow-up. Chang et al[36] demonstrated a relationship between falls in the past 12 months and health-related QoL. Having a history of falls appears to have the strongest correlations with the physical domain of QoL.[33,36] In contrast, we found weak, nonstatistically significant correlations between the number of falls experienced in the past 12 months and overall satisfaction with life, overall satisfaction with health, or QoL measured in the physical health, psychological, social relationships, and environment domains of the WHOQOL-BREF.

Our findings support reports from previous studies that suggest community-dwelling older adults who report fear of falling have lower health-related QoL.[15,36,37] Participants

with high FFABQ scores had lower QoL scores in the physical health, psychological, and environment domains. Our results are in concordance with Chang et al,[36] who noted that fear of falling was correlated with mental and physical component scales on the SF-36 for health-related QoL regardless of the individual's fall history. In other studies involving community-dwelling older adults who fall, high fear of falling is associated with almost all of the components of the SF-36[15] and EQ-5D.[37] Similar to our findings, Alexandre and colleagues[33] found that older adults with self-reported fear of falling scored lower in the psychological and environment domains on the WHOQOL-BREF. In our study, the overall QoL was lower in all domains except social relationships for participants who demonstrated fear of falling avoidance behavior. We found that FFABQ scores also had strong correlations with overall satisfaction with health and the WHOQOL-BREF physical domain scores. Since fear of falling has a negative relationship with QoL, interventions aimed at reducing fear of falling in community-dwelling older adults may also improve QoL. Future research to evaluate the efficacy of interventions to reduce fear of falling should also include QoL outcomes.

To our knowledge, this is the first study to examine the relationship between scores on the ABC and QoL in community-dwelling older adults without specific chronic health conditions. As indicated by their score on the ABC, individuals who demonstrated high balance confidence had higher levels of health-related QoL. Quality-of-life outcomes should be considered in future studies that examine interventions to improve balance confidence.

Participants in the Veterans Affairs Normative Aging Study demonstrated a curvilinear relationship between age and life satisfaction, with life satisfaction peaking at age 65.[38] However, they found individual variability and noted that extroverted participants reported less decline in life satisfaction as they age. In our study, age was not correlated with overall life satisfaction, health-related QoL, or the physical health, psychological, social relationships, or environment domains of the WHOQOL-BREF. These findings are consistent with other studies that have demonstrated that QoL does not decrease as one ages, a phenomenon that has been termed the "paradox of well-being."[39] Tseng and colleagues[39] demonstrated that age was not associated with health-related QoL, and QoL in the psychosocial domain actually increased with age. Other studies have found that age-related declines in QoL were most significant for participants with depression[4,16] or a diagnosis of at least 2 chronic health conditions.[40]

There are limitations to the current study. First, ours was a sample of convenience, and participants reported high satisfaction in all of the domains measured by the WHOQOL-BREF as well as overall satisfaction with life and satisfaction with their health. Social support from family or friends is associated with high QoL.[8] Our participants may have been more active in their community or had strong social relationships since one of the recruitment methods was via advertising with churches and community service organizations. We strove to recruit a diverse sample by recruiting participants in 3 geographically distinct communities. However, a random sample of community-dwelling older adults may yield higher variability in WHOQOL-BREF scores. Second, QoL may decrease with increasing physical disability.[6] Our inclusion criteria purposefully selected for participants with minimal disability. However, we still found that participants with lower scores on performance-based mobility tests reported lower QoL. We excluded participants with cognitive impairment. Outcomes may be different for older adults with mild cognitive impairment.[16] Finally, some studies have demonstrated that older adults with depression[4,16] or chronic health conditions[40] have low QoL scores. We did not screen for depression or chronic health conditions in our participants and cannot determine whether there would have been correlations between these factors and QoL in our sample. Further research is needed to determine whether community-dwelling older adults who report low QoL and fear of falling have decreased overall activity levels, which could place them at risk for future falls.

CONCLUSIONS

Community-dwelling older adults reported high satisfaction in all domains of the WHOQOL-BREF. No differences were observed between fallers and nonfallers in QoL measures, and QoL was not associated with age. Performance-based outcome measures that assess high-level mobility such as the CB&M and FGA are positively correlated with the physical health domain on the WHOQOL-BREF. Patient-reported outcome measures for balance confidence and fear of falling avoidance behavior such as the ABC and FFABQ are also correlated with the physical health, psychological, and environment domains on the WHOQOL-BREF. Interventions to decrease fear of falling or improve high-level mobility may improve QoL in community-dwelling older adults.

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