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Predictors of Health Related Quality of Life in Adults 50 Years and Older

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: Short Form 12; Geriatrics; Cardiovascular tness; Gait; Balance; Physical function

I

By 2030 the population of Americans age 65 and older is projected to double to 71 million [1]. e rapid growth of this demographic group has important public health implications, and will place signi cant demands on services o ered to this group, as well as on the nation's entire health care system. As life expectancy increases, the goal of improving the additional years in spite of the cumulative health e ects associated with normal aging, requires consideration of the quality of life experienced with age. As a result, quality of life has become an increasingly important outcome of interventions and research targeting the aging population. Perceived health related quality of life

participation subjects read and signed a consent form approved by the university's Institutional Review Board for Protection of Human Subject Participants.

Sixty-four freely living participants between the ages of 53 and 94 participated in this investigation. Participants were recruited by advertisement in various newsletters serving older adults in the

Self-reported physical activity was assessed using the Physical Activity Scale for the Elderly (PASE) [13]. e PASE is a self-administered, 7-day recall questionnaire speci cally designed for older adults. e PASE collects information related to leisure-time, household, and work related physical activity. Activity is weighted as being light, moderate, or vigorous and participants indicate the frequency of participation as never, seldom (1-2 days per week), sometimes (3-4 days per week), or o en (5-7 days per week). Duration is recorded as 1 hour, 1-2 hours, or more than 4 hours. e total PASE score is computed by multiplying time spent in each activity by the weight or intensity and then a sum for all reported activities is generated.

A er completing the questionnaires participants completed a series of tests designed to assess di erent domains of physical function including cardiovascular tness, muscular strength, balance, and gait. Completion of all questionnaires and measures took each subject approximately 90 minutes.

Cardiovascular tness was assessed using the 6 Minute Walk Test (6MWT). e 6MWT was performed in a tiled hallway using a marked 30-meter walkway according to the procedures described by the merican oracic Society [14,15]. Total distance walked or 6 minute walk distance (6MWD) during the test was used as the outcome measure for this test.

Muscular strength of the upper extremities was assessed by measuring grip strength and of the lower extremities by measuring power during bilateral leg extension (leg press). Grip strength was assessed in both hands using an adjustable, hand-held, hydraulic grip strength Jamar dynamometer (Sammons Preston Roylan, Chicago, IL). Each subject stood holding the arm to be tested with the elbow exed at 90°. e dynamometer was then be tted to the participants' hand such that the rear part of the dynamometer was snug against the base of the thumb and the front edge of the adjustable part of the grip was exactly in line with the second joint of the middle nger. e participants' forearm was turned out so that the palm was facing up and the wrist was straight [16]. e subject then squeezed the dynamometer as hard as possible and held it for one second. e subject completed three trials of this measure in each hand separated by at least a 30-second recovery period.

e average of the three trials for the dominant hand was used for data analyses. Power during the leg press was assessed using Keiser Air 300 leg Press machine. Prior to assessment of power, participants were positioned on the machine such that their hips, knees, and ankles were all at 90°. Starting at a very low resistance, participants were asked to press both legs out and then provide a rating of di culty using the 0-10 Borg Rating of Perceived Exertion (RPE) scale. Resistance was then increased during repeated bouts (interspaced by 30 seconds or rest) until RPE reached seven on the scale. Resistance was then increased to 125% of that recorded with an RPE of seven. Participants were then asked to complete six repetitions of leg press as hard and as fast as they could. Power (lower extremity Power) and force (lower extremity Force) during the leg press was then calculated by averaging the maximal power and force recorded during each of the repetitions for the dominant leg.

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e SPPB examines three areas of lower extremity function including static balance, gait speed, and getting in and out of a chair [17]. To assess static balance the participant stood in three progressively challenging standing postures (side by side, semi-tandem, and full tandem) for up to 10 seconds. To assess gait speed the participant was asked to walk at his or her comfortable speed across a 4-meter distance. To assess the participants' ability to get in and out of a chair, the subject was asked to stand from a standard chair without upper extremity assistance ve times. e time it took for the subject to complete ve chair stands was recorded. From this battery of tests a composite score (ranging from 0 to 12) based on performance was calculated and used for the analysis.

