

1. Introduction

In 2015, dementia cost the United States of America alone \$226 billion; 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 and increased depression (2). There is emerging evidence that dementia caregiving may impact upon central nervous system activity in informal caregivers (3); this may exacerbate the physiological effects of ageing (see Figure 1). We examined the cognitive neurobiology and mental well-being of dementia caregivers, as well as interventions targeting stress and the caregiving role.

2. Aims of the Study

- Aims:** (1). Systematically evaluate the literature for evidence of the effects of dementia caregiving on biomarkers of stress.
(2). Examine stress, depression and cognitive performance in an Irish cohort of caregivers for family members with dementia.
(3). Examine whether carer interventions can attenuate the impact of chronic stress on neurocognitive performance.
- Hypotheses:** (1). Dementia caregiving is associated with heightened biomarkers of stress and worsened mental health.
(2). Carer interventions are associated with an attenuation of this effect.

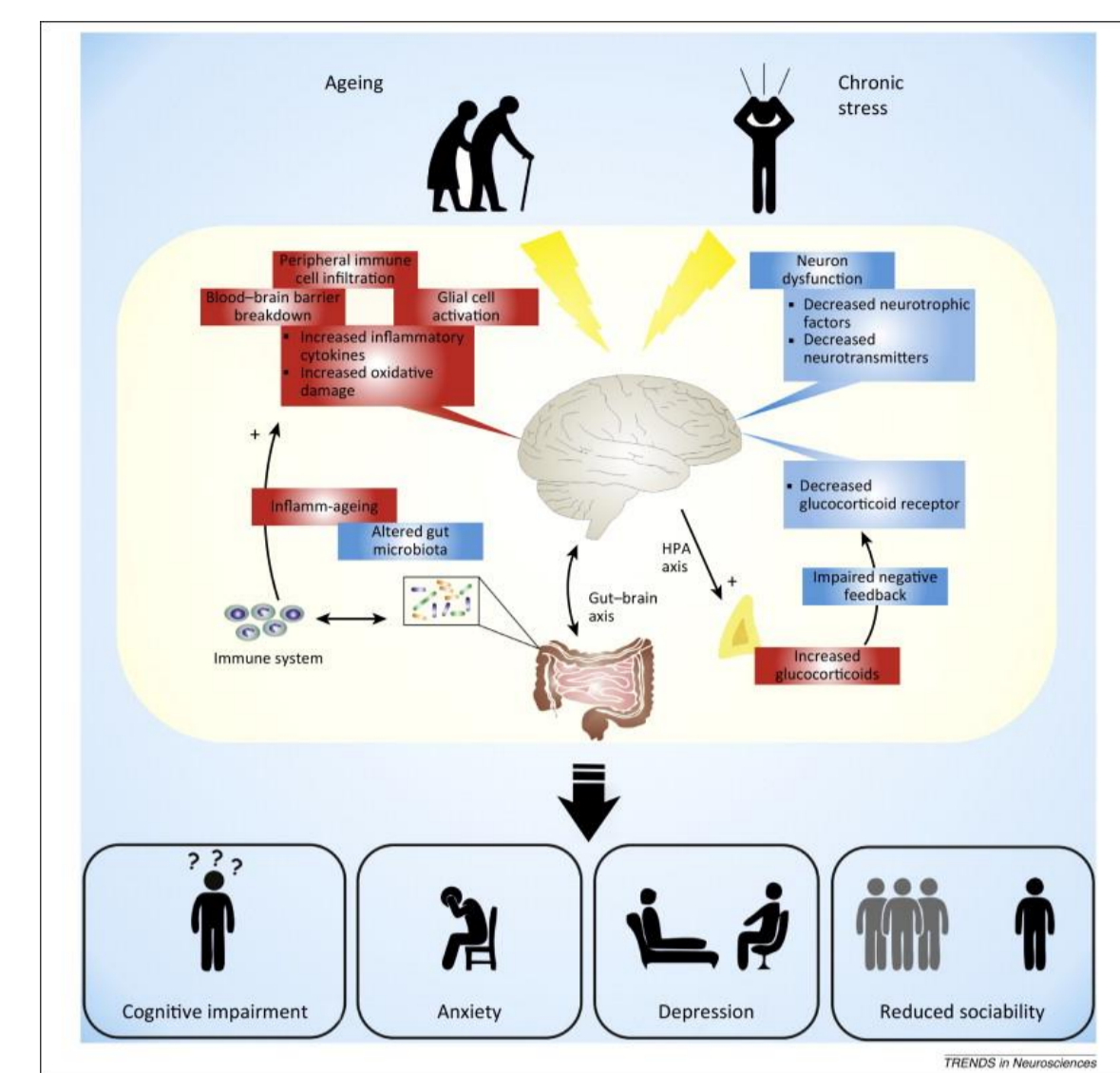


Figure 1: Chronic stress may exacerbate the physiological impact of ageing (adapted from 4.)

