



Exploration of Timed Up and Go scores with and without a Cognitive Challenge in People with MS and a Healthy Reference Group

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Objectives

- Provide sample TUG and TUG-C data for pwMS and a healthy reference group
- Examine within group differences in these populations for these measures
- Examine differences between these populations in these measures
- Examine differences between people with MS who fall and those who do not in these measures
- Present preliminary results of instrumented TUG and TUG-C data from a healthy reference group



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Background



Methodology



Results



Key Points



Background



Falls in People with MS

- 56% in a 3 month period (Nilsagård et al 2014)
- Effect on the individual
 - Injurious Falls (Peterson et al 2008)
 - Fear of Falling (Peterson et al 2007)
 - Activity Curtailment (Peterson et al 2007)
- Balance impairment and falls
 - Pooled OR 1.07 (95%CI 1.04-1.10) (Gunn et al 2013)
- Gait, Turning, Postural Transitions
 - Gunn et al 2014
 - Matsuda et al 2012
 - Nilsagård et al 2009



Why Choose the TUG?

- Timed Up and Go
 - Objective/Quick to administer
 - Elicits dynamic activity
 - MS Evaluation Database to Guide Effectiveness
 - IMSFPRN (Cattaneo et al 2014)
- Timed Up and Go-Cognitive
 - PwMS dual tasking difficulties (Sosnoff et al 2011)
 - Dual task cost
- Predictive Validity?



Methodology



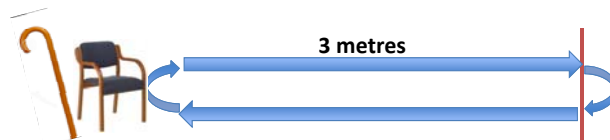
Study Recruitment

- Healthy Reference Group
 - University of Limerick
 - Undergraduate Physiotherapy Students
 - N=50
- People with MS
 - St Vincent's University Hospital
 - MS Society of Ireland
 - N=51



Inclusion Criteria	Exclusion Criteria
EDSS 3.0-6.5	Unable to provide consent
Over 18 years of age	Pregnant Women

TUG Administration



- Seated on a standard armchair with back rested against chair
- Permitted to use usual aid
- Walk as quickly and as safely as possible to the line
- Turn, walk back and sit down again
- 1 Practice trial and 3 timed trials performed
- **TUG-Cognitive:** Subtracting out loud backwards in 3s from random numbers between 20 and 100
- **Follow Up:** Three months of prospective falls diaries
 - Fortnightly Text/Email Reminders

Smartphone Falls Prediction

- App Development
 - University of Limerick 2014
- Smartphone Variables
 - 4 Parameters in 3 Dimensions
 - 12 Summary Statistics
 - 5 Phases in 2 Conditions
 - 960 Variables



Statistical Analysis

- Frequency analysis
 - Mean, Standard Deviation
 - Median, Interquartile Range
- Tests of Normality
 - Skewed Data
- Non-Parametric Tests
 - Wilcoxon Signed Rank
 - Mann-Whitney U



