

1. Introduction

In 2015, dementia will cost the United States of America alone \$226 billion, and by 2050, this cost is projected to rise to \$1.1 trillion (1). An often underappreciated cost of dementia is the impact upon informal caregivers for dementia patients. Dementia caregiving is associated with heightened stress as well as increased anxiety and depression (2). There is also emerging evidence that the chronic stress of dementia caregiving may impact upon central nervous system activity in informal caregivers (3); this may exacerbate the physiological effects of ageing (see **Figure 1**). The current study examined the cognitive neurobiology and mental well-being of dementia caregivers.

2. Aims & Hypothesis

Aims: (1). Systematically evaluate the literature for evidence of the effects of dementia caregiving on biomarkers of stress, including HPA axis activity, inflammation and cognitive performance.

(2). Examine stress, depression and cognitive performance in an Irish cohort of dementia caregivers.

Hypotheses: We hypothesised that dementia caregiving would be associated with heightened biomarkers of stress and worsened mental health.

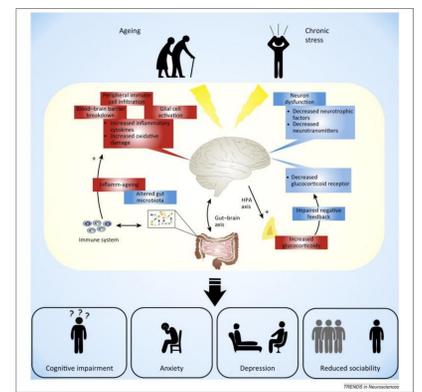


Figure 1: Chronic stress may exacerbate ageing's physiological impact (adapted from 4.)

3. Methods

Systematic review

Systematic review: We searched PsycINFO, ScienceDirect, Web of Knowledge, PubMed, Scopus and Cinahl for quantitative studies published in English that examined biomarkers of stress in dementia caregivers. Studies were assessed for inclusion in the systematic review (see Figure 2 for flowchart of study evaluation). We examined studies assessing biomarkers of stress in dementia caregivers, as well as interventions to reduce stress biomarkers.

The systematic review was registered on 28/05/2015 at the following link:

http://www.crd.york.ac.uk/PROSPERO/display_record.asp?ID=CRD42015020828

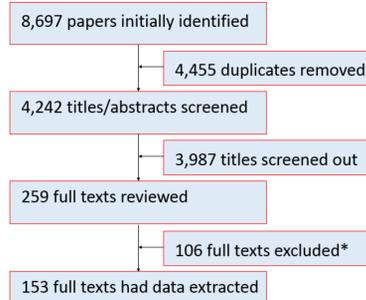


Figure 2: Flowchart of articles examined

Caregiver assessment

Family dementia caregivers (N = 21) were recruited via the Memory Clinic at St. Finbarr's Hospital, Cork. Caregivers were providing at least 10 hours of unpaid care per week to a relative with dementia. Controls (N = 7) were recruited from the community.

	Caregivers (N = 21)	Controls (N = 7)	P-value
Age	56.2 +/- 2.4	49.6 +/- 3.2	.15
Gender	13 females, 8 males	5 females, 3 males	.97
Relation to care recipient	12 children, 9 spouses	-	-
IQ (NART)	107.2 +/- 2	101.2	.14

Table 1: Participant characteristics (Values are mean +/- SEM)

Exclusion criteria were: serious health problems, taking a medication that would confound the aims of the study, participation in a trial involving experimental drugs in the last 30 days.

Daily stress: Daily stress was assessed using the Cohen Perceived Stress Scale.

Depression was assessed using the Beck Depression Inventory (BDI).

Neurocognitive performance: Participants completed the paired associates learning task (PAL), simple reaction time, spatial span and rapid visual information processing tests from the CANTAB platform (see **Figure 3**).



Figure 3: CANTAB: neurocognitive assessment.