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

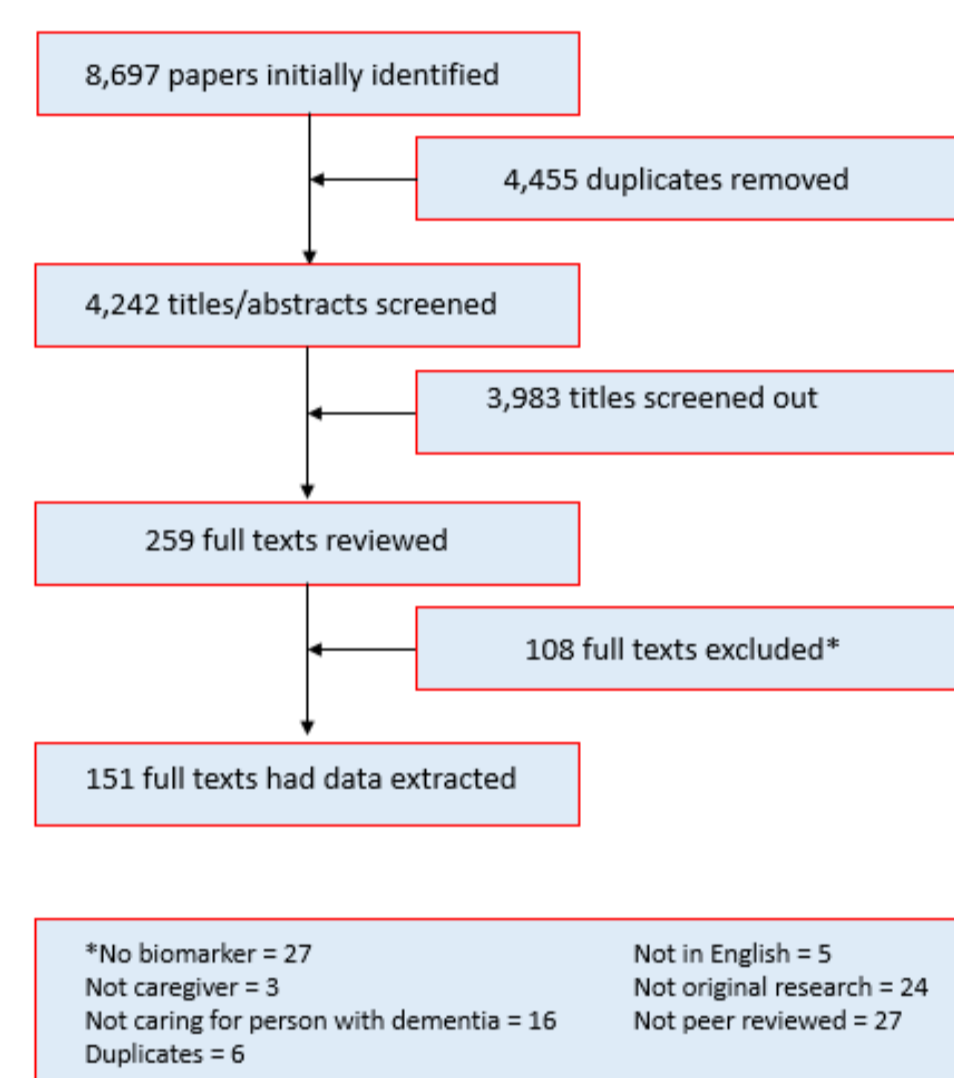


Figure 2: Flowchart of articles examined

Caregiver assessment & intervention

Family dementia caregivers (N = 31) 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 = 18) were recruited from the community.

	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	-	-

Table 1: Participant characteristics

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.

A subset of participants (N = 7) completed both a carer training program (CTP) and mindfulness-based stress reduction (MBSR) program. Each program was provided by an experienced instructor and lasted approximately 2 months.

