

PSYCHOMETRIC MEASUREMENT OF PHYSICAL
PERFORMANCE IN OLDER ADULTS

by

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Thesis submitted to the faculty of the
Virginia Polytechnic Institute and State University
in partial fulfillment of the requirements for the degree of

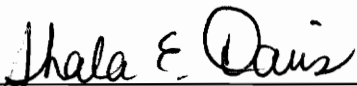
MASTER OF SCIENCE

in

Education

Health/Physical Education

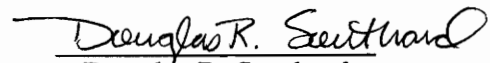
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April, 1996

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Key words: aging, activities of daily living, physical performance tests,
Veteran's Specific Activity Questionnaire, Yale Physical Activity
Survey

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(ABSTRACT)

This investigation examined the ability of the self-reported Veterans Specific Activity Questionnaire (VSAQ) and the Yale Physical Activity Survey (YPAS) to predict an individual's performance on a timed walking assessment. Twenty subjects 65 years of age and older (73.5 ± 4.8) volunteered for the study. There were 13 women and nine men. Subjects participated in an individual interview in which the VSAQ and the YPAS were administered. The subjects then participated in a timed 25 meter walking test (16.5 ± 2.5). The 25 meter walking test was given twice and the times for each individual were averaged. Descriptive analysis of the YPAS demonstrated that the predominant reported level of energy expenditure was used for work activities ($50\% \pm 18.4$). The least amount of calories for the entire group was expended in caretaking with a mean percentage of $3.3\% (\pm 6.1)$. Exercise was the second highest calorie expending category with $21.9\% (\pm 14.0)$ of total calories. However, recreational activities were a close third with a mean of $17\% (\pm 19.0)$. Yard work represented $7.8\% (\pm 7.8)$ of total calories. The mean score for the VSAQ was $7.4 (\pm 3.4)$. The regression analysis demonstrated that age, gender, and VSAQ score were significant predictors of physical performance on the walking test ($p < 0.05$) ($\text{Time} = -1.78 + 0.274 \text{ Age} + 2.22 \text{ Gender} - 0.366 \text{ VSAQ}$). The r-squared value for this was 62.5%. Performance time was significantly predicted by adding the selected values from the YPAS (exercise and work) and the value from the VSAQ ($\text{Time} = 18.5 - 0.566 \text{ VSAQ} + 0.0568 \% \text{ Exer} + 0.0350 \% \text{ Work}$). The r-squared value for this was 52.6%. There was also a significant correlation ($p < 0.05$) between age, time, and

performance ($r^2=0.5$). Therefore, the VSAQ appears to be an alternative assessment tool for physical activity in this selected elderly population.

ACKNOWLEDGMENTS

I would like to thank my committee members: Dr. Shala E. Davis, Dr. William G. Herbert, and Dr. Douglas R. Southard for their input, encouragement, and support they have given me throughout my research. I would especially like to thank Dr. Shala “Sunshine” Davis for her continual support, dedication, hard work, and her vast amount of knowledge. It is a true talent to be so encouraging and provide a truly positive experience in a long, often frustrating process.

I extend a huge thank you to my parents. Mom, without your continual encouragement, love, pride, and belief in me I would not be where I am today. Dad, thank you for your confidence in me. Dennis, thank you for being a solid pillar in my foundation.

I thank all of those individuals who helped collect my data: DeJuana Bowers, Megan Brenner, Laurie Bullock, Laura Craft, Lauren Jabour, and LeaAnn Fritsch. I would like to thank Rick Davis and Bill Aschenbach for their continual support, listening, and jokes to make me smile when the going got tough. Rick, you have definitely made my two years of graduate school a little bit funnier and a lot more bearable. A special thank you goes to Julie Felix for her continual support, jokes, laughter, stress relief, and for the use of her laptop computer when we were on the road. “I know your alone!” A special thank you goes to John Hile, Dipi Bhaya, and Katrina Silva for their understanding and support.

Finally, I would like to thank my counterpart in crime, Marcia Walker. Without your continual, unconditional support and ceaseless encouragement, this project would not be what it is. Your unending positive remarks, laughter, and finally, “Just suck it up and do it” had more effect on me than you know. You have been a integral part of my success as a graduate student and in my completion of this project.

TABLE OF CONTENTS

	<u>Page</u>
ACKNOWLEDGMENTS	iv
LIST OF TABLES	vii
I. INTRODUCTION.....	1
Statement of the Problem.....	2
Research Hypothesis.....	3
Significance of the Study.....	3
Delimitations.....	5
Limitations.....	5
Basic Assumptions.....	6
Summary.....	6
II. REVIEW OF RELATED LITERATURE	
Introduction.....	7
Questionnaires Created for Assessing Functional Capacity.....	7
The New York Heart Association Classification System.....	8
The Canadian Cardiovascular Society.....	9
The Specific Activity Scale.....	10
The Duke Activity Status Index.....	11
Veteran's Specific Activity Questionnaire.....	11
Structured Interviews for Assessment of Physical Capacity.....	12
Yale Physical Activity Survey.....	13
Physical Performance Assessment.....	14
Strength Performance Assessment.....	15
Balance Performance Assessment.....	15
Summary.....	16
III. JOURNAL MANUSCRIPT	
Abstract.....	17
Introduction.....	19
Purpose.....	19
Methods.....	20
Statistical Analysis.....	22
Results.....	22
Discussion.....	24
References.....	32
IV. CONCLUSIONS AND RECOMMENDATIONS	
Summary.....	34
Research Implications.....	37
Recommendations for Future Research.....	40
Implications for Clinical Practice.....	41

BIBLIOGRAPHY.....	43
APPENDIX A: Methodology.....	45
APPENDIX B: Informed Consent.....	49
APPENDIX C: Raw Data.....	53
APPENDIX D: Subject Data Sheet.....	59
APPENDIX E: VSAQ Data Sheet.....	61
APPENDIX F: YPAS Interview and Data Sheet.....	63
VITA.....	69

LIST OF TABLES

<u>Table</u>		<u>Page</u>
1:	Description of Characteristics for Subjects.....	28
2:	Activity Energy Percent Expenditure Values from the YPAS.....	29
3:	Descriptive Characteristics for Low Performance Group (n=9).....	30
4:	Descriptive Characteristics for High Performance Group (n=11).....	31

CHAPTER 1

INTRODUCTION

Aging is a natural, inevitable process. In fact, in the United States, the elderly represent the fastest growing subset of the population. It is estimated that by the year 2000, over 30 million Americans, or 13% of the population, will be 65 or older (Healthy People 2000). Unfortunately, the understanding of how aging effects physical activity capabilities as well as common daily activities is obscure. Our understanding of the aging process is complicated by a decline in physical activity, the aging process itself, neural and morphological changes, as well as degenerative diseases.

Currently, the national health objectives for the year 2000, has set goals to increase the years of healthy life, with a full range of functional capacity (or mobility) at each stage of life (Healthy People 2000). As the population continues to age and due to the limited amount of research about the aging process, one can expect a decreased ability to perform daily activities, an increase injuries, and an increased dependence on loved ones in an elderly individual. Assessment of an elderly individuals capability for physical activity appears warranted.

To effectively evaluate an elderly individual, a functional evaluation is commonly included in the traditional clinical examination. Functional capacity, for this study is defined as mobility. Therefore, with a decrease in mobility, there is a decrease in functional capacity, as well as a decrease in activities of daily living. Often a decrease in mobility is due to a disability such as arthritis or osteoporosis. Disability can be accurately identified through responses to a wide variety of questions about self-care and physical activity. In addition, there are a vast amount of physical performance tests such as a

walking test, gait initiation, step length, standing on toes and placing foot on the seat of a chair which can also predict functional status (Guralnik et al.).

Statement of the Problem

The current literature suggests various methods for assessing activity in the elderly. Although there are no gold standards for measuring quality of life, there are approximately 40 different questionnaires used today (Elam et al). In addition, there are an array of physical performance tests used to assess physical ability.

Unfortunately, there are limitations to all the current methodology assessing activity in the older adult. For example, the interviewing process is timely and requires a trained interviewer. Also, most interviews rely heavily on recall which may not always be accurate. Too, some older adults may not be cognitively aware for an interview process due to medications, mental state, or vision.

On the other hand, physical performance tests also have their disadvantages. For example, to administer many physical performance tests adequate space and special equipment may be required. The examiner must also take into consideration the possibility for potential injury. Too, simple assessments may not accurately reflect performance on complex tasks or adaptations to environment in daily life (Guralnik et al.).

Research indicates that disability can be accurately identified through responses to a wide variety of questions about self-care and physical activity. Assessment of mobility or functional status can accurately identify disability especially when the activity is timed (Guralnik et al.). A decrease in an individual's mobility suggests a decrease in the ability of an individual to perform certain activities of daily living. Studies have also demonstrated that there are a vast amount of physical performance tests which can also predict functional status. Therefore, the purpose of this study was to compare the self-reported capabilities using the Yale Physical Activity Survey for Older Adults and the Veterans Specific Activity

Questionnaire interviews to the results of a 25 meter walking physical performance test.

Research Hypothesis

Ho1: There is no relationship between the self-reported responses on the Yale Physical Activity Survey for Older Adults between the low and high physical performance groups.

