

## S2.2 The Neurobiology of Adult Caregiving

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**BACKGROUND AND AIM:** More than 16 million Americans provide unpaid care for dementia patients. Caring for patients with dementia is highly stressful, and is associated with a variety of negative mental health outcomes, including depression and anxiety. While the neurobiology of parental caregiving has been thoroughly investigated, nothing is known about the neurobiology of adult caregiving. We hypothesized that adult caregivers of dementia patients would recruit neural systems that are involved in parental caregiving when viewing photographs of their patient. **METHODS:** We recruited 20 caregivers (n=17 female, mean age = 54.5 +/- 9.6 years) of adult dementia patients and imaged their brain function with fMRI as they viewed photographs of their patient, a friend and an unknown adult of the same sex and similar age as the patient. **RESULTS:** Compared with the unknown patient, viewing patient photographs activated brain areas that have been linked with core aspects of parental care, including emotional empathy (dorsal anterior cingulate, anterior insula), cognitive empathy (dorsomedial prefrontal cortex and temporo-parietal junction) and reward and motivation (substantia nigra/VTa, nucleus accumbens, and caudate nucleus). The contrast between the own patient and the friend controlled for familiarity and yielded stronger activation to the patient primarily within regions implicated in emotional empathy (dorsal anterior cingulate and anterior insula) and reward and motivation (substantia nigra/VTa and caudate nucleus). Caregivers also completed a number of questionnaires to determine if their mental health status modulated their neural response to their patient. Both perceived stress and depressive symptomology were robustly positively correlated with activation in the lateral orbitofrontal cortex, a region implicated in depression and activated by punishing stimuli. Finally, caregiver brain function was compared with brain function in a sample of grandmothers of similar age as the caregivers. When grandmothers viewed photographs of their grandchildren compared with an unknown grandchild, they activated all of the same parental brain regions that were activated in caregivers when they viewed pictures of their patient. However, grandmothers more strongly activated both the nucleus accumbens and caudate nucleus than did caregivers. This suggests that grandchildren may more effectively activate the reward and motivation systems of adult brains. **CONCLUSIONS:** Adult caregiving seems to rely on neural systems that are also involved in parental caregiving and these activations are modulated by caregiver stress and depressive symptomatology. **ACKNOWLEDGEMENT AND FUNDING:** Supported by the Emory Roybal Center for Dementia Caregiving, the Emory University Alzheimer's Disease Research Center, and the Emory Center for Health in Aging.