

By Alvaro Fernandez

The Business and Ethics of the Brain Fitness Boom

The recent discovery that experience can change brain structure and function at any age has sparked numerous health, education, and productivity applications whose value and limitations we are only starting to grasp.

Brain fitness has quickly become a mainstream aspiration among baby boomers and elders, primarily in North America. It has fueled a growing interest in brain fitness classes, brain fitness centers, and brain fitness programs, along with attendant opportunities and challenges. An increasing number of adults want useful tools to protect cognitive health and performance—not necessarily to reverse

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aging—and what they are finding is an expanding and noisy marketplace where they (and also professionals) need to carefully evaluate their own needs and the available options (Fernandez and Goldberg, 2009).

The recent discovery that experience can change brain structure and function at any age has inspired a range of health, education, and productivity applications whose value and limitations we are only starting to grasp. If you can envision the array of equipment available to train different muscles in a typical modern health club, you can

anticipate the value—and perhaps the limitations—of having an expanding toolkit to measure and enhance cognition and mental wellness. The burgeoning brain fitness industry needs to define and refine itself, to mature, before it can be as established as today's physical fitness industry.

The good news is that adults of all ages are paying more attention to the impact of lifestyle options on cognitive health, and that there are more tools available than ever before to assess, monitor, and enhance a variety of cognitive, emotional, and self-regulation skills. The bad news is that there is no magic pill and that, as often happens in emerging markets, the overwhelming amount of superficial media coverage and hyped marketing claims are provoking consumer confusion and skepticism among researchers and professionals.

The Business of Brain Fitness

First, some perspective. I estimate that the size of the worldwide digital brain fitness software market (defined as automated applications that help assess, enhance, or repair targeted brain functions) in 2009 was \$295 million, representing an annualized growth rate of 31 percent

since 2005 (Fernandez, 2010). Around half of that amount, or \$148 million, was spent by U.S.-based buyers.

Compare this to other fitness market segments: in 2007, American consumers bought \$3 billion worth of treadmills, and in 2009, American health club memberships amounted to \$19.5 billion. Off-label drug prescription revenues in the United States alone exceed \$10 billion per year, and the current estimate for the North America's vitamins, minerals, and supplements market is \$17.7 billion.

The brain fitness software industry is only in its infancy; it is an emerging and largely unregulated market where many products have limited clinical validation and often present confusing claims that make it difficult for consumers to separate wheat from chaff. If this is the case, can we expect this industry's significant and continued growth in the foreseeable future?

Demand drives supply

A growing portion of the 78 million baby boomers in the United States is investing time and effort into retaining their mental sharpness. This motivates healthcare and insurance providers to introduce and test innovative solutions in areas such as driving safety.

The often unrecognized role of brain fitness software is that it can serve as both an assessment and an enhancement tool, and database-driven cognitive care solutions have started to become available. At the same time, new community-based models for preventive services have begun to pop up to help customers put all the puzzle pieces together and navigate the overwhelming array of research, products, and claims.

Science and research drive policy

There is accumulating evidence that basic cognitive, emotional, and self-regulation brain-based capacities are more malleable than once thought and that lifestyle, non-invasive interventions, and invasive interventions can all play

a role in augmenting or maintaining cognitive and emotional health.

Major initiatives worldwide are starting to shift the overall mental health discourse from illness and disease to building mental capital and mental well-being throughout life.

The answer to the above question is a definite yes: brain fitness is here to stay. The next question is: How do we harness this enthusiasm and energy to create and support a sustainable and valuable field?

The Ethics of Brain Fitness

The terminology “fundamental attribution error” describes the tendency to overvalue personality-based explanations for observed human behaviors, while undervaluing situational explanations for those behaviors. I believe that a primary reason behind many perceived and real ethical challenges in the brain fitness field is due not so much to certain stakeholders' lack of personal or professional ethics, but derives from the flawed societal construct that underpins current, relevant innovations. To improve the ethics of the brain fitness business and its application (and empower consumers' informed decision making), there must first be agreement about a meaningful, appropriate way to analyze and guide innovation. This is the crux of the problem. The current medical model is not up to the task at hand, since it is heavily skewed toward invasive drugs and devices driven by disease-based models, and fails to leverage cognitive reserve findings and the protective role of physical exercise, cognitive engagement, and cognitive training (Valenzuela, 2009; AHRQ, 2010).