Ho2: There is no relationship between self-reported responses on the VSAQ Questionnaire between the low and high physical performance groups.

Significance of the Study

For over twenty-five years, functional assessment of elderly patients has been a focus of research. However, functional assessment is often difficult because no “gold standard” exists. In fact, there are over 40 scales which measure activities of daily living. Accurate physical functional assessment is significant to diagnosing changes in health status in the elderly. Some common goals for use of functional assessment include: establishing a baseline description, screening for risk factors or undetected problems, assisting in diagnosis, setting rehabilitation goals, and monitoring the patients clinical course.

Physical function can be measured using several different methods. An individual may be asked to answer questions via an interview or questionnaire regarding his/her level of performance or activities of daily living. A second method is through direct observation of designated physical performance tasks. Both methods are commonly used during a functional evaluation in the traditional exercise evaluation process. Unfortunately, neither method is without limitations. For example, the physical performance tests often do not take into account biomechanical adaptations individuals make to overcome physical

impairment. Likewise, self-reported activity may be over estimated or responses may not be an accurate assessment of the individuals true ability.

Not surprisingly, there is a significant amount of research concerning activities of daily living questionnaires and physical performance tests. However, due to a wide variety of questionnaires and physical performance tests and the rapidly increasing elderly population, there is a continued demand for research that examines methodologies. Previous research supports the need for the investigation of activities of daily living questionnaires as a predictor of physical performance in the elderly.

The Yale Physical Activity Survey for Older Adults (YPAS) is a frequently utilized method of evaluating quality of life as defined by physical function. This particular survey was designed for measuring current physical activity among older individuals. Dipietro et al. concluded that the YPAS was reliable ($r^2=.65$) and valid for several physiological variables that were assumed to reflect physical activity. The researchers suggest that the questionnaire be tested in variety of older populations to establish its generalizability. In addition, the investigators recommend establishing the value of the YPAS in assessing low intensity activity in the elderly. Unfortunately, the YPAS requires a trained interviewer, recall and significant time.

The Veterans Survey Activity Questionnaire(VSAQ) is another possible methodological tool for assessing physical capabilities in older adults. The VSAQ does not require a trained interviewer nor does it use recall. The VSAQ contains activities listed according to sequential MET values (Myers, Do, Herbert, Ribisl & Froelicher, 1994). The individual is asked to draw a line under the activities he/she can perform without symptoms or undue fatigue.

There are also a wide variety of physical performance tests. The most commonly used tests are balance, walking, and strength assessments.

Guralnik et al. found that performance measures of functioning which time an activity or count repetitions offer the most advantages (6). In fact, Guralnik et al. report that using a timed measured walk gives information on ability with time serving as an indicator for the amount of difficulty (6). Dorevitch et al. used a timed 50 meter walking test to assess mobility (4). Similarly, Elam et al. evaluated mobility by using a timed 25 meter walking test (5). In addition, Winograd et al. conducted a timed walking test for measuring physical performance (18).

The YPAS, the VSAQ, and various physical performance tests have been studied individually to assess their potential to evaluate physical abilities. However, the present study's purpose is to examine whether any relationship exists between the questionnaires and the physical performance tests.

Delimitations

1. Subjects were 11 members from the Warm Hearth retirement community and 9 patients enrolled in the Virginia Tech Cardiac Therapy and Intervention Center.
2. Independent variables were weight and disease state.
3. Dependent variables included the calculated total kcal values and the MET level reported on the VSAQ, and the time on the 25 meter walk.

Limitations

1. The results are specific to the YPAS and VSAQ interviews.
2. The results are specific to individuals over the age of 65 who are relatively disease free and ambulatory.

Basic Assumptions

1. Subjects correctly assessed their functional capacity on the VSAQ.
2. Subjects responded to the YPAS with accurate hourly estimations of their work, yard work, caretaking, exercise, and leisurely activities.
3. Subjects walked briskly for the walking test, not slower than they could walk.

Summary

The fastest growing subset of the American population is the elderly. The knowledge of the aging process, physical activity status and functional capacity of the older adult is limited. Therefore, research investigating the impact of the aging process on physical activity, mobility, disability and functional capacity is a necessity.

Currently, there are many questionnaires used to assess the physical activity level in the older adult. Unfortunately, most of these questionnaires must be administered by a trained individual and most require a substantial amount of time. Too, there may be language barriers as well as cognitive, hearing and visual impairments.

In addition to the questionnaires, many professionals use physical performance tests to assess physical functioning. These tests often require a large amount of space, trained individuals, special equipment, and the potential for injury.

The purpose of this study was to find an easily administered method accurate for predicting how an elderly individual would perform in a 25 meter walking test. The VSAQ and YPAS were used to assess the physical capabilities of older adults.

Chapter II

Review of Related Literature

Introduction

The literature which is relevant to the topics researched is presented in two major sections. The initial section summarizes various methods which predict functional capacity. These methods include questionnaires and interviews which were created and used for the assessment of physical function and activities of daily living. The second section examines several popular physical performance tests commonly used for assessing functional capacity and disability. Although there are a variety of interviews and questionnaires related to activities of daily living (approximately 40), there has been very little research conducted finding these interviews valid and reliable.

Questionnaires Created for Assessing Functional Capacity

For over twenty-five years, functional assessment of the elderly population has been the focus of research. However, functional assessment is often difficult because no “gold standard” exists (Dipietro et al., Dorevitch et al.). Frequently, the graded exercise test (GXT) is used to assess functional capacity. Although the GXT is the most accurate means for assessing disability and functional capacity, it is costly and requires the use of expensive equipment and trained individuals. Therefore, there is a need for an inexpensive, yet accurate means for assessing functional capacity and disability. The activities of daily living questionnaires were developed precisely for this reason. In fact, there are over 40 scales which measure activities of daily living. Accurate physical

functional assessment is significant to diagnosing changes in health status in the elderly. Some common goals for use of functional assessment include: establishing a baseline description, screening for risk factors or undetected problems, assisting in diagnosis, setting rehabilitation goals, and monitoring the patient's clinical course (Applegate et al.).

Physical function can be measured using several different methods. An individual may be asked to answer questions via an interview or questionnaire regarding his/her level of performance or activities of daily living. A second method is through direct observation of designated physical performance tasks. Both methods are commonly used during a functional evaluation in the traditional clinical examination. Unfortunately, neither method is completely accurate. For example, the physical performance tests often do not take into account adaptations individuals make to overcome physical impairment. Likewise, self-reported activity may be over estimated or responses may not be an accurate assessment of the individuals true ability(Winograd et al.).

Not surprisingly, there is much research concerning activities of daily living questionnaires and physical performance tests. However, due to the wide variety of questionnaires and physical performance tests and the rapidly increasing elderly population, there is a continual demand for research in this area. Previous research supports the need for the investigation of activities of daily living questionnaires as a predictor of quality of life and physical performance in the elderly.

The New York Heart Association Classification System

The search for a quick, reliable, and accurate measurement for functional capacity has evolved over the past several years (Myers et al., Califf et al.). The New York Heart

Association was the first to develop a functional classification system. This methodology separated patients into one of four categories according to the degree of symptoms (angina, shortness of breath, undue fatigue) experienced while participating in “ordinary” or “less than ordinary” activity (Myers et al.). The four functional categories range from completely asymptomatic regardless of activity (Class I) to symptomatic at rest and worsening with activity (Class IV). Certain MET levels were commonly associated with each category. They are as follows: Class I > 7 METs, Class II = 5-6 METs, Class III = 2-4 METs, and Class IV = 1-2 METs.

Not surprisingly, this categorical system, being the first of its kind, remained in use for a long period of time. Unfortunately, this system had several limitations (Myers et al.). First, the categories were very general. Second, the correlation between the categorical system and direct measures of functional capacity is ambiguous. Lastly, the patients and physicians often disagreed on classification, which resulted in patients being misclassified.

Canadian Cardiovascular Society (CCS)

Later, a second classification system was developed by the Canadian Cardiovascular Society (CCS). This system was designed to improve the reproducibility of classification by independent observers and establish a consistent grading scale for angina pectoris (Circulation, 1976). While there are similar features when comparing the CCS to the NYHA, the CCS uses more detailed terminology in its classification categories. Each category uses specific references to physical activity (walking, climbing stairs, walking uphill), environment and emotions which enables a more accurate assessment of the patient’s activity level.

Specific Activity Questionnaire (SAS)

Next, Goldman et al. developed a Specific Activity Scale (SAS) which classifies patients according to cardiac functional class using metabolic equivalents or METs. Specifically, the SAS was developed to improve the reproducibility and validity of the NYHA and CCS classification systems (Goldman et al.).

The SAS consists of the estimation of metabolic costs for a variety of occupational, housework, personal care, and recreational activities. These activities and their appropriate MET values were organized into a self - administered questionnaire. There was also an additional set of criteria which defined each of the four functional classifications.

The patient was considered to successfully perform the metabolic equivalents of a functional class if the patient could complete any activity listed on the questionnaire regardless of symptoms. If the patient could not complete any of the activities at a particular MET level on the questionnaire due to symptoms, fear of symptoms, or other limiting factors, the patient was considered unable to work at that functional classification and MET level.

