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Letter to the editor

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Dear Editor,—Physical activity (PA) is essential for health [1]. Among individuals with a physical disability (PD), PA can decrease activity limitations, improve participation and enhance quality of life [2]. Thus, Bowen et al. [3] suggested considering PA as a vital sign and systematically monitoring it. Questionnaires allow for fast and cost-effective monitoring. However, they must first be proven to possess good psychometric properties.

In a recent issue of the *Annals of Physical and Rehabilitation Medicine*, Meunier et al. [4] published a French version of the Physical Activity Scale for Individuals with Physical Disabilities (PASIPD-Fr), by performing a transcultural adaptation of the original PASIPD [5]. This scale consists of 13 items divided into 3 domains: leisure PA (domain 1: 6 items), household PA (domain 2: 6 items), and work-related PA (domain 3: one item). It produces a score in terms of metabolic equivalent of task-hour per day (MET-h/day) [5].

Unknowingly, simultaneously and by an identical procedure, our research team also performed a French translation and adaptation of the PASIPD. A critical analysis of both versions, performed by a group of 4 French-speaking rehabilitation professionals, led to the conclusion that the 2 versions are semantically equivalent. Indeed, most of the wording is identical. Moreover, the few words that vary between the translations are synonyms describing the same concept.

The Meunier et al. study concluded that the PASIPD-Fr displayed good criterion and convergent validity, internal consistency and test−retest reproducibility. However, the authors stated that its validation should be completed by investigating sensitivity to change [4]. Moreover, Meunier et al. investigated these parameters for the PASIPD-Fr total score. Therefore, our study, which examined psychometric properties of the PASIPD-Fr, including standardized error of measurement (SEM) and minimal detectable change (MDC), of both the total and domain scores, is complementary to the Meunier et al. findings and provides additional information for score interpretation. The aim was to investigate validity, reliability, and threshold to detect real change of the PASIPD-Fr.

The protocol was approved by the ethics committee of the University of Liège (reference 2019/300). Individuals with a physical disability were recruited from adaptive sports clubs and by physiotherapists in Belgium by use of a convenience sampling procedure. Participants were included if they (1) were ≥ 18 years old, (2) had a permanent physical disability of neurological or locomotor nature, (3) had the physical disability for ≥ 6 months, (4) were discharged from inpatient rehabilitation and (5) understood written and spoken French. They were excluded if they were unable to understand the questionnaire due to cognitive deficiencies. Participants had to provide written consent to be in the study.

Participants completed the PASIPD-Fr and the validated French version of the Global Physical Activity Questionnaire (GPAQ-Fr) [6]. Similar to the PASIPD-Fr, the GPAQ-Fr, with 16 items, obtains a score in MET-min/week [6], thereby facilitating comparison between these scales. The GPAQ-Fr does not have a maximal score, but the PASIPD-Fr total score ranges from 0 to 199.5; scores for domains 1, 2 and 3 range from 0 to 98.7, 0 to 81.5, and 0 to 19.3 MET-h/day, respectively (5). Participants were asked to complete the PASIPD-Fr a second time 7 days later.

IBM SPSS v27 was used for data analysis. Nominal and ordinal variables are expressed with number (%). Quantitative variables are expressed with means (SD) or medians (interquartile range) according to the normality of distribution, verified by the Shapiro-Wilk test. Demographic differences and the total and domain scores for the PASIPD-Fr between the test and retest groups were analyzed by paired Student *t*-test or Wilcoxon signed-rank test (for non-parametric data) and the McNemar-Bowker test for ordinal data. Statistical significance was set at $p < 0.05$.

The Spearman correlation coefficient and intraclass correlation coefficient (ICC) were used to examine concurrent validity and test−retest reliability by using a two-way mixed model with absolute agreement. Internal consistency was studied by McDonald's Omega [7] and by correlations between the domain and total PASIPD-Fr scores. The absolute SEM and MDC were computed with the following equations: $\text{SEM} = \frac{SDdiff}{\sqrt{2}}$; where *SDdiff* is the standard deviation (SD) of the difference between test and retest PASIPD-Fr scores, and $\text{MDC} = 1.96 \times \sqrt{2} \times \text{SEM}$. They were expressed with number (%) and were acceptable when < 10% of the maximum observed score [8]. Finally, floor and ceiling effects were investigated and were present if > 15% of the test and retest scores were a minimal or maximal score. Psychometric properties were evaluated for the total and domain scores.

In total, 71 participants completed the self-administered questionnaires; 38 were recruited by physiotherapists and 33 from adaptive sports teams. A number of different disability types were present (Table 1). Of the 71 participants, 13 were not available for retests, but 58 completed the PASIPD-Fr a second time.

