
Objectives: To develop a transcultural adaptation of the Leisure Time Physical Activity Instrument (LTPAI) and the Physical Activity at Home and Work Instrument (PAHWI) in Spanish and to assess their psychometric properties in women with fibromyalgia syndrome (FS).

Design: A cross-sectional transcultural adaptation and validation study.

Setting: Testing was completed at the university.

Participants: Seventy-five (N=75) women with FS (median age = 51 y; 25th–75th percentiles, 45–55 y) and a median symptom duration of 16 years (25th–75th percentiles, 10–25 y) were recruited for the study.

Intervention: Not applicable.

Main Outcome Measures: Cognitive function (Paced Auditory Serial Addition Task), physical activity habits (LTPAI, PAHWI, International Physical Activity Questionnaire [IPAQ]), and active energy expenditure using a multiple-sensor body monitor were used for the evaluations. The differences between the readings (test 1 – test 2) and the SD of the differences, intraclass correlation coefficient (ICC), 95% confidence interval (CI) for the ICC, coefficient of repeatability, intrapatient SD, standard error of the mean, minimal detectable change, Wilcoxon signed-rank test, and Bland-Altman graphs were used to examine reliability. The magnitude of the associations between LTPAI–PAHWI and IPAQ, and between LT-PAWI–PAHWI and the body monitoring device, were used to examine the validity of the construct.

Results: The median time that the study population spent performing physical activities during their leisure time was 5 h/wk (25th–75th percentiles, 3–9 h/wk). A satisfactory test–retest reliability was found for the total score of the LTPAI (ICC = .84; 95% CI, .76–.90) and for the workplace subscale of the PAHWI (ICC = .87; 95% CI, .81–.92). A significant association was observed between LTPAI and both the leisure time domain of the IPAQ (p = .01; P < .001) and the active energy expenditure of the body monitoring device (p = .27; P = .021). A significant association was found between the workplace subscale of the PAHWI and the work domain of the IPAQ (p = .58; P < .001) as well as between the subscale for housework of the PAHWI and the domestic domain of the IPAQ (p = .43; P < .001). However, no association was observed between PAHWI and the SenseWear Armband.

Conclusions: The Spanish version of the LTPAI and PAHWI is understandable, and its administration is feasible in patients with FS. LTPAI can be considered a fairly reliable and valid tool to assess leisure physical activities in Spanish women with FS. The PAHWI does not appear to be a reliable and valid tool to assess physical activities associated with work in Spanish women with FS. Although the PAHWI demonstrated acceptable test–retest reliability for the workplace subscale, a lower reliability was observed for the total score and for the housework subscale.

Key Words: Fibromyalgia; Questionnaires; Leisure activities; Motor activity; Psychometrics; Rehabilitation.

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FIBROMYALGIA SYNDROME is a chronic clinical condition that is characterized by diffuse musculoskeletal pain and a reduced pain threshold, particularly at defined tender points. The condition is often accompanied by a wide variety of symptoms, such as sleep disturbances, reduced physical work capacity, muscular fatigue, cognitive disturbances, anxiety, and depressed mood.

For patients, an impairment of daily functional performance is one of the most significant aspects of FS. This impairment can be a result of the reduced physical activity level caused by the symptoms or of metabolic disturbances. Consequently, the assessment of physical activity in this population is

List of Abbreviations

| CHAMPS | Community Health Activities Model Program for Seniors |
| CI | confidence interval |
| FS | fibromyalgia syndrome |
| ICC | intraclass correlation coefficient |
| IPAQ | International Physical Activity Questionnaire |
| LTPAI | Leisure Time Physical Activity Instrument |
| MDC | minimal detectable change |
| PAHWI | Physical Activity at Home and Work Instrument |
| PASAT | Paced Auditory Serial Addition Task |
| SEM | standard error of mean |
| s-IPAQ | short-form International Physical Activity Questionnaire |

From the Section of Physical Education and Sports, University Pablo de Olavide, Seville, Spain (Munguía-Izquierdo); Section of Physical Education and Sports, University of Zaragoza, Zaragoza, Spain (Legaz-Arrese); Department of Rheumatology and Inflammation Research, Sahlgrenska Academy, Göteborg University, Göteborg, Sweden (Mannerkorpi).

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Reprint requests to Diego Munguía-Izquierdo, PhD, Departamento de Deporte e Informática, Universidad Pablo de Olavide, Carretera de Utrera, Km 1, s/n, 41013, Seville, Spain, e-mail: dumanzq@upo.es.

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important for understanding the relationship between physical activity and health and for determining the efficacy of treatment interventions.

There is increasing interest in the use of both subjective and objective measures of physical activity in patients with FS. A number of studies have used newer technologies such as actigraphy or pedometers to document objective physical activity levels in patients with FS. The most commonly used technique to assess physical activity is self-reported questionnaires because they are easy and inexpensive to administer and are nonreactive (ie, they do not influence the behavior of the respondent). Most instruments have demonstrated a considerably greater focus on typical male domains, such as competitive sports, as opposed to typical female activity domains.

Because physical activity dimensions differ in many ways, the measurement tools must have the ability to offset discrepancies. For example, women are more likely to participate in housework and care giving than men. In addition, it is important to evaluate the possible involvement of cognitive disturbances in patients with FS in relation to their ability to complete physical activity questionnaires accurately.

To date, some specific physical activity questionnaires have been used in patients with FS without a prior analysis of psychometric properties in the respective clinical population. Very few physical activity questionnaires have been validated in subjects with FS, and all of them are in the English language. With respect to psychometric properties, the reliability of the LTPAI–PAHWI, CHAMPS, and s-IPAQ were found to be satisfactory, moderate, and poor, respectively. Low construct validity has not been established for PAHWI. Low to moderate construct validity has been described for LTPAI and and poor construct validity has been reported for CHAMPS and s-IPAQ. Consequently, no well established physical activity questionnaires are currently available for patients with FS, and there are no physical activity questionnaires for Spanish-speaking patients with FS.

