

Assessing the Physical Activity Readiness of Inactive Older Adults

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The purpose of this study was to examine the relationship between inactive older adults' physical activity readiness (based on the Physical Activity Readiness Questionnaire [PARQ]) and several biometric, demographic, and physical activity indices. Participants were 181 (91 female, 90 male) inactive 60- to 89-year-old adults (M age = 70.2 ± 6.6 yr.). Self-report measures were completed and body mass index (BMI) and VO_{2max} were estimated. BMI, weight, and VO_{2max} were significantly associated with physical activity readiness. There was no significant association among 10-year age cohort and physical activity readiness. The blood pressure question excluded the largest number of participants (42%). Overall, 45.3% of the participants appeared to be healthy enough to begin a low to moderate physical activity program. Preliminary evidence suggests the PARQ may be a useful method of identifying older adults for whom low to moderate physical activity participation is safe.

As the older adult segment of the population continues to increase, methods are needed that enable and reinforce the adoption and maintenance of lifestyle practices associated with "successful aging" (i.e., preservation of functioning; Rowe & Kahn, 1987). One important lifestyle practice associated with successful aging is physical activity. For example, Simonsick et al. (1993) found that mortality rates among highly active older adults were one-third to one-half that of inactive older adults. LaCroix, Guralnik, Berkman, Wallace, and Satterfield (1993) showed that smoking, alcohol consumption, high body mass index, and low physical activity levels were all associated with a loss of mobility in older adults. Of these factors, frequent (i.e., three or more days per week) physical activity involvement was the most important factor.

However, misconceptions regarding the health risks and/or the belief that exercise is inappropriate for older adults may discourage some elderly from increasing their physical activity level (Ostrow & Dziewaltowski, 1986). Others have suggested, "The cost of seeing a physician for pre-exercise testing may deter many

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elderly patients from beginning an exercise program, thereby increasing the population at risk for disuse syndromes" (Simpson, 1986, p. 96). Accordingly, strategies for overcoming barriers and encouraging physical activity involvement among the elderly are needed (O'Neill & Reid, 1991; US Department of Health and Human Services, 1992).

One potential strategy for achieving this is through the use of a self- or paramedical-administered health screening questionnaire such as the "Physical Activity Readiness Questionnaire" (PARQ) (Canadian Society for Exercise Physiology, 1994). The PARQ was first published in 1975 and was promoted as a simple and safe method of identifying persons for whom increased physical activity may be contraindicated (Chisholm, Collis, Kulak, Davenport, & Gruber, 1975). In cases where an older adult is uncertain about health status and/or the suitability of initiating a low to moderate physical activity program, PARQ clearance may give them increased confidence in their ability to pursue such programs.

In the initial PARQ validation study, Chisholm et al. (1975) administered 19 self-report questions to a group of 1,253 people and compared their responses with the results of a medical exam, which included resting blood pressure and resting and exercise electrocardiograms. On the basis of their results, 7 of the 19 questions were retained because they most effectively identified persons in need of a medical exam prior to increased physical activity involvement. In a large, epidemiological study of Canadian adults (30 to 69 years), those who responded affirmatively to one or more of the PARQ items at baseline had significantly higher morbidity and mortality rates at 7-year follow-up compared to those who responded "no" to each of the PARQ items (Arraiz, Wigle, & Mao, 1992). In a review, Shephard (1994) suggested the PARQ has, over the past 20 years, proven to be essentially 100% sensitive for the detection of medical contraindications and 80% specific. The scientific and medical communities also have endorsed the PARQ as a simple and safe prephysical activity screening measure (American College of Sports Medicine, 1995; Canadian Society for Exercise Physiology, 1994).