Surely there are other methods better suited to the opportunity at hand other than the purely entertainment-driven “brain age” invention. The following quote from a recent paper in *Global Policy* invites all stakeholders to shift perceptions of aging from burden to human capital: “We contend that early and repeated preventive care ‘interventions’ (especially in health behaviours

and geriatric medicine) and ‘preventive’ measures (such as social integration, design of cities and lifelong learning so that workers can upgrade skills) will delay the onset of late-life difficulties” (Olshansky et al., 2011).

If we are to transform the conversation that currently focuses on the medical model of diagnosis and treatment of a collection of disorders toward dialogue that centers upon a cost-benefits scalable model of life-course investments in brain health and fitness, what strategies could inform this new conversation?

Building mental capital and well-being

The *Foresight Project on Mental Capital and Wellbeing* (The Government Office for Science, 2008), a major research and policy initiative launched in 2008 by the government of the United Kingdom, was intended to “promote optimal mental capital trajectories through life for the general population [by] influencing individuals’ mental development and wellbeing from conception until death, analyzing possible interventions to address challenges, drawing upon considerations such as scientific efficacy, economics, governance and ethics.”

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The Project, a massive endeavor marshalling hundreds of neuroscientists, resulted in dozens of detailed reports and put forward a new framework to guide public policy, with focus on the following two key concepts:

Mental capital. “This encompasses a person’s cognitive and emotional resources. It includes their cognitive ability, how flexible and efficient they are at learning, and their ‘emotional intelligence,’ such as their social skills and resilience in the face of stress. It therefore conditions how well an individual is able to

contribute effectively to society, and also to experience a high personal quality of life. The idea of ‘capital’ naturally sparks association with ideas of financial capital and it is both challenging and natural to think of the mind in this way.”

Mental well-being. “This is a dynamic state, in which the individual is able to develop their potential, work productively and creatively, build strong and positive relationships with others, and contribute to their community. It is enhanced when an individual is able to fulfill their personal and social goals and achieve a sense of purpose in society.”

The Project issued a number of life-course recommendations, including the need to address the “massive under-utilisation of the mental capital of older adults” and to “act decisively to establish protective lifestyles for those in middle age in areas where the situation is set to worsen, such as the growing number of older people at risk of dementia.”

Ultimately, the primary recommendation culled from all the reports was to promote optimal mental capital trajectories through life for the general population since “...achieving a small change in the average level of wellbeing across the population would produce a large decrease in the percentage with mental disorder, and also in the percentage who have sub-clinical disorder.”

Translating this to practice, the U.K.’s National Health Service has started to adopt a care model that relies heavily on self-care and automated service models early on in the care continuum. Computerized Cognitive Behavioral Therapy (CBT) has become the first standard of care for patients presenting with mild or moderate depression, rather than immediately opting for antidepressant medication. Given the mismatch between the number of available, trained therapists and people who would benefit from this form of brain training,

computer-assisted CBT can make a significant difference as a complement or alternative to therapist-delivered CBT.

Engaging people where they are in the life-course

Eighty percent of the 38,000 adults over age 50 who were responders in the 2010 AARP Member Opinion Survey indicated “staying mentally sharp” was their top ranked interest and concern (Dinger, 2010). What exactly does this phrase mean? And what role can technology play in “staying mentally sharp”? Intel CEO Paul Otellini has said, “You have to start by thinking about what people want to do... and work backward.”

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In March 2008, AARP ran their *Healthy@Home Survey* (Barret, 2008) asking just under 1,000 responders, ages 65 and over (mean age of 74 years), and their caregivers about their perceptions of successful aging and technologies for successful aging. In a nutshell, the survey’s main findings were that older adults prioritize health and independence, that their obstacles have a strong cognitive or perceptual component, and that they are open to digital health technology.