Stress and mental health: Stress was assessed using the Cohen Perceived Stress Scale (PSS). Depression was assessed using the Beck Depression Inventory (BDI).

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



5. Discussion & conclusions

- Dementia caregiving is associated with heightened levels of cortisol and self-reported stress, as well as poorer memory and sustained attention performance. This likely interacts with depressive symptoms and may underpin a possible cognitive neurobiology of caregiving.
- Both MBSR and carer training programs for dementia caregivers may attenuate the impact of chronic stress.
- 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, dysregulated cortisol output and poorer performance on tests of attention and executive function. Intervention to reduce stress led to improved cognition (see Figure 4). Risk of bias was generally low to moderate.

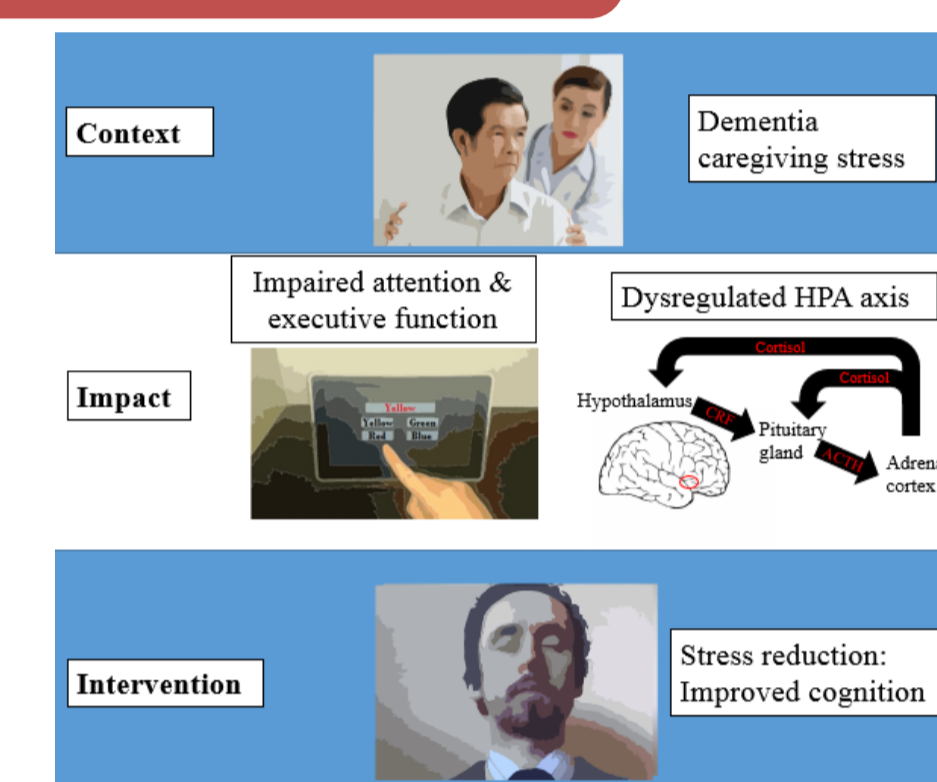


Figure 4: Systematic review conclusions.

Stress and mental health 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 5).

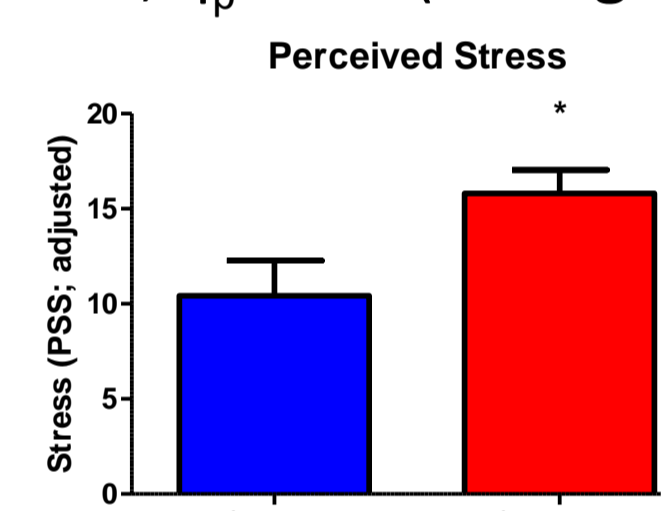


Figure 5: Perceived stress in caregiver and controls (means adjusted for age as a covariate).

