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Original Study

Is Fear of Falling Associated With Decline in Global Cognitive Functioning in Older Adults: Findings From the Irish Longitudinal Study on Ageing

Geeske Peeters PhD [a,*], Siobhan Leahy PhD [b], Sean Kennelly PhD, MD [a,c], Rose Anne Kenny PhD MD [a,b,d]

[a] Global Brain Health Institute, University of California San Francisco, United States of America and Trinity College, Dublin, Ireland
[b] The Irish Longitudinal Study on Ageing, Trinity College, Dublin, Ireland
[c] Department of Age-Related Health Care, Tallaght Hospital, Dublin, Ireland
[d] Mercer's Institute for Successful Ageing, St James's Hospital, Dublin, Ireland

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A B S T R A C T

Background: Fear of falling (FoF) is present in 20% to 85% of older adults and may be an early marker of decline in global cognitive functioning (GCF). We tested the hypothesis that FoF is associated with lower levels of GCF (cross-sectional) and greater decline in GCF (prospective) in adults aged 50 and older.
Design: Observational cohort study.
Setting: The Irish Longitudinal Study on Ageing, a population-based study.
Participants: Data were from 4931 participants (mean age 62.9 ± 9.1, range 50–98, 54.3% female).
Measurements: FoF was based on self-report in 2010. GCF was measured with the Montreal Cognitive Assessment (MoCA) and Mini Mental Status Examination (MMSE) in 2010 and 2014. The cross-sectional association was examined using linear regression unadjusted and after adjustment for demographic and health factors. The prospective association between FoF and the odds of >1-SD decline in GCF were examined using logistic regression. Interaction with age and mediation by social and physical activities were examined.
Results: In 2010, 21.9% of participants reported FoF. In the unadjusted cross-sectional models, those with FoF had lower scores on the MoCA (B −1.15, 95% confidence interval [CI] −1.40 to −0.90) and MMSE (B −0.52, CI −0.67 to −0.37). In the unadjusted prospective models, FoF was associated with a greater odds of decline in MoCA (odds ratio [OR] 1.60, CI 1.26–2.04) and MMSE (OR 1.64, CI 1.29–2.08). After adjustment for covariates, all associations attenuated and were no longer statistically significant, except the association with decline in MoCA (OR 1.32, CI 1.01–1.71). No statistically significant interaction with age was found ($P > .37$). Additional adjustment for social and physical activity did not change the results.
Conclusions: The findings provide weak evidence for FoF as a predictor of cognitive decline.

Fear of falling (FoF) has been associated with reduced physical, social, and daily activities[1–6]; poorer physical functioning[5,7,8]; poorer mental health[9]; and poorer well-being.[6–8,10] Prevalence estimates of FoF vary between 20% and 85% of older adults,[11] which makes it a common problem in older adults.

To date, few studies have examined the association between FoF and cognitive functioning. The findings from a cross-sectional study in 101 older adults suggest that lower levels of FoF were associated with greater memory decline.[12] However, a 1-year prospective study in 406 adults aged 65 to 85 years found that higher levels of FoF were associated with a greater risk of subjective memory complaints.[13] These contrasting findings may be explained by differences in study design. It could be that the acute effects of FoF on cognitive functioning are different from the long-term effects, resulting in different findings in cross-sectional and prospective models. Also, there may be differences in the association between FoF and objective and subjective measures of cognitive functioning. To our knowledge, no studies

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* Address correspondence to Geeske Peeters, PhD, Trinity College Dublin, Global Brain Health Institute, Lloyd building, Dublin 2, Ireland.
E-mail address: geeske.peeters@gbhi.org (G. Peeters).

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have examined the prospective association between FoF and objectively measured cognitive functioning in a large population-based sample.

A potential mechanism through which FoF may have an impact on cognitive functioning is via its effects on physical activity and social activity. FoF causes avoidance of physical and social activities.[3,4,6] Insufficient levels of engagement in physical and social activities have been associated with increased decline in cognitive functioning.[14–17] Thus, physical activity and social activity may be mediators of the association between FoF and cognitive functioning. Also, although FoF is already present at younger ages (ie, 17% in Irish adults aged 50–64 years),[18] none of the previous studies included adults younger than 65. As both the prevalence of FoF and the rate of decline in cognitive functioning are higher at older ages, the association may become stronger with age.

The aim in this study was to examine the association between FoF and global cognitive functioning (GCF) in a large population-based sample of adults aged 50 years and older. The mediating roles of physical activity and social activity, and the modifying role of age, are explored. We hypothesized that people with FoF have lower levels of GCF (cross-sectional models) and greater decline in GCF (prospective models) than people without FoF.

