

1. Introduction

In 2015, dementia 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 depression (2). There is also emerging evidence that the chronic stress of dementia caregiving may impact upon central nervous system activity in informal caregivers; where such stress is not addressed it may exacerbate the physiological effects of ageing (see **Figure 1**), but there is preliminary evidence to suggest that interventions to manage stress may ameliorate such effects (3).

The current study examined the cognitive neurobiology of dementia caregivers, as well as the impact of stress management and carer training for these caregivers.

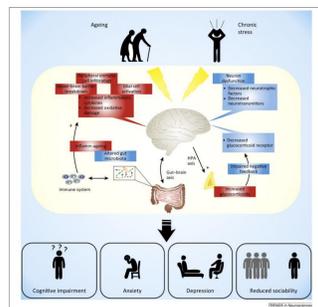


Figure 1: Chronic stress may exacerbate ageing's physiological impact (adapted from 4.)

2. Aims of the Study

Aims: (1). Examine stress, depression and cognitive performance in an Irish cohort of caregivers for family members with dementia, compared to a control group not caring for a sick relative.

(2). Examine whether carer interventions can attenuate the impact of chronic stress on neurocognitive performance.

Hypotheses: (1). Informal dementia caregiving is associated with heightened stress and depressive symptoms and impaired cognitive performance.

(2). Carer interventions (both mindfulness-based stress reduction and a carer training program) are associated with an attenuation of these effects.

3. Methods

Participants

Family dementia caregivers (N = 31) were recruited via memory and old age psychiatry clinics 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 = 18) were recruited from the community. **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.

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

	Caregivers (N = 31)	Controls (N = 18)	P-value
Age	56.1 (SD = 10.5)	55.8 (SD = 10.8)	.9
Gender	20 females, 11 males	11 females, 7 males	.77
Relation to care recipient	20 children, 11 spouses	-	-

Assessments

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 tests of sustained attention (rapid visual information processing; RVP), visuospatial memory (paired associates learning task; PAL), working memory (spatial span; SSP) and simple reaction time (SRT) from the CANTAB platform (see **Figure 2**). Cognitive tests were ordered using a Latin Squares design to avoid testing order effects.



Figure 2: CANTAB: neurocognitive assessment.

Intervention

A subset of participants (N = 7) completed a mindfulness-based stress reduction (MBSR) program, followed by a carer training program (CTP). MBSR was delivered by an old age psychiatrist and CTP was delivered by a senior clinical psychologist.

Each program was delivered in a group setting at St. Finbarr's hospital, and lasted approximately 2 months.

4. Results

Stress and depression in caregivers

Stress

Dementia caregivers reported significantly higher stress than non-caregivers, $F(1, 35) = 5.69, p = .02, \eta_p^2 = .14$ (see **Figure 3**).

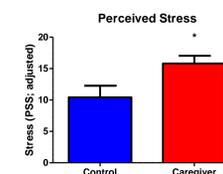


Figure 3: Perceived stress in caregiver and controls (means adjusted for age as a covariate).

Depression

Caregivers reported marginally higher depression than non-caregivers $F(1, 32) = 3.72, p = .06, \eta_p^2 = .1$ (see **Figure 4**).

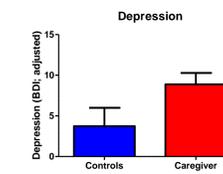


Figure 4: Depression in caregivers and controls (means adjusted for age).

Neurocognition

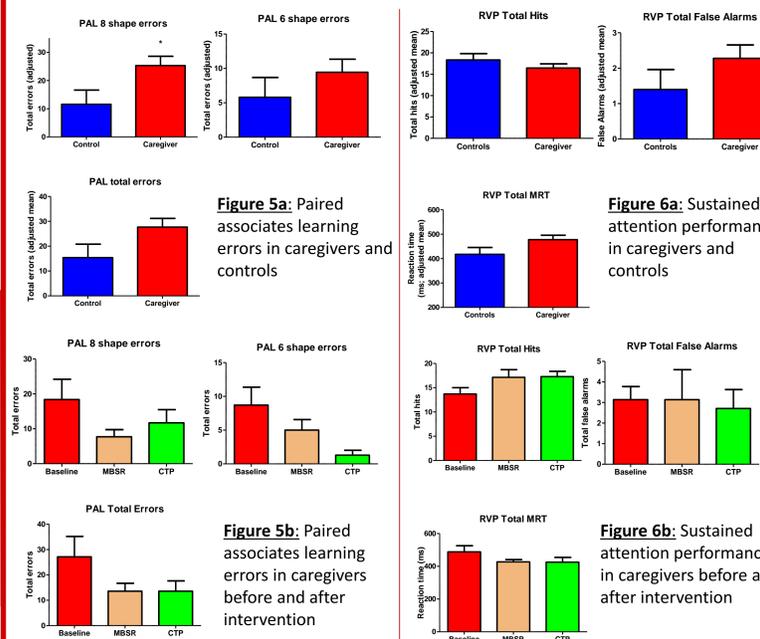


Figure 5a: Paired associates learning errors in caregivers and controls

Figure 5b: Paired associates learning errors in caregivers before and after intervention

Figure 6a: Sustained attention performance in caregivers and controls

Figure 6b: Sustained attention performance in caregivers before and after intervention

Caregivers made significantly more errors on the Paired Associates Learning (PAL) test, 8 patterns: $F(1, 37) = 5.18, p = .03, \eta_p^2 = .12$ (see **Figure 5a**), but made fewer errors post-intervention, $F(1, 6) = 3.07, p = .08, \eta_p^2 = .34$ (see **Figure 5b**). Caregivers had slower reaction time on the Rapid Visual Information Processing (RVP) test, $F(1, 36) = 3.22, p = .08, \eta_p^2 = .08$ (see **Figure 6a**), but had faster reaction time post-intervention, $F(2, 12) = 3.44, p = .07, \eta_p^2 = .37$ (see **Figure 6b**). There were no differences between caregivers and controls in spatial memory performance or simple reaction time, and these were not affected by MBSR or CTP.

5. Discussion

- Dementia caregiving is associated with heightened levels self-reported stress and depressive symptoms, and poorer memory and sustained attention performance. This may underpin a possible cognitive neurobiology of caregiving.
- Both MBSR and carer training programs may attenuate the impact of chronic carer stress on cognitive performance (see **Figure 7**).

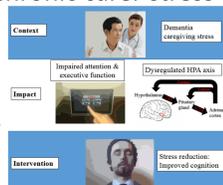


Figure 7: Impact of caregiver stress and interventions (adapted from 3).

6. Acknowledgements

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7. References

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