Influence of gender on accelerometry patterns

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Purpose Human movement is considered one of the important factors for maintaining an independent life. Besides, the way a person walks is considered a personal identification trait and may be able to distinguish individuals with the same pathological condition, with the same range, of the same gender and the same ethnicity (Connor; Ross, 2018; Yu et al., 2009). Although the use of the accelerometer is becoming increasingly common in the health area, a standard has not yet been created on which frequency patterns are ideal to discriminate individuals according to gender, especially when they are out of clinical settings, carrying out their activities of daily living. The aim of this study was to identify which accelerometry characteristics extracted from the use of a triaxial accelerometer during 7 days of activities of daily living are associated with female and male gender. **Method** A cross-sectional study was conducted based on the database of the first wave of the Epidemiological Study of Movement (EPIMOV) cohort. Data from 1080 participants aged from 18 years were evaluated, the participants included in the study did not have health conditions that could interfere with the pattern of the walking pattern or postural control, such as diseases of the central nervous system (stroke, Parkinson's), peripheral neuromuscular disorder (sclerosis), neurocognitive decline or amputation and/or use of a lower limb prosthesis or other device that modifies the gait pattern, presence of claudication, among others. Participants whose accelerometry data showed errors, such as incomplete or inconsistent data, were excluded. Features of entropy (PSE), frequency (PSPF1, PSPF2, PSPF3), amplitude (PSP1, PSP2, PSP3), harmonic components of the gait (WPSP), and Counts were extracted from the accelerometer (ActiGraph GT3X +, MTI, Pensacola, FL) signal obtained from 7 days of daily life activities. These accelerometry variables have previously been successfully explored to identify older adult fallers (Ponti et al., 2017; Bet; Castro; Ponti, 2021). Two-way analysis of variance was employed to compare the variables according to the groups. **Results and Discussion** The sample consisted mostly of female participants between 18-39 years old (n=254), 40-59 years old (n=271) and ≥ 60 years old (n=109). The table below describes the primary outcomes with the continuous variables of accelerometry of all study participants. The entropy features (PSE) and the amplitude features (PSP1, PSP2 and PSP3) showed a significant difference between the female and male genders (See Table 1). The results demonstrated the interference of gender in movement patterns. Most articles published on the topic do not consider gender, so it would be interesting in future studies for movement patterns to be adjusted according to the gender of the participants.

References

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*Table 1. Accelerometer features collected using a triaxial accelerometer during 7 days of activity of daily living stratified by gender. Notes: *p ≤ 0.05 difference between genders by Bonferroni test; PSE: Power Spectrum Entropy; PSP: Peak Power Spectrum; PSPF: Peak frequency of the power spectrum; WPSP: Peak weighted power spectrum.*

Accel.	Female (n=634)		Male (n=446)		Total (n=1080)		
Features	Median	95% CI	Median	95% CI	Median	95% CI	p-value
PSE	6.600	6.528 - 6.911	8.028	7.341 - 7.875	7.160	6.999 -7.328	**0.000***
PSP1	5.773	5.500 - 5.682	5.237	5.164 - 5.419	5.571	5.363 -5.519	**0.000***
PSP2	1.729	1.669 - 1.836	2.028	1.824 - 2.058	1.843	1.775 -1.918	**0.010***
PSP3	0.791	0.823 - 0.928	1.001	0.976 - 1.123	0.883	0.917 -1.008	**0.000***
PSPF1	7.000	7.066 - 7.684	7.000	6.997 - 7.861	7.000	7.137 -7.668	0.841
PSPF2	13.000	12.685 - 14.325	13.000	11.416 - 13.707	13.000	12.329 -13.737	0.189
PSPF3	17.000	17.221 - 19.136	17.000	17.436 - 20.113	17.000	17.654 -19.299	0.477
WPSP	37.147	33.864 - 36.817	33.264	31.506 - 35.632	35.255	33.186 -35.723	0.710
Counts	67.313	76.076 - 95.842	81.880	87.376 - 114.99	72.624	85.081 -102.061	0.079