In other words, the top priority for older adults is not anti-aging—it is about maintaining capacities to function independently. This is where recent cognitive science and digital tools can add more value: managing and enhancing “brain fitness” in the present and the near future—not just preventing or treating Alzheimer’s Disease thirty years from now.

What are some of the areas where people want more help with brain fitness? To answer this question, SharpBrains (www.sharpbrains.com)

conducted a survey in March 2010 of our monthly newsletter subscribers (a group not representative of the population at large, but indicative of early-adopters and decision makers). We received nearly 1,700 responses from respondents who were ages 40 and older.

When asked what were the most important brain functions necessary to thrive personally and professionally in the twenty-first century, respondents’ priorities covered a range of cognitive, emotional, and self-regulation functions, suggesting that brain fitness solutions will need to integrate all these domains—or at least be able to link their specific functional benefits to specific user priorities. It was interesting to

contrast the top two ranked functions (“ability to manage stressful situations”; “concentration power to avoid distractions”) with the bottom two (“ability to multi-task”; remembering faces and names”),

which may debunk many myths about our assumptions of what people actually want and need. When asked for their beliefs about the effectiveness of certain habits and tools, respondents named intellectual challenges, aerobic exercise, and reading books as most effective, closely followed by meditation.

Simply stated: what people seem to want is help to enhance and prolong their functional mental capacity. The next step is to determine how older adults can best navigate through the brain fitness marketplace.

Empowering Professionals to Empower Consumers

Institutions and professionals in the field of aging have the daily task of helping consumers, patients, and caregivers navigate the available non-invasive options. Personalized assessments and advice are critical, since improvements experienced in therapy and training programs seem more likely to transfer to real life when a person targets the brain function(s) that are

specifically relevant to their unique context and its bottlenecks or deficits (SharpBrains, 2011). People have different needs and priorities, have varying lifestyles, and reside in particular cognitive environments: one size does *not* fit all.

I propose that institutions and professionals who must traverse this still-emerging, complex landscape first identify an individual's particular bottlenecks or deficits, then seek the level of clinical validation for options (technology-based or not) that target those specific cognitive, emotional, or self-regulation functions. (See the list on page 68 that can help professionals evaluate brain fitness options.)

How to Evaluate Brain Fitness Programs: A Consumer Checklist

- ✓ Are there scientists and neuropsychologists, and a scientific advisory board behind the program?
- ✓ Are there published, peer-reviewed scientific papers in mainstream scientific and professional journals written by those scientists? How many?
- ✓ Does the program tell me what part of my brain or which cognitive skill I am exercising?
- ✓ Is there an independent assessment tool to measure my progress?
- ✓ Is it a structured program, with guidance on how many hours per week and days per week to use it?
- ✓ Do the exercises vary and teach me something new?
- ✓ Does the program challenge and motivate me, or does it feel like it would become easy once I learned it?
- ✓ Does the program fit my personal goals?
- ✓ Does the program fit my lifestyle?
- ✓ Am I ready and willing to do the program, or would it be too stressful?

The other role professionals play is in educating and empowering consumers, patients, and caregivers to enhance their self-efficacy by making their own decisions. (Our SharpBrains 2009 consumer guide included a program evaluation checklist, excerpted in the box on this page; the full checklist is available at www.SharpBrains.com.)

In the absence of perfect answers—and we won't have perfect answers for a while, if ever—today's best course is to provide education and resources that facilitate informed decision making. Professionals in the field of aging are in a unique position to help parse the offerings in the rapidly evolving field of brain fitness.

Building Blocks for a Better Future

The best alternative for tomorrow should be better than the best alternative available today. How do we get there, when “cognition” and “brain fitness” remain elusive concepts in popular culture? I believe that the lack of public education is the major obstacle that limits the brain fitness field's potential to deliver real-world benefits, since only informed demand will ensure the ongoing development of rational, structured “rules of the road.” What could be done to address this and other particular obstacles?