Validity for the SAS as a predictor of functional capacity was tested using the treadmill and the Bruce protocol. A significant correlation ($r=0.66$) was found between the METs derived by the SAS and the MET level predicted using the speed and grade of the treadmill (Goldman et al.). The SAS proved to be advantageous due to the fact that the SAS asks standardized questions related to specific activities that an individual can perform. A comparison is then made using these particular responses with the actual ability to exercise (Goldman et al.).

The SAS marked the first assessment which actively used the patient's perspective on the ability to engage in physical activity, rather than depending on an accurate physician diagnosis. Virtually all of the research following the development of the SAS in which the classification of functional capacity was investigated, used some variation of the SAS format.

The Duke Activity Status Index (DASI)

The Duke Activity Status Index (DASI) was soon developed after the SAS. The DASI originally emerged as a brief, self administered questionnaire which predicts functional capacity in any individual regardless of disease state (Hlatkey et al). The DASI was an expanded version of the SAS which included such activities as personal care, household tasks, sexual function, ambulation, and a wide variety of recreational activities. Primary construction of the DASI took into account the relationship of activity items with maximal oxygen uptake and data from previous studies (Goldman et al.) indicating those activities best representing different areas of physical functioning. Stepwise multiple regression analysis was used to determine which activities best correlated with maximal oxygen uptake.

Veteran's Specific Activity Questionnaire (VSAQ)

The most recent research enhancing the prediction of functional capacity from a questionnaire was done by Myers et al. The creation of the questionnaire centered around and was specific to the veteran population and was named the Veteran's Specific Activity Questionnaire (VSAQ). The questionnaire is self - administered and consists of a list of

specific activities which are increasing difficult in MET levels (from 1 to 13 METs). The MET values used in the VSAQ were obtained from various sources.

Two hundred and twelve subjects were instructed to determine the activities they could perform without undue fatigue, angina, or shortness of breath. Maximal oxygen uptake was estimated using the VSAQ and an individualized ramp protocol. Maximal functional capacity was determined by estimation based on a standard equation from treadmill speed and grade values at the highest exercise stage. A correlation coefficient of 0.79 ($p < 0.001$) was noted between mean maximal MET value predicted by the VSAQ and the actual achieved value on the treadmill.

Structured Interviews for Assessment of Physical Capacity

The use of interviews improves the accuracy of predicting functional capacity in both healthy and diseased individuals. There are several possible hypothesis for this. First, the interviewer is able to improve on the specificity of questions and responses. The interview also provides a structured environment. This reduces distractions as well as encourages concentration and thought to answers given. However, there are limitations. Time requirements needed for the interview process, as well as medications which effect cognition and language barriers are all limitations with the interview process.

The initial study which examined the accuracy of the interview process in assessing physical functioning was a study done by Goldman et al. Both the SAS and the CSS were used to estimate the MET level or physical function of the subjects. Each subject was interviewed twice, before the GXT, by two separate trained interviewers. Physicians assessed the functional classification of each individual using the NYHA before the GXT.

The authors concluded that the CSS and the SAS functional classifications were reproducible approximately 73% of the time, while the NYHA was only reproducible 56% (Goldman et al.). Goldman and associates concluded that the greater validity of the SAS when compared to the CSS and NYHA mostly due to the fact that the SAS uses a predetermined set of questions about activity level.

Lee and associates studied the SAS in addition to an interview as a method for predicting functional capacity in those with CAD. The research primarily focused on the correlation between maximal oxygen uptake (VO₂ Max) and classification category. Two separate interviewers, trained and untrained administered the SAS. Results showed that the interviews had a high inter-rater reliability(81%). In addition, regression analysis showed a strong correlation between maximal oxygen uptake and SAS classification ($r^2=0.75$, $P<0.0001$). The investigators concluded that self-reported activities of daily living as measured by the SAS is highly reproducible regardless of the interviewer being trained or untrained. These conclusions and results support Goldman et al. findings that an interview is powerful in predicting physical function or functional capacity.

The Yale Physical Activity Survey (YPAS)

A common structured interview used to measure physical activity among older adults is the Yale Physical Activity Survey (YPAS). This particular survey was designed for measuring current physical activity among older adults. The YPAS is divided into five separate categories. These categories are: work (cooking, vacuuming, laundry, and dishwashing), yard work (raking, gardening, shoveling), caretaking (pushing a wheel chair/stroller, lifting), exercise (walking, biking, swimming), and recreation (leisurely

walking, knitting, and dancing). The participant is asked to estimate the amount of time spent in a particular activity during a typical week in the past month. The hours are then converted into minutes and multiplied by a designated weighted score for that particular activity. At the end of the survey, questions take into consideration differences in activity due to seasonal changes. The total calories from each category are then added together to obtain a total caloric expenditure on a weekly basis. The total can then be multiplied by the weighted answers to the seasonal questions to obtain seasonal differences in calorie expenditure.

Unfortunately, most physical activity survey's were designed for younger populations and are not sensitive enough to accurately represent the range of activities in which the older population participates. The development of an interview such as the YPAS was a necessity. Dipietro et al. concluded that the YPAS was reliable and valid for several physiological variables that were assumed to reflect physical activity. The researchers suggest that the questionnaire be tested in a variety of older populations to establish its generalizability. Too, the investigators recommend establishing the value of the YPAS in assessing low intensity activity in the elderly(Dipietro et al.).

Physical Performance Assessments

There are also a wide variety of physical performance tests. The most commonly used tests are balance tests, walking tests, and strength tests. Guralnik et al. found that performance measures of functioning which time an activity or count repetitions offer the most advantages. Some popular walking tests included: the Rockport walking test (estimates the distance walked in twelve minutes), a quarter of a mile walking test which is

timed, and a timed mile walk/run test. In fact, Guralnik et al. reported that using a timed measured walk gives information on ability with time serving as an indicator for the amount of difficulty. Dorevitch and associated used a timed 50 meter walking test to assess mobility. Similarly, Elam et al. evaluated mobility by using a 25 meter walking test. In addition, Winograd et al conducted a timed walking test for measuring physical performance. All the researchers and authors concluded a walking test is an accurate means for identifying disability and assessing physical functioning.

Strength Performance Assessments

A commonly used test for assessing strength is a chair test. Winograd et al. as well as Guralnik et al. used a chair test in which the individual was asked to rise from a chair five times while being rated by two investigators. In another study done by Guralnik et al., the chair test was used to determine lower extremity function. Elam et al. also used the chair test in the comparison of subjective ratings of function With observed functional ability.

Balance Performance Assessment

Frequently, a balance test is used to measure mobility and physical functioning. In fact, there are a number of balance tests. Guralink et al. investigated a balance test which assess' lower extremity function, mobility and physical functioning. The test consisted of three stances. The first stance consisted of placing the feet at shoulder length apart. If the first stance was held for ten seconds, the individual progressed to the second stance, which consisted of standing with the feet together for ten seconds. If the second stance was

mastered, the third stance consisted of standing in a semi-tandem fashion (the heel of one foot placed beside the big toe of the other foot) for ten seconds.

Scoring systems are as important to the investigation as is choosing an appropriated physical performance test. Most investigators and research correlated by using a 3-level scale rather than a more ambiguous pass-fail scale or a highly technical 4 or 5 level scale. Winograd et al. investigated a multi - level scoring system. In the balance test, a score of high (3) was given for completing all the stances (3), a score of medium (2) was given for completing two stances, and a score of low (1) , was given for the completion of one or none of the stances. For rising from a chair, high pass is scored only when subjects can stand up without using their arms. Medium is scored if the individual stands using one or two arms for assistance. A low score is designated for those individuals who need assistance to rise from a chair. The timed walk was scored as a standard deviation from the mean.

Summary

In summary, there has been much documentation and research on activities of daily living questionnaires and physical performance. However, no agreement has been reached on which methodological tool for a person's physical performance provides the most information with the fewest disadvantages. Various investigators have sought to strengthen the interview process by increasing the specificity of activities and analyzing their energy requirements. Many physical performance tests have also been investigated in an attempt to accurately assess function capacity, impairment, and activity level. Through the further investigation of activities of daily living questionnaires, interviews, and physical performance tests, an abundance of information can be gained about activity capabilities and the growing elderly population.

CHAPTER III
JOURNAL MANUSCRIPT
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(ABSTRACT)

This investigation examined the ability of the self-reported Veterans Specific Activity Questionnaire (VSAQ) and the Yale Physical Activity Survey (YPAS) to predict an individual's performance on a timed walking assessment. Twenty subjects 65 years of age and older (73.5 ± 4.8) volunteered for the study. There were 13 women and nine men. Subjects participated in an individual interview in which the VSAQ and the YPAS were administered. The subjects then participated in a timed 25 meter walking test (16.5 ± 2.5). The 25 meter walking test was given twice and the times for each individual were averaged. Descriptive analysis of the YPAS demonstrated that the predominant reported level of energy expenditure was used for work activities ($50\% \pm 18.4$). The least amount of calories for the entire group was expended in caretaking with a mean percentage of $3.3\% (\pm 6.1)$. Exercise was the second highest calorie expending category with $21.9\% (\pm 14.0)$ of total calories. However, recreational activities were a close third with a mean of $17\% (\pm 19.0)$. Yard work represented $7.8\% (\pm 7.8)$ of total calories. The mean score for the VSAQ was $7.4 (\pm 3.4)$. The regression analysis demonstrated that age, gender, and VSAQ score were significant predictors of physical performance on the walking test ($p < 0.05$) ($\text{Time} = -1.78 + 0.274 \text{ Age} + 2.22 \text{ Gender} - 0.366 \text{ VSAQ}$). The r-squared value

for this was 62.5%. Performance time was significantly predicted by adding the selected values from the YPAS (exercise and work) and the value from the VSAQ (Time=18.5 - 0.566 VSAQ +0.0568 %Exer + 0.0350 %Work). The r-squared value for this was 52.6%. There was also a significant correlation ($p<0.05$) between age, time, and performance ($r^2=0.5$). Therefore, the VSAQ appears to be an alternative assessment tool for physical activity in this selected elderly population.