FS is recognized as a common clinical condition and a major cause of morbidity worldwide. Based on clinical studies performed in various countries, the prevalence of FS in the general population has been estimated to be between 0.5% and 5%. The overall prevalence of FS in the adult Spanish population has been estimated to be 2.4% (95% CI, 1.5–3.2). Similar prevalence rates have been reported in North America and in Western European countries. However, the prevalence of FS is lower in other European countries such as Finland and Denmark. To advance knowledge concerning physical activity in patients with FS in Spain, we adopted a behavioral epidemiologic framework.

Extensive research has supported a link between physical activity and health in patients with FS. Current research efforts must focus on the development of methods that accurately measure physical activity to assess (1) the prevalence of physical activity or inactivity in the FS population, (2) the efficacy of physical activity interventions, and (3) the relationship between physical activity or inactivity and other outcomes that are of interest to researchers. Until physical activity can be validly and reliably assessed in this population, progress toward the development of effective interventions will be delayed. Consequently, the objective of this study was to assess the psychometric properties and transcultural adaptation of 2 physical activity instruments in Spanish in subjects with FS.

The goal was to provide potential tools that could be used by both clinicians and researchers in this field.

**METHODS**

**Study Population**

An invitation to participate in the study was sent to all women age 18 to 60 years (N = 250) from a local FS association in Seville, Spain. Seventy-five potentially eligible subjects responded and sought more information. After receiving an explanation of the study protocol, these 75 patients provided written consent that was approved by the Committee on Bio-medical Ethics of the University Pablo de Olavide. The exclusion criteria included the presence of subjects with a history of morbid obesity, known cardiopulmonary diseases, uncontrolled endocrine or allergic disturbances, severe trauma, orthopedic or musculoskeletal limitations that precluded ambulation, frequent migraines, inflammatory rheumatic diseases, and severe psychiatric illness. In addition, subjects with any type of tremor, subjects with other diseases that prevent physical loading, and subjects who were pregnant were also excluded. The inclusion criteria were the ability to read and write in Spanish.

All 75 patients completed all of the physical activity assessments and wore the multiple-sensor body monitor for 1 week. Two measurement conditions that were separated by 1-week intervals were performed at the university appointments to obtain the values that were used to evaluate the construct validity and the test–retest reliability. At the first appointment, the personal medical records of the patients were examined by a physician, and a diagnosis of FS was confirmed according to the American College of Rheumatology classification criteria. In addition, a multiple-sensor body monitor was placed on the arm of each patient, and the Spanish versions of the LTPAI and PAHWI were administered and completed by each patient. At the second appointment, the patients were carefully interviewed to ensure that their routine lifestyles had not changed during the study period, the multiple-sensor body monitor was removed from each patient, and the PASAT and the Spanish versions of the IPAQ, LTPAI, and PAHWI were administered and completed by each patient. All of the protocols were completed accurately, and all of the patients participated in the reliability and construct validity analyses.

**Instruments**

**Physical activity measures.** The LTPAI is composed of 4 items with 3 activity levels: light, moderate, and vigorous (a short description of each category was presented). Subjects were asked to recall the average number of hours a week during the previous 4 weeks that they had spent engaged in a particular type of physical activity and at what activity level. The scale was simplified into the following 3 levels: (1) 0.5 to 1.5 hours a week, (2) 2 to 4 hours a week, and (3) more than 4 hours a week, and the respondent was asked to provide answers in hours. For the first 2 activity levels, the mean number of hours (1 and 3 hours, respectively) was used to calculate the total score. If no level was selected for that category, the number of hours indicated in the particular category was presented (a short description of each category was presented). The number of hours indicated by the subjects for each intensity category was summed to obtain the leisure time physical activity level for 1 week.

PAHWI is composed of 7 items with 3 categories for work performed at home (light, moderate, heavy activity) and 4 categories for employment (sedentary, light, moderate, heavy activity). A short description of each category was presented, and the respondents were asked to report the amount of time spent performing each of the activity categories. The hours for each category were summed to obtain...
the total score for the PAHWI (activity at housework and activity at the workplace). 21

The Spanish long-form version of the IPAQ was used to measure the frequency, intensity, and duration of occupational, transportation, home, leisure/sport, and sitting activity performed during the previous 7 days. The IPAQ is a relatively new instrument that is used to assess health-related physical activity and physical inactivity in population surveys. It has been validated against accelerometry 34 and been shown to have satisfactory psychometric properties. 34-36 Before the IPAQ was designed, no standardized, self-reported instrument was available for international comparisons. In contrast with most other questionnaires, the IPAQ has been designed to include all of the domains of physical activity.

A wearable body-monitoring device (SenseWear Pro, Armband®) was used to assess the expenditure of active energy. The monitor was worn for 1 week on the right arm over the triceps brachii muscle at the midpoint between the acromion and the olecranon processes. Data obtained using the monitor were downloaded using software developed by the manufacturer (SenseWear Professional software version 6.1). This portable device has been successfully validated against doubly labeled water 39 and indirect calorimetry. 40 It includes a 2-axis accelerometer for motion detection and additional sensors to measure energy expenditure by monitoring the heat flow from the body, skin temperature, and galvanic skin responses. These multiple sensors can be used to sample a variety of different physiologic parameters simultaneously over time. The physio-
logic information gathered by the sensor array together with simple body measurements were processed using SenseWear algorithms to obtain accurate estimations of energy expenditure for all types of activity over the course of an entire week.

Cognitive function measure. All of the participants were asked to complete the PASAT. This standardized neuropsychologic test measures sustained and divided attention, auditory information processing speed, and stimulus competition filtering skill. 41 In the present study, the PASAT was administered only at its slowest presentation rate of 2.4 seconds. 42 The score was defined by the number of correct responses obtained in 60 trials.