Educate the public

Ramp up efforts to build public awareness around a culture of brain fitness and mental capital across the lifespan, including establishing clear links to daily life and work and the role of cognitive, emotional, and self-regulation factors. Too many people still view mental capacity as a kind of unified trait (such as IQ) that is determined by our genes and can only decline with age.

Make it easier to navigate claims

Easy-to-understand and research-based taxonomies could help consumers and professionals

Navigating the Cognitive Product Maze: Ten Things to Consider

1. **Target Users.** What cohort of the population you serve is ready and willing to use these programs? What criteria are most important to that group?
2. **Targeted Benefits.** What are the specific cognitive, emotional, or self-regulation skills that the program aims to enhance or retrain? What is the frequency of use (how many hours per week or number of weeks)?
3. **Appropriate Level of Challenge.** Do the exercises adjust to the individual's skill level and continually vary and challenge users at an appropriate pace?
4. **Scientific Credentials.** Are there scientists (ideally, neuropsychologists) behind the program? Is there a clearly defined and credible scientific advisory board? Are there published, peer-reviewed scientific papers on the program's efficacy?
5. **Return on Investment.** What are your organization's key business objectives, and can you independently measure program results to evaluate whether or not the program will meet those objectives?
6. **Total Cost of Ownership.** What will the total cost of ownership be over the next three to five years including up-front fees, ongoing fees, hardware, software, training and support fees, cost of additional modules, and staff time? How many users will likely end up using the product or system, and what would be the cost of ownership per user?
7. **Technical Requirements.** What are the technical requirements needed to successfully deploy and maintain the program? Does it require Internet access? Are people expected to install their own CD-ROMs? Who will help solve potential technical maintenance glitches?
8. **Staff Training.** What type of training is required to run the program and who will provide it?
9. **Product Roadmap.** What is the vendor's product roadmap? What is the vendor developing and planning to offer over the next one to three years?
10. **References.** What similar providers have used this specific program? What benefits have they measured directly? Is the use of the program growing, or is it flat or declining?

evaluate product claims. Perhaps a labeling system, similar to the Good Housekeeping Seal of Approval, will emerge at the initiative of a regulator or of the industry.

Offer objective cognitive assessment tools

It has been said that “you can't manage what you can't measure.” Reliable, objective assessment tools are critical. Ideally, assessments would be adapted to the particular cognitive demands of different priorities and settings such as workplace performance, functional aging, driving, working as a pilot, or clinical conditions. Perhaps the single most effective way to bring cognitive research into the mainstream conversation would be if people took an “annual brain check-up” (ASA-MetLife

Foundation, 2006) to understand their own opportunities for improvement and progress, and to support clinical decision making.

Emphasize brain fitness at the professional level

Professional associations could beef up their efforts to add a brain fitness lens to their existing offerings; this could help incorporate an emphasis on cognition, neuroplasticity, and mental wellness into mainstream activities.


Advocate for more and better research

There are two main priorities for research: to develop widely accepted outcome standards, including an established set of “functional markers” at different levels (such as brain-based, cognitive, and behavioral-functional) for different

populations; and to fund trials that test multi-modal interventions. Identifying the respective and complementary benefits of different types of interventions can result in better integrated and personalized products and programs.

Summary: Work Toward Accord

The growing interest in the science, practice, and business of brain fitness presents a significant opportunity to build mental capital, enhance mental wellness, and delay symptoms of brain-based decline and disease. To best capitalize on this opportunity, stakeholders must agree on a meaningful and appropriate capacity-based

framework—one that supports both consumers and professionals in making informed decisions, and that allows for person-centered and cross-sector innovation. Such accord can mean that in five to ten years, we may find ourselves in a much better place. Where to start? By developing a culture of brain fitness and mental capital that spans from cradle to grave: I propose that this is the real business—and guiding ethic—of the brain fitness field. 

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