INTRODUCTION

As the elderly population rapidly increases in the United States, there is a demand for knowledge about the aging process, activities of daily living, and physical functioning in the older adult.

Currently, there exists no “gold standard” for measuring activities of daily living and physical functioning. In fact, there are over 40 questionnaires in use today for assessing activities of daily living. However, evidence suggests that the observed decrease in physical activity with increasing age may be due to inaccurate measurement. This may be due in part to the fact that most questionnaires have been developed for younger populations and may not be sensitive enough for the variety of physical activities in which the older population engage.

In addition to the wide variety of questionnaires, there are also an array of physical performance measurements commonly known as activities of daily living. Often an assessment of physical functioning is included in a clinical evaluation. Many older individuals judge quality of life by their physical functioning, rather than their disease state or physician diagnosis. Physical function is often defined as mobility. With a decrease in physical function, or mobility, there is an increase in disability.

The purpose of this study was to determine if the self-reported answers to the Yale Physical Activity Survey for Older Adults (YPAS) and the Veterans Specific Activity Questionnaire (VSAQ) predict physical performance in individuals over 65.

METHODS

Subjects

Twenty subjects volunteered to participate in this study. Descriptive characteristics are presented in Table 1. Eleven of the subjects were from Warm Hearth Retirement Community in Southwest Virginia. The remaining nine were currently enrolled in the Virginia Tech Cardiac Therapy and Intervention program. Overall, there were seven men and thirteen women. All subjects were 65 or older with the oldest being 83. All subjects were ambulatory. For this study, ambulatory was defined as the ability to walk without using a cane or walker. Physical function or capacity was defined as mobility, or walking time. Subjects were included in the study after completing a PAR-Q and giving their informed consent as approved by the Human Investigations Committee at Virginia Polytechnic Institute and State University.

Experimental Protocol

Interviewing Process

Subjects attended an orientation session about the study in which all procedures were explained and questions were addressed. A half an hour individual interview was then conducted with each participant. The VSAQ and YPAS were completed during the interview process.

For the VSAQ, each subject was instructed to draw a line under each task they felt could perform. If they could do at least one of the tasks at the given MET level, they were instructed to move to the next MET level until they came to a level where they could not complete the activities without physical symptoms such as undue fatigue, shortness of

breath, and chest pain. The last MET level where they reported they could do activity was then recorded. Ainsworth and colleagues Compendium of Physical Activities was used to compare different activities with MET values for individuals who were not aware of how to do a certain task (i.e. bike, play basketball, swim).

The YPAS was administered second. The participant was read the instructions out loud and was then given the opportunity to read the instructions at their own pace. The participant then answered the questions as they were asked by the interviewer. Each activity was printed on a card and shown to the individual as the individual was questioned about that particular activity.

Each hour was then converted to minutes and multiplied by its designated weight. The calories from the work, yard work, caretaking, exercise, and recreational activities were then added together to obtain a total weekly calorie expenditure for each subject.

Two weeks after the interview was conducted, the VSAQ was again administered to 10 individuals to evaluate test - retest reliability. These individuals were again given the same instructions for completion of the VSAQ.

The Walking Test

The physical performance test used in this particular study was the 25 meter walking test. Subjects were instructed to walk 25 meters at a comfortable but quick pace; as if they were late for a meeting. Each subject was timed. Cones were used to denote the starting and finishing points. The walking test was done down a hallway and each participant started from a standstill. The walking test was completed twice by each individual and the times were averaged. The subjects performance on the walking test was used to identify group membership into either a low or high physical performance category.

Statistical Procedures

Descriptive statistics were calculated for all mean data (Table II). Pearson Product Moment Correlations were used to define the relationship between total kcal, work kcal, exercise kcal, yard work kcal, leisure, recreational kcal, and physical performance. Test-retest reliability was examined for the VSAQ using Pearson Product-Moment correlation. A regression analysis was used to estimate the predictive equation for performance using age, gender, and VSAQ score.

RESULTS

The mean age for the subjects was 73.5 (± 4.8) years age with a range between 65 - 83. Approximately 52% of the subjects had diagnosed heart disease (coronary artery disease, congestive heart failure), while 10% had diagnosed hypertension, and 3% had pulmonary disease (asthma, COPD). Thirty-five percent of the subjects were considered apparently healthy. Descriptive characteristics are available in Table I.

Descriptive analysis showed that the predominant amount of energy expenditure was used for work. The mean for time spent in work activity was 50% (± 18.4) with a minimum of 13% and maximum of 77.2%. The least amount of calories used for the entire group was expended in caretaking with a mean percentage of 3.3% (± 6.1) with a range from 0% to 18.5%. Exercise was the second highest calorie expending category with 21.9% (± 14.0) (range from 0% to 60.6%) of total calories. However, recreational activities were a close third with a mean of 17% (± 19.0). Yard work represented 7.8% (± 7.8) of the total calories. See Table 2.

The walking test divided the subjects into two groups. There was an obvious break in time, and eleven subjects were in the high group and nine subjects were in the low group. There were several differences between the two groups.

The low group (Table 3) had a mean age of 74.9 (± 5.3) while the high group (Table 4) was younger and had a mean age of 72.3 (± 4.3). The low group also had a slower walking time, with a mean of 18.7 (± 1.7), when compared to the high walking group which had a mean time of 14.7 (± 1.6). Interestingly, the low walking group reported a lower VSAQ score than the fast walking group. The low groups mean prediction was 7.4 (± 3.4), while the high walkers reported a VSAQ mean of 10.1 (± 1.0). Not surprisingly, the high walking group reported expending more calories on a daily basis than did the low walkers. The high walking group reported a mean of 7461 (± 2795) total calorie expenditure, while the low walking group reported expending only 6301 (± 2482) total calories. Both groups expended an approximately equal amount of calories in work, with the high group reporting a slightly higher expenditure of 3441 (± 2476) than the low groups 3263 (± 2482). The high group spends more time in exercise with a reported calorie expenditure of 1602 (± 1026), however the low group was not far behind with a caloric exercise expenditure of 1547 (± 1309). The low walking group spent significantly less time in recreation with a mean of 741 (± 651) calories when compared to the high groups 1488 (± 1761) calorie expenditure. The high group spent approximately double the calories (622 ± 526) in yard work than the low walking group (375 ± 511). Surprisingly, the low walking group expended a mean total of 379 (± 471) calories in caretaking. The high walking group on the other hand only reported a mean of 43.6 (± 144.7) calories expended in caretaking.

The mean score for the VSAQ was 8.9 (± 2.7). The regression analysis demonstrated that age, gender, and VSAQ score were significant predictors for physical performance ($p < 0.05$, $r^2 = 62.5\%$).

$$(\text{Time} = -1.78 + 0.274 \text{ Age} + 2.22 \text{ Gender} - 0.366 \text{ VSAQ})$$

Performance time was significantly predicted ($r^2 = 52.6\%$) by adding the selected values from YPAS (exercise and work) and the value from the VSAQ

$$(\text{Time} = 18.5 - 0.566 \text{ VSAQ} + 0.0568 \% \text{ Exer} + 0.0350 \% \text{ Work})$$

There was also a significant correlation ($p < .05$) between age, time, and performance ($r^2 = .5$). Test - retest reliability was adequate for the VSAQ ($r = .80$). No significant ($p > 0.05$) difference was found between VSAQ test one and VSAQ test two. See Table III.

DISCUSSION

Surprisingly, the VSAQ proved to be a more accurate means for predicting whether a subject fell into the high or low performance group than the YPAS. However, the YPAS did provide some interesting descriptive data. For example, it seems for this particular group of subjects, most of their time was spent and most of the calories burned in work related activities. Little to no time was in caretaking. Ironically, for those individuals spending more time in caretaking, there was a decrease in the amount of time and calories expended in work and exercise. Perhaps the individuals spending more time in caretaking

have less time for work, exercise, and leisurely activity due to the increased amount of time spent in caretaking. Consequently, those individuals spending more time in caretaking had slower performance times and fell into the low performance group. This may be due to the fact that they are not spending as much time or do not have the time to spend in work and exercise and therefore have a diminished functional and physiological capacity. On the other hand, these individuals may have the time, however, they are too physically and emotionally exhausted to participate in leisurely activity. Fear of leaving the individual being cared for alone may also factor into the small amount of time spent in work and exercise.

In addition, the subjects in the high walking category (11 subjects) reported more total calorie expenditure than those in the low walking category. The high performers also consistently self-reported higher MET levels on the VSAQ than the low performers.

