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Vision, Falls and Fear of Falling in an Older Irish Population: Findings from The Irish Longitudinal Study on Ageing (TILDA)

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Background

• **Falls** affect one-third of community-dwelling older adults aged 65 years and older annually. Up to half of those aged 80 years and older have a fall each year. Similarly **fear of falling** is a major health issue. Its prevalence ranges from between 21% and 85% and is higher in women and increases with age.

• **Visual acuity** is a measure of a person's ability to discriminate detail at high contrast, while **contrast sensitivity (CS)** is a measure of our ability to discriminate levels of detail across a range of contrast levels.

• An individual can have normal visual acuity (6/6) but have poor contrast sensitivity. This picture compares what would be seen while driving at night by a person with good CS and poor CS.



Issues

- **Conflicting evidence:** relationship between visual acuity and falls uncertain.
- **Poor contrast sensitivity was associated with falls** in approximately 70% of the studies reviewed.
- Contrast sensitivity was associated with **fear of falling** in one study.
- Previous studies are heterogeneous, with poorly controlled methodologies used and small sample sizes.

Aims

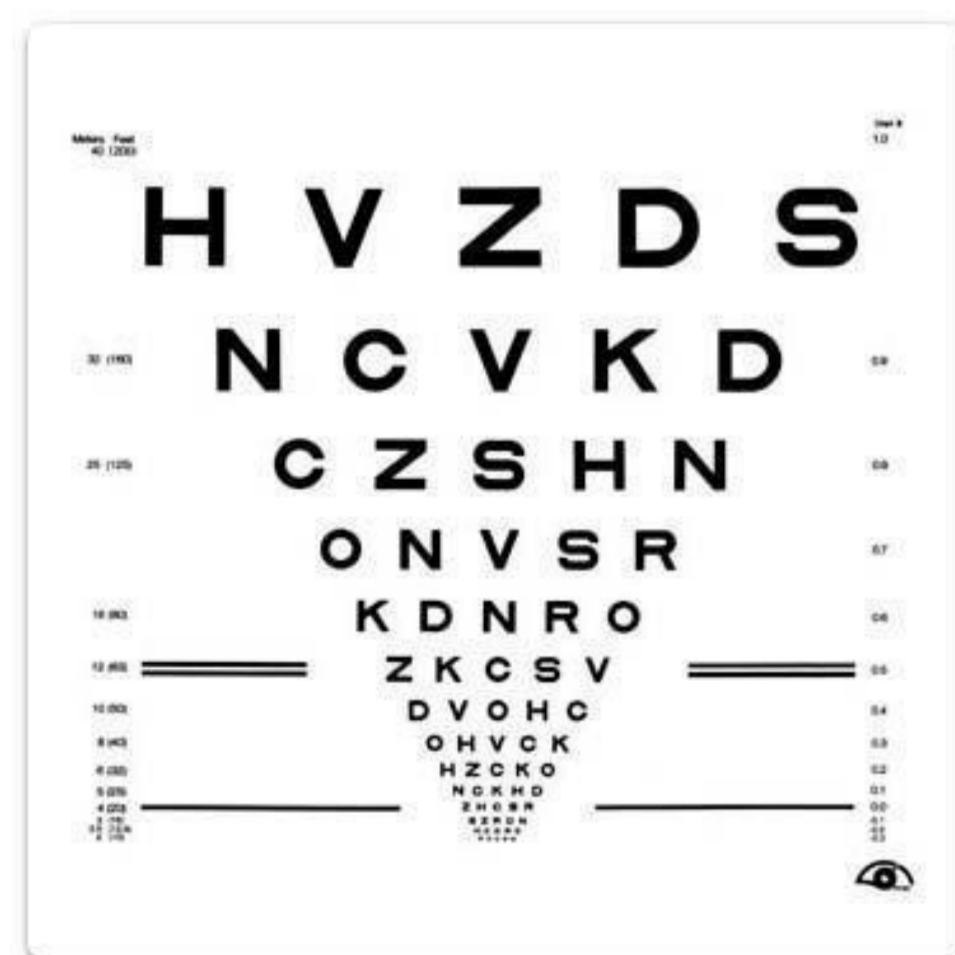
• To determine if impaired **visual acuity** or **contrast sensitivity** is significantly associated with **falls** and/or **fear of falling** in older adults in a community dwelling sample.

