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## MENTAL AND PHYSICAL WELLNESS

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### Why This Lecture?

It may seem strange for a Professor of Finance to give a lecture on mental and physical wellness. I'm not a psychologist, exercise scientist, or personal trainer. I've read extensively on the science behind exercise and learned a substantial amount from various coaches, but this is no substitute and it would be disingenuous to claim that I have anything close to the expertise of a professional.

Instead, I hope to contribute to this topic along a number of dimensions. First, I've experienced first-hand the challenges of incorporating mental and physical wellness into a busy schedule, initially as a junior investment banker and then untenured professor (where working hours are extremely long), and now with a portfolio career and so any time not spent exercising or resting can be used to generate additional income. Second, it's tempting to think that you're either born with athletic ability or not, something I'll explore further in Lecture 6, The Growth Mindset. I have flat feet and beta-thalassemia (which lowers haemoglobin), both of which might seem to genetically predispose me against activities such as running. Third, one of my academic focuses is behavioural economics, which provides guidance on how to develop good habits.

### The Mental Benefits of Exercise

I'll start by discussing the benefits of exercise. This may seem pointless and "academic" – we all know that exercise is important, so why don't I just go straight into how to put it into practice – how to develop an exercise regimen? I'd like to stress the benefits of exercise for two reasons. First, many people may not appreciate *just how important* exercise is, else they'd prioritise it. People have busy schedules. There's lots of "important" things they can do with their time – work an extra hour in the office, read more books, or spend more time with family and friends. So I'd like to emphasise how exercise might be *even more important* than these other good uses of time. Second, knowing exactly what the benefits of exercise are can guide us on how to draw up a regimen to maximise these benefits.

Now you probably all know the physical benefits of exercise – it helps you live longer, feel better, and look better. But clearly this isn't enough motivation for many people, else they'd exercise more. So I'll instead discuss the mental benefits of exercise, which are often overlooked. Exercise can make you significantly more productive at work. Thus, *even if* your only goal in life is to succeed in your career, exercise is a good time investment.

Before moving to the more "applied" mental benefits of exercise, I'll start with the neurological benefits since they're easier to test scientifically. This is to show that there's a scientific basis behind the mental benefits of exercise, rather than this lecture just claiming benefits that sound logical. For further reading, I recommend John Ratey and Eric Hagerman's book *Spark: How Exercise Will Improve the Performance of your Brain*, from which some of this material is derived.

- Exercise increases blood flow to the brain. Blood carries oxygen, which converts glucose to ATP (adenosine triphosphate) and feeds brain cells.



- Exercise increases Brain-Derived Neurotrophic Factor, which is like “Miracle-Gro” for the brain. This in turn increases neurogenesis (the production of new brain cells)<sup>1</sup>, leads to neurons forming more connections, and for these connections to form thicker myelin sheaths (known as “myelination”) allowing them to fire signals more effectively. These effects are particularly strong in the hippocampus, the area of the brain associated with memory and learning. Controlled studies have documented such effects in children<sup>2</sup>, adults<sup>3</sup>, and the elderly<sup>4</sup>.
  - For example, a study of sedentary old people asked one group to hit the gym 1 hour, 3 times a week for 6 months, while the control group did stretching. The former experienced not only a 16% increase in VO2 Max (a measure of aerobic fitness) but an increase in brain volume.<sup>5</sup>
- Exercise stresses the body. All animals have a stress response, triggered by the amygdala in the brain. Such a response is critical for survival – it induces a “fight-or-flight” decision. However, humans are unique because they don’t need a clear and present danger to elicit a stress response. They can be stressed by worrying about the future; as I’ll explain in Lecture 5 (Critical Thinking), someone disagreeing with you triggers the amygdala. Exercise teaches the body that a higher heart rate and breathing are normal, and so these don’t induce a panic attack.
  - A study of students asked one group to run at 60-90% of their maximum heart rate (MHR) for 20 minutes, 6 times a week for 2 weeks, while the control group walked at 50% of their MHR. The first group became less sensitive to anxiety.
- Exercise increases the neurotransmitters that regulate mood and thus are typically targeted by antidepressants (e.g. serotonin, norepinephrine, dopamine, and endorphins). Thus, “runners’ high” has a neurological basis – it’s not just due to the satisfaction of having completed a challenge (completing a crossword doesn’t lead to the same high). Indeed, a study found that exercise was more effective than Zoloft in treating depression.<sup>6</sup>

I’ll now move to the more “applied” mental benefits of exercise. The first is increased focus. In Lecture 1 (Time Management in the Digital Age), I explained how focusing (e.g. working on a presentation without any digital distractions) changes the brain and strengthens its capacity to focus. I used the metaphor of the brain as a muscle, which strengthens the more you work it.

