Biological & Cognitive Markers of Dementia Caregiver Stress and the Impact of Caregiver Interventions

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Stressors

- Recession
- Boom or Bust?
- Property Market Rate Rises
- Slow Growth
- Low Returns
- No Tenants
- Childcare
- The 50 Year Mortgage
“It’s not stress that kills us, it is our reaction to it”.
Hans Selye
Measuring Stress

Perceived Stress Scale

The questions in this scale ask you about your feelings and thoughts during the last month. In each case, you will be asked to indicate by circling how often you felt or thought in a certain way.

Name ___________________________ Date ___________________________

Age __________ Gender (Circle): M F Other ___________________________

0 = Never 1 = Almost Never 2 = Sometimes 3 = Fairly Often 4 = Very Often

1. In the last month, how often have you been upset because of something that happened unexpectedly? .................................................. 0 1 2 3 4

2. In the last month, how often have you felt that you were unable to control the important things in your life? .................................................. 0 1 2 3 4

3. In the last month, how often have you felt nervous and “stressed”? .................................................. 0 1 2 3 4

4. In the last month, how often have you felt confident about your ability to handle your personal problems? .................................................. 0 1 2 3 4

5. In the last month, how often have you felt that things were going your way? ...................................................................................... 0 1 2 3 4

6. In the last month, how often have you found that you could not cope with all the things that you had to do? .................................................. 0 1 2 3 4

7. In the last month, how often have you been able to control irritations in your life? .................................................. 0 1 2 3 4

8. In the last month, how often have you felt that you were on top of things? .................................................. 0 1 2 3 4

9. In the last month, how often have you been angered because of things that were outside of your control? .................................................. 0 1 2 3 4

10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them? .................................................. 0 1 2 3 4

Blk - Blank
TA - Total Activity
NSB - Non-Specific Binding
Bp - Maximum Binding
S1-S8 - Standards 1-8
1-24 - Samples
Informal dementia care

Article

Risk of Cognitive and Functional Impairment in Spouses of People With Dementia: Evidence From the Health and Retirement Study

Maria M. Pertl, PhD\textsuperscript{1}, Brian A. Lawlor, MD\textsuperscript{2}, Ian H. Robertson, PhD\textsuperscript{1}, Cathal Walsh, PhD\textsuperscript{3}, and Sabina Brennan, PhD\textsuperscript{1}
Aims

1. Highlight impact of carer stress to inform public policy

2. Assess cognition and biological markers of stress in informal dementia caregivers

3. Assess impact of interventions to manage carer stress
### Caregiver assessment: Participants

<table>
<thead>
<tr>
<th></th>
<th>Caregivers (N = 74)</th>
<th>Controls (N = 31)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>56.5 (SD = 11.9)</td>
<td>55.7 (SD = 10)</td>
<td>.75</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td>F = 49, M = 23</td>
<td>F = 21, M = 10</td>
<td>.98</td>
</tr>
<tr>
<td><strong>Relation to care recipient</strong></td>
<td>Child = 47, Spouse = 25, Sibling = 1, Friend = 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Burden (ZBI; 22 item)</strong></td>
<td>34.8 (SD = 16.5)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Caregiver assessment: Methods

CANTAB
Flexible test battery assessing numerous cognitive domains
Validated in wide variety of clinical populations

Stress, depression & anxiety
Cohen perceived stress scale
Beck depression inventory
Spielberger trait anxiety inventory
Caregiver assessment: Methods

Stress biomarkers
Blood: pro-inflammatory cytokines
Salivary cortisol
Stool
Urine
Hair
Higher Stress, Anxiety & Depression

Perceived Stress

- Stress (PSS; adjusted)
  - Control
  - Caregiver

Anxiety

- Anxiety (STAI; adjusted)
  - Control
  - Caregiver

Depression

- Depression (BDI; adjusted)
  - Controls
  - Caregiver
Cognitive performance

Memory

- Errors made (adjusted) for Control: 10
- Errors made (adjusted) for Caregiver: 20

* Significant difference

Hippocampus

Attention

- Reaction time (ms; adjusted mean) for Controls: 300
- Reaction time (ms; adjusted mean) for Caregiver: 400

