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Jun 25th, 2008

[Art Kramer on Why We Need Walking Book Clubs](#)

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[Dr. Arthur Kramer](#) is a Professor in the University of Illinois Department of Psychology, the Campus Neuroscience Program, the Beckman Institute, and the Director of the Biomedical Imaging Center at the University of Illinois.



I am honored to interview him today.

Dr. Kramer, thank you for your time. Let's start by trying to clarify some existing misconceptions and controversies. Based on what we know today, and your recent Nature piece (Note: referenced below), what are the 2-3 key lifestyle habits would you suggest to a person who wants to delay Alzheimer's symptoms and improve overall brain health?

First, Be Active. Do physical exercise. Aerobic exercise, 30 to 60 minutes per day 3 days per week, has been shown to have an impact in a variety of experiments. And you don't need to do something strenuous: even walking has shown that effect. There are many open questions in terms of specific types of exercise, duration, magnitude of effect...but, as we wrote in our recent Nature Reviews Neuroscience article, there is little doubt that leading a sedentary life is bad for our cognitive health. Cardiovascular exercise seems to have a positive effect.

Second, Maintain Lifelong Intellectual Engagement. There is abundant prospective observational research showing that doing more mentally stimulating activities reduces the risk of developing Alzheimer's symptoms.

Let me add, given all media hype, that no "brain game" in particular has been shown to have a long-term impact on Alzheimer's or the maintenance of cognition across extended periods of time. It is too early for that-and consumers should be aware of that fact. It is true that some companies are being more science-based than others but, in my view, the consumer-oriented field is growing faster than the research is.

Ideally, combine both physical and mental stimulation along with social interactions. Why not take a good walk with friends to discuss a book? We lead very busy lives, so the more integrated and interesting activities are, the more likely we will do them.

Great concept: a walking book club! Now, part of the confusion we observe is due to the search of "magic solutions" that work for everyone and everything. We prefer to talk about several pillars of brain health, and different priorities for different individuals. Can you elaborate on what interventions seem to have a positive effect on specific cognitive abilities and individuals?

Perhaps one day we will be able to recommend specific interventions for individuals based on genetic testing, for example, but we don't have a clue today. We are only beginning to understand how the environment interacts with our genome.

But I agree on the premise that there probably won't be a general solution that solves all cognitive problems, but we need a multitude of approaches. And we can't forget, for example, the cognitive benefits from smoking cessation, sleep, pharmacological interventions, nutrition, social engagement.

Physical exercise tends to have rather broad effects on different forms of perception and cognition, as seen in the Colcombe and Kramer, 2003, meta-analysis published in Psychological Science (Note: referenced below).

Cognitive training also works for a multitude of perceptual and cognitive domains – but has shown little transfer beyond trained tasks.

No single type of intervention is sufficient. Today there is no clear research on how those different lifestyle factors may interact. The National Institute on Aging is starting to sponsor research to address precisely that.

Earlier you said that no brain software in particular has been shown to maintain cognition across extended periods of time. Now, didn't the ACTIVE trial (Note: referenced below) 5-year results show how cognitive training (computerized or not) can result in pretty durable results? For context, are there comparable controlled studies to ACTIVE where 10 or so hours of physical exercise today can result in measurable (yet, incomplete) cognitive benefits 5 years from now?

The ACTIVE study showed a good deal of 5-year retention of the tasks that were trained for 10 hours each, but limited transfer of training was found for other untrained tasks. It seems unlikely that significant transfer may occur with the relatively little training (e.g. 10 hours in the ACTIVE study) and focused tasks that have been provided in training studies thus far.

On whether there are controlled studies similar to ACTIVE that have measured the long-term cognitive benefits of physical exercise, not that I know of.