But the muscle metaphor is incomplete. For a muscle, the only way to build it is to work that particular muscle. A bicep is strengthened by performing bicep curls, not squats. However, the brain can be improved not only by undertaking cognitive activities that directly target the brain, but also by exercising. The same focus and perseverance that you develop when doing a long run or set of push-ups and resisting the temptation to give up, is also useful when sitting down to work and resisting the temptation to check email. Indeed, a study found that exercise improved children’s executive control and ability to ignore distractions.<sup>7</sup> This is why chess players train by running and swimming even though chess doesn’t involve physical exertion. Instead, endurance training allows the brain to sustain the long periods of mental concentration that chess requires.

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<sup>1</sup> Van Praag, Henriette et al. (1998): “Running enhances neurogenesis, learning, and long-term potentiation in mice.” *Proceedings of the National Academy of Sciences* 96, 13427-13431.

<sup>2</sup> Chaddock, Laura et al. (2010): “A neuroimaging investigation of the association between aerobic fitness, hippocampal volume, and memory performance in preadolescent children.” *Brain Research* 1358, 172-183.

<sup>3</sup> Thomas, Adam G. et al. (2016): “Multi-modal characterization of rapid anterior hippocampal volume increase associated with aerobic exercise.” *NeuroImage* 131, 162-170.

<sup>4</sup> Kirk I. Erickson et al. (2011): “Exercise training increases size of hippocampus and improves memory.” *Proceedings of the National Academy of Sciences* 108, 3017-3022.

<sup>5</sup> Colcombe, Stanley J. et al. (2006): “Aerobic exercise training increases brain volume in aging humans.” *The Journals of Gerontology* 61, 1166-1170.

<sup>6</sup> Blumenthal, James A. et al. (1999): “Effects of exercise training on older patients with major depression.” *Archives of Internal Medicine* 159, 2349-2356.

<sup>7</sup> Hillman, Charles H. et al. (2014): “Effects of the FITKids randomized controlled trial on executive control and brain function.” *Pediatrics* 134, 1063-71.



A second benefit is empowerment. With exercise, you can immediately see quantifiable results – e.g. you ran further, lifted heavier, or held a plank for longer than the previous week. This is different from other valuable activities (e.g. learning a musical instrument or how to dance) where there are fewer quantifiable short-term milestones. This is valuable to instil the growth mindset that I’ll discuss in more detail in Lecture 6. When you see how effort can lead to quantifiable improvement, even in an area that you might not be naturally talented in, this empowers you to take on challenges in other areas, e.g. public speaking, rather than accepting your abilities as given. A related benefit is self-mastery, the mindset that you can take control of your life. Indeed, a study found that, after a 2-month exercise programme, subjects smoked less, drank less, ate more healthily, and curbed impulse spending.<sup>8</sup>

Now there are many other activities with immediately quantifiable results, e.g. hitting a new high score in a computer game, but these activities don’t have long-term benefits. Exercise is rather unique in that it has substantial long-term benefits, but also quantifiable short-term milestones (economists call these “leading indicators”). The effect of exercise on your lifespan, or whether you develop diabetes, may not manifest for decades, but your running times or rep count can immediately be measured. Many activities with short-term milestones don’t have long-term benefits (e.g. computer games); other activities with long-term benefits don’t have as quantifiable short-term milestones (e.g. music).

A third benefit is ownership and personal accountability. This is the flipside of empowerment. Empowerment means that you can achieve results through sustained effort, even if you don’t think you have natural talent. Ownership and accountability mean that if you don’t achieve results, it’s your fault. In your career, you often don’t get the results you want. It’s tempting to blame external circumstances – you were unfairly denied a promotion, your pitch was the best but the client gave the contract based on personal relationships, or you made the right investment decision but the market moved unexpectedly. Of course, external circumstances *do* matter and luck is important. However, it’s tempting to blame external circumstances more than warranted, known as “self-attribution bias”.

In Lecture 2 (Finding Purpose in Your Career), I emphasised the benefits of team sports since they engender a sense of tribalism. But for the ownership/accountability benefit, individual sports are particularly valuable. If you fail to achieve your target time for a 10km race, you can’t blame your teammates, the referee, or the opposition for cheating – it’s entirely down to you. This teaches personal accountability for failures in other situations, which is also important for developing the growth mindset. As I learned from one of my own trainers, “Fitness is the hardest thing to get because only you can get it. You can’t inherit it. You can’t win the lottery. You can’t buy it. You have to work for it”<sup>9</sup>.