Among the elderly, however, the measure has seen only limited use (Clemons & Foret, 1994; Fitness Canada, 1983; Shephard, Cox, & Simper, 1981; Shephard, Mahoney, Flowers, & Berridge, 1984). Most likely, two reasons exist for this situation. First, the medical community has traditionally recommended a full medical examination for females 50 years and older and males 40 years and older prior to initiating a *vigorous* exercise program (American College of Sports Medicine, 1995). Second, PARQ's instructions imply that it has been designed for people between the ages of 15 and 69 years (Canadian Society for Exercise Physiology, 1994). However, low to moderate forms of physical activity, not just vigorous exercise, are associated with a number of health benefits (Pate et al., 1995), and these forms of activity can be pursued *without* undergoing a full medical examination (American College of Sports Medicine, 1995). Regardless, very little is known about the use of PARQ among older adults. Furthermore, the measure has recently undergone some wording and language modifications (Thomas, Reading, & Shephard, 1992; Canadian Society for Exercise Physiology, 1994).

Because little is known about using the PARQ with older adults and the questionnaire was recently modified, the purpose of this study was to develop a descriptive database within the 60 to 89 year old age cohort for the instrument. The specific research questions addressed in this study were:

1. Is PARQ exclusion/inclusion status related to various biometric or demographic participant characteristics?
2. Is PARQ exclusion/inclusion status related to respondents' 10-year age cohort (i.e., 60-69, 70-79, 80-89)?
3. What PARQ question(s) is(are) most responsible for excluding inactive older adults from physical activity involvement?
4. On the basis of PARQ, what percentage of inactive older adults appear to be healthy enough to begin a low to moderate physical activity program?

Method

Participants

Potential participants were recruited through the Community Nutrition Center program of a large US urban municipality. Of those attending the program, 356 60- to 89-year-old adults were identified. These individuals were then queried about their physical activity involvement using Schechtman, Barzilai, Rost, and Fisher's (1991) validated question: "Do you currently participate in any regular activity program (either on your own or in a formal class) designed to improve or maintain your physical fitness?" On the basis of this question, 181 (91 female, 90 male) people responded "No" and were requested to participate in the study (M age = 70.2 yr., SD = 6.6). The majority of participants were African American and of lower socioeconomic status (Tables 1 and 2).

Measures and Procedures

After being identified as inactive, participants were asked to complete a brief self-report questionnaire about their biometric, demographic, and physical activity readiness (i.e., PARQ). From participants' self-report height and weight values, body mass index (BMI) was calculated using the Quetelet Index (i.e., weight kg/height m^2). Ainsworth, Richardson, Jacobs, and Leon's (1992) nonexercise test equation was used to predict participants' VO_{2max} (ml/kg/min). This equation relies on four items to predict VO_{2max} : age, gender, BMI, and a single question about strenuous exercise. In the initial validation study, the equation was highly related to VO_{2max} derived from indirect calorimetry using a treadmill-graded exercise test ($R^2 = .78$, $p < .0001$). Participants' physical activity readiness was determined using the revised PARQ (Canadian Society for Exercise Physiology, 1994). The revised PARQ is a self-report of health status and health history based on 7 dichotomous questions. If a respondent answers "yes" to any one question on the measure, physical activity exclusion is implied.

Statistical Analysis

The relationships between participants' PARQ exclusion/inclusion status and 10 different participant characteristics (Table 3) were determined using either point-biserial correlations (r) or contingency coefficients (c) derived from chi-square tests of association (χ^2). Participants were then classified into 1 of 3 age cohorts (i.e., 60-69, 70-79, or 80-89) to further explore the relationship between age and physical activity readiness. Lastly, simple percentages were calculated for each of the PARQ items. For all probability tests, alpha was set at the .05 level.

Table 1 Sample Characteristics (*N* = 181)

| Variable | Percent |
|----------------------|---------|
| Gender | |
| Female | 50.3 |
| Male | 49.7 |
| Marital status | |
| Married | 24.3 |
| Single | 75.7 |
| Ethnicity | |
| African American | 67.4 |
| Asian-Pacific | 0.6 |
| Caucasian | 23.8 |
| Latino/Hispanic | 3.3 |
| Native American | 4.4 |
| Other | 0.6 |
| Educational level | |
| 0-11 years | 45.6 |
| High school graduate | 32.2 |
| Some college | 13.9 |
| College graduate | 4.4 |
| Other | 3.9 |
| Income | |
| ≤ \$11,999 | 79.6 |
| \$12,000 to \$23,999 | 17.7 |
| ≥ \$24,000 | 2.8 |

Results

Of the 10 participant characteristics examined, 3 (i.e., BMI, weight, and VO_{2max}) were significantly associated with participants' physical activity readiness (Table 3). The relationships between 10-year age cohorts and physical activity readiness were not significant (exclusion rates of 55.3%, 54.5%, and 52.4% for the 60-69, 70-79, and 80-89 year age cohorts, respectively; $\chi^2(2, N = 181) = 0.06, p > .95, c = .02$).

