Sep 7, 2015

The Darrell K Royal Research Fund for Alzheimer’s Disease
PO Box 5839
Austin, TX 78763

Dear Mrs. Edith Royal and The Board of Directors of the DKR Fund,

It is with pleasure that I write the annual report of the period of 2014-2015 for the project (title: Targeted Cognitive Interventions in MCI Adults for an Active Mind).

With continual increases in life expectancies and falling birth rates, significant global increases in the proportion of adults over age of 65 in our population is happening, resulting in a remarkable demographic shift. In U.S., approximately 32% of adults aged 85 and older suffer from Alzheimer’s disease (AD), and almost all older adults experience some degree of cognitive loss with age (Park et al., 2002; Salihouse, 1996). One of the greatest scientific challenges associated with this demographic shift is discovering how to maintain the quality of life and decrease the medical-care burden of a rapidly aging society. The Alzheimer’s Association estimates that delaying the onset of AD symptoms by five years would reduce the rate of incidence by 50 percent!

A clear scientific understanding of the principles of cognitive optimization through inexpensive, non-invasive, everyday cognitive activities can slow cognitive aging and help us maintain an active mind till late adulthood. Such cognitive interventions have the potential to decrease Alzheimer’s disease and enrich lives of older adults, while simultaneously addressing a significant public health problem. My research is aimed at developing such targeted cognitive interventions, and with continued support, we can not only establish an understanding of the cognitive and biological markers (e.g., regional gray matter volume) of these engaging, game-like cognitive interventions in both cognitively healthy older adults and patients with Mild Clinical Impairments (MCI), but also use these interventions to improve targeted cognitive abilities that degrade with onset of AD. Such a research agenda is a novel, systematic approach in combining non-invasive neural measures and cognitive measures in both normal aging and MCI population.

Sincerely,

[Signature]

Chandramallika Basak, Ph.D.

THE UNIVERSITY OF TEXAS AT DALLAS
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The aim of our project is to understand how two different genres of video game learning (strategy game vs. action game) are related to different cognitive abilities, brain structure and brain function in healthy older adults and MCI patients. We had collected data on 26 healthy older adults prior to receiving funding, and have added 13 healthy older adults and 2 MCI adults in the first year of funding. Therefore, now we have a total of 39 healthy older adults on whom we have the two types of game learning data, brain imaging data and neuropsychological data. This number gives us enough power to run any group-level and individual differences analyses. We are already writing two journal manuscripts from this data set on brain activity at task-switching and aging (Nashiro et al., in preparation; Basak et al., in preparation) and a paper related to this has been accepted as a talk in a nanosymposium at the Society for Neuroscience, Chicago, October, 2015 (Qin et al., 2015).

Also, we aim to collect pilot longitudinal data to see if strategy game learning can engender greater benefit to both cognitive and brain function in older adults. In addition to our previously collected data, we had 17 individuals undergo either word puzzle training or strategy video game training. Two participants are still completing their training. In total, we have now more than 50 participants in this training study. This study is expected to yield multiple papers - behavioral, brain activity during 2 fMRI tasks, resting state fMRI and DTI data. The preliminary behavioral and one fMRI data with 38 participants were presented by Dr. Basak at ICPS 2015 in Amsterdam, Netherlands in March, 2015 (http://icps.psychologicalescience.org/) and at the American Psychological Association, August 2015 in Toronto, Canada. Final behavioral results on which the first manuscript will be written will be presented at the Annual Meeting of Psychonomic Society, Nov, 2015 by Dr. Basak where it has been selected for a talk, which is a rare honor (http://www.psychonomic.org/annual-meeting).

In sum, 2014-2015 has been a very productive year for us with regards to this DKR funded project. We are almost done with healthy aging data and are working on disseminating the results through conferences and journal publications. We have also started collecting data on MCI patients, which will be the focus for next 2 years of funding. In addition to what we had proposed in the DKR grant, we have also made inroads on testing the cognitive and brain plasticity hypothesis, such that we now have reasonable data on two arms of our training study - strategy game and word puzzles. This data set will allow us to apply for both federal and foundation funding in the coming academic year to conduct a full-scale study that will fund long-term training on different varieties of video games and compare their benefits to physical fitness training or word puzzle training. In the coming two years, we will also focus on extensive analyses of the data set and publishing them.

We look forward to the continuing this research and thank DKR foundation for their generous support.

Sincerely,
Dr. Chandramallika Basak
Assistant Professor
University of Texas at Dallas

The Accepted Talks

**Basak, C.** (March, 2015). Playing for keeps: Real-time strategy game training, aging brain and cognition.. Symposium conducted at the meeting of the ICPS, Amsterdam, Netherlands.


Qin, S., Nashiro, K., O'Connell M., Chen X., & **Basak, C.** (October, 2015). Age-related differences in task load, response compatibility and selective attention in task switching: An fMRI study. Talk accepted in a nano symposium at the Society for Neuroscience, Chicago, IL.