Methods

Participants

The Irish Longitudinal Study on Ageing (TILDA) is a nationally representative sample of 8175 adults aged 50 years and older.[19] The recruitment strategy was based on the Irish national directory of all residential addresses divided into geographical clusters, of which 640 were selected based on area-level socioeconomic status and geographical location. Within each cluster, 40 addresses were selected and visited by an interviewer. All individuals aged 50 years and older living at each selected address were invited to participate (response rate 62%). Further details of the study design and cohort have been described elsewhere.[19,20] The study was approved by the Trinity College Dublin Faculty of Health Sciences Research Ethics Committee and all participants provided written informed consent.

Figure 1 shows how the 4 subsamples were selected for the current analyses. Data collection involved a computer-assisted interview, a self-administered questionnaire, and a health assessment carried out by research nurses. The cognitive tests were completed as part of the health assessment, which was completed by 72.3% of the participants. Analyses were therefore limited to participants who completed the health assessments. Responders to the health assessment were less physically and cognitively frail than the nonresponders.[21] For the cross-sectional analyses, participants were excluded if they had missing data on the outcome, FoF, or covariates at the baseline assessment in 2010. For the prospective analyses, participants were also excluded if they had scores suggestive of advanced cognitive decline on the outcome measured at baseline (ie, scores below the age- and education-stratified 10th percentile of the national distribution)[22] to minimize reverse causation, or if they had missing data on the outcome measured at the follow-up wave in 2014.

Global Cognitive Functioning

Two measures of GCF were used: the Montreal Cognitive Assessment (MoCA)[23] and the Mini Mental Status Examination (MMSE).[24] Both are frequently used measures of GCF used as screening methods for cognitive impairment. The MoCA is known to be more sensitive to mild cognitive deficits than the MMSE when applied to cognitively healthy older adults.[22] Both the MoCA and MMSE measure orientation, registration, attention, calculation, recall, and language; the MoCA additionally measures executive function, abstraction, and visuospatial ability. For both measures, the scores range from 0 to 30 with higher scores indicating better GCF.

Fear of Falling

FoF was measured using the question "Are you afraid of falling?" with the response options "yes" and "no." Validation of this question against the well-validated 16-item falls efficacy scale (FES-I)[25,26] in the 2012 follow-up wave in this cohort showed an agreement of 76.3%, sensitivity of 50.5%, and specificity of 87.5%. (Note that 2012 data were not included in the current analyses due to absence of measures of GCF.)

Baseline Characteristics, Mediators, and Covariates

Sociodemographic factors included age, sex, and educational attainment (categorized as "primary level or no education,"

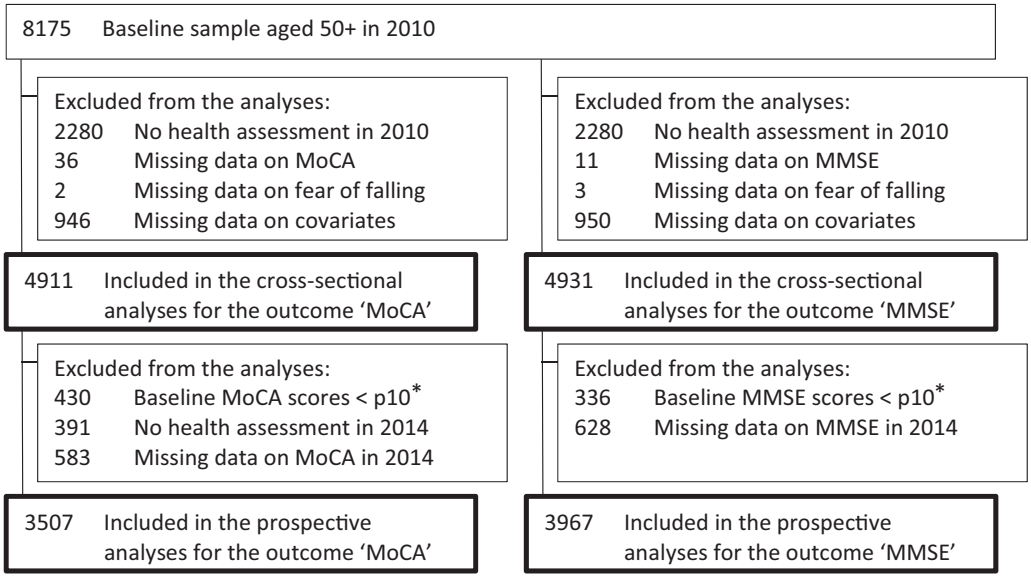

Fig. 1. Flow chart. *Participants with MoCA or MMSE scores below the 10th percentile of the Irish age- and education-stratified distribution were excluded from the analyses.[22]