Study Design

Transcultural translation process. Figure 1 shows the ad-
aptation process that was followed for the LTPAI and PAHWI using direct and reverse translation (forward-backward trans-
lagation), as prescribed by the scientific literature. 43-45

In the first step of the process, 2 bilingual translators whose first language was Spanish independently translated the origin-

Original version

Direct translation A

Direct translation B

Conceptual equivalence rating

First consensus version

Reverse translation (backward translation)

Comparison of the backward translation with the original version

Second consensus version

Comprehension test (Paraphrasing method)

Rating of the results of the previous phase by the investigation team

Final version

the total score for the PAHWI (activity at housework and activity at the workplace). 21

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the original version of the questionnaires in English. Their objective was to analyze the conceptual equivalence of the items and to provide alternatives to any detected discrepancies. The consensus resulted in the second version of the questionnaires (appendices 1 and 2), which was assessed by the main author of the instrument to guarantee a quality-adjusted version of the original questionnaire.

Subsequently, individual interviews were conducted for the patients with FS to evaluate their understanding of the ques-
tionnaires (cognitive debriefing), as described by previous stud-
ies. 44 The purpose of this strategy was to evaluate the compre-
hesibility and feasibility of the instrument. A method called paraphrasing 46 was used during the interviews, in which some patients were asked to repeat in their own words the most difficult items of the questionnaires or the items about which they were unsure.

Evaluation of test–retest reliability. Test–retest reliability was evaluated for (1) the total score for the Spanish version of the LTPAI; (2) separately for the categories of light, moderate, and vigorous activities; (3) the total score for the Spanish version of PAHWI; (4) separately for activity at housework and at the workplace; and (5) separately for the categories of sedentary, light, moderate, and strenuous activities. All of the patients were asked to complete the LTPAI and PAHWI twice (separated by 1-week intervals).
Evaluation of construct validity. Two measures were selected to evaluate construct validity. The first measure was the Spanish long-form (27 items) version of the IPAQ, which is an instrument that measures the overall physical activity and has been validated and frequently used in clinical populations with rheumatic diseases, associated chronic syndromes such as chronic fatigue syndrome and musculoskeletal disorders. From the IPAQ, 3 outcome measures were computed according to published guidelines (http://www.ipaq.ki.se): work, domestic gardening, and leisure time physical activities during the previous 7 days. All of the patients were asked to complete the IPAQ 1 time. This administration coincided with the second completion of the LTPAI and the PAHWI and with removal of the body-monitoring device. The second evaluation tool was the multiple-sensor body monitor (SenseWear Pro3 Armband), which was used to assess active energy expenditure. This tool has been analyzed recently and was demonstrated to possess satisfactory psychometric properties in both healthy and chronically ill clinical populations. The monitor was worn during the week that coincided with the time elapsed between administration of the first and second tests.

Statistical analysis. Test–retest reliability is expressed according to the differences observed between the readings (test 1 − test 2) and the SDs of the differences, ICC, coefficient of repeatability, intrapatient SD, SEM, and MDC. A 95% confidence level for the MDC that corresponded to a value of 1.96 was established. ICCs of less than .40, .4 to .75, and greater than .75 represented poor, moderate, and excellent agreement, respectively.

The Wilcoxon signed-rank test was selected to analyze systematic differences in the variables between the 2 occasions. In addition, using the Bland-Altman graph, a plot of the differences between test 1 and 2 against the mean for each physical activity category was used to determine the agreement between the reported values at the individual level.

Associations between the variables were calculated using the Spearman correlation coefficient. A moderate correlation between variables was considered meaningful. To detect a moderate correlation (\( p < .30 \)), a sample of 64 subjects is needed to have an 80% chance of obtaining a statistically significant correlation at the 5% significance level. All of the tests were 2-tailed, and a significance level of 5% was established.

RESULTS

Sample Characteristics

Seventy-five volunteer subjects who were diagnosed with FS were included in the analyses. The age of the subjects ranged from 22 to 60 years, and the median age was 51 years (25th–75th percentiles, 45–55y). All of the patients were women, white, and born in Spain. Most of the patients were married (91%), were homemakers (56%), and reported an elementary-level education or higher (87%). They exhibited poor cognitive performance on the PASAT. None of the patients reported any problems related to the SenseWear Armband, and none of the body monitors failed during the assessment period. Clinical and demographic data are presented in table 1.

Transcultural Translation Process

During the process of direct and reverse translation (forward and backward translation), the range of difficulty for the translators varied between 1 and 4, whereas the conceptual equivalence varied between 7 and 10. Items 2 and 3 of the LTPAI presented the greatest difficulty and/or the least conceptual equivalence and were discussed during the first and second consensus meetings. In these meetings, linguistic criteria were also unified, such as the use of the Spanish usted as a form of courtesy and the use of the indefinite preterite as a preferred verbal tense, according to the criteria adopted in the physical activity and health questionnaires that are most commonly used in the scientific literature.

Subsequently, the most problematic items were analyzed specifically in individual interviews to rate the subjects’ comprehension of the questionnaire (cognitive debriefing). The interviews were conducted for 10 women with FS who ranged in age from 33 to 60 years and had different education levels (2 with no schooling, 4 with an elementary school education, 3 with a high school education, and 1 with a university education). The administration time for both questionnaires was 2–3 minutes.

Table 1: Characteristics of Study Population (n=75)

<table>
<thead>
<tr>
<th>Variables</th>
<th>FS Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (y)</td>
<td>Median (25th–75th Percentiles)</td>
</tr>
<tr>
<td>Duration of symptoms (y)</td>
<td>16 (10–25)</td>
</tr>
<tr>
<td>Tender point count, 1–18</td>
<td>18 (17–18)</td>
</tr>
<tr>
<td>Body mass index (kg/m²)</td>
<td>28.3 ± 5.6</td>
</tr>
<tr>
<td>PASAT Test 2.4 seconds 0–60</td>
<td>29.7 ± 12.6</td>
</tr>
<tr>
<td>Domestic labor</td>
<td>42 (56)</td>
</tr>
<tr>
<td>Operatives</td>
<td>14 (19)</td>
</tr>
<tr>
<td>Office or store worker</td>
<td>9 (12)</td>
</tr>
<tr>
<td>Manager</td>
<td>3 (4)</td>
</tr>
<tr>
<td>Highest education</td>
<td></td>
</tr>
<tr>
<td>No schooling</td>
<td>10 (13)</td>
</tr>
<tr>
<td>Elementary school</td>
<td>48 (64)</td>
</tr>
<tr>
<td>High school</td>
<td>14 (19)</td>
</tr>
<tr>
<td>College/university</td>
<td>3 (4)</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>2 (3)</td>
</tr>
<tr>
<td>Married</td>
<td>60 (91)</td>
</tr>
<tr>
<td>Widowed</td>
<td>2 (3)</td>
</tr>
<tr>
<td>Divorced or separated</td>
<td>2 (3)</td>
</tr>
<tr>
<td>Drugs</td>
<td></td>
</tr>
<tr>
<td>Simple analgesic</td>
<td>44 (59)</td>
</tr>
<tr>
<td>NSAID</td>
<td>28 (37)</td>
</tr>
<tr>
<td>Antidepressants</td>
<td>14 (19)</td>
</tr>
<tr>
<td>Anxiolytics</td>
<td>29 (19)</td>
</tr>
<tr>
<td>Current smoker</td>
<td>21 (28)</td>
</tr>
</tbody>
</table>