Statistical analysis demonstrated that the VSAQ can accurately predict whether the subject was in the high or low performance group. There was no significant correlation between the self-reported YPAS and the walking times or the VSAQ. This may be due to fact that the YPAS requires recall. It is often difficult to recall and calculate how many hours one spends doing an activity on a weekly basis. The data also reveals a large discrepancy on the total amount of calories expended. For example, the range is 12,245 to 2370 with no set pattern as to which group is spending more total calories. The high group has a range from 3548 to 12,245. The low group reported similar data with a range from 2370 to 10,740. The extremes in the YPAS data can be seen in all of the five categories. Although the YPAS provides beneficial descriptive data, this study found that the YPAS could not predict physical performance in a 25 meter walking test. The YPAS relies heavily on recall and time spent in activities but does not take into consideration

physiological and mental state. Fear of falling, disease state, social isolation, and cognitive ability are not taken into consideration in the YPAS. Consequently, an individual may spend a great amount of time stair climbing while carrying a load, however, they are spending this large amount of time being careful so they do not fall. Unfortunately, the more time reported doing an activity, the higher the caloric expenditure. However, a higher caloric expenditure may be inaccurate because the individual may be doing the activity slowly with a low intensity level. Another example is an individual with arthritis who may take a long time washing dishes. The individual takes a long time due to disability, not workload, and the YPAS does not take this into consideration.

On the other hand, the VSAQ presents specific physical activities which an individual perceives they can or cannot do. The VSAQ is more representative of what an individual perceives their physical abilities to be and appears to be a reliable assessment. Too, a compendium of physical activities can be used to compare similar activities at similar MET values.

The YPAS is valuable for descriptive data and determining how an individual spends their time. However, this present study demonstrated that the VSAQ more accurately predicts walking time than the YPAS. Fortunately, the VSAQ is a much shorter interview and does not require a trained interviewer. However, it also demonstrated the value of the YPAS for collecting descriptive data while also determining the value of the VSAQ for predicting physical performance in a 25 meter walking test.

Unfortunately, there is not much information on the predictive value for physical performance tests using the VSAQ. More research needs to be done to determine if the VSAQ is indicative of performance on other physical tests. In addition, more research needs to be done using the YPAS. Perhaps the YPAS could be more predictive of performance on different physical tests.

In conclusion, this study shows the value of the YPAS for collecting descriptive data and calculating how older individuals are spending their time. The VSAQ is an accurate predictor of physical performance in this select group of older adults.

Table 1: Description of Characteristics for Subjects

Characteristic	Mean	Standard Deviation
Age (years)	73.5	± 4.8
Time (seconds)	16.5	± 2.5
VSAQ Score	8.9	± 2.7
Total calories	6939	± 2656
Disease state:		
heart disease	52%	
hypertension	10%	
arthritis	8%	
pulmonary disease	3%	
apparently healthy	35%	

Table 2: Activity Energy Percent Expenditure Values from the Yale Physical Activity Survey

Activity	Mean	Standard Deviation
Work	50%	± 18.4
Exercise	21.9%	± 14.02
Recreation	17%	± 19.0
Yard work	7.8%	± 7.8
Caretaking	3.3%	± 6.1

Table 3: Descriptive Characteristics for Low Performance Group (n=9)

Variable	Mean	Standard Deviation
Age (years)	74.9	± 5.3
Time (seconds)	18.7	± 1.7
VSAQ Score	7.4	± 3.4
Total calories	6301	± 2482
Work	3263	± 1832
Exercise	1547	± 1309
Recreation	741	± 651
Yard work	375	± 511
Caretaking	379	± 471

Table 4: Descriptive Characteristics for High Performance Group (n=11)

Variable	Mean	Standard Deviation
Age (years)	72.3	± 4.3
Time (seconds)	14.7	± 1.6
VSAQ Score	10.1	± 1.0
Total calories	7461	± 2795
Work	3441	± 2476
Exercise	1602	± 1026
Recreation	1488	± 1761
Yard work	622	± 526
Caretaking	43.6	± 144.7

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CHAPTER IV

Conclusions and Recommendations

Summary

This study was conducted to determine the predictive ability of the Veterans Specific Activity Questionnaire (VSAQ) and the Yale Physical Activity Survey for Older Adults (YPAS) to accurately place subjects in a high or low physical performance group. Specifically, the purpose of the study was to examine whether any relationship exists between the VSAQ, the YPAS, and the 25 meter walking physical performance test.

Twenty subjects volunteered for the study. There were eleven subjects from Warm Hearth Retirement Community (two men, nine women). The remaining nine subjects were volunteers from the Virginia Tech Cardiac Therapy and Intervention Program. These volunteers were comprised of four women and five men. Overall, there were seven men and thirteen women. All subjects were sixty five or older, with the oldest being eighty-three. All subjects were ambulatory. For this study, ambulatory was defined as the ability to walk without using any aide such as a cane or walker. Functional capacity was defined as mobility for this study.

Subjects attended an orientation session about the study in which all procedures were explained and questions were addressed. Each participant then signed an informed consent. Each subject was then interviewed individually for an half an hour using the YPAS and the VSAQ.

For the VSAQ, each subject was instructed to draw a line under each task they felt they could perform. If they could do at least one of the tasks at the given MET level, they were instructed to move to the next MET level until they came to a level where they could

not complete the activities without physical symptoms such as undue fatigue, chest pain, or shortness of breath. The last MET level where they reported they could do activity was then recorded. A compendium of physical activities was used to compare MET values for activities not found on the VSAQ. The VSAQ was given twice to ten of the subjects to evaluate test - retest reliability.

The Yale Physical Activity Survey (YPAS) was administered second. The participant was read the instructions out loud and was then aloud to read the instructions at their own pace. The participant then answered the questions as they were asked by the interviewer. Each activity was printed on a card and shown to the individual as the individual was questioned about that particular activity.

Each hour was then converted to minutes and multiplied by its designated weight. All the calories from the work, yard work, caretaking, exercise, and recreation categories were then added together to get a total weekly calorie expenditure for each subject.

After the interviews, the subjects participated in a 25 meter walking test. The 25 meters was measured down a hallway. Cones were used to denote the start and finish of the walk. The subjects were instructed to walk quickly, as if they were late for a meeting. The subjects completed the walking test twice and the times were then averaged. The subjects performance on the walking test was used to identify group membership into either a low or high physical performance category.

Descriptive statistics were calculated for mean data. Pearson Product Moment Correlations were used to examine the relationship between total kcal, work kcal, yard work kcal, care taking kcal, exercise kcal, and leisure kcal. A regression analysis was used to estimate the predictive equation for performance using age, gender, and VSAQ score.

The mean age of the subjects was 73.5 (± 4.8). Subjects ranged in age from 65 to 83. Health status assessment revealed that 52% of the subjects had diagnosed heart disease (coronary artery disease, congestive heart failure), while 10% had diagnosed hypertension, 8% had arthritis and 3% had pulmonary disease. Thirty-five percent of the subjects were considered apparently healthy.

Descriptive analysis showed that the predominant amount of energy expenditure was used for work. The mean percentage for time spent in work activity was 50% (± 18.4) with a minimum of 13% and a maximum of 77.2%. The least amount of calories were used for caretaking with a mean percentage of 3.3% (± 6.1). Exercise was the second highest calorie expending category with 21.9% (± 14.02). However, recreational activities were close with a mean of 17% (± 18.98). Yard work represented 7.8% (± 7.8) of the total calories.

The regression analysis demonstrated that age, gender, and VSAQ score were significant predictors for physical performance ($p < 0.05$).

$$\text{Time} = 1.78 + 0.274 \text{ Age} + 2.22 \text{ Gender} - 0.366 \text{ VSAQ}$$

The r-squared value for this was 62.5%. Performance time was significantly predicted by adding selected values from the YPAS (exercise, work) and the value from the VSAQ.

$$\text{Time} = 18.5 - 0.566 \text{ VSAQ} + 0.0568 \% \text{ Exer} + 0.0350 \% \text{ Work}$$

The r-squared value for this was 52.6%. There was also a significant correlation ($p < 0.05$) between age and performance time ($r^2 = .5$).

Test - retest reliability of the VSAQ was adequate. No significant difference was found between VSAQ test one and VSAQ test two.

RESEARCH IMPLICATIONS

Surprisingly, the VSAQ proved to be a more accurate means for predicting whether a subject fell into a high or low walking category than the YPAS. However, the YPAS yielded valuable descriptive data. For example, for this particular group of subjects, most of their time and calories were spent doing work activities. Little to no time was spent in caretaking. Ironically, for those individuals spending more time caretaking, there is a decrease in the amount of time and calories expended in work and exercise. Due to the increased amount of time spent in caretaking, individuals may have less time to participate in work, exercise, and leisurely activities. Consequently, those individuals spending more time in caretaking had slower walking times and fell into the low walking category. This may be due to the fact that the subjects spending more time in caretaking are spending less time and calories in work, exercise, and leisurely activity and therefore have a diminished functional and physiological capacity. In addition, the subjects in the fast walking category (11) reported more total calorie expenditure than those in the low walking category. The subjects in the high performance category also consistently self-reported higher MET levels on the VSAQ than those subject in low walking category.

