Impact of symptoms and disease severity on digital mobility outcomes in COPD

D. Megaritis[1] , J. Buekers[2] , T. Bonci[3] , E. Hume[1] , L. Alcock[4] , A. Yarnall[4] , E. M. Amigo[4] , P. Brown[5] , C. Buckley[1] , S. Del Din[4] , C. Echevarria[5] , C. Mazzà[3] , L. Rochester[4] , J. Garcia Aymerich[2] , I. Vogiatzis[1]

[1]Northumbria University - Newcastle upon Tyne (United Kingdom), [2] ISGlobal - Barcelona (Spain), [3]The University of Sheffield - Sheffield (United Kingdom), [4]Newcastle University - Newcastle upon Tyne (United Kingdom), [5]The Newcastle Upon Tyne Hospitals NHS Foundation Trust - Newcastle upon Tyne (United Kingdom)

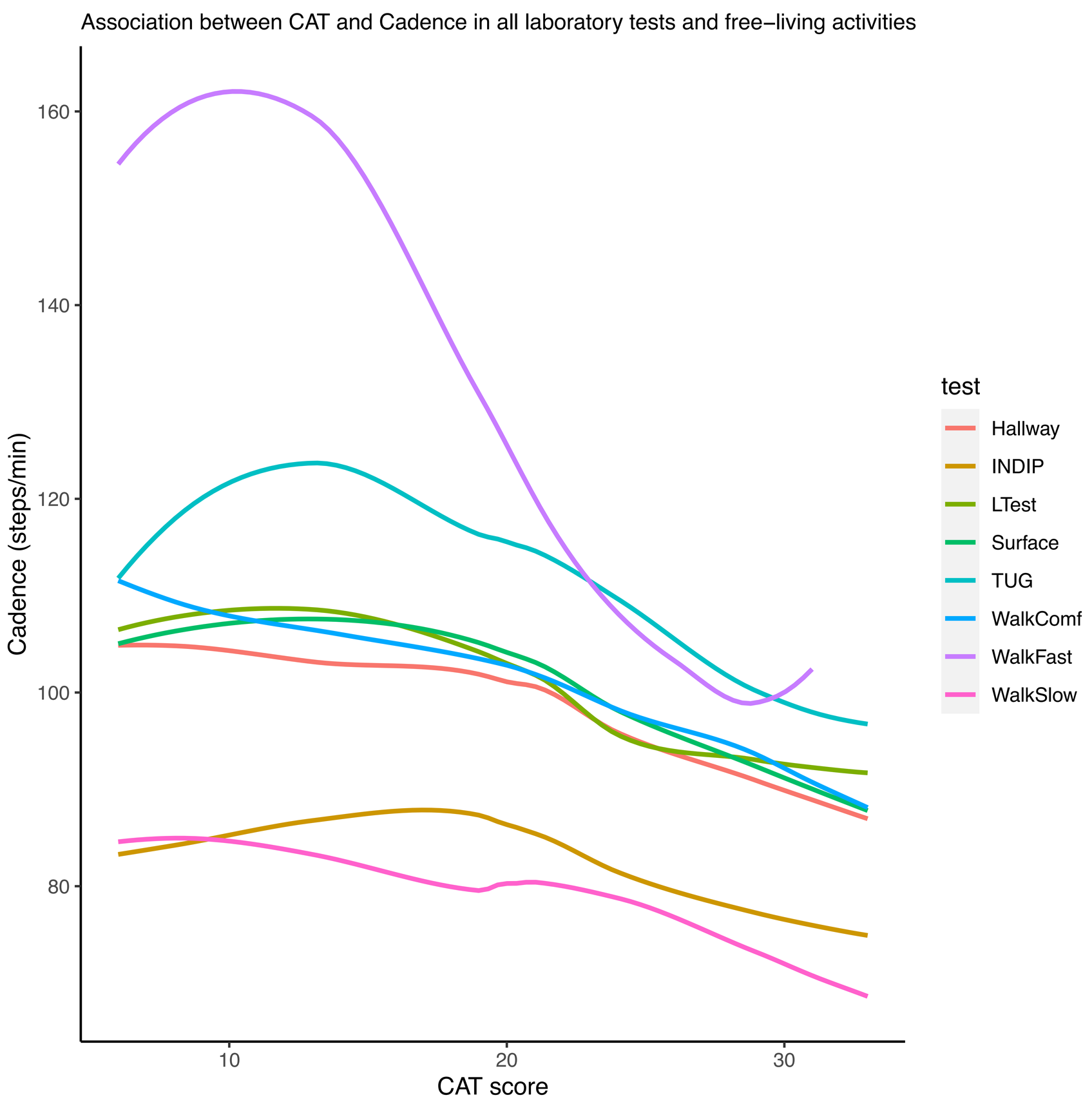
@D_Megaritis

Background: The association of gait characteristics with disease severity and health status/symptom burden is currently unknown in COPD patients.

Aim: To examine whether gait characteristics (cadence (steps/min), stride length (m), and walking speed (m/s)) are affected by health status/symptom burden and the degree of lung dysfunction in COPD.

Methods: 17 clinically stable COPD patients (mean±SD FEV_1% predicted: 56.8±19.2, CAT: 19.6±9.0; range: 6.0 to 33.0) underwent laboratory assessment (stereophotogrammetry) and free-living gait monitoring (multi-sensor wearable system (INDIP)). The laboratory tests included common daily walking tasks (straight walking, turns, surfaces and obstacles). Free-living daily-life activities included a 2.5-hour habitual daily activity assessment. Linear regression was employed to investigate associations between gait characteristics and the following variables: CAT, FEV_1% predicted, and FVC% predicted.

Results: A better CAT score was associated ($p<0.05$) with a faster walking cadence across the various laboratory tasks (r=-0.56 to -0.91, R^2=0.32 to 0.83) and the free-living activities (r=-0.49, R^2=0.24), Figure 1. Stride length and walking speed (Table 1) were not associated with CAT scores. Lung function was not associated with gait characteristics.



Free living	Mean (SD)	Range
Cadence (steps/min)	82.51 (5.77)	74 - 92
Stride length (m)	0.83 (0.11)	0.62 - 1.03
Walking speed (m/s)	0.58 (0.08)	0.45 - 0.80

Table 1. Gait characteristics during free-living conditions

Figure1: INDIP: 2.5-hour habitual daily activity assessment; Hallway: straight walking 5m; TUG: timed up and go; Ltest: TUG with 2 90 degree turns; Surface: straight walking over surface/obstacle; WalkComf, WalkFast, WalkSlow: strtaght walking at different speeds

Conclusion: Irrespective of the degree of lung dysfunction, more symptomatic COPD patients exhibit greater impairment in cadence. Future pharmacological and non-pharmacological interventions may include cadence as a study outcome.

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