Participant responses to the 7 PARQ items are shown in Table 4. The question responsible for excluding the largest number of participants was Number 6, the blood pressure question (42%). Overall, 45.3% of the participants responded "No" to each of the PARQ items, implying these people were healthy enough to begin a low to moderate physical activity program.

Discussion

The purpose of this study was to develop a descriptive database for the revised PARQ instrument within the 60 to 89 year range. Within this sample, PARQ exclu-

Table 2 Gender Specific Participant Characteristics (N = 181)

| Variable | <i>M</i> | <i>SD</i> | <i>t</i> | <i>p</i> |
|--------------------------------------|----------|-----------|----------|----------|
| Age (year) | | | | |
| Female | 70.7 | 6.8 | 1.01 | .16 |
| Male | 69.7 | 6.3 | | |
| Body mass index (kg/m ²) | | | | |
| Female | 28.5 | 5.4 | 3.02 | .002 |
| Male | 26.2 | 4.4 | | |
| Height (cm) | | | | |
| Female | 162.9 | 32.2 | 2.10 | .02 |
| Male | 172.9 | 32.3 | | |
| Weight (kg) | | | | |
| Female | 63.5 | 3.4 | 8.17 | .0001 |
| Male | 68.1 | 4.2 | | |
| VO _{2max} ml/kg/min | | | | |
| Female | 20.1 | 6.5 | 11.46 | .0001 |
| Male | 30.9 | 6.1 | | |

Note. Data provided by 91 females and 90 males.

Table 3 Relationship Between Participant Characteristics and Physical Activity Readiness^a

| Characteristic | Physical activity readiness | | |
|--------------------|-----------------------------|----------|----------|
| | <i>r</i> | χ^2 | <i>c</i> |
| Gender | — | 1.59 | .10 |
| Marital status | — | 0.00 | .00 |
| Ethnicity | — | 3.41 | .14 |
| Educational level | — | 4.32 | .15 |
| Income | — | 0.10 | .02 |
| Age | .02 | — | — |
| Body mass index | .16* | — | — |
| Height | .01 | — | — |
| Weight | .17* | — | — |
| VO _{2max} | .16* | — | — |

^aCoded 0 for “not excluded” and 1 for “excluded”.

**p* < .05.

Table 4 Participants' Responses to Specific Physical Activity Readiness Questionnaire Items ($N = 181$).

| PARQ Question | Response | |
|--|----------|------|
| | % Yes | % No |
| 1. "Has your doctor ever said that you have a heart condition <u>and</u> that you should only do physical activity recommended by a doctor?" | 12.7 | 87.3 |
| 2. "Do you feel pain in your chest when you do physical activity?" | | |
| 3. "In the past month, have you had chest pain when you were not doing physical activity?" | 5.0 | 95.0 |
| 4. "Do you lose your balance because of dizziness or do you ever lose consciousness?" | 7.2 | 92.8 |
| 5. "Do you have a bone or joint problem that could be made worse by a change in your physical activity?" | 23.8 | 76.2 |
| 6. "Is your doctor currently prescribing drugs (for example, water pills) for your blood pressure or heart condition?" | 42.0 | 58.0 |
| 7. "Do you know of <u>any other reason</u> why you should not do physical activity?" | 13.8 | 86.2 |

sion/inclusion status was significantly related to participants' BMI, weight, and predicted $VO_{2\max}$, whereas age, educational level, ethnicity, gender, height, income, and marital status were not significantly related to PARQ exclusion/inclusion status. Cohen (1992) defines correlation coefficients of .10, .30, and .50 as small, medium, and large, respectively. Thus, the associations found in the present study were small. In descriptive research, however, small and significant associations may be important, particularly in the absence of nonsignificant associations for other measured variables (Prentice & Miller, 1992).

