GOAL EXECUTION IN HEALTHY AGING
AND ALZHEIMER'S DISEASE

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PROSPECTIVE MEMORY (PM)

• Remembering to execute future plans, such as remembering to take blood pressure medication.

• Age-PM paradox
  • Older adults often outperform younger adults in real-world PM tasks
  • Younger adults tend to outperform older adults in most laboratory PM tasks
PM IN ALZHEIMER'S DISEASE (AD)

• Significant PM impairments are present in AD patients (Duchek, Balota, & Cortese, 2006; Huppert, Johnson, & Nickson, 2000; Maylor, Smith, Della Sala, & Logie, 2002;)
  • Even in its very mild or preclinical stages (Jones et al., 2006; McDaniel, Shelton, Breneiser, Moynan, & Balota, 2011).
• What is the source of the PM deficit observed in AD patients?
WHAT TYPE OF PM DEFICIT IS PRESENT IN AD?

- Clinical Dementia Rating (CDR) used for classification (0’s & .5’s)
- 35 CDR 0’s (M age=77), 33 CDR .5’s (M age=79) completed 3 blocks of category judgment task
  - Control block : no PM component
  - Focal PM task block
  - Nonfocal PM task block

CATEGORY DECISION TASK

tennis     SPORT
piano     COLOR
tennis     STATE
tortoise    FRUIT
blue     COLOR
Illinois     STATE

PM Target
PROPORTION OF CORRECT RESPONSES ON PM TASKS

Focal PM

Nonfocal PM

CDR 0

CDR .5
WHY IS FOCAL PM SUCH A POWERFUL PREDICTOR?

- Spontaneous retrieval deficit
  - Early neuropathology in medial temporal lobes
- Gordon et al. (2011)
  - Robust correlation between focal PM and medial temporal lobe gray matter volume ($r = 0.503, p < 0.01$)
    - Mostly driven by hippocampal volume

CAN PM BE IMPROVED?

• An implementation intention (II) is a behavioral strategy that benefits tasks such as remembering to check blood glucose levels (Chen, et al., 2015, meta-analysis)

• Why do they work?
  • Strengthens association between goal context and action to be completed (McDaniel & Scullin, 2010)
DESIGN/PROCEDURE

- 38 CDR 0’s ($M$ age=74); 34 CDR .5’s ($M$ age=79)
- Encoding manipulated between-participants
- Completed 3 blocks of a category judgment task:
  - Focal PM block, nonfocal PM block, control (no PM) block
- Completed Virtual Week task
## SAMPLE CLASSIFICATION

<table>
<thead>
<tr>
<th></th>
<th>CDR 0</th>
<th>CDR .5</th>
<th>Significance</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Standard</td>
<td>Strong</td>
<td>Standard</td>
</tr>
<tr>
<td>Education</td>
<td>14.9(.64)</td>
<td>14.94(.66)</td>
<td>15.29(.72)</td>
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<td>MMSE</td>
<td>28.78(.43)</td>
<td>29.06(.45)</td>
<td>27.21(.49)</td>
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<tr>
<td>Associate Memory</td>
<td>12.97(1.00)</td>
<td>16.32(1.03)</td>
<td>7.5(1.13)</td>
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<td>Selective Reminding Test</td>
<td>47.89(.79)</td>
<td>47.65(.81)</td>
<td>45.21(.89)</td>
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<td>Forward Digit Span</td>
<td>6.89(.23)</td>
<td>7.00(.24)</td>
<td>6.5(.26)</td>
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<tr>
<td>Backward Digit Span</td>
<td>4.94(.27)</td>
<td>5.12(.28)</td>
<td>4.79(.31)</td>
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<tr>
<td>Trail Making Test-Part A</td>
<td>36.33(3.46)</td>
<td>31.41(3.56)</td>
<td>45.86(3.921)</td>
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<td>Trail Making Test-Part B</td>
<td>92.61(8.81)</td>
<td>77.18(9.06)</td>
<td>120.36(9.99)</td>
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<td>WMS Logical Memory</td>
<td>13.67(.94)</td>
<td>14.29(.97)</td>
<td>7.71(1.07)</td>
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<tr>
<td>Letter Number Sequencing</td>
<td>8.22(.69)</td>
<td>9.29(.71)</td>
<td>6.71(.78)</td>
</tr>
</tbody>
</table>
VIRTUAL WEEK TASK

The board

Encoding.

PM task
FOCAL PM TASK PERFORMANCE

Proportion of correct responses

NONFOCAL PM TASK PERFORMANCE

Proportion of correct responses

- CDR 0
- CDR .5

(Bar chart showing performance comparison between Standard and II conditions)
CONCLUSIONS

• Widespread deficits in goal execution exist in patients in the very early stages of AD

• Early diagnosis could be critical for efficacy of medical interventions
  • Focal PM tasks have could be a powerful diagnostic tool and should be used for screening purposes

• A simple behavioral strategy to boost PM encoding could be beneficial in very mild AD patients, regardless of their general memory function
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