Methods

- TILDA recruited a stratified clustered sample of 8178 individuals representative of the community living Irish population.
- Participants underwent a Computer Aided Personal Interview (CAPI) which addressed questions on education, finances, social issues, physical, cognitive and mental health.

Assessment of Vision

Visual acuity was measured using LogMAR charts according to the Early Treatment of Diabetic Retinopathy (ETDRS) protocol.



LogMAR Chart



Functional Acuity Contrast Test

Functional Visual Analyser



Contrast Sensitivity was measured with the Functional Acuity Contrast Test (F.A.C.T.) using the Functional Vision Analyser (FVA) (Stereo Optical Co., Inc., Chicago, IL, USA).

Assessment of falls and fear of falling

- Falls and fear of falling were assessed retrospectively in the CAPI.
- Participants were asked whether they had fallen in the past year and if so how many times.
- They were asked if they were afraid of falling.

Statistical Analysis

Baseline characteristics among the faller/non-faller, fear of falling/ no fear group were assessed using χ^2 tests & Student's t-test.

Differences in the contrast sensitivity function were evaluated with t-tests of the mean for both groups and multivariate logistic regression was used to investigate the factors which affect fear of falling. All data were analysed using Stata version 10 (StataCorp, College Station, TX, USA).

Results

• N=4509 participant records were analysed.

• Visual Acuity was not significantly different between fallers and non-fallers: 0.05 vs. 0.06 LogMAR, $p=0.54$.

• There is no significant difference in the contrast sensitivity between the two groups. Figure 1.