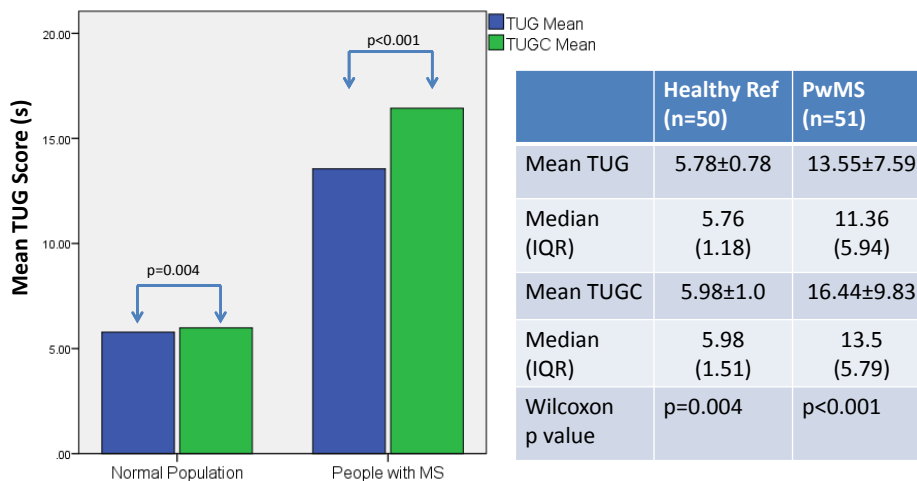
Results