A fourth benefit is discipline. I just discussed making excuses for results (the output). This concerns making excuses for the input – the effort you put in. It’s tempting to skip an exercise session because you feel tired, or put in less effort or attempt fewer reps because you don’t feel at your best. (Of course, there will sometimes be legitimate reasons to do so, such as an illness, but we often rationalise low effort illegitimately – as psychologist Stephen R. Covey pointed out, “rationalising” is telling ourselves “rational lies”.) The discipline of maintaining an exercise regimen even when there are excuses helps you in the real world, where conditions are similarly never perfect.

Not only does exercise discipline you to put in effort (even if there are excuses), but it also disciplines you to embrace discomfort – to become comfortable feeling uncomfortable. In exercise, you can only hit a new personal best by pushing yourself harder than you’ve ever done before. This involves discomfort, but teaches you to associate discomfort with results. As I’ll discuss in Lecture 6 (The Growth Mindset), research suggests that the

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<sup>8</sup> Oaten, Megan and Ken Cheng (2006): “Longitudinal gains in self-regulation from regular physical exercise.” *British Journal of Health and Psychology* 11, 717-733.

<sup>9</sup> Louis Rennocks of Barry’s Bootcamp London.



practice that's most productive is uncomfortable and stretching, e.g. repeating the most difficult parts of a piano piece multiple times rather than simply playing the whole piece through. As I explained in Lecture 3 ([Public Speaking Without Fear](#)), public speaking is a particularly uncomfortable activity for most people, which is why they shy away from working on it and tell themselves they have no talent for it.

Now all of the above benefits are “serious”. But the final benefit that I'll mention is fun. I've already discussed the research on how exercise elevates neurotransmitters which improve mood. Less scientifically, it gives you a break from work and allows you to return refreshed. Interestingly the benefits aren't only *ex post* (after you've done the exercise) but also *ex ante* (before you've done the exercise). (Indeed, research shows that experiences lead to happiness not only due to the experiences themselves, but also the anticipation). As an untenured assistant professor at Wharton, it's tempting to work all the time, to increase your chances of getting tenure. But if I had a day with nothing to look forward to except work, I'd view the day as a struggle and thus be less motivated and productive. Instead, many days I played ice hockey in the evenings. This gave me something to look forward to and meant that I was much more productive at work.

### Putting It into Practice

Given the above benefits, how can we design a regimen to (1) ensure we actually exercise and (2) undertake the exercise that's most likely to lead to these benefits? The Behavioural Insights Team (colloquially known as the “Nudge Unit”) was set up by the UK government to use “nudges” to change citizens' behaviour (e.g. encourage them to exercise more, save more, or use less electricity). It developed the acronym EAST for an ideal intervention – it must be Easy, Attractive, Social, and Timely. (Timely doesn't apply here; it's relevant for an intervention that a policymaker applies on citizens, rather than something you do yourself such as exercise.)

- Easy: choose an activity that's convenient, e.g. close to your work or office. This may seem obvious, but often people – upon making a resolution to get fit – choose the most difficult workout, regardless of the location, thinking this will lead to the fastest results. However, the *consistency* of a routine is more important than its *intensity*. Another aspect of making it easy is to make it the default – to put it into your regular schedule, so that you'll automatically go to your spinning class on Saturday at 9am without having to make it a conscious decision – just as you automatically brush your teeth before going to bed. If the exercise is individual (rather than a scheduled class), such as going for a run, it's equally important to schedule it into your calendar. Else, you might skip it if you don't feel like it, or you might procrastinate and only start the run when you feel like it (e.g. 9:30am) which wastes time.

Note that “Easy” also highlights the value of small changes which, if performed consistently, can make big differences – such as taking the stairs or walking to work. By making this a habit, you'll take the stairs on autopilot and not need to think about it.

- Attractive: choose an activity that you personally find fun. Again, this may seem obvious, but again people find the most intense activity and then give up after a week. It may be that Activity A burns more calories than B or C, but that's meaningless if you don't like A and will find every excuse not to do it. What's most important is to get *some* exercise into your routine – to use the Nike slogan, “Just Do It”. Once you've made exercise a habit, you can later upgrade to more intense forms. But since most people's excuse for not exercising is “I don't have time”, getting in the habit of finding the time is often the most important challenge, rather than choosing the precise activity.