Contrast Sensitivity Function by Recurrent Fallers

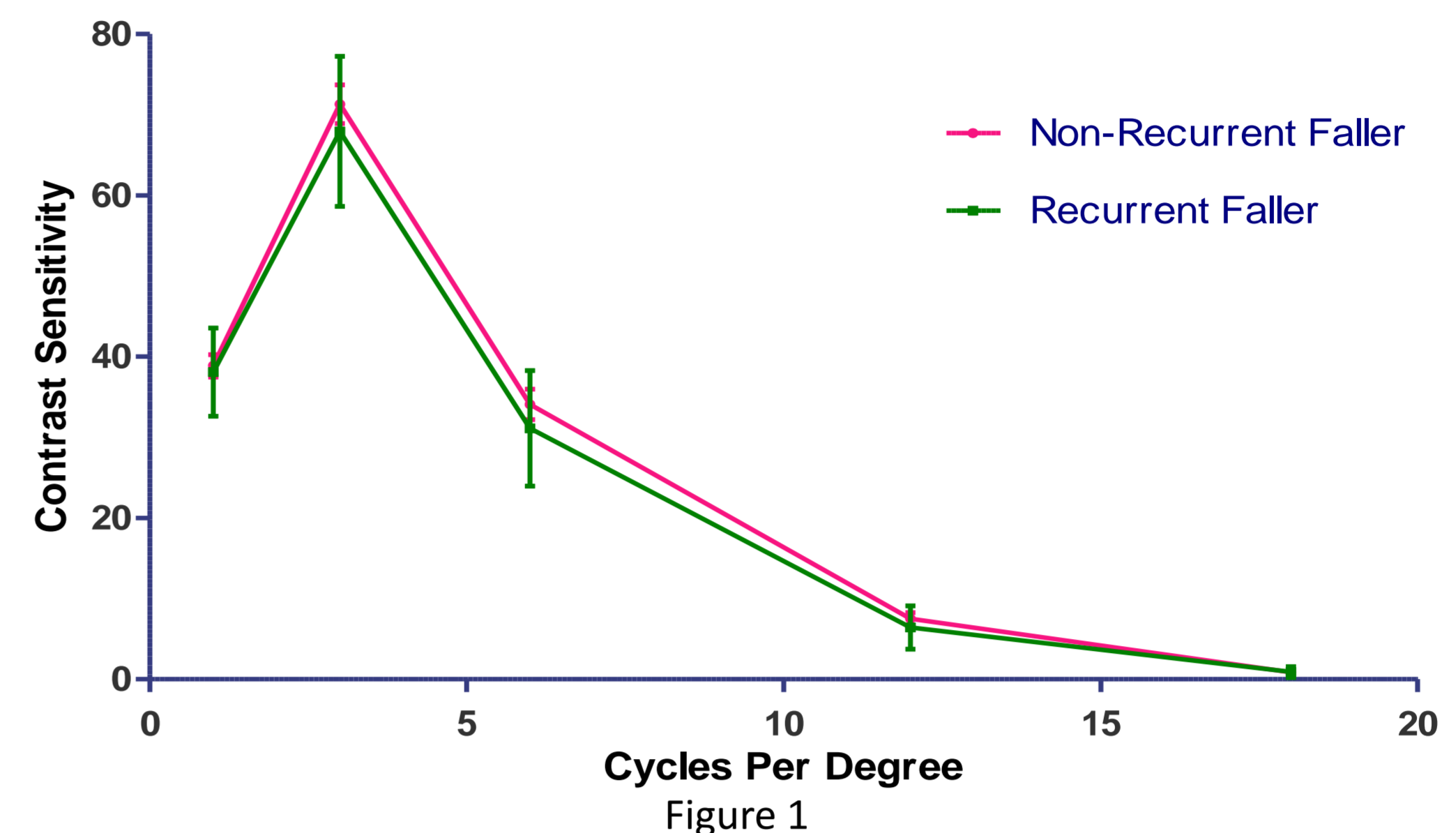


Figure 1

• Figure 2 show the contrast sensitivity functions for those afraid of falling and those not. Those with a fear of falling can be seen to have significantly lower contrast scores ($P<0.001$). The odds ratio for fear of falling and mid-frequency contrast sensitivity is 0.99.