Both total and domain PASIPD-Fr and total GPAQ-Fr scores did not follow a normal distribution and were positively skewed. Concurrent validity of the PASIPD-Fr was good: Spearman's correlation coefficients between the GPAQ-Fr and PASIPD-Fr total and domain scores ranged from 0.41 to 0.76, considered moderate to strong (Table 2). Test−retest reliability was good to excellent: ICCs ranged from 0.86 to 0.96. McDonald's Omega coefficient was 0.44 (95% confidence interval 0.23−0.64). Spearman's Rho showed moderate to strong correlations ($r_s > 0.51$) between the domain scores and total PASIPD-Fr

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Table 1
Sample characteristics.

Variable	Test (n = 71)	*Re*-test (n = 58)	p-value
Age (years), mean (SD) [range]	54.6 (17.8) [20–86]	53.8 (16.8) [20–86]	0.24
Sex, n (%)			0.52
Women	25 (35%)	21 (36%)	
Men	46 (65%)	37 (64%)	
Type of disability, n (%)			0.94
Stroke	25 (35%)	20 (35%)	
CP	9 (13%)	8 (14%)	
Paraplegia	7 (10%)	6 (10%)	
Parkinson	6 (9%)	3 (5%)	
MS	8 (11%)	8 (14%)	
Other*	16 (22%)	13 (22%)	
Time since beginning of disability (years), n (%)			0.47
<1	4 (6%)	2 (3%)	
1–2	6 (8%)	6 (10%)	
2–5	13 (18%)	9 (16%)	
5–10	10 (14%)	9 (16%)	
>10/since birth	38 (54%)	32 (55%)	
Assistance in mobility, n (%)			0.38
None	27 (38%)	19 (33%)	
Cane, crutch, walker	13 (18%)	20 (21%)	
Manual wheelchair	14 (20%)	13 (22%)	
Electric wheelchair	17 (24%)	14 (24%)	
PASIPD-Fr (MET-h/day), median (IQR) [range]			
`Leisure PA	6.4 (2.4; 14.4) [0–59.2]	6.4 (2.0; 13.9) [0–44.4]	0.93
Household PA	1.5 (0; 5.7) [0–25.6]	1.1 (0; 3.8) [0–28.3]	0.70
Work-related PA	0 (0; 1.6) [0–19.3]	0 (0; 1.4) [0–19.3]	0.33
Total	12.2 (4.5; 23.7) [0–75.2]	9.9 (3.5; 20.7) [0–78.4]	0.87
GPAQ-Fr (MET-min/week), median (IQR) [range]			
Total	1680 (360; 4960) [0–29,760]	not tested	/

CP, cerebral palsy; GPAQ-Fr, French version of the Global Physical Activity Questionnaire; IQR, interquartile range; MET, metabolic equivalent of task; MS, multiple sclerosis; PA, physical activity; PASIPD-Fr, French version of the Physical Activity Scale of Individuals with a Physical Disability; SD, standard deviation.
Other*=lower-limb amputation, joint malformation, missing upper-limb, Charcot-Marie Tooth, polio, cerebellar lesion, traumatic brain injury, spina bifida, lateral amyotrophic sclerosis, equina syndrome.

score. The strongest correlation was with the leisure-PA domain. Floor effects were found in household and work-related PA. No ceiling effects were observed. SEMs ranged from 1.3 to 6.6 MET-h/day, or 6% to 9% of the maximal observed score. Absolute MDCs ranged from 3.7 to 18.1 MET-h/day, with MDC relative values from 19% to 26%.

In agreement with the Meunier et al. findings [4], the PASIPD-Fr showed good concurrent validity and test–retest reliability. The internal consistency computed in the present study was weaker than that computed by Meunier et al. with Cronbach's alpha (0.44 vs 0.51) [4] perhaps because of the more heterogeneous population recruited in this study. Indeed, although both studies included individuals with neurological disabilities, the present study also recruited some participants with locomotor disabilities and showed a wider range of neurological disabilities. Moreover, as reported by Washburn et al., the PASIPD consists of 5 latent factors, so it is not unidimensional [5]. Therefore, low internal consistency is to be expected and does not necessarily affect the scale's validity. Furthermore, strong correlations were found between the domain scores and total PASIPD-Fr score.

The present study uncovered significant floor effects in the household and work-related PA domains. Indeed, a non-negligible proportion of this population lacks the physical ability to engage in

Table 2
PASIPD-Fr domain and total correlations, ICCs, SEMs and MDCs.