Abbreviation: NSAID, nonsteroidal anti-inflammatory drug.
sudor was selected because the term transpiración did not contribute to an increased conceptual equivalence and created greater comprehension difficulty. In this regard, the opinions contributed by some of the patients during the interviews supported our approach. In the next example, the patient answers on the comprehension test enabled us to decide between 2 options (andar or caminar) for suggested item 5 of the PAHWI. The final example shows that although there was a consensus for an equivalent term in the original version during the process of direct and reverse translation, footing was changed to trotar because of difficulty comprehending this item on the cognitive test.

With respect to the degree of questionnaire acceptance and formality, the results showed that all of the subjects found the format comfortable and considered their comprehension of the items sufficient to allow them to suggest changes in specific items on both questionnaires. There were no missing data in any of the questionnaires.

Activity Level

The active energy expenditure of the sample collected by the SenseWear Armband ranged from 780 to 9456 kcal/wk, and the median value was 3337 kcal/wk (25th–75th percentiles, 2132–4439 kcal/wk).

Concerning the self-reported results, the median time devoted to leisure time physical activity was 5h/wk (25th–75th percentiles, 3–9h/wk; range, 0–40h/wk). The median duration of physical activity performed at housework was 39h/wk (25th–75th percentiles, 25–55h/wk; range, 4–105h/wk). The median duration of activity at work was 2h/wk (25th–75th percentiles, 0–25h/wk; range, 0–72h/wk) (table 4).

Low-intensity activities represented 51% (3.3h/wk) of the total amount of time devoted to leisure-time physical activity, moderate-intensity activities represented 37% (2.4h/wk), and vigorous activities represented only 12% (0.8h/wk). Sedentary and low-intensity activities represented 65% (35.9h/wk) of the total amount of time devoted to work-related physical activity, moderate-intensity activities represented 29% (15.7h/wk), and vigorous activities represented only 6% (3.1h/wk). Housework activities represented 76% (41.5h/wk) of the total amount of time devoted to work-related physical activities, whereas workplace activities represented only 24% (13.3h/wk).

Test–Retest Reliability

For the LTPAI, the mean differences, SDs of the differences, intrapatient SD, ICCs, 95% CIs for the ICCs, SEMs, and 95% CIs for the MDCs are presented in table 5. The ICCs were satisfactory for the LTPAI total score (.84) and for the light (.86), moderate (.79), and vigorous activity (.87) categories. The SEMs and MDCs were satisfactory for the LTPAI for all of the activity level categories; the MDCs ranged from 1.41 to 6.77 hours, and the SEMs ranged from .51 to 2.44 hours. No systematic differences were observed for assessments that were completed on 2 different occasions, as determined using the Wilcoxon signed-rank test. Figure 2 shows the Bland-Altman graph for the total score of the LTPAI. The limits of agreement indicated that the differences between repeated tests would lie within 2 SD in 95% of the cases. The coefficient of repeatability was less than 2 SD for the total score of the LTPAI (12.5).

For the PAHWI, the ICCs for the total score (.71) and for the subscale for housework activity (.64) were moderate. The ICCs for the workplace activity subscale (.87) and for all of the activity level categories were excellent. The SEMs and MDCs were acceptable for the workplace subscale for all of the activity level categories; the MDCs ranged from 1.91 to 17.93 hours, and the SEMs ranged from .69 to 6.47 hours. However, the SEMs and MDCs were higher for the total score of the PAHWI and for the housework subscale for all of the activity level categories; the MDCs ranged from 5.27 to 38.76 hours, and the SEMs ranged from 1.90 to 13.98 hours (see table 5). Significant differences were observed between assessments that were completed on 2 different occasions for the total score of the PAHWI (P < .001) and for the housework subscale (P < .001), as determined using the Wilcoxon signed-rank test. Figure 2 also shows the Bland-Altman graphs for the total score of the PAHWI and for the housework and workplace subscales. The limits of agreement for the workplace subscale of the PAHWI indicated that the differences between repeat tests would lie within 2 SD in 95% of the cases. The coefficient of repeatability was less than 2 SD for the

### Table 2: Questions Arising in the Process of Direct and Reverse Translation and Raised on the Cognitive Test

<table>
<thead>
<tr>
<th>Items 3 and 4 of the LTPAI</th>
<th>Detected Problem</th>
<th>Consensus Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perspiration</td>
<td>The conceptual equivalent and comprehension difference between sudor and transpiración was raised</td>
<td>Sudor, because of its greater conceptual equivalence and lower comprehension difficulty following the results of the cognitive test</td>
</tr>
<tr>
<td>Item 2 of the LTPAI Light</td>
<td>The more adequate location of the adjective suaves was raised for better comprehension</td>
<td>. . . ejercicio acuático, natación o jardinería suave was included following results on the cognitive test and the advice of the original authors</td>
</tr>
<tr>
<td>Jogging</td>
<td>The conceptual equivalence between jogging and trotar or footing was raised</td>
<td>Trotar, by conceptual equivalence following results on the cognitive test and the advice of the original authors</td>
</tr>
<tr>
<td>Items 1, 5, and 6 of the PAHWI Walk/Walking</td>
<td>The conceptual equivalence between walk/walking and andar or caminar was raised</td>
<td>Caminar, by conceptual equivalence and patient preference following the results of the cognitive test</td>
</tr>
<tr>
<td>Items 2, 3, and 4 of the LTPAI Gardening</td>
<td>The conceptual equivalence between gardening and jardinería (horticulture) was raised</td>
<td>Jardinería, by conceptual equivalence following the advice of the original authors</td>
</tr>
</tbody>
</table>