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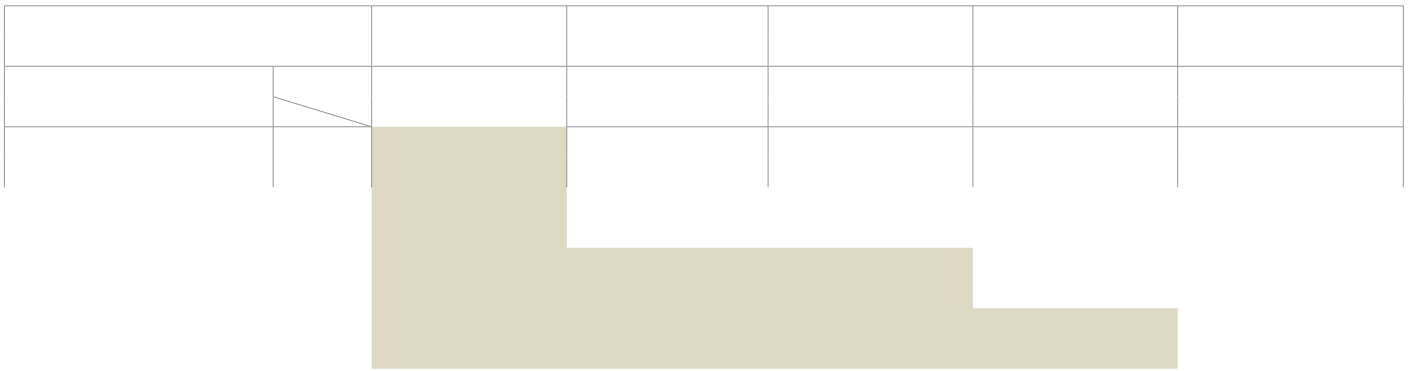

(BMI), 6 Minute Walk Distance, SPPB Score, Lower Extremity Power, Gait Speed, Vestibular ESA, and PASE. PCS was also correlated with Functional Ambulation Pro le, while WHO- Physical Health was also correlated with Lower Extremity Force and Self-Esteem. e WHO- Psychological Health was correlated with 9 independent measures including Prescription Medications, Number of Diseases, 6 Minute Walk Distance, SPPB Score, Gait Velocity, Visual ESA, Somatosensory ESA, Vestibular ESA, and Self-Esteem. In comparison, the MCS (correlated with 5 measures), WHO-Environ (correlated with 6 measures), and WHO-Social (correlated with 2 measures) were correlated with far fewer independent measures. Number of diseases, SPPB score, and Self-Esteem appeared to be the most valuable independent measures since they were correlated with 5 of the 6 dependent measures. e results of stepwise regression analyses for all dependent measures are summarized in Table 5. e strongest predictive equation was produced for WHO-Physical Health where Number of Chronic Diseases, Prescription Medications, and SPPB Score entered into the model producing an r^2=0.60 (adjusted r^2=0.58). For PCS, Prescription Medications and SPPB Score entered into the model and produced an r^2=0.43 (adjusted r^2=0.41). In a similar fashion, the model for WHO-Psychological Health included Self Esteem, Number of Chronic Diseases, and Vestibular ESA producing a r^2=0.58 (adjusted R^2=0.56). e models for MCS, WHO-Environment, and WHO-Social Relationships were much weaker producing r^2's of 0.30 (adjusted r^2=0.27), 0.22 (adjusted r^2=0.20), and 0.16 (adjusted r^2=0.13), respectively.

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In this investigation, PCS and MCS of the SF-12v^2 were not correlated with each other while all of the domains of the WHOQOL-BREF were found to be at least moderately correlated with each other. e reliability and validity of each of these measures has been well established in numerous disease populations [9,10,19-21]. Original work with the WHOQOL-BREF indicated that all four of the domains make a signi cant contribution in explaining overall HRQoL and general health [10]. Both of these questionnaires take a relatively short time to complete. Since both measures address overall HRQoL, the results of this investigation suggest that the SF-12v^2 may evaluate a greater spectrum of HRQoL than the WHOQOL- BREF. As a consequence, the practitioner may gravitate to use of the SF-12v^2 if they

SPPB test evaluates power (chair rise) and gait speed along with static balance (tandem stance). As a consequence, it is possible that the SPPB score masked the value of the more direct tools used to evaluate power, gait speed, and balance in predicting HRQoL.

Interestingly, Vestibular ESA entered into the predictive equations for WHOQOL Psychological Health and Social Relationships. Dysfunction of the vestibular system and the secondary impact on balance have been previously associated with reductions in measures of overall HRQoL, so the results of this investigation are somewhat consistent with previous ndings. In fact, greater sway area while standing has been shown to be positively associated with greater levels of psychosocial variables like apathy in older adults with Parkinson's disease [26]. It remains unclear why Vestibular ESA was valuable at predicting WHOQOL Psychological Health and Social Relationships but was not valuable at predicting measures of HRQoL in the physical domain. It is also not clear why Vestibular ESA is valuable at predicting HRQoL, but the other measures of balance are not. Humans rely primarily on the somatosensory and visual systems to maintain their balance while using the vestibular system mainly to resolve con icting sensory input from the other two systems. Inability to use the vestibular system e ectively to maintain balance could indicate increased reliance on the other two systems. Decreases in visual and proprioceptive acuity are o en associated with aging. An alternative possibility that cannot be addressed by the design used in this investigation is the relationship between vestibular function, hearing loss, and HRQoL [27]. As a result, the potentially unique contribution of vestibular function on HRQoL needs to be further examined.

e 6 minute walk test (6MWT) is an extraordinarily common measure used to assess physical function. It has been well established as a valid and reliable measure [14,15]. Six minute walk distance

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