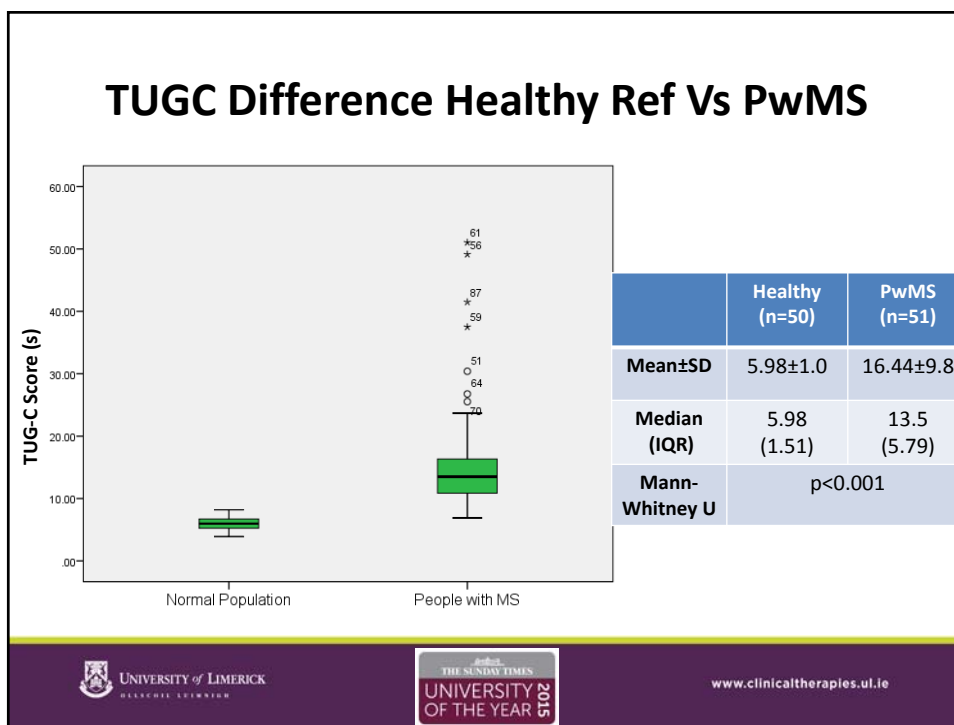
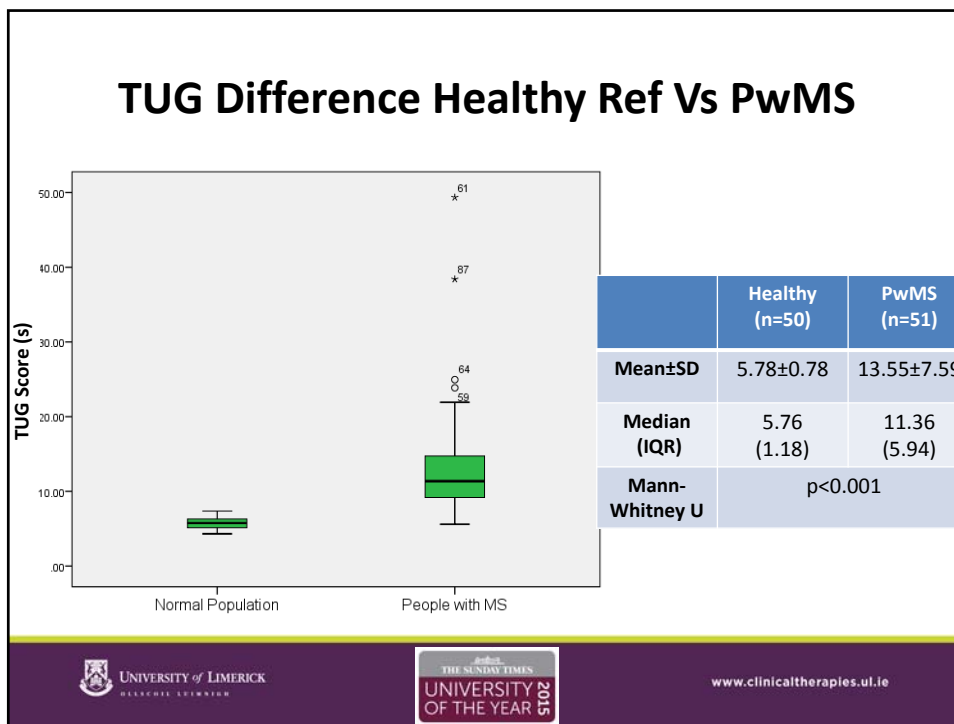