Direct translation: jardinería Reverse translation: horticulture

Sudor, because of its greater conceptual equivalence and lower comprehension difficulty following the results of the cognitive test
workplace subscale (25.4). However, the limits of agreement for the total score of the PAHWI and for the housework subscale indicated that the differences between repeated tests would not lie within 2 SD in 95% of the cases. The coefficient of repeatability was greater than 2 SD for the total score of the PAHWI and for the housework subscale indicated that the differences between repeated tests would not lie within 2 SD in 95% of the cases. However, the limits of agreement for the total score of the PAHWI and for the housework subscale indicated that the differences between repeated tests would not lie within 2 SD in 95% of the cases.

Construct Validity

The Spearman correlation coefficient revealed a strong association between the LTPAI and the leisure time domain of the IPAQ ($r = .61; 95\% CI, .45-.74; P < .001$) and a low association between the LTPAI and the active energy expenditure measured by the SenseWear Armband ($r = .27; 95\% CI, .05-.47; P = .021$), which implied that there was some degree of association between the LTPAI and these instruments. The Spearman correlation coefficient also revealed moderate associations between the workplace subscale of the PAHWI and the domestic and garden domain of the IPAQ ($r = .43; 95\% CI, .22-.60; P < .001$). These results implied that there was some degree of association between the subscales of PAHWI and the respective domains of IPAQ. The association between PAHWI

<table>
<thead>
<tr>
<th>Process of Transcultural Adaptation</th>
<th>Item 4 of LTPAI</th>
<th>Item 5 of PAHWI</th>
<th>Item 3 of LTPAI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original version</td>
<td>Vigorous exercise that noticeably increases your breathing rate and perspiration, . . .</td>
<td>Light yet flexible work. You have a light job, during which you walk . . .</td>
<td>. . . This includes brisk walking or cycling, walking on paths in nature, light jogging, . . .</td>
</tr>
<tr>
<td>Direct translation A</td>
<td>Ejercicio fuerte que incrementó notablemente su frecuencia respiratoria y transpiración, . . .</td>
<td>Trabajo suave aunque flexible. Tiene un empleo suave, durante el cual camina . . .</td>
<td>. . . Esto incluye caminar o ir en bicicleta a frecuencia acelerada, caminar por senderos en la naturaleza, footing suave, . . .</td>
</tr>
<tr>
<td>Equivalence Difficulty</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Direct translation B</td>
<td>Ejercicio vigoroso que incrementó perceptiblemente su frecuencia respiratoria y su sudor, . . .</td>
<td>Trabajo suave aunque flexible. Tiene un empleo suave, durante el cual anda . . .</td>
<td>. . . Esto incluye caminar o ir en bicicleta a frecuencia acelerada, caminar por senderos en la naturaleza, trotar suavemente, . . .</td>
</tr>
<tr>
<td>Equivalence Difficulty</td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>First consensus version</td>
<td>Ejercicio vigoroso que incrementó perceptiblemente su frecuencia respiratoria y su transpiración, . . .</td>
<td>Trabajo suave aunque flexible. Tiene un empleo suave, durante el cual camina . . . Trabajo suave aunque flexible. Tiene un empleo suave, durante el cual anda . . .</td>
<td>. . . Esto incluye caminar o ir en bicicleta a frecuencia acelerada, dar pasos por la naturaleza, footing suave, . . .</td>
</tr>
<tr>
<td>Reverse translation</td>
<td>Vigorous exercise that notably increases your level of breathing and transpiration, . . .</td>
<td>Flexible and mild/gentle work. You have an easy/simple job, during which you are walking . . .</td>
<td>This includes walking or going by bike in a gentle manner, walking on natural paths, gentle footing, . . .</td>
</tr>
<tr>
<td>Second consensus version</td>
<td>Two options suggested to patients in the cognitive test: Ejercicio vigoroso que incrementó perceptiblemente su frecuencia respiratoria y su sudor, . . . Ejercicio vigoroso que incrementó perceptiblemente su frecuencia respiratoria y su transpiración, . . .</td>
<td>Two options suggested to patients in the cognitive test: Trabajo suave aunque flexible. Tiene un empleo suave, durante el cual camina . . . Trabajo suave aunque flexible. Tiene un empleo suave, durante el cual anda . . .</td>
<td>Two options suggested to patients in the cognitive test: Esto incluye caminar o ir en bicicleta a frecuencia acelerada, caminar por senderos en la naturaleza, footing suave, . . . Esto incluye caminar o ir en bicicleta a frecuencia acelerada, caminar por senderos en la naturaleza, trotar suavemente, . . .</td>
</tr>
<tr>
<td>Cognitive test</td>
<td>All of the patients preferred the option sudor to transpiración Sudor: high conceptual equivalence and low comprehension difficulty Transpiración: high comprehension difficulty without adding greater conceptual equivalence than sudor</td>
<td>Most of the patients (9/10) preferred the option caminar to andar Caminar: makes reference to a more structured action, presents greater conceptual equivalence Andar: used colloquially, has more meanings</td>
<td>Most of the patients (9/10) preferred the option trotar to footing Trotar: it was recognized as an intensity between slow running and fast walking Footing: Anglicism; they did not comprehend the meaning nor the exercise intensity</td>
</tr>
<tr>
<td>Final version</td>
<td>Option B: Ejercicio vigoroso que incrementó perceptiblemente su frecuencia respiratoria y su sudor, . . .</td>
<td>Option A: Trabajo suave aunque flexible. Tiene un empleo suave, durante el cual camina . . .</td>
<td>Option B: Esto incluye caminar o ir en bicicleta a frecuencia acelerada, caminar por senderos en la naturaleza, trotar suavemente, . . .</td>
</tr>
</tbody>
</table>
is the short duration of the administration, which can promote a high response rate. The total administration time was approximately 5 to 10 minutes, which is similar to that reported for the original version.21