Contrast Sensitivity Function by Fear of Falling

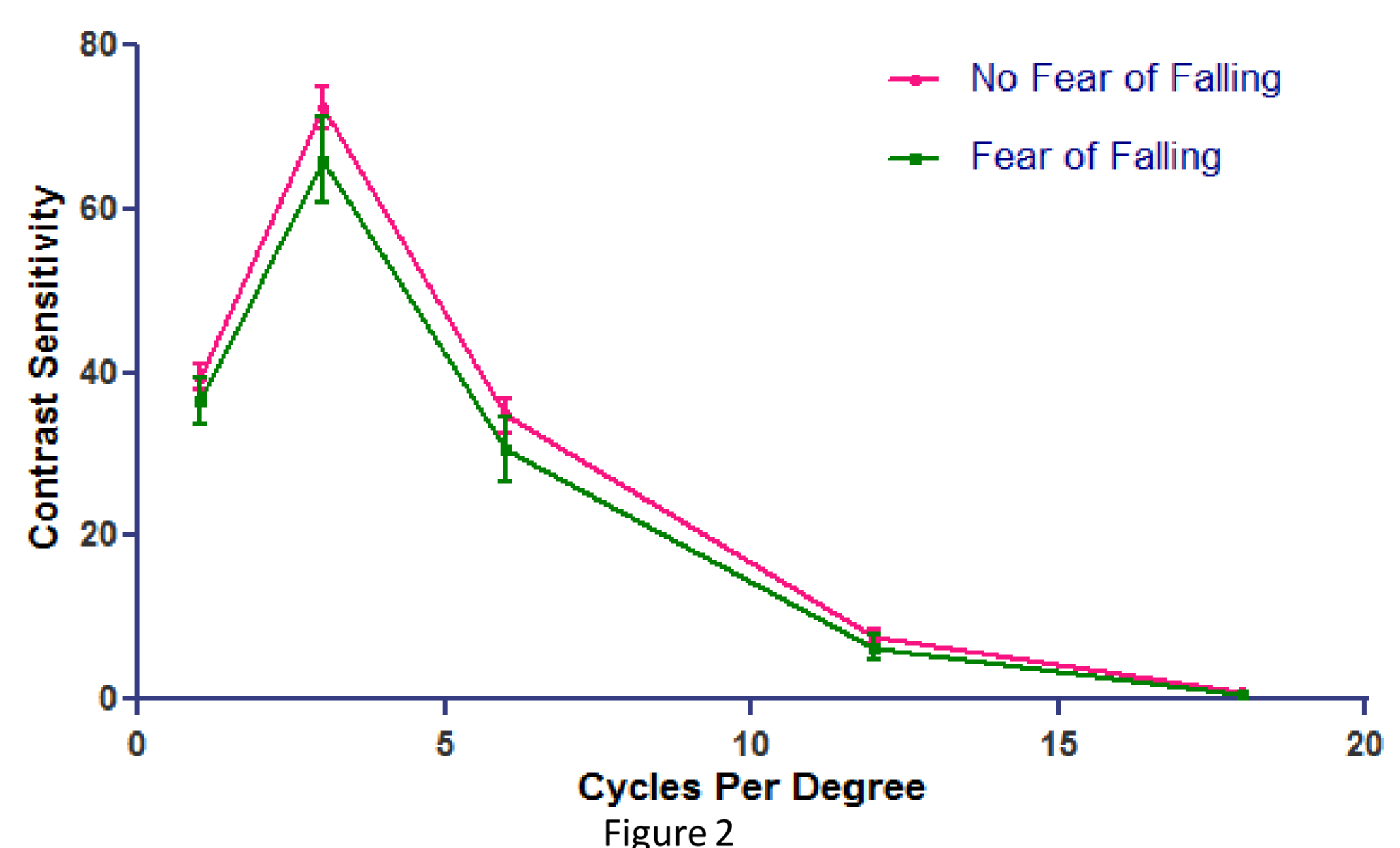


Figure 2

• The results of a multivariate analysis are shown in table 1. When age and gender were entered into a model for fear of falling, it can be seen that the association between fear of falling and contrast sensitivity is gender dependent.

Table 1.

Fear of Falling	Odds Ratio	Std. Err.	z	P>z	[95% Conf. Interval]
Age	1.0492	0.0045	11	<0.001	1.0403 1.0582
Gender	3.3143	0.2793	14.22	<0.001	2.8097 3.9096
Contrast Sensitivity	0.9987	0.0016	-0.75	0.456	0.9954 1.0020

Discussion

- Visual acuity **is not** independently associated **with falls** in the older person
- Contrast sensitivity **is not** significantly associated **with falling** in the older population. This is surprising as the majority of studies have found an association.
- Our study used larger sample size and ambient light controlled CS testing.
- Visual acuity is statistically lower in those with fear of falling. However, the difference between the two groups is small.
- Contrast sensitivity is significantly lower in those with fear of falling but this result is not independent of gender.
- Multivariate analysis investigating this gender effect was not performed in the other studies.

Conclusion

Eyesight has traditionally been considered a risk factor for falls – however its interaction with fear of falling is unknown. These results suggest interactions are weak at most in both fallers and those with fear of falling and maybe largely explained by gender effects. Longitudinal analysis will elucidate these interactions more clearly in the future. These results would suggest however that falls and fear of falling prevention strategies should be tailored to individuals.