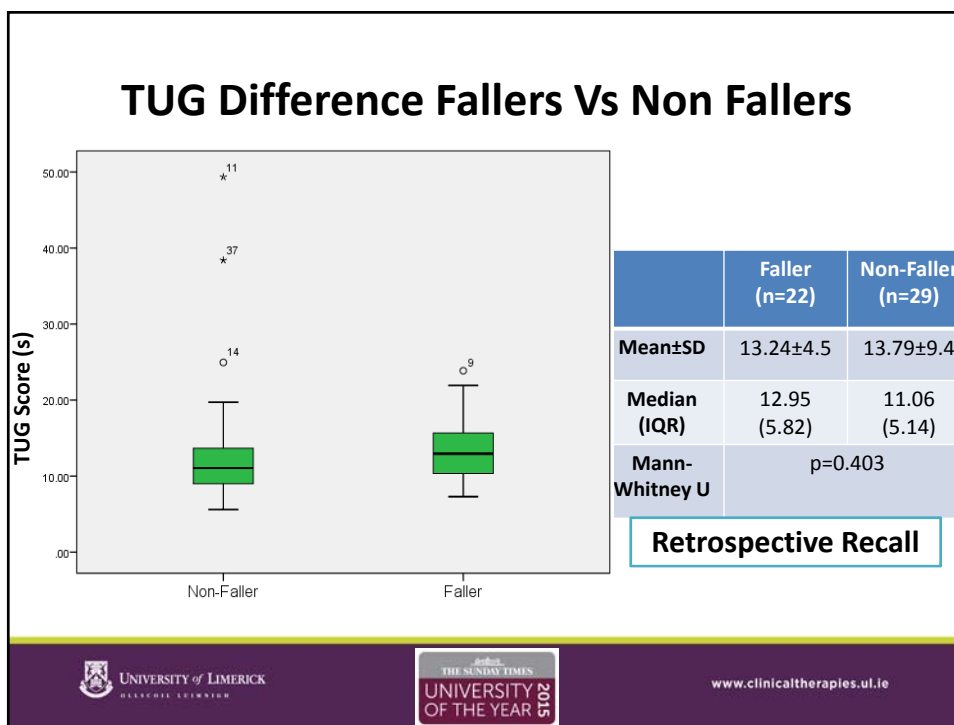
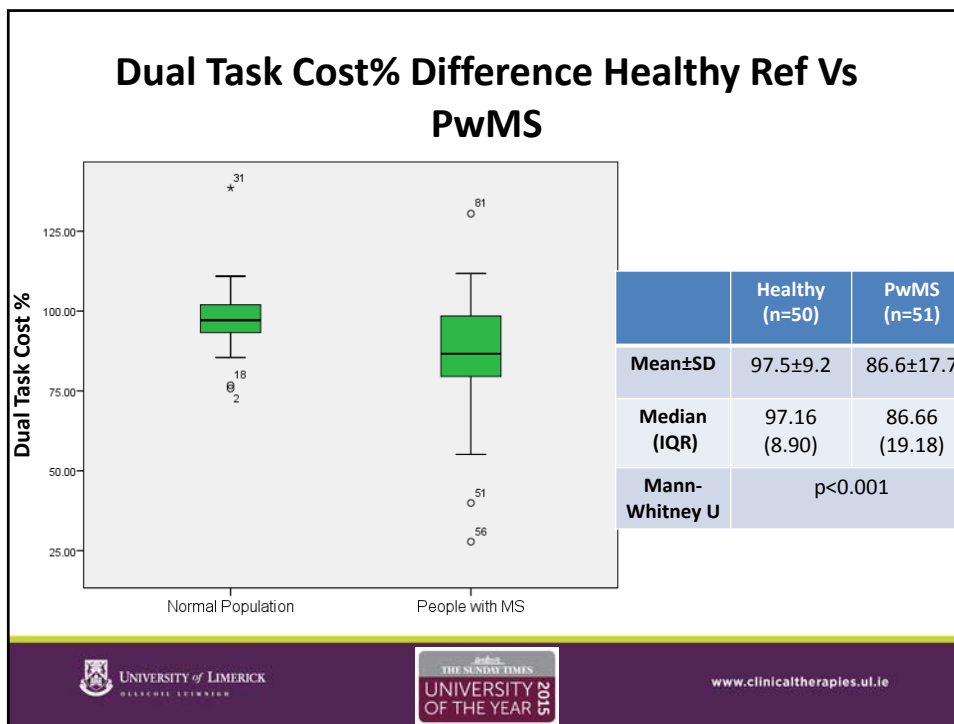
Study Population