Statistical analysis revealed the VSAQ can accurately predict the walking category for eighty percent of the subjects. There was no significant correlation between the self-reported YPAS, the VSAQ score, and the walking times.

A major factor that effects the accuracy of the YPAS is subject recall. It is often difficult to recall and calculate the number of hours spent in an activity during the course of a week. It is especially difficult to estimate the time spent doing activities which are not done for long periods of time such as dish washing. Too, there were extremes for all categories of the YPAS. Although the YPAS provides beneficial descriptive data, this study found that the YPAS could not predict physical performance in a 25 meter walking test. Since the YPAS relies heavily on recall and time spent in activities, it does not take into consideration physiological and mental state. Fear of falling, disease state, social isolation, and cognitive ability are also not taken into consideration in the YPAS. Consequently an individual with arthritis may spend a great amount of time doing dish washing. Unfortunately, the more time reported doing an activity, the higher the caloric expenditure, despite the fact the activity may be done slowly at a very low intensity.

On the other hand, the VSAQ presents specific physical activities. This questionnaire does not require recall, but it asks the subject to determine the activities which can be done without symptoms such as undue fatigue, shortness of breath, and chest pain. The VSAQ has an advantage because an individual is more likely to know their limitations physically and know the activities in which they feel comfortable participating.

The results of this study suggest that the VSAQ is an accurate predictor for physical performance. Fortunately, the VSAQ is a short questionnaire which requires little time and money. Too, a trained interviewer is not needed to administer the questionnaire. The implications of these results is great. An abundance of money and time can be saved for both the health care provider and the patient. In addition, the health care provider can get a fairly accurate idea of the patients physical capabilities and activity level.

The value of the Yale Physical Activity survey however, can not be underestimated. The YPAS provides valuable information for the health care provider also. The simple knowledge of where a majority of an older persons time is spent is invaluable. Perhaps the individual is spending an increased amount of time in the caretaking of a spouse or loved and has less time to participate in work, exercise, and leisurely activity or is afraid to be dependent alone. Too, the individual may be physically and emotionally drained and not able to participate in leisurely activity. This may result in lower number of total calories expended during a week and may ultimately result in a decreased physical functioning.

The YPAS provides the investigator with the specific activities the individual participates and the estimated amount of time the individual spends doing this activity. This information is significant for determining the percentage of time and total calories expended in overall categories as well as specific activities. This gives researchers valuable information as to what the older population is doing and the activities in which this population feels comfortable participating.

This study determined that the elderly population investigated spent a significant amount of time and calories in work and leisurely activities. This specific population also spent a majority of their time in exercise related activity. Although this may be expected from a population which volunteers for a study, the results and percentages of time and calories spent in work and exercise related activity is significant. The results of this study provided from the YPAS significantly suggests that age and disease does not necessarily slow a persons activity level. Too, it suggests an older population enjoys physical activity and work and will spend most of their time in these activities. The YPAS gives valuable information for the activity level, time and total calories spent in specific activities for older individuals.

Overall, the VSAQ and the YPAS are questionnaires which provide an abundance of information and are valuable for gaining knowledge about an older individual or population. The VSAQ is practical for a clinical setting and evaluations.

It is relatively quick and inexpensive to administer while providing information about an individual's activity capabilities. The YPAS provides information about how an individual is spending time and in which activities the most time is spent.

In conclusion, this study shows the value of the YPAS for collecting descriptive data and calculating how an older individual or population is spending time and calories. The VSAQ is an accurate predictor for performance on a 25 meter walking test. In addition, the VSAQ is advantageous because it requires little time and does not require a trained interviewer.

Recommendations for Future Research

Results of this study warrant a need for further research investigating the predictive ability of the VSAQ with regards to physical performance tests and persons over the age of sixty-five. Recommendations for future research include a variety of physical performance tests and activities which may aid in an accurate assessment of the VSAQ's capabilities.

Future investigations examining the predictive ability of the VSAQ should include the use of various physical performance tests. Popular physical performance tests include the measuring of distance walked over a period of six or twelve minutes (Guralink et al.), placing a foot on the edge of a chair, rising from chair without using hands, stepping up and down, and gait initiation and step length (Guralink et al.). The use of the VSAQ and its predictive capabilities for how an individual performs on these tests should be examined.

The relationship of an individual's actual activities of daily living and performance on specific activity tests needs to be better understood. In addition, there are a variety of instruments used for assessing activities of daily living, however, not one has demonstrated to be consistently reliable and valid (Guralink et al.). Performance tests which are timed have proven to be the most reproducible and better able to measure small changes. For example, time in the walking test measures difficulty in walking. The slower an individual's time is, the more difficulty there is in walking.

Another suggestion for future research would be to compare the results of several different performance tests. For example, if an individual has a fast walking time does that individual also score high on the stepping test. Perhaps the specificity of the predictive value of the VSAQ should be examined.

Further recommendations for research include interpreting the validity and reliability of the YPAS. Pedometers, self-reported daily diaries, and heart rate monitors would better validate the internal validity of the YPAS. Perhaps more precise laboratory data could be utilized to determine the accuracy of the self-reported data (Dipietro et al.).

The final suggestion for further research includes the testing of the YPAS on different populations. For example, the population for this study was active, relatively healthy and ambulatory. Further research should be conducted using a more diseased population, or a population which was not fully ambulatory. Research such as this would insure the external validity of the YPAS.

Implications for Clinical Practice

The recent concern over the rapidly increasing population of individuals over the age of 65 has sparked an increase in research in this area. While the cost of effectiveness and efficiency of service are important issues, the assessment of activities of daily living

and physical activity is imperative. Currently, there is no gold standard for assessing physical activity or activities of daily living for individuals over 65. In fact, there is very little information on the aging process and the activities in which an older individual participates.

The use of the VSAQ and the YPAS served two important purposes and both have important clinical implications. The self-reported responses to the VSAQ accurately predicted the fast or slow walking performance. Since time in the walking test implies difficulty in walking, the results of the VSAQ can accurately predict the individuals difficulty in walking. The VSAQ may either eliminate or provide additional information to the GXT. The VSAQ can also eliminate the more expensive, time consuming physical performance tests such as the GXT.

On the other hand, the YPAS is valuable for estimating the time and total calories spent in specific activities. The YPAS also demonstrates the less the calories a person expends over the course of a week, the lower the score on a physical performance test. The YPAS is also valuable in determining how much time is spent in caretaking. The results of this study suggests the more time spent in care taking for another individual, the less time is spent in work, exercise, and leisurely activity. As a direct result, walking time was slower. The YPAS is valuable for determining the types of activities in which an individual engages as well as the amount of time and calories spent doing these activities.

The results of this study indicate that the VSAQ accurately predicts the category of walking speed in which an individual performs. The YPAS provides important descriptive data about the time and calories spent in specific activity. Future studies should include: the use of various physical performance tests to determine the predictive capabilities of the VSAQ, research using a variety of older populations, and the use of laboratory data to determine the accuracy of self-reporting on the YPAS.

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***APPENDIX A
METHODOLOGY***

METHODOLOGY

Subjects

Twenty subjects volunteered to participate in this study. Descriptive characteristics are presented in Table I. Eleven of the subjects were from Warm Hearth Retirement community. The Warm Hearth volunteers were comprised of two men and nine women. The remaining nine were participants currently enrolled in the Virginia Tech Cardiac Therapy and Intervention program. These volunteers were comprised of four women and five men. Overall, there were seven men and thirteen women. All subjects were sixty five or older, with the oldest being 83. All subjects were ambulatory. For this study, ambulatory was defined as the ability to walk without using any aide such as a cane or walker. Functional capacity was defined as mobility.

Experimental Protocol

Interviewing Process

Subjects attended an orientation session about the study in which all procedures were explained and questions were addressed. Each participant then signed an informed consent which had been approved by the Human Subjects Institutional Review Board at Virginia Tech. A half an hour individual interview was then conducted with each participant. The VSAQ and Yale Physical Activity Questionnaire for the Older Adult were used during the interview process.

For the VSAQ (see appendix), each subject was instructed to draw a line under each task they felt they could perform. If they could do a least one of the tasks at the given MET

level, they were instructed to move to the next MET level until they came to a level where they could not complete the activities without physical symptoms such as undue fatigue, chest pain, or shortness of breath. The last MET level where they reported they could do activity was then recorded. A compendium of physical activity was used to compare MET values for activities not listed on the VSAQ (Ainsworth et al.). The VSAQ was given twice to ten of the subjects to evaluate test-retest reliability.

The Yale Physical Activity Survey (YPAS)(see appendix) was administered second. The participant was read the instructions out loud and was then given the opportunity to read the instructions at their own pace. The participant then answered the questions as they were asked by the interviewer. Each activity was printed on a card and shown to the individual as the individual was questioned about that particular activity.

Each hour was then converted to minutes and multiplied by its designated weight. All of the calories from the work, yard work, caretaking, exercise, and recreation categories were then added together to get a total weekly calorie expenditure for each subject.

Two weeks after the interview was conducted, the VSAQ was again administered to 10 individuals to evaluate test - retest reliability. These individuals were again given the same instructions for completion of the VSAQ.

PHYSICAL PERFORMANCE TEST

The participants performed one physical performance test which took no longer than one half an hour. The physical performance test consisted of a 25 meter walking test.