Depression
Dementia caregivers reported higher depression than non-caregivers, a marginally significant effect, $F(1, 32) = 3.72, p = .06, \eta_p^2 = .1$ (see Figure 6).

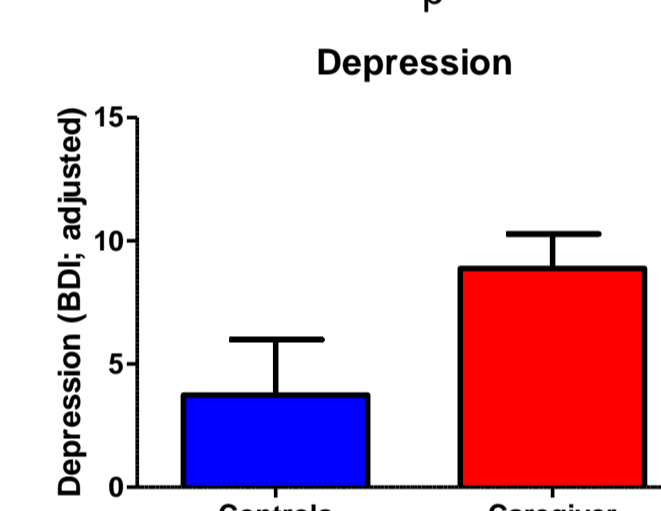


Figure 6: Depression in caregivers and controls.

Neurocognition

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 7a), but made fewer errors post-intervention, $F(1.1, 6.8) = 3.07, p = .08, \eta_p^2 = .34$ (see Figure 7b). 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 8a), but had faster reaction time post-intervention, $F(2, 12) = 3.44, p = .07, \eta_p^2 = .37$ (see Figure 8b). 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.