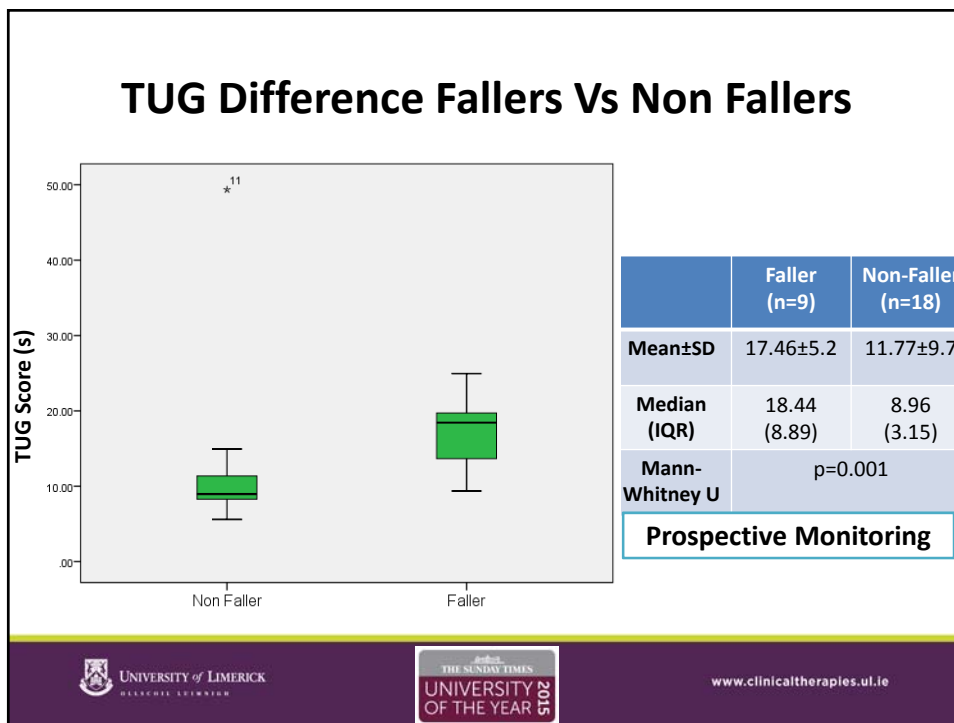
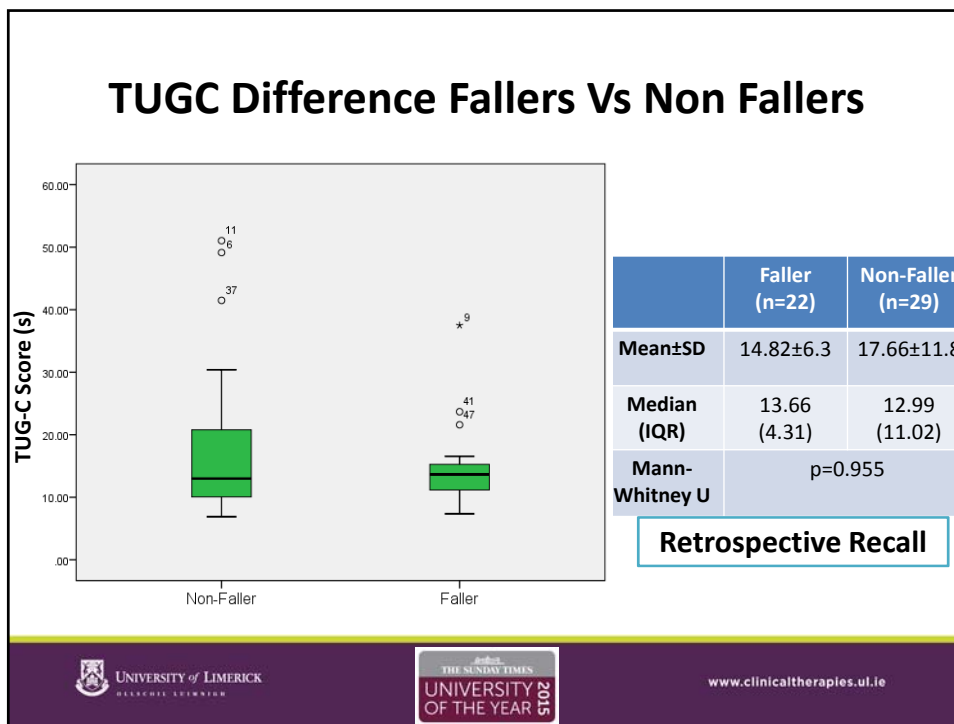
	Healthy Reference (n=50)	People with MS (n=51)
Mean Age	22.8±4.96	53.26±10.19
Males: Females	14:36	16:35
Mean TUG	5.78±0.78	13.55±7.59
Mean TUG-C	5.98±1.0	16.44±9.83
Mean Disease Duration	N/A	13.67±8.99
Walking Aid Users	N/A	35/51 (69%)
Retrospective Fallers	N/A	22/51 (43%)
Prospective Fallers	N/A	9/27 (33%)