The Walking Test

The physical performance test consisted of a walking test. Subjects were instructed to walk 25 meters at a comfortable but quick pace. Each subject was timed. Cones were used to denote the starting and finishing points. The walking test was done down a hallway and each participant started from a standstill. The walking test was done two times and the times were then averaged. The subjects performance on the walking test was used to identify group by two researchers to insure inter-rater reliability.

Statistical Procedures

Descriptive statistics were calculated for all mean data (Table 2). Pearson Product-Moment correlation's were used to define the relationship between total kcal, work kcal, exercise kcal, yard work kcal, leisure, recreational kcal, and physical performance. Test - retest reliability was examined for the VSAQ using Pearson Product-Moment correlation. A regression analysis was also used to estimate the predictive equation for performance using age, gender, and VSAQ score.

APPENDIX B
INFORMED CONSENT

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Informed Consent for Participants of Investigative Projects

Title of Project: Psychometric Measurement of Physical Performance in Older Adults

Principal Investigator: Jennifer P. Sulin, Master's Candidate
Shala E. Davis, Ph.D.; Academic Advisor

I. The Purpose of this Research

You are invited to participate in a study about the quality of life in persons over the age of 65. This study involves experimentation for the purpose of establishing an accurate way of measuring quality of life in individuals over the age of 65 as well as evaluating and improving quality of life.

II. Procedures

You will be asked to participate in an interview to assess your quality of life based on your responses. The interview will take approximately 30-40 minutes. A week later, you will be asked to participate in a physical performance tests. This is a 25 meter walking test. Again, testing time should only take 30-40 minutes.

The possible risk or discomfort to you as a participant may be muscle fatigue, soreness, and general feelings of fatigue.

Safeguards to minimize your risk or discomfort include: CPR and first aid certified researchers, medical equipment on site, and prior permission to participate in the study by a physician.

III. Benefits of this Project

Your participation in the project will provide information which may or may not be beneficial to you. These include an assessment of quality of life and what may be done to improve it and possible early detection of abnormalities and further recommendations for intervention.

No guarantee of benefits has been made to encourage you to participate. You may receive a synopsis or summary of this research when completed.

IV. Extent of Anonymity and Confidentiality

The results of this study will be kept strictly confidential. At no time will the researchers release the results of the study to anyone other than individuals working on the project without your written consent. The information you provide will have your name removed and only a subject number will identify you during analysis and any written reports of the research.

V. Freedom to Withdraw

You are free to withdraw from this study at any time without penalty. There may be some circumstances under which the investigator may want you to withdraw. These may include, but are not limited to: joint pain, chest pain, shortness of breath, mental state, and general medical state.

VI. Approval of Research

This research has been approved, as required, by the Institutional Review Board for projects involving human subjects at Virginia Polytechnic Institute and State University, by the College of Human Foods, Nutrition, and Exercise Science.

Signature

Date

VII. Subject's Permission

I have read and understand the informed consent and conditions of this project. I have had all my questions answered. I hereby acknowledge the above and give my voluntary consent for participation in this project.

If I participate, I may withdraw at any time without penalty. I agree to abide by all the rules of this project.

Should I have any questions about this research or its conduct, I will contact:

Jennifer P. Sulin
Investigator

961-7539
Phone

Shala E. Davis
Investigator

231-8320
Phone

Janet Johnson
Nutrition, Foods, and Exercise Science

231-5549
Phone

Ernest Stout
Chair, IRB
Research Division

231-6077
Phone

APPENDIX C
RAW DATA

SUBJECT DATA

<u>Subject #</u>	<u>Gender</u>	<u>Total kcal</u>	<u>Work kcal</u>	<u>Yard kcal</u>	<u>Care kcal</u>	<u>Exercise kcal</u>	<u>Rec Kcal</u>
1	M	7440	990	600	0	390	5464
2	F	9158	5078	0	480	2340	1260
3	M	3548	2025	623	0	900	0
4	F	7331	2531	0	0	600	4200
5	F	5008	3455	143	0	1260	150
6	M	4833	1128	975	0	1530	1200
7	F	6915	4455	195	0	630	1635
8	M	9165	4125	1215	0	3195	630
9	F	5070	2055	840	0	1080	1095
10	M	11,355	6000	1650	0	2970	735
11	F	12,245	8915	600	0	2730	0
12	M	6785	1735	450	0	4110	490
13	M	3773	1830	840	83	810	210
14	F	10,740	5970	1410	480	2790	90
15	F	7635	5145	0	240	1620	630
16	F	7123	2128	0	1320	1530	2145
17	F	5415	3150	675	960	0	630
18	F	2370	1830	0	330	0	210
19	F	7890	5715	0	0	1170	1005
20	F	4980	1830	0	0	1890	1260

SUBJECT DATA

<u>SUBJECT #</u>	<u>GENDER</u>	<u>AGE</u>	<u>METS</u>	<u>TOTAL KCAL</u>	<u>TIMED WALK</u>
1	M	72	9	7440	12.05
2	F	65	10	9158	12.45
3	M	77	13	3548	13.49
4	F	69	10	7331	14.13
5	F	65	10	5008	14.23
6	M	72	10	4833	15.35
7	F	75	10	6915	15.55
8	M	77	10	9165	15.98
9	F	75	9	5070	16.20
10	M	74	10	11,355	16.22
11	F	74	10	12,245	16.38
12	M	72	9	6785	17.26
13	M	82	4	3773	17.27
14	F	70	10	10,740	17.54
15	F	73	13	7635	17.76
16	F	73	10	7123	17.93
17	F	77	8	5415	18.63
18	F	67	3	2370	18.95
19	F	77	4	7890	20.41
20	F	83	6	4980	22.14

SUBJECT DATA FOR MEN

<u>SUBJECT #</u>	<u>AGE</u>	<u>METS</u>	<u>TOTAL KCAL</u>	<u>TIMED WALK</u>
1	72	9	7440	12.05
3	77	13	3548	13.49
6	72	10	4833	15.35
8	77	10	9165	15.98
10	74	10	11,355	16.22
12	72	9	6785	17.26
13	82	4	3773	17.27

SUBJECT DATA FOR WOMEN

<u>SUBJECT #</u>	<u>AGE</u>	<u>MET</u>	<u>TOTAL KCAL</u>	<u>TIMED WALK</u>
2	65	10	9158	12.45
4	65	10	7331	14.13
5	65	10	5008	14.23
7	75	10	6915	15.55
9	75	9	5070	16.20
11	74	10	12,245	16.38
14	70	10	10,740	17.54
15	73	13	7635	17.76
16	73	10	7123	17.93
17	77	8	5415	18.63
18	67	3	2370	18.95
19	77	4	7890	20.41
20	83	6	4980	22.14

PERCENTAGE OF TOTAL KCAL SPENT IN WORK, YARDWORK
 CARETAKING, EXERCISE, AND RECREATIONAL ACTIVITIES

SUBJECT #	TOTAL KCAL	%WORK	%YARDWORK	%CARETAKING	%EXERCISE	%RECREAT
1	7440	13.3%	8.1%	0%	5.2%	73.4%
2	9158	55.4%	0%	5.2%	25.6%	13.8%
3	3548	57.1%	17.5%	0%	25.4%	0%
4	7331	34.5%	0%	0%	8.2%	57.3%
5	5008	69%	2.8%	0%	25.2%	3%
6	4833	23.4%	20.1%	0%	31.7%	24.8%
7	6915	64.4%	2.8%	0%	9.2%	23.6%
8	9165	45%	13.3%	0%	34.9%	6.9%
9	5070	40.5%	16.6%	0%	21.3%	21.6%
10	11,355	52.8%	14.5%	0%	26.2%	6.5%
11	12,245	72.8%	4.9%	0%	22.3%	0%
12	6785	25.6%	6.6%	0%	60.6%	7.2%
13	3773	48.5%	22.3%	2.2%	21.5%	5.6%
14	10,740	55.6%	13.1%	4.5%	26%	84%
15	7635	67.4%	0%	3.1%	21.2%	8.3%
16	7123	29.9%	0%	18.5%	21.5%	30.1%
17	5415	58.2%	12.5%	17.7%	0%	11.6%
18	2370	77.2%	0%	13.9%	0%	8.9%
19	7890	72.9%	0%	0%	14.8%	12.7%
20	4980	36.8%	0%	0%	38%	25.3%

APPENDIX D
SUBJECT DATA SHEET

**PSYCHOMETRIC MEASUREMENT OF PHYSICAL
PERFORMANCE IN OLDER ADULTS**

PRIMARY RESEARCHER: JENNIFER SULIN

DATA SHEET

NAME: _____

AGE: _____

HEIGHT: _____

WEIGHT: _____

GENDER: M F

TIMED WALK

TIME

INITIALS

TRIAL 1:

TRIAL 2:

APPENDIX E
VSAQ DATA SHEET

VETERAN'S SPECIFIC ACTIVITY QUESTIONNAIRE

AGE: _____

GENDER: M F

Instructions: Draw one line below the activities you are able to do routinely with minimum or no symptoms, such as shortness of breath, fatigue, chest discomfort, etc.