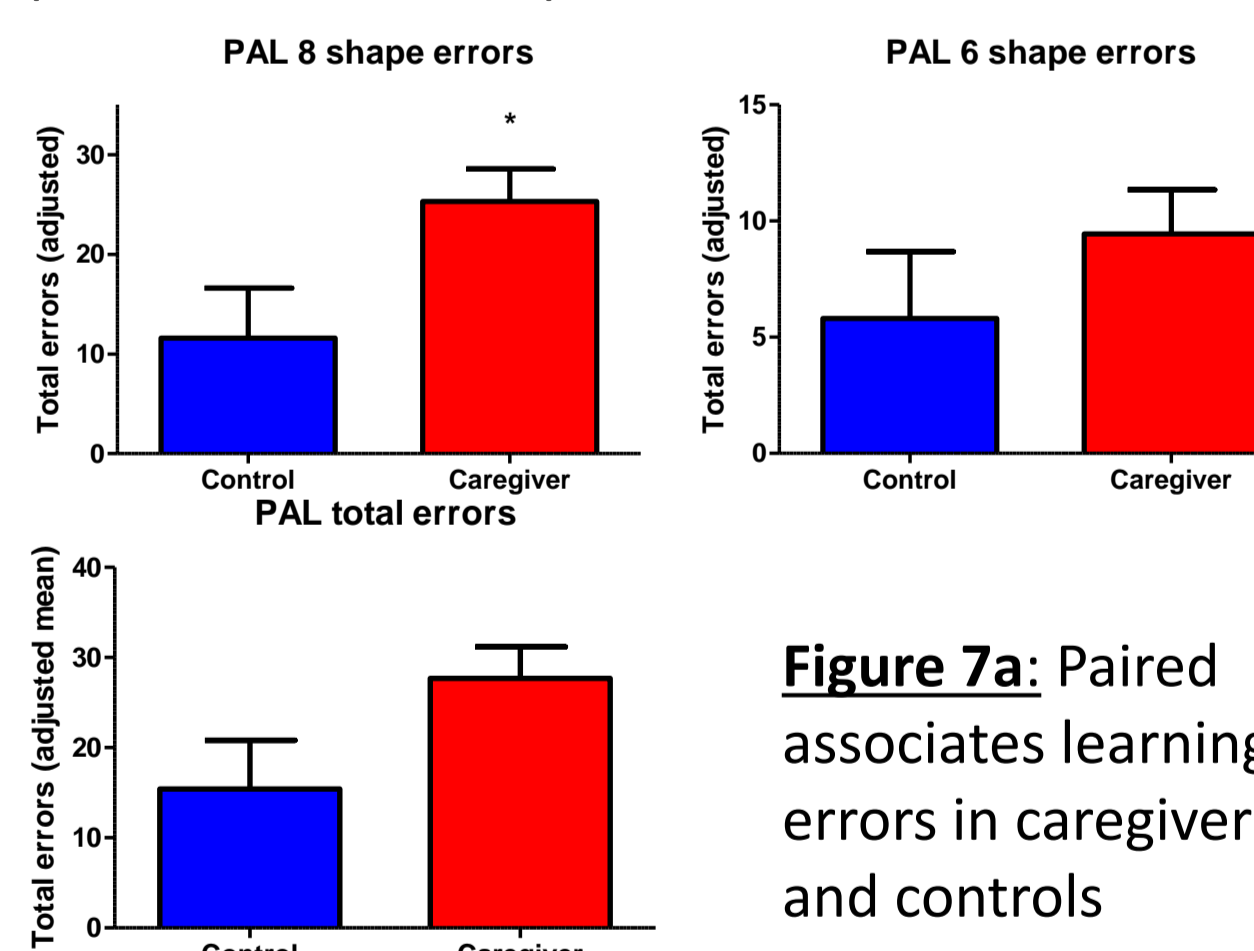


Figure 7a: Paired associates learning errors in caregivers and controls

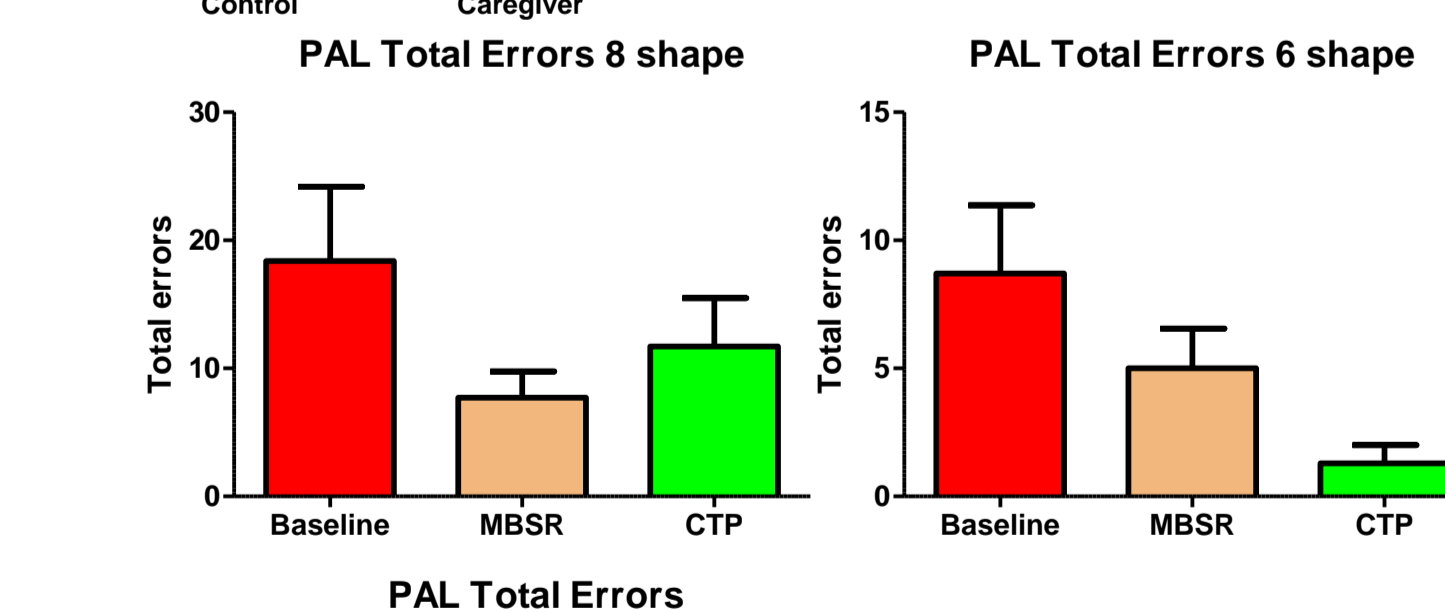


Figure 7b: Paired associates learning errors in caregivers before and after intervention