The small, significant associations found for BMI and weight were in a direction that partially supports the construct validity of the PARQ instrument (i.e., the higher a study participant's BMI or weight, the more likely that person was excluded from activity). However, those with higher predicted $VO_{2\max}$ values also were more likely to be excluded from physical activity involvement on the basis of their PARQ responses. These disparate findings may have resulted from the manner in which variables were obtained (i.e., self-report and/or predicted from regression equations that were validated in different samples). Future studies using direct measurement techniques will help clarify these preliminary findings.

Both point-biserial and χ^2 tests of association found age to be unrelated to PARQ exclusion status. Interestingly, exclusion rates *decreased* slightly across the three age cohorts. This latter finding is worthy of additional investigation as it implies the PARQ may be more generalizable to those 70 years old and older than previously thought. Although speculative, it seems tenable that persons who have yet to experience major health problems by age 70 are a self-select group that may not require a physician's clearance prior to becoming involved in low to moderate

physical activity programs. If this conjecture is confirmed in future, more extensive research, physical activity promotion efforts could certainly be expanded within the older adult population.

The PARQ question responsible for excluding the largest number of participants was the blood pressure question (42%). As blood pressure can be readily obtained and monitored by a paramedical professional, the exclusionary power of this question could be minimized through a simple blood pressure referral, follow-up, and monitoring system.

Overall, 54.7% of the study's participants were excluded from physical activity involvement on the basis of one or more affirmative responses on the PARQ instrument. This is similar to the percentage of older adult participants thought to be screened by the original PARQ instrument (i.e., 55%; Fitness Canada, 1983; Shephard et al., 1981, 1984). Thus, within this sample, the revised PARQ instrument does not appear to have changed the number of persons excluded in comparison to the original PARQ instrument. However, the 55% figure was only an estimate and there is reason to believe it may have lacked external validity (Cardinal & Cardinal, 1995; Cardinal, Esters, & Cardinal, 1996).

In a study of senior exercise programs in California, 13 exercise leaders were interviewed and 14 programs were evaluated (Schroeder, 1995). Of the programs studied, only 54% required participants to obtain a physician's approval prior to entry in their program. Sixty-two percent of the instructors obtained medical histories on the participants, yet only 23% kept records of this information. Only one instructor performed pre-post physical fitness assessments, less than half monitored participants during class, and only 14% of the facilities had an emergency plan in case of accident.

For the participant's safety and to at least partially protect programs and instructors from litigation, a reasonable professional standard would be to require all prospective program participants to pass a prephysical activity screening, such as the PARQ, prior to program entry. This information should then be maintained in each participant's membership file and updated periodically. If at any time a prospective exercise participant is found to have risk factors or symptoms suggestive of cardiopulmonary or metabolic disease, he or she should be referred to a physician (Shephard, 1994). Furthermore, females older than 50 and males older than 40 who intend to pursue *vigorous* exercise should be referred to a physician for clearance (American College of Sports Medicine, 1995).

Participants in this study were unique (e.g., large percentage of minorities, lower socioeconomic status), and this limits the generalizability of the findings. Also, studies that rely on self-report are open to a number of biases including item interpretation, social desirability, and memory loss. Furthermore, no external criteria were taken against which participants' responses could be compared (e.g., blood pressure readings, electrocardiograms, medical records). However, as little information is available regarding the efficacy of prephysical activity screening instruments for older adults prior to low to moderate physical activity involvement, the present study provides a useful reference point for future, more extensive research.

In conclusion, preliminary evidence suggests the PARQ may be a potential method of identifying older adults for whom low to moderate physical activity participation is safe. If additional, more extensive research corroborates this conclusion, professionals interested in providing low to moderate physical activity

opportunities for older adults would have a useful method for identifying those most and least likely to be at health risk. Moreover, older adults might be more willing to initiate low to moderate intensity physical activity programs on the basis of no affirmative responses to the PARQ instrument.

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