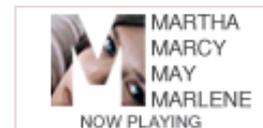


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# Addicted to Exercise?

By **NICHOLAS D. KRISTOF**

FOR decades, scientists have studied areas deep within the brain that seem associated with pleasure and addiction.

Put an electrode in that part of a rat's brain, and it will become obsessed with stimulating those areas. When rats are allowed to push a lever in exchange for a mild current that produces a "high" in the "pleasure centers," they will press the lever up to 7,000 times per hour.

These rats forget to eat or drink, and they must be unhooked to prevent self-starvation. Male rats ignore females in heat to get a fix, and nursing mothers ignore their babies.

"Pressing that lever became their entire world," David J. Linden, a [neuroscientist at Johns Hopkins University medical school](#), writes in his [fascinating new book](#), "The Compass of Pleasure."

Professor Linden explains how drugs such as cocaine that light up these pleasure centers (there are several interconnected areas) actually rewire the brain to increase cravings. You can look at magnified photos of rat brains and tell which animal was given cocaine and which wasn't.

Yet it's not just drugs. Brain scans suggest that everything from sugar to sex lights up the brain's pleasure circuitry. These all can have neurological consequences that correspond to what we think of as addiction. For example: exercise.

As a pathological runner since my days as a high school cross country athlete in Oregon, that struck a chord. Am I addicted to running?

"Exercise addicts display all of the hallmarks of substance addicts: tolerance, craving, withdrawal and the need to exercise 'just to feel normal,'" Linden writes.

O.K., I confess. I might be an addict.

Exercise seems to trigger the release of chemicals called endorphins and enkephalins (the brain's version of opium) and endocannabinoids (the brain's version of marijuana). In the lab, rats can develop an addiction to exercise on a wheel.

Brain researchers are finding many similar patterns. Who knew that orgasms, in men and women alike, light up the pleasure centers much like cocaine? (And who knew that researchers immobilize subjects in a lab, hook them up to a brain scanner, and then instruct them to engage in sexual activity?)

Linden argues that there is such a thing as a genuine biological addiction to sex. The public's failure to recognize this, he says, means that people often don't receive treatment.

"Sex addicts are among the least likely to seek help among all sufferers of addiction," he writes, adding that this is tragic because sex addicts may be more likely than drug addicts to take others down with them.

Brain chemistry research also suggests that gambling and overeating can be addictive behaviors, analogous to narcotics addictions. In particular, foods with sugar or fat seem to trigger cravings that then rewire the brain's pleasure circuitry to amplify that craving.

One study found that rats fed foods like cheesecake and chocolate showed differences in brain circuitry after just 40 days. The impact was that the pleasure centers of their brains were numbed, so they apparently needed to gobble even more cheesecake to generate the same satisfaction. Whether it's sugar or heroin, the body steadily ratchets up the quantity necessary to provide the same high.

Does this mean the end of free will?

Of course not. But it's a reminder that cravings are complex phenomena with strong ties to brain chemistry and genetics. Maybe that's why President Obama has shown astounding self-discipline in his political career while enduring a long struggle with nicotine.

Moreover, our brains impel us not only toward vices, but also toward virtues. In recent years, researchers have found that generosity isn't always a sacrifice; instead, it often exhilarates us.

One set of experiments at the University of Oregon involved young women hooked up to brain scanners as they were presented with modest amounts of money. Sometimes the money was then "taxed," sometimes they were given the chance to donate to charity, and sometimes they were given additional money.

Their pleasure centers lit up when they received money, as one might expect — but also when they gave money away.

There were considerable variations among individuals. About half of the women seemed to derive as much pleasure, based upon their brain patterns, from giving money as from receiving

it. The other half enjoyed receiving money more. Not surprisingly, the latter contributed less to charity.

Maybe the research will lead to new tools to fight drug addiction, alcoholism or obesity. Maybe I'll be able to get a runner's high without the sweat. But, to me, the most fascinating insight is that for at least half of humans it truly does seem to be as blessed to give as to receive.

On the basis of the latest brain research, as well as practical experience, let's acknowledge this profound truth: altruism and generosity can be hedonistic pleasures.

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