Within Group TUG and TUGC Difference

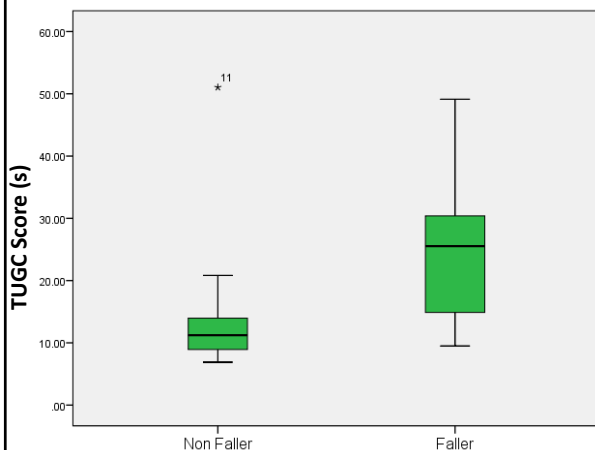








TUGC Difference Fallers Vs Non Fallers



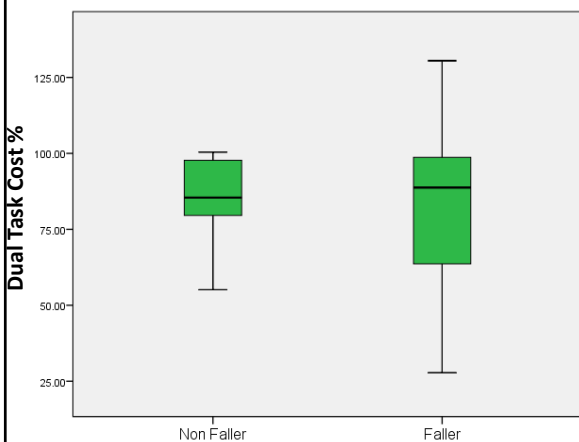
	Faller (n=9)	Non-Faller (n=18)
Mean±SD	25.48±12.4	13.74±9.96
Median (IQR)	25.53 (19.11)	11.22 (5.38)
Mann-Whitney U	p=0.004	

Prospective Monitoring



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DTC% Difference Fallers Vs Non Fallers



	Faller (n=9)	Non-Faller (n=18)
Mean±SD	80.56±32.4	85.59±12.8
Median (IQR)	88.73 (50.21)	85.44 (18.39)
Mann-Whitney U	p=0.860	

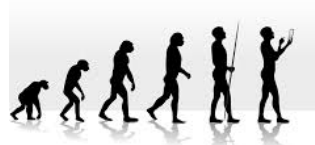
Prospective Monitoring



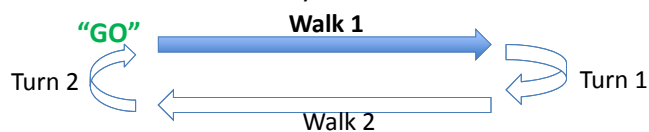
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Preliminary Smartphone Data

- 50 University Students
- Mean Age 22.8 ± 4.96
- Cognitive Challenge
 - ↑ Walk 1 Length (mean 0.11, $p < 0.001$)
 - ↑ Go Phase (mean 0.07, $p = 0.004$)



- PwMS data collection ongoing
- Creation of multivariate TUG/TUGC dataset



Key Points



Summary

- Significant Differences in TUG and TUGC exist between healthy populations and pwMS
- Limited sample sizes suggest significant differences exist between fallers and non-fallers when prospective falls diaries are used
 - Research ongoing
- Instrumented TUG/TUGC data may be useful in identifying pwMS at risk of falls
 - Research ongoing

Prospective Falls Monitoring

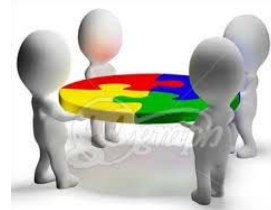
- Retrospective Vs Prospective
- Falls Diaries IMSFPRN (Coote et al 2014)
 - 3 Months
- Small sample size (n=27)
- Ongoing study
- ROC and AUC analysis



Acknowledgements

- Funded by Education and Health Sciences Faculty Seed Fund and MS Ireland through the Ireland Fund
- Dr Susan Coote, UL Clinical Therapies
- Dr Rose Galvin, UL Clinical Therapies
- Pepijn Van de Ven, UL Engineering
- Prof. Ailish Hannigan, UL GEMS
- Dr Chris McGuigan, SVUH
- Gillian Quinn, SVUH

- UL MS Research Team (www.msresearch.ie)
- Study Participants



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Questions



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