To wrap up this part of the conversation, what's in your mind the best way to explain the relative benefits of physical vs. cognitive exercise? From a fundamental point of view, it seems clear that physical exercise can help enhance neurogenesis (Note: the creation of new neurons), yet learning/cognitive exercise contributes to the survival of those neurons by strengthening synapses, so I see more how those two "pillars" are complimentary than "one or the other".

I agree. Given what we know today I would recommend both intellectual engagement and physical exercise. However, we do know, from a multitude of animal studies, that physical exercise has a multitude of effects on brains beyond neurogenesis, including increases in various neurotransmitters, nerve growth factors, and angiogenesis (the formation of new blood vessels).

Tell us more about your work with cognitive training for older adults.

We have now a study in press where we evaluate the effect of a commercially available strategy videogame on older adults' cognition.

Let me first give some context. It seems clear that, as we age, our so-called crystallized abilities remain

pretty stable, whereas the so-called fluid abilities decline. One particular set of fluid abilities are called executive functions, which deal with executive control, planning, dealing with ambiguity, prioritizing, multi-tasking. These skills are crucial to maintain independent living.

In this study, we examined whether playing strategy-based video game can train those executive functions and improve them. We showed that playing a strategy-based videogame (Rise of Nations Gold Edition) can result in not only becoming a better videogame player but it transferred to untrained executive functions. We saw a significant improvement in task switching, working memory, visual short-term memory, and mental rotation. And some, but more limited, benefits in inhibition and reasoning.

I can share a few details on the study: the average age was 69 years, and the experiment required around 23 hours of training time. We only included individuals who had played videogames 0 hours/ week for the last 2 years.

That last criteria is interesting. We typically say that good “brain exercise” requires novelty, variety and challenge. So, if you take adults who are 69-years-old and haven’t played a videogame in 2 years, how do you know if the benefit comes from the particular videogame they played vs. just the value of dealing with a new and complex task?

That’s a great question. The reality is that we don’t know, since we had a “waiting list” control group. In the future perhaps we should compare different videogames or other mentally stimulating activities against each other and see what method is the most efficient. Perhaps the National Institutes on Health may be interested in funding such research.

In any case, your study reinforces an important point: older brains can, and do, learn new skills.

Yes. The rate of learning by older adults may be slower, and they may benefit from more explicit instruction and technology training, but, as a society, it is a massive waste of talent not to ensure older adults remain active and productive.

Another recent study we conducted, this one still under review, is titled Experience-Based Mitigation of Age-Related Performance Declines: Evidence from Air Traffic Control. It deals with the question: “Can Age Itself Be an Obstacle for someone to perform as an Air Controller? And the Answer is: age itself, within the age range that we studied, is not an obstacle. Our results suggest that, given substantial accumulated experience, older adults can be quite capable of performing at high levels of proficiency on fast-paced demanding real-world tasks.

Now, the field of computerized cognitive training has potential in a variety of applications beyond “healthy aging”. You are obviously familiar with Daniel Gopher’s work training military pilots using Space Fortress. Is your lab doing something in that cognitive enhancement direction?

Yes, I have been involved in that area of work since the late 70s, when I helped design the protocols for Space Fortress. Which provides indeed a very interesting example of real-life transfer: pilots do seem to fly better as measured by real-life instruments.

Our lab is now embarking on a 5-year study for the Navy to explore ways to capitalize emerging research on brain plasticity to enhance training and performance. MIT and my lab will analyze the best training procedures to increase the efficiency and efficacy of training of individual and team performance skills, particularly those skills requiring high levels of flexibility. The results from this study will be in the public

domain, so I hope they contribute to the maturity of the field at large.

That’s an important point. What does the field of cognitive fitness at large need to mature and become more mainstream?

We need more research. But not any kind of research. What we need is a kind of independent “Seal of Approval” based on independent clinical trials. Most published research of cognitive training interventions is sponsored and/ or conducted by the companies themselves. We need independent, objective and clear standards of excellence.