Moreover, there are steps that you can undertake to increase the attractiveness of exercise. One is “temptation bundling” – pairing an enjoyable activity with exercise. A study gave subjects access to audiobooks *only* when they went to the gym; they had to keep the audiobook in the gym and weren't



allowed to access it elsewhere.<sup>10</sup> This led to a significant increase in gym attendance. A second is to give yourself a reward after exercise (that doesn't undo its benefits). For example, I make myself a fresh fruit smoothie which I have at the end of a group class. I also write down the routine assigned by the instructor, which gives a sense of accomplishment (as well as allowing me to repeat it myself). Many people use heart rate and calorie tracking devices which have similar effects.

- **Social:** choose an activity that involves other people. This has multiple benefits. First, it increases the mental benefits of exercise – simply being around other people boosts serotonin. Second, it increases the physical benefits of exercise. “Hubs”, where you are surrounded by other people exerting effort, creates peer pressure to exert effort yourself. Just as it's easier to study in a library where everyone else is working, it's easier to work out in a group or team where everyone else is pushing themselves. Third, it's a commitment device. If you arrange to go to an activity with a friend, then you're less likely to cancel.

Aside from the “EAST” principles, which apply to instilling good habits in general, there are additional valuable principles for exercise in particular. An individual activity with measurable results helps with *empowerment*. You can see your progress more easily with running or lifting than a team sport. It also helps with *accountability*, as success or failure is due to you. For the same reason, the sense of fulfilment is particularly high, which increases the reward benefits and thus *attractiveness* of the activity. (Of course, there are substantial benefits to team sports, as well as individual sports with less measurable results such as figure skating; this is just to highlight the value of incorporating individual activities with measurable results into your routine).

How to square the social benefits of exercise with the benefits of individual activities with measurable results? One solution is group exercise classes, where several people do similar activities. While a gym also involves other people working out, the “hub” element is less since they're doing different things. In addition, group classes offer at least two further benefits:

- You delegate the design of the workout to an expert. While it's possible to design one's own gym routine, people often repeat it each visit, which reduces the physical benefits (since some parts of the body are not exercised), reduces the mental benefits (since the brain is constantly challenged by trying new things) and increases boredom. A good group class has a different regime each time. (Of course, a personal trainer leads to even more tailored design, if you can afford one).
- It gives a valuable mental break. Many people dread going to the gym after a long day at work, since they have to motivate themselves and design their own workout. Conversely, if you start the day with an individually-motivated workout, you may have less mental energy to concentrate at work. The book *Scarcity* discusses the importance of “bandwidth management” and stresses how we have a limited mental bandwidth budget which we need to manage each day.<sup>11</sup> With a group class, you delegate the design and motivation to an expert which is his/her comparative advantage. This in turn frees you to focus on your comparative advantage, such as your job or spending time with family.

The final principle is the importance of focus. To maximise the mental benefits of training your mind to focus, it's critical to focus on exercise throughout the entirety of the workout. This is another advantage of group exercise over individual gym workouts, where it's tempting to check your phone between sets. Not every exercise needs to be in a group setting, and not everyone can afford group exercise, but it's possible to build focus into individual workouts. I used to do long runs with my iPhone to listen to music. Afterwards, I couldn't resist the temptation to check my phone on the way home, rather than soaking in the endorphins and enjoying the full benefits of the exercise. I thus invested in a dedicated mp3 player, which only plays music, and also use this when going to the gym. In addition to the mental benefits of focus, as I'll discuss in Lecture 6, the physical benefits are

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<sup>10</sup> Milkman, Katherine L., Julia A. Minson, and Kevin G. M. Volpp (2014): “Holding the Hunger Games Hostage at the Gym: An Evaluation of Temptation Bundling.” *Management Science*, 60, 283-299.

<sup>11</sup> Mullainathan, Sendhil and Eldar Shafir (2012): *Scarcity: Why Having Too Little Means So Much*.



highest under “deliberate practice”. This involves being fully attuned to your body rather than being on autopilot or going through the motions – for example, a swimmer focusing on every stroke rather than just swimming, and a resistance trainer ensuring that he/she is engaging the precise muscle being targeted.

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This summary only covers the “physical wellness” topic of the talk (plus its implications for mental wellness) to ensure it remains concise. Please see the talk for the specific “mental wellness” elements. There are also many other aspects to physical wellness, such as diet, which are beyond the scope of this talk.