LTPAI Analysis

Compared with patients who took the original version of the LTPAI,21 activity levels and the time devoted to leisure time physical activity were similar. In the present study, all of the activity categories in the Spanish LTPAI were scored by the study population, which suggested that the face validity of the questionnaire was satisfactory for Spanish patients with FS. The same result was shown for the original version of LTPAI in a different study population.21

Regarding the test–retest reliability, the high ICCs indicated a satisfactory60 stability for the total score and for all activity level categories of the LTPAI. To analyze the repeatability of the instrument, the coefficient of repeatability, SEM, MDC, and intrapatient SD were calculated. The results of these analyses were presented in the same units as those used for the instrument (hours). An intrapatient SD*2.77 is assumed to provide a range within which 95% of the repeated measurements are found.60 The intrapatient SD*2.77 of the total score on the LTPAI was 6.9 hours, which is acceptable for this instrument. The Spanish LTPAI demonstrated good stability across repeated questionnaires because it presented reduced MDCs. It showed greater test–retest reliability compared with the 2 physical activity assessment tools that were recently validated in patients with FS.17 The reliability of the LTPAI was as satisfactory as that determined for the original version.21

An examination of the Bland-Altman graph (see fig 2A) suggested that the fanning effect observed in the LTPAI plot indicated that the reproducibility of the data decreased as the amount of reported physical activity increased. The coefficient of repeatability for the total score of the LTPAI suggested that the recall was fairly repeatable regardless of the amount of reported activity.

The associations between the total score of the LTPAI and the leisure time domain of the IPAQ demonstrated a significant and high correlation (r= .61; P<.001). The validity of the LTPAI showed a greater correlation with the leisure time domain of the IPAQ compared with the original version.22 The original version included a questionnaire that was designed to

and active energy expenditure was not significant as measured by the SenseWear Armband (table 6).

**DISCUSSION**

The transcultural adaptation of questionnaires is a systematic and rigorous process. The present work presents 2 measurement instruments in Spanish that are conceptually equivalent to their original English versions.

During the adaptation of LTPAI and PAHWI, no significant problems were encountered during the translation into Spanish or during evaluation of the conceptual equivalence of the items on the questionnaires. In general, the ability of the patients with FS to comprehend the questionnaires was good, and the patients suggested various options when necessary to improve their comprehension. The patients experienced no difficulty completing the questionnaire.

In addition to satisfactory comprehension and easy administration, another advantage of the Spanish LTPAI and PAHWI is the short duration of the administration, which can promote

Table 4: Scorings of the Spanish Version of LTPAI and PAHWI at the First Occasion of Patients With FS (n=75)

<table>
<thead>
<tr>
<th>Activity Levels of LTPAI and PAHWI</th>
<th>Median (25th–75th Percentiles)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LTPAI (h)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light</td>
<td>3 (0–5)</td>
<td>0–30</td>
</tr>
<tr>
<td>Moderate</td>
<td>3 (0–3)</td>
<td>0–10</td>
</tr>
<tr>
<td>Vigorous</td>
<td>0 (0–1)</td>
<td>0–5</td>
</tr>
<tr>
<td>Total score</td>
<td>5 (3–9)</td>
<td>0–40</td>
</tr>
<tr>
<td><strong>PAHWI (h)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work home light</td>
<td>25 (15–35)</td>
<td>0–64</td>
</tr>
<tr>
<td>Work home moderate</td>
<td>10 (14–20)</td>
<td>0–56</td>
</tr>
<tr>
<td>Work home strenuous</td>
<td>0 (0–0)</td>
<td>0–40</td>
</tr>
<tr>
<td>Work home total</td>
<td>39 (25–55)</td>
<td>4–105</td>
</tr>
<tr>
<td>Workplace sedentary</td>
<td>0 (0–2)</td>
<td>0–48</td>
</tr>
<tr>
<td>Workplace light</td>
<td>0 (0–5)</td>
<td>0–54</td>
</tr>
<tr>
<td>Workplace moderate</td>
<td>0 (0–0)</td>
<td>0–25</td>
</tr>
<tr>
<td>Workplace strenuous</td>
<td>0 (0–0)</td>
<td>0–35</td>
</tr>
<tr>
<td>Workplace total</td>
<td>2 (0–25)</td>
<td>0–72</td>
</tr>
<tr>
<td>Total score</td>
<td>48 (38–71)</td>
<td>5–112</td>
</tr>
</tbody>
</table>

Table 5: Spanish Version of LTPAI and PAHWI (N=75)