The Department of Education maintains a What Works Clearinghouse to review existing evidence behind programs that make education-related claims. Perhaps we need a similar approach for programs making cognitive claims with adults. We also see a need for more solid and widely-available cognitive assessments, to have better baselines and independent measures of cognitive abilities.

Good news there: the NIH is preparing an “NIH Toolbox” to provide valid, reliable instruments to researchers and clinicians, to solve the problem that exists today, namely, the lack of uniformity among many measures used. The initiative was launched in 2006, and it is a 5-year effort, so we’ll need to wait to see results.

Dr. Kramer, many thanks for your time and work. My apologies for having you stay by your desk during this interview. Next time I am in Illinois, I will invite you to a walking interview.

Excellent idea! The pleasure has been mine. Let me thank you as well, for the very important work you are doing.

(Note: on 6/30, I clarified some remarks by Dr. Kramer regarding the ACTIVE trials, with his approval.)

References

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Charles H. Hillman, Kirk I. Erickson & Arthur F. Kramer Be smart, exercise your heart: exercise effects on brain and cognition. *Nature Reviews Neuroscience* 9, 58-65.

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6 Responses to "Art Kramer on Why We Need Walking Book Clubs"

1. [# Ward](#) on 25 Jun 2008 at 4:26

Great post !

very informative and down to earth. I really liked the idea of a walking book club.

2. [# Mark Waldman](#) on 30 Jun 2008 at 3:25

A wonderful interview with Dr. Kramer. There is so much hype surrounding "brain enhancement" programs, and its great to hear a wise and cautionary summary concerning the long-term benefits across the spectrum of cognitive abilities. For example, Dr. Andrew Newberg at the University of Pennsylvania just finished a study on the effects of a 12 minute meditation exercise with cognitively impaired adults. He found 10-20% improvement after eight weeks of training (you guys should interview him). In his next book, How God Changes Your Brain, he too states that exercise is the best brain sharpener in the world-even 10 minutes a day will make huge improvements-and like Kramer, he suggests that you combine exercise with intense social stimulation. And the more complicated you make the exercise (sequentially touch your fingertips as you spell out personally meaningful words (like peace, compassion, happiness, etc.)), the greater the cognitive benefits. Also, creating your own personalized brain/body exercise program increases the beneficial results. Studies also show that a strong sense of optimism is needed to make any of these brain enhancement strategies work.

Mark Waldman

Associate Fellow

Center for Spirituality and the Mind

University of Pennsylvania

3. [# Kenneth Heinrichon](#) 01 Jul 2008 at 11:22

Hello again, Alvaro.

Is there a link to the full article published in Nature, for those of us who do not subscribe to that journal?

Ken

4. [# Alvaro](#) on 01 Jul 2008 at 6:05

Ward: glad you enjoyed it!

Mark, thank you for those comments, and the lead to Dr. Newberg's study. We will track it down. And perhaps he already has some good published study we can discuss in detail.

Kenneth: usually scientists offer some of their puublications in their Lab websites. For Dr. Kramer's, you can request reprints at

https://www.psych.uiuc.edu/reprints/index.php?site_id=9

5. [# Kenneth Heinrichon 03 Jul 2008 at 4:43](#)

Many thanks, Alvaro,
I just received the article

6. [# Hourglass: A carnival of biogerontology « Ouroboros on 08 Jul 2008 at 11:39](#)

[...] Assuming for the moment that long life and intelligence are associated --- in which direction does the causal arrow point? We're still unsure about that at the level of the whole organism, but in the case of brain health we know a bit more. At SharpBrains, Alvaro Fernandez interviews U. of Illinois' Prof. Art Kramer, who describes ways that everyone can extend their mental healthspans and even delay the onset of age-related neurological dysfunction such as Alzheimer's disease. That's just the beginning of the lengthy interview, which goes on to talk about people's desire for magical solutions to age-related declines in mental function, the results of prior studies, and the synergy between physical and cognitive exercise --- among many other subjects. [...]

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