Brain regions:
- Frontal Lobe
- Parietal Lobe
- Occipital Lobe
- Temporal Lobe

CANTAB
Cognitive performance

CANTAB

Other tests unaffected
**Higher Pro-inflammatory Cytokine**

**IL-6**
- Control: [Value]
- Caregiver: [Value] ± [Standard Error]

**IL-8**
- Control: [Value]
- Caregiver: [Value] ± [Standard Error]

**TNF-α**
- Control: [Value]
- Caregiver: [Value] ± [Standard Error]
Positive Aspects of Caregiving

THE LANCET

Correspondence

Burdensome aspects of care rather than caregiver burden

Desmond O'Neill

Published: 03 October 2015
Positive Aspects of Caregiving

Providing help to the care recipient has made me feel...

<table>
<thead>
<tr>
<th>Question</th>
<th>Agree a little (%)</th>
<th>Agree a lot (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>...more useful</td>
<td>34</td>
<td>26</td>
</tr>
<tr>
<td>...good about myself</td>
<td>32</td>
<td>26</td>
</tr>
<tr>
<td>...needed</td>
<td>32</td>
<td>30</td>
</tr>
<tr>
<td>...appreciated</td>
<td>32</td>
<td>20</td>
</tr>
<tr>
<td>...important</td>
<td>14</td>
<td>8</td>
</tr>
<tr>
<td>...strong and confident</td>
<td>18</td>
<td>18</td>
</tr>
</tbody>
</table>
## Positive Aspects of Caregiving

*Providing help to the care recipient has...*

<table>
<thead>
<tr>
<th>Question</th>
<th>Agree a little (%)</th>
<th>Agree a lot (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>…enabled me to appreciate life more</td>
<td>28</td>
<td>52</td>
</tr>
<tr>
<td>…enabled me to develop a more positive attitude toward life</td>
<td>22</td>
<td>33</td>
</tr>
<tr>
<td>…strengthened my relationships with others</td>
<td>23</td>
<td>35</td>
</tr>
</tbody>
</table>
Carer Interventions

Two group-based interventions
Both offered to caregivers
Approx. 2-month duration
Carer training program
Mindfulness-based stress reduction
Carer Intervention Improves Performance

Memory

Total errors

Baseline
MBSR
CPT

http://apc.ucc.ie
Carer Intervention Improves Performance

Attention speed

- Baseline
- MBSR
- CPT

Reaction time (ms)

Attention accuracy

- Baseline
- MBSR
- CPT

Total hits
Summary

Caregiver assessment:
- Dementia caregiving impacts on cognitive performance
- Heightened stress, anxiety and depressive symptoms
- Heightened inflammatory cytokine

Stress management:
- Improved cognitive performance
Brain-Gut-Microbiome Axis

Healthy status

Healthy CNS function

Normal gut physiology

Physiological levels of inflammatory cells/mediators
Normal gut microbiota

Stress/disease

Alterations in behaviour, cognition, emotion, nociception

Abnormal gut function

Increased levels of inflammatory cells/mediators
Intestinal dysbiosis

Grenham, Clarke et al., Frontiers in Physiology 2011
B. longum reduces stress in healthy human volunteers

**Stress**

- Perceived stress

**Cortisol output**

- Area under the curve

**Brain activity**

- Fz Mobility (Hz)

**Memory: total errors**

- PAL: Total errors
Acknowledgements

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Gerard Clarke

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Nurses at Assessment & Treatment Centre,
St Finbarr’s Hospital
Poonam Gururajan
Glucksman
www.hellobrain.eu/en/carers
Looking for Healthy Volunteers

Are you a healthy individual aged between 35 and 85 years?
Are you interested in participating in a study investigating physiology, cognitive function, stress and mood?

You will be reimbursed for your participation.

For further details, please contact:
Andrew Allen at andrewallen@ucc.ie

This study is being conducted by the APC Microbiome Institute. The APC Microbiome Institute is a UCC/Teagasc Research Centre funded by Science Foundation Ireland and industry, focusing on gastrointestinal health and development of therapies for debilitating disorders such as Crohn’s disease, colitis, irritable bowel syndrome (IBS) and food poisoning (http://apc.ucc.ie).