<table>
<thead>
<tr>
<th>Activity Levels of LTPAI and PAHWI</th>
<th>Difference Mean ± SD</th>
<th>Intrapatient SD</th>
<th>ICC</th>
<th>95% CI for ICC</th>
<th>SEM (h/wk)</th>
<th>MDC (h/wk)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LTPAI</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light</td>
<td>-0.1±4.4</td>
<td>1.67</td>
<td>.86</td>
<td>.78–.91</td>
<td>1.62</td>
<td>4.49</td>
</tr>
<tr>
<td>Moderate</td>
<td>0.2±2.4</td>
<td>1.09</td>
<td>.79</td>
<td>.69–.86</td>
<td>0.94</td>
<td>2.60</td>
</tr>
<tr>
<td>Vigorous</td>
<td>-0.3±1.9</td>
<td>0.68</td>
<td>.87</td>
<td>.81–.92</td>
<td>0.51</td>
<td>1.41</td>
</tr>
<tr>
<td>Total score</td>
<td>-0.2±6.4</td>
<td>2.55</td>
<td>.84</td>
<td>.76–.90</td>
<td>2.44</td>
<td>6.77</td>
</tr>
<tr>
<td><strong>PAHWI</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work home light</td>
<td>5.8±14.7</td>
<td>8.18</td>
<td>.69</td>
<td>.55–.79</td>
<td>8.44</td>
<td>23.38</td>
</tr>
<tr>
<td>Work home moderate</td>
<td>1.5±14.3</td>
<td>6.76</td>
<td>.78</td>
<td>.67–.85</td>
<td>5.39</td>
<td>14.93</td>
</tr>
<tr>
<td>Work home strenuous</td>
<td>1.0±5.4</td>
<td>1.45</td>
<td>.93</td>
<td>.89–.95</td>
<td>1.90</td>
<td>5.27</td>
</tr>
<tr>
<td>Workplace total</td>
<td>8.3±21.6</td>
<td>12.97</td>
<td>.64</td>
<td>.48–.76</td>
<td>13.50</td>
<td>37.42</td>
</tr>
<tr>
<td>Workplace sedentary</td>
<td>0.0±6.4</td>
<td>1.45</td>
<td>.95</td>
<td>.92–.97</td>
<td>2.33</td>
<td>6.45</td>
</tr>
<tr>
<td>Workplace light</td>
<td>0.2±2.9</td>
<td>2.58</td>
<td>.92</td>
<td>.88–.95</td>
<td>2.83</td>
<td>7.85</td>
</tr>
<tr>
<td>Workplace moderate</td>
<td>0.9±6.6</td>
<td>1.90</td>
<td>.92</td>
<td>.87–.95</td>
<td>1.90</td>
<td>5.27</td>
</tr>
<tr>
<td>Workplace strenuous</td>
<td>0.1±2.8</td>
<td>0.35</td>
<td>.98</td>
<td>.97–.99</td>
<td>0.69</td>
<td>1.91</td>
</tr>
<tr>
<td>Total score</td>
<td>12.2±12.9</td>
<td>4.54</td>
<td>.87</td>
<td>.81–.92</td>
<td>6.47</td>
<td>17.93</td>
</tr>
</tbody>
</table>

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measure overall physical activity in older people. It included both leisure time and domestic activities, whereas the LTPAI and the leisure time domain of the IPAQ included only leisure time activities. Consequently, this higher correlation of the Spanish version was likely a result of a greater similarity in the design of the 2 instruments compared (LTPAI vs the leisure time domain of the IPAQ).

The Spanish version of the LTPAI showed a low association with active energy expenditure ($\rho=.27; \text{P}=0.021$). These results demonstrated that the active energy expenditure of our patients occurred more frequently during leisure than during work time and demonstrated the importance of participating in active leisure to maintain an active lifestyle and to obtain the beneficial effects of exercise for the symptoms of FS.\textsuperscript{31-33} No significant correlations were observed between 2 self-reported physical activity questionnaires and the accelerometry data in a recent study in patients with FS.\textsuperscript{17} The present findings showed that the total score of the LTPAI was an adequate indicator of active energy expenditure in patients with FS because it was one of the few tools that correlated with an objective measure. Despite high compliance with the SenseWear Armband, the

Table 6: Spearman Correlation Coefficients ($\rho$) between the Spanish Versions of LTPAI, PAHWI, IPAQ, and Active Energy Expenditure in Patients With FS (N=75)

<table>
<thead>
<tr>
<th></th>
<th>LTPAI total score (h)</th>
<th>Active Energy Expenditure (met)</th>
<th>IPAQ Leisure Time (met)</th>
<th>IPAQ Work (met)</th>
<th>IPAQ Domestic (met)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LTPAI total score (h)</td>
<td>0.27* (0.05/0.47)</td>
<td>0.61† (0.45/0.74)</td>
<td>0.10 (−0.13/0.32)</td>
<td>0.10 (−0.13/0.32)</td>
<td></td>
</tr>
<tr>
<td>PAHWI workplace total (h)</td>
<td>0.01 (−0.22/0.24)</td>
<td>−0.29* (−0.48/−0.11)</td>
<td>0.58† (0.40/0.71)</td>
<td>−0.01 (−0.23/0.20)</td>
<td></td>
</tr>
<tr>
<td>PAHWI work home total (h)</td>
<td>0.12 (−0.11/0.34)</td>
<td>0.08 (−0.18/0.28)</td>
<td>−0.16 (−0.38/−0.06)</td>
<td>0.43† (0.22/0.60)</td>
<td></td>
</tr>
</tbody>
</table>

NOTE. Values are $\rho$ (95% CI).
Abbreviation: met, metabolic equivalents.
* $\text{P}<.05$; † $\text{P}<.001$. 

Fig 2. Bland and Altman plots of the differences between tests 1 and 2 for (A) LTPAI total score, (B) subscale for workplace of the PAHWI, (C) subscale for home work of the PAHWI, (D) PAHWI total score. The means of the differences (solid lines) and limits of agreement (dashed lines) within ±2 SDs are shown.
low correlation was likely a result of the ability of the SenseWear Armband to record movements that the study population might not consider physical activity. In addition, our patients demonstrated a cognitive performance that was inferior to a healthy group of Spanish and age-controlled subjects. Consequently, cognitive disturbances could also interfere with the ability of patients with FS to self-report physical activity accurately.

PAHWI Analysis

Compared with patients who completed the original version of the PAHWI, activity levels and the time devoted to physical activity at the workplace were similar. However, the patients in the present study devoted more than 3-fold the amount of time spent on by the patients of the original version to physical activity at housework. This finding was likely influenced by the significant amount of time spent by most of our patients on chores at home. In our study, all of the activity categories in the Spanish PAHWI were scored by the study population, which suggested that the face validity of the questionnaire was satisfactory for Spanish patients with FS. The same result was shown for the original version of PAHWI in a different study population.

Regarding the test–retest reliability, the high ICCs indicated a satisfactory stability for the total score and for all of the activity level categories of the PAHWI at the workplace. The ICCs indicated a moderate to high stability for the total score and for the light activity category of the PAHWI for housework. They also indicated a satisfactory stability for the remaining activity categories. The Wilcoxon signed-rank test did not reveal any systematic differences for the repeated measurements, excluding those obtained for the total score of the PAHWI and for the housework subscale, which demonstrated a lower stability across repeated questionnaires because of sizable MDCs. The Bland–Altman graph (see fig 2B) and the coefficient of repeatability for the workplace subscale of the PAHWI suggested that recall was fairly repeatable irrespective of the reported amount of activity. However, low levels of repeatability were obtained for the total score of the PAHWI and for its housework subscale.