-
- | | |
|----|--|
| 1 | Eating, getting dressed, working at a desk. |
| 2 | Taking a shower, walking down eight steps. |
| 3 | Walking slowly on a flat surface for one or two blocks. A moderate amount of work around the house, like vacuuming, sweeping the floor, or carrying groceries. |
| 4 | Light yard work, i.e., raking leaves, weeding, or pushing a power mower. |
| 5 | Walking briskly, i.e., four miles in one hour. Social dancing, washing the car. |
| 6 | Playing nine holes of golf carrying own clubs, heavy carpentry, mow lawn with a push mower. |
| 7 | Perform heavy outdoor work, i.e. digging, spading soil, play tennis, carry 60 pounds. |
| 8 | Move heavy furniture, jog slowly, climb stairs quickly, carry 20 pounds upstairs. |
| 9 | Bicycling at a moderate pace, sawing wood, jumping rope (slowly). |
| 10 | Brisk swimming, bicycle up a hill, walking briskly uphill, jog six miles per hour. |
| 11 | Cross country ski, play full court basketball. |
| 12 | Running briskly, continuously (level ground, eight minutes per mile). |
| 13 | Any competitive activity, including those which involve intermittent sprinting. Running competitively, rowing, backpacking. |

APPENDIX F
YPAS INTERVIEW AND DATA SHEET

The Yale Physical Activity Survey for Older Adults

Interviewer: Please Mark Time: _____:_____:_____
HR MIN SEC

INTERVIEWER: (Please hand the subject the list of activities while reading this statement). Here is a list of common types of physical activities. Please tell me which of them you did during a typical week in the last month. Our interest is learning about the types of physical activities that are a part of your regular work and leisure routines.

For each activity you do, please tell me how much time (hours) you spent doing this activity during a typical week.

<u>WORK</u>	<u>TIME</u> (HRS/WK)	<u>INTENSITY</u> <u>CODE</u> (KCAL/MIN)
Shopping (e.g., grocery, clothes)	_____	3.5
Stair climbing while carrying a load	_____	6.5
Laundry (time loading, unloading, hanging, folding only)	_____	3.0
Light housework: tidying, dusting sweeping, collecting trash in home, polishing, indoor gardening, ironing)	_____	3.0
Heavy housework: vacuuming, mopping scrubbing floors and walls, moving furniture, boxes, or garbage cans.	_____	4.5
Food preparation (10+ mins in duration): chopping, stirring, moving about to get food items, pans	_____	2.5
Food Service (10+ mins in duration): setting table, carrying food, serving food	_____	2.5
Dish washing (10 + mins in duration): clearing the table, washing/drying dishes putting dishes away	_____	2.5
Light home repair: small appliance repair, light home maintenance/repair	_____	3.0
Heavy home repair: painting, carpentry, washing/polishing car	_____	5.5

YARD WORK**TIME**
(HRS/WK)**INTENSITY**
CODE
(KCAL/MIN)Gardening: Planting, weeding, digging,
hoeing

4.5

Lawn mowing (walking only)

4.5

Clearing walks/driveway: sweeping,
shoveling, raking

5.0

CARETAKING

Older or disabled person (lifting, pushing wheelchair)

5.5

Childcare (lifting, carrying, pushing a stroller)

4.0

EXERCISEBrisk walking (10 + mins in duration)

6.0

Pool exercises, stretching, yoga

3.0

Vigorous calisthenics, aerobics

6.0

Cycling, exercycle

6.0

Swimming (laps only)

6.0

RECREATIONAL ACTIVITIESLeisurely walking (10+ mins in duration)

3.5

Needlework: knitting, sewing, needlepoint etc.

1.5

Dancing (mod/fast): line, ballroom, tap, square, etc.

5.5

Bowling, bocci

3.0

Golf (walking to each hole only)

5.0

Racquet sports: tennis, racquet ball

7.0

Billiards

2.5

INTERVIEWER: (please read to subject). I would now like to ask you about certain types of activities you have done during the past month. I will ask you about how much vigorous activity, leisurely walking, sitting, standing and some other things that you usually do.

1. About how many times during the past month did you participate in vigorous activities that lasted at least 10 minutes and caused large increases in breathing, heart rate, or leg fatigue or caused you to perspire?

SCORE: 0= not at all (go to Q3)
1= 1-3 times per month
2= 1-2 times per week
3= 3-4 times per week
4= 5+ times per week
7= refused
8= don't know

FREQUENCY SCORE: _____

2. About how long do you do this vigorous activity(ies) each time?

SCORE: 0= not applicable
1= 10-30 minutes
2= 31-60 minutes
3= 60+ minutes
7= refused
8= don't know

DURATION SCORE: _____
WEIGHT: 5

VIGOROUS ACTIVITY INDEX SCORE:

FREQ SCORE ____ **X** **DUR SCORE** ____ **X** **WEIGHT** = _____

3. Think about the walks you have taken during the past month. About how many times per month did you walk for at least 10 minutes or more without stopping which was not strenuous enough to cause large increases in breathing heart rate, or leg fatigue or cause you to perspire?

SCORE: 0= Not at all (go to Q5)
1= 1-3 times per month
2= 1-2 times per week
3= 3-4 times per week
4= 5+ times per week
7= refused
8= don't know

FREQUENCY SCORE: _____

4. When you did this walking, for how many minutes did you do it?

SCORE: 0= not applicable
1= 10-30 minutes
2= 31-60 minutes
3= 60+ minutes

7= refused
8= don't know

DURATION SCORE= _____
WEIGHT = 4

LEISURELY WALKING INDEX SCORE:

FREQ SCORE ____ **X DUR SCORE** ____ **X WEIGHT** = _____

5. About how many hours a day do you spend moving around on your feet while doing things. Please report only the time you are actually moving.

SCORE: 0= not at all
1= less than 1 hour per day
2= 1 to less than 3 hours per day
3= 3 to less than 5 hours per day
4= 5 to less than 7 hours per day
5= 7+ hours per day
7= refused
8= don't know

MOVING SCORE= _____
WEIGHT= 3

MOVING INDEX SCORE:

MOVING SCORE _____ **X WEIGHT** _____ = _____

6. Think about how much time you spend standing or moving around on your feet on an average day during the past month. About how many hours per day do you stand?

SCORE: 0= not at all
1= less than 1 hour per day
2= 1 to less than 3 hours per day
3= 3 to less than 5 hours per day
4= 5 to less 7 hours per day
5= 7+ hours per day
7= refuses
8= DK

STANDING SCORE= _____
WEIGHT 2

STANDING INDEX SCORE:

STANDING SCORE _____ **X WEIGHT** _____ = _____

7. About how many hours did you spend sitting on an average day during the past month?

SCORE: 0= Not at all
 1= less than 3 hours
 2 = 3 hours to less than 6 hours
 3= 6 hours to less than 8 hours
 4= 8+ hours
 7= refused
 8= don't know

SITTING SCORE= _____
WEIGHT= 1

SITTING INDEX SCORE:
SITTING SCORE _____ **X WEIGHT =** _____

8. About how many flights of stairs do you climb up each day? (let 10 steps = 1 flight).

9. Please compare the amount of physical activity that you do during other seasons of the year with the amount of activity you just reported for a typical week in the past month. For example, in the summer, do you do more or less activity than what you reported doing in the past month?

	<u>Lot More</u>	<u>Little More</u>	<u>Same</u>	<u>Little less</u>	<u>Lot less</u>
Spring	1.30	1.15	1.00	.85	.70
Summer	1.30	1.15	1.00	.85	.70
Fall	1.30	1.15	1.00	.85	.70
Winter	1.30	1.15	1.00	.85	.70

SEASONAL ADJUSTMENT SCORE = SUM OVER ALL SEASONS/4 _____

INTERVIEWER PLEASE MARK TIME: _____:_____:_____
 HR MIN SEC

VITA

Jennifer P. Sulin was born on June 21, 1972 in Baltimore, Maryland. She was the second child born to Victor and Gayle Sulin. She grew up outside of Baltimore in a town named Ellicott City where she attended and graduated from Mt. Hebron High School. Throughout her childhood, high school and college years, she competed several ponies and horses in combined training, dressage, and show jumping. She and her horse, For Keeps, won the Junior Hunter title and were ranked fourth in the Equation over 14 Division in 1989. She and her pony, Bobby Sox, made it to Nationals in the Large Pony Show Jumping Division.

She continued her education at Virginia Tech and graduated with a degree in Exercise Science and a minor in psychology. While attending Virginia Tech, Jennifer was a member of Tri-Delta Sorority, served on the student budget board, the commission on student affairs, served as Panhellenic President, was named to Who's Who Among American College Students, and was a candidate for Virginia Tech Woman of the Year.

After graduation, she immediately entered graduate school at Virginia Tech and pursued a degree in Exercise Physiology. In her first year of graduate school, she was the graduate assistant coach/player for the Virginia Tech Women's Lacrosse team. She played in the goal as well as on the field. In her second year of graduate school, her responsibility to the Virginia Tech Women's Lacrosse team was as a true graduate assistant. Academically, Jennifer graduated with a 3.23 GPA. She was exercise leader for the track and aquatic challenge aspects of the Virginia Tech Cardiac Therapy and Intervention Program.

Currently, Jennifer is seeking a job in the Cardiac Rehabilitation/Adult Fitness field. Eventually, she aspires to get her doctorate and teach at the college level. She also looks forward to getting back into competitive horse back riding.