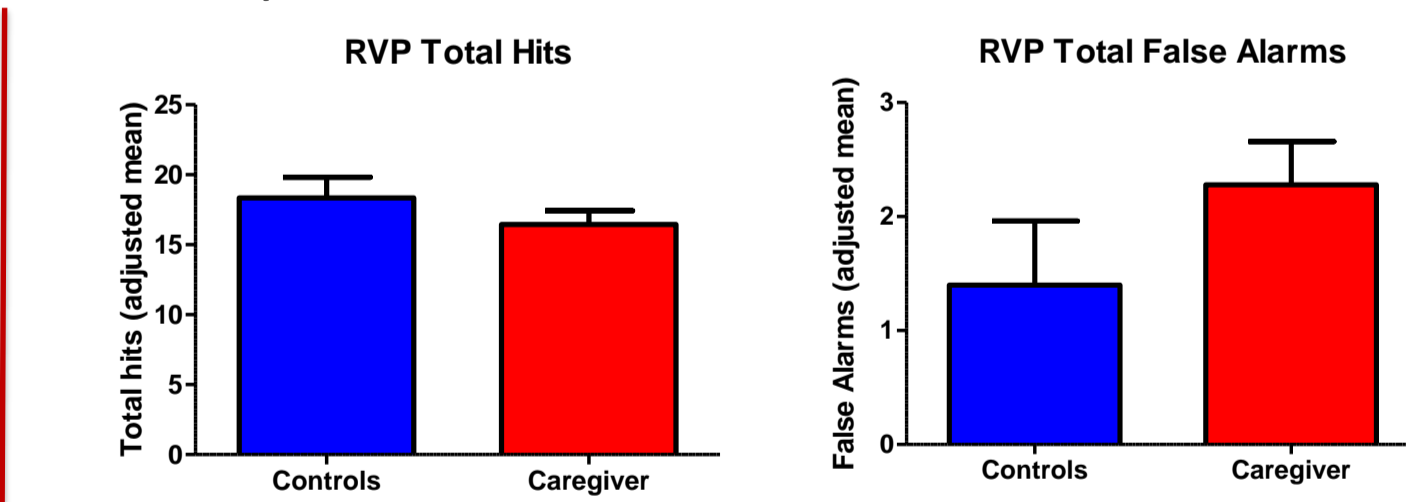


Figure 8a: Sustained attention performance in caregivers and controls

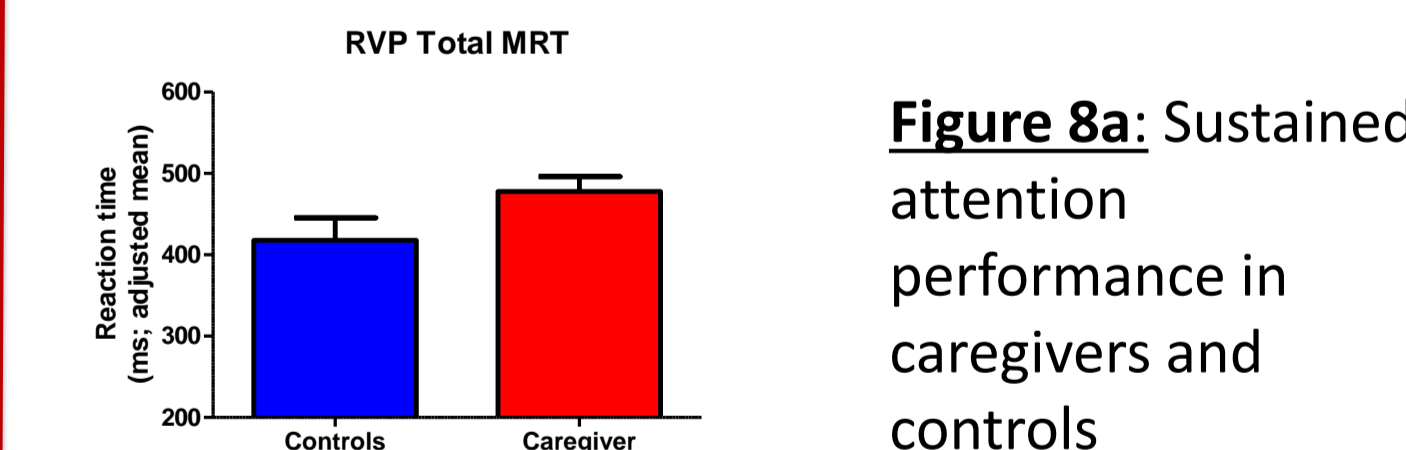


Figure 8b: Sustained attention performance in caregivers before and after intervention

7. References

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