The Spanish version of PAHWI demonstrated greater test–retest reliability compared with CHAMPS and s-IPAQ, which are physical activity assessment tools that were recently validated for housework. They also indicated a satisfactory stability for the total score and for the light activity category of the PAHWI for housework physical activities in Spanish women with FS. Although PAHWI does not appear to be a reliable and valid tool for the assessment of work physical activities in Spanish women with FS, PAHWI does not factor in the value of physical activity measurements in patients with FS. In addition to the studies reported herein, analytic studies of the relationships between domain-specific activities in patients with FS should be conducted. These additional efforts will aid researchers in interpreting and understanding the value of physical activity measurements in patients with FS to determine the amount of active energy expenditure or physical activity that effectively manages patient symptoms.

CONCLUSIONS

In conclusion, the results of the present study reveal that the Spanish versions of the LTPAI and PAHWI are understandable and can be administered in a population with FS. Because these questionnaires are short and easy to complete, they can be used to assess the physical activity level of patients diagnosed with FS with a minimal cost and burden to the subjects. LTPAI can be considered a fairly reliable and valid tool to assess leisure physical activities in Spanish women with FS. PAHWI does not factor in the value of physical activity measurements in patients with FS, but PAHWI demonstrated acceptable test–retest reliability for the workplace subscale, a lower reliability was observed for the total score and for the housework subscale. Additionally, no association was detected between PAHWI and objective measures of physical activity.

The present study is a further demonstration of the capacity of the LTPAI and PAHWI to assess physical activity in patients with FS. In addition to the studies reported herein, analytic studies of the relationships between domain-specific activities in patients with FS should be conducted. These additional efforts will aid researchers in interpreting and understanding the value of physical activity measurements in patients with FS to determine the amount of active energy expenditure or physical activity that effectively manages patient symptoms.

APPENDIX 1: SPANISH VERSION OF LTPAI

La versión española del Instrumento de Actividad física del Tiempo Libre – IAFTL.

Nos gustaría obtener información sobre el promedio de su nivel de actividad durante su tiempo de ocio en el último mes. En el tiempo de ocio, también incluimos caminar al trabajo, a las tiendas, etcétera. Usted puede seleccionar más de una alternativa si realiza ejercicio en varios niveles de actividad. Nosotros sumaremos después el número de horas totales.

1. Actividades de tiempo libre sedentarias.
   1. La mayoría de las actividades sedentarias.
   2. Actividades físicas suaves que no incrementaron su frecuencia respiratoria, como por ejemplo paseos a pie o en bicicleta, ejercicios acuáticos, natación o jardinería suave.
   3. Ejercicio suave durante más de 4 horas a la semana
   4. Ejercicio suave durante más de 4 horas a la semana

Indique el número de horas.

2. Actividades físicas moderadas que incrementaron su frecuencia respiratoria o temperatura corporal (sudor),...
aunque pudiera mantener todavía una conversación mientras se ejercitaba. Esto incluye caminar o ir en bici a frecuencia acelerada, caminar por senderos en la naturaleza, trotar suavemente, jardinería moderada o intensamente, ejercicio acuático, aeróbicos, etcétera.

1. Ejercicio moderado durante 0.5-1.5 horas a la semana.
2. Ejercicio moderado durante 2-4 horas a la semana.
3. Ejercicio moderado durante más de 4 horas a la semana. Indique el número de horas ________

4. Ejercicio vigoroso que incrementó perceptiblemente su frecuencia respiratoria y su sudor, tales como caminar rápido, trotar, otros ejercicios aeróbicos extenuantes o entrenamiento con sobrecargas, juegos de pelota, jardinería, etcétera.

1. Actividad vigorosa durante 0.5-1.5 horas a la semana.
2. Actividad vigorosa durante 2-4 horas a la semana.
3. Actividad vigorosa durante más de 4 horas a la semana. Indique el número de horas ________

APPENDIX 2: SPANISH VERSION OF PAHWI

La versión española del Instrumento de Actividad física en casa o en el trabajo – IAFCT.

Nos gustaría conocer cuanto camina y cuanto peso levanta en casa y en el trabajo durante el período de una semana. Elija la alternativa que mejor corresponda con sus tareas de trabajo durante el último mes e indique el número de horas que usted dedicó a esas actividades.

(A) Trabajo en casa
1. Trabajo doméstico suave, que incluya permanecer de pie y caminar, como cocinar, planchar, recoger cosas, __________ horas a la semana.
2. Trabajo doméstico moderado, por ejemplo, limpiar pasando la aspiradora, limpieza semanal de la casa, poner el horno, levantar y transportar cargas de mas de 3 Kg, tales como niños pequeños __________ horas a la semana.
3. Reparaciones pesadas, levantar y transportar cargas pesadas, tales como cuidado de adultos relacionados con el hogar, etcétera __________ horas a la semana.

(B) El lugar de trabajo
1. La mayoría del trabajo sedentario Durante la mayor parte del trabajo sedentario, en un ordenador, por ejemplo __________ horas a la semana.
2. Trabajo suave aunque flexible Tiene un empleo suave, durante el cual camina y permanece de pie bastante, por ejemplo, trabajar como enfermera, en una tienda, haciendo trabajo industrial suave, __________ horas a la semana.
3. Trabajo moderadamente extenuante Tiene un empleo bastante extenuante, por ejemplo, caminar, subir escaleras, levantar pesos de más de 3 Kg, tales como enfermería, cartero, __________ horas a la semana.
4. Trabajo físicamente duro Este incluye pesadas cargas físicas que implican levantamientos pesados, en conexión con pesados trabajos de enfermería, almacén o trabajos agrícolas, __________ horas a la semana.

Total de horas a la semana ____________________

References