

Longer Chair-Stand Time is Associated With Orthostatic Intolerance in an Older Irish Population

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Staidéar Fadaimseartha na hÉireann um Dhul in Aois

The Irish Longitudinal Study on Ageing

BACKGROUND

- Hospital admissions for orthostatic hypotension (OH) have risen more than two-fold in the past ten years [1]
- OH can lead to orthostatic intolerance (OI), and both OH and OI are common causes of falls and injuries in older persons [2]
- Sarcopenia is also common in older persons and associated with adverse health outcomes [3]
- The 5-chair stand test (5-CST) is a measure of lower limb muscle strength and can be used as a marker of probable sarcopenia [4]
- A cut-off of 15s on the 5-CST has been proposed by the European Working Group on Sarcopenia [5]
- The interaction between sarcopenia and OH has only had limited investigation in the past [6,7]

AIM

- We sought to investigate whether those with a worse performance on the 5-CST would be at greater risk of OH in an older Irish population cohort study

METHODS

- Data for this study was collected in Wave 3 of The Irish Longitudinal Study on Ageing (TILDA) between January 2014 and December 2015
- Participants underwent a Computer Aided Personal Interview which addressed questions on education, finances, social issues as well as physical, cognitive and mental health
- They were also invited to attend a centre based health assessment which examined cognitive, cardiovascular, gait, balance and vision measurements
- 5-CST was measured as the time in seconds taken for a participant to stand up from a sitting position and sit down again five times, while holding the arms crossed over the chest
- Non-invasive continuous beat-to-beat blood pressure was measured during an active stand procedure using digital photoplethysmography (Finometer MIDI Device, Finapres Medical Systems BV, Amsterdam, The Netherlands)
- Participants rested supine for 10 minutes and were then asked to quickly stand. Systolic blood pressure (SBP), diastolic blood pressure (DBP) and heart rate were recorded during the 10 minutes rest period and for 3 minutes after standing
- Orthostatic hypotension at 40 seconds after standing (OH40) was defined as a drop of as a drop in blood pressure of ≥ 20 mmHg in SBP and/or ≥ 10 mm Hg in DBP
- OI was defined as OH40 with reported symptoms of dizziness or light-headedness
- The mean response to active stand test was visualised by group in SPSS v26
- Multivariable logistic regressions were performed in Stata v15 to investigate the associations between OH40, OI, and 5-CST time
- Potential confounders were controlled for in the model including age, sex, education, body mass index (BMI) and antihypertensive and antidepressant medications

RESULTS

- Data from 3119 participants were available for analysis
- Mean age was 63.8 years, 55% were female & 25% took longer than 15s on the 5-CST as shown in table 1
- Mean baseline blood pressure was 141/76 mmHg
- The prevalence of OH40 was 12.5% (n = 392) and 4.4% (n= 137) had OI at 40 seconds
- Figures 1 & 2 show the mean change in SBP and DBP respectively, at 10 second time intervals after standing, grouped by those above and below 15s on the 5-CST i.e. the cut-off for probable sarcopenia
- OH40 was not independently associated with 5-CST time after controlling for age ($p > 0.05$), in a multivariable logistic regression model
- In the final multivariable logistic regression model (table 1), adjusting for age, sex, education, BMI and medications: worse performance on the chair stands test was an independent predictor of OI (odds ratio 1.06, $p = 0.041$)

Table 1: Demographics of the cohort and regression results from the final multivariable logistic regression

	Demographics	Final Regression Results	
	(N=3119)	Odds Ratio (95% CI)	P Value
Age	63.83 \pm 7.85 years	1.06 (1.03 to 0.08)	<0.001
Sex			
Male	44.6% (n=1,404)	Reference	
Female	55.37% (n=1,742)	0.77 (0.54 to 1.1)	0.156
Education			
Primary/None	15.6% (n=491)	Reference	
Secondary	40.2% (n=1,263)	0.95 (0.58 to 1.56)	0.831
Third/Higher	44.3% (n=1,392)	1.08 (0.66 to 1.76)	0.764
Antihypertensive Meds			
No	86.9% (n=2,734)	Reference	
Yes	13.1% (n=412)	2.05 (-1.35 to 3.12)	0.001
Antidepressant Meds			
No	93.0% (n=2,926)	Reference	
Yes	7.0% (n=220)	2.40 (1.43 to 4.01)	0.001
Time on 5-CST			
Below 15s	75.0% (n=2,340)	As continuous variable	
Above 15s	25.0% (n=781)	1.06 (1.00 to 1.12)	0.041
BMI	x \pm y kg/m ²	0.94 (0.90 to 0.98)	0.002