5. Discussion & conclusions

- Dementia caregiving is associated a proinflammatory phenotype and high self-reported stress levels. This likely contributes to higher levels of depressive symptoms and may underpin a possible cognitive neurobiology of caregiving. Further data is required on cognitive performance in dementia caregivers.
- A comprehensive physiological phenotyping of dementia caregivers is required to better understand the mechanisms of these effects.

6. Acknowledgements & Disclosure

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4. Results

Systematic review

Papers assessed in the review indicated that dementia caregiving was associated with heightened perceived stress, as well as dysregulated cortisol output and immune activity. Quality assessment of articles reviewed is ongoing.

Stress and mental health in caregivers

Stress

Dementia caregivers reported higher stress than non-caregivers, although this was not significant (see **Figure 4**).

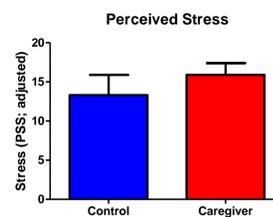


Figure 4: Perceived stress in caregiver and controls (means adjusted for age as a covariate).

Depression

Dementia caregivers reported higher depression than non-caregivers, although this was not significant (see **Figure 5**).

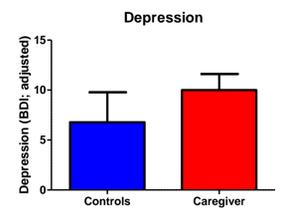


Figure 5: Depression in caregivers and controls.

Neurocognition

Visuospatial Memory

Caregivers made greater total errors on the Paired Associates Learning (PAL) test, although this effect was not significant (see **Figure 6**).

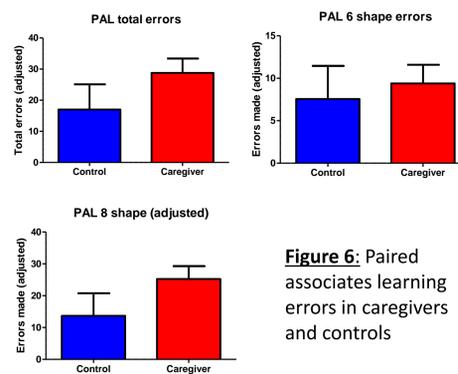


Figure 6: Paired associates learning errors in caregivers and controls

Working memory

Caregivers and controls did not differ in spatial span performance (see **Figure 8**)

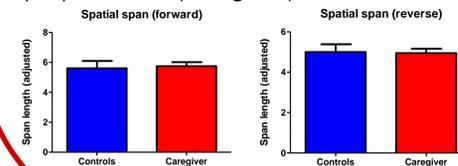


Figure 8: Spatial span performance in caregivers and controls

Sustained Attention

Caregivers had fewer hits, more false alarms and slower reaction time on the Rapid Visual Information Processing (RVP) test, although this was not significant (see **Figure 7**).

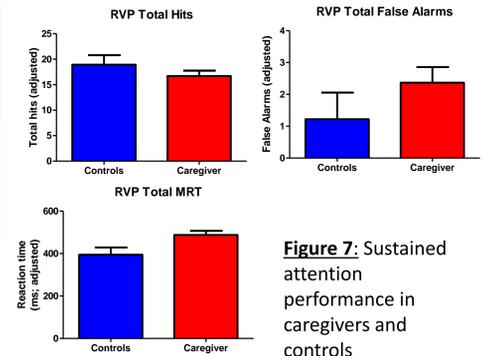


Figure 7: Sustained attention performance in caregivers and controls

Simple reaction time

Caregivers had slower reaction time than controls (see **Figure 9**).

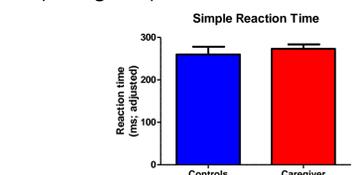


Figure 9: Simple reaction time performance in caregivers and controls

7. References

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- Mahoney R, et al. Am J Geriatr Psychiatry 2005; 13: 795-801
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