PASIPD-Fr score	Floor-ceiling effects (% of test and retest scores obtaining min or max value)	Spearman's coefficient (r_s) with total GPAQ-Fr score	Spearman's coefficient (r_s) with total PASIPD-Fr score	ICC (95% CI)	SEM (MET-h/day) (% of max observed)	MDC (MET-h/day) (% of max observed)
Leisure PA	no (1%)-no (0%)	0.67 ($p < 0.001$)	0.85 ($p < 0.001$)	0.86 (0.76–0.92)	4.9 (9%)	13.7 (26%)
Household PA	yes (30%)-no (0%)	0.62 ($p < 0.001$)	0.76 ($p < 0.001$)	0.89 (0.82–0.94)	2.4 (8%)	6.7 (24%)
Work-related PA	yes (29%)-no (0%)	0.41 ($p < 0.001$)	0.52 ($p < 0.001$)	0.96 (0.94–0.98)	1.3 (7%)	3.7 (19%)
Total	no (1%)-no (0%)	0.76 ($p < 0.001$)	/	0.90 (0.84–0.94)	6.6 (8%)	18.1 (23%)

CI, confidence interval; GPAQ-Fr, French version of the Global Physical Activity Questionnaire; ICC, intraclass coefficient; MDC, minimal detectable change; MET, metabolic equivalent of task; PA, physical activity; PASIPD-Fr, French version of the Physical Activity Scale of Individuals with a Physical Disability; SEM, standard error of measurement.

work requiring PA. Moreover, employment rates still remain low among individuals with a physical disability [9], and, according to the 2006 "Survey of Labor and Income Dynamics", they have fewer annual average work hours than non-disabled peers [10]. Additionally, individuals with a physical disability commonly rely on help to perform household activities [11]. Therefore, not surprisingly, these domains only marginally contributed to the sample's total PA score. However, the leisure-PA domain, with the highest correlation with the total score, also had the highest SEM and MDC, due to great inter-individual variability of leisure-PA scores in the study's heterogeneous sample.

Moreover, the MDCs for the PASIPD-Fr surpassed the tolerable threshold. Therefore, the scale does not possess adequate ability and precision to detect real change, above the change attributed to measurement error and variability [8]. Indeed, an individual needs to have a score difference > 18.1 MET-h/day or > 23% of the baseline score to ascertain real change in PA level.

This imprecision may be inherent to all PA-measuring questionnaires. Indeed, measuring complex human behavior, which undergoes daily variation, by questionnaires remains challenging, creating certain psychometric flaws. However, few studies have reported the MDCs for such questionnaires. Neither the initial version of the PASIPD [5] nor any of its validated translations [4,12–14] have analyzed this. In fact, to our knowledge, only the Physical Activity Scale for the Elderly has an MDC of 87, although its relative value is unknown [15]. Research should further investigate MDCs of PA questionnaires to allow for a thorough understanding of their psychometric properties.

Finally, the present study used a distribution-based approach to investigate the sensitivity of the PASIPD-Fr to detect change. This approach gives insight into the scale's ability to detect change exceeding that produced by measurement error, but it remains a statistical threshold and does not give indication of clinically relevant changes or changes that are meaningful to participants [16]. Moreover, the distribution-based approach largely depends on the SD of the data, with larger SDs, such as that computed in the present study, decreasing the scale's sensitivity to change. Future studies are encouraged to investigate the scale's minimal clinical important difference using an anchor-based approach, which does not depend on data distribution but rather on an external criterion to assess the improvement or worsening of the variable's value [17].

The study is limited by participant attrition. However, this effect is probably very small because test and retest sample demographic variables were statistically similar (Table 1). Moreover, using the GPAQ-Fr, another self-reporting PA questionnaire, to assess the validity of the scale may induce bias. Indeed, although the GPAQ-Fr has been validated, it may also be subject to certain degrees of measurement error. Comparing the PASIPD-Fr to objective energy expenditure-assessing devices could allow for more valid comparisons, leading to a deeper examination of scale validity. Because such devices do not differentiate between the different domains of PA, associating this measure with behavioral observation may be needed to classify the data into leisure, household and work-related PA.

We conclude that the PASIPD-Fr should be used with caution, in clinical and research settings. Users should be aware of the scale's limitations. The scale demonstrates good concurrent validity, test–retest reliability, and acceptable measurement error, but its sensitivity to change, using a distribution approach, is poor. However, this lack of sensitivity may be inherent to all PA-measuring questionnaires. Future trials should verify this observation because this study is among the first to investigate the MDCs of a PA-measuring questionnaire. Moreover, further longitudinal research should examine the sensitivity to change of the PASIPD-Fr with an anchor-based approach. This would give precious insight by providing threshold values regarding change that is clinically meaningful.

Declaration of Competing Interest

None declared.

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