Figure 1: Mean Change from Baseline Systolic Blood Pressure over Time after Standing Grouped by Above and Below 15s on 5-Chair Stand Test

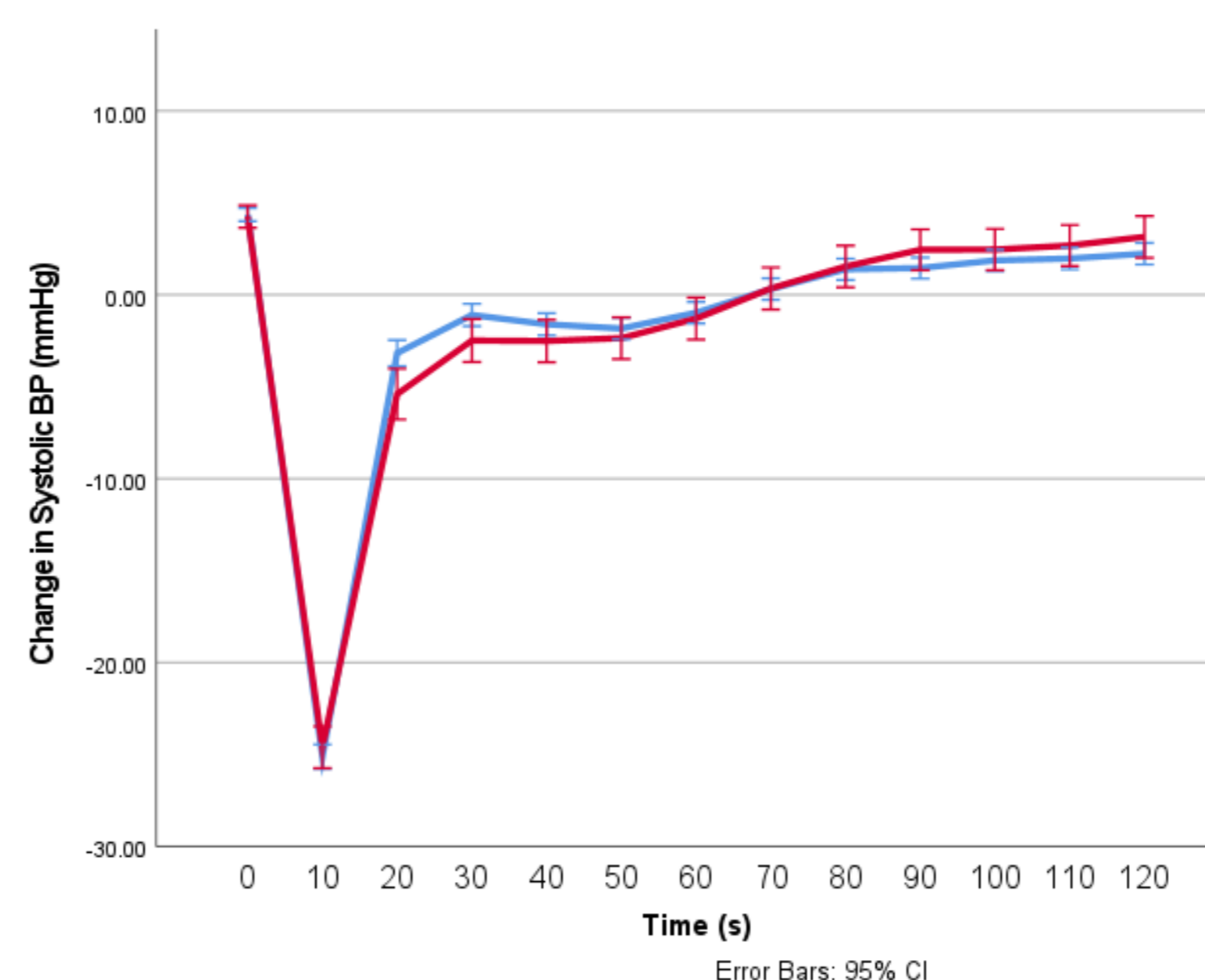
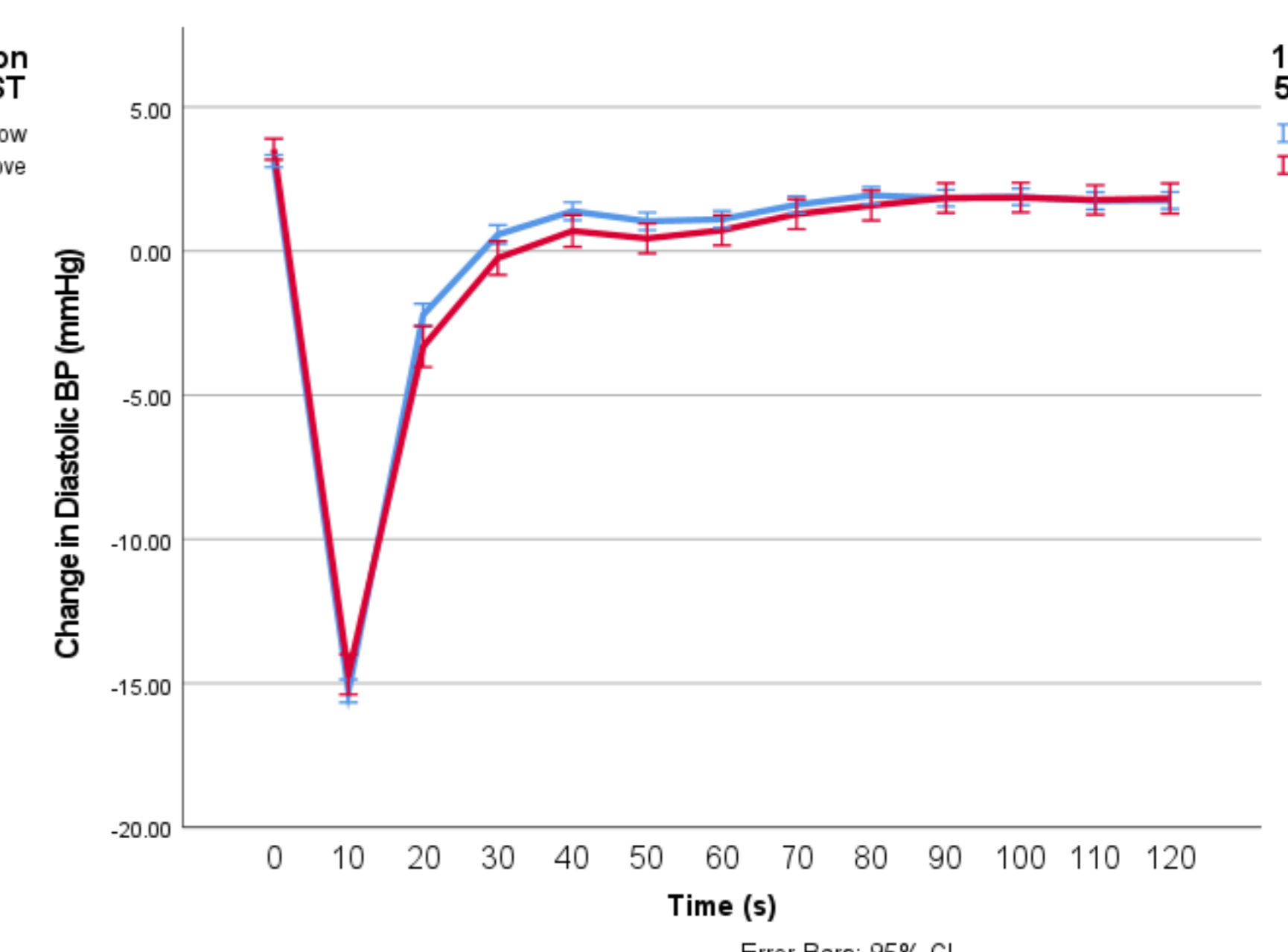


Figure 2: Mean Change from Baseline Diastolic Blood Pressure over Time after Standing Grouped by Above and Below 15s on 5-Chair Stand Test



CONCLUSION

- Longer time taken on the 5-CST, a marker of probable sarcopenia, was an independent predictor of OI in a large population study
- The relationship between sarcopenia and orthostatic blood pressure response is not well elucidated and may be modulated by the skeletal muscle pump in the lower limbs
- We plan to further investigate this area in a future clinical cohort – the FRAILMatics study

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