Addiction fiction: Dopamine is not why kids love TikTok

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Nowadays, it seems we can be addicted to anything – not just alcohol and drugs, but pornography, random Internet browsing, video games, and smartphones. Academic research papers have investigated a wide range of other behaviors including gambling, but also "dance addiction," "fishing addiction," "milk tea addiction," and "cat addiction." One cheeky paper used the standard medical criteria to show young people are "addicted" to their real-life friends.

While this trend involves many factors, perhaps the single most important claim that has transformed what might be devoted or enthusiastic behavior into a presumed medical case of addiction is the presence of the neurotransmitter dopamine.

Health experts and the popular press tell us that fun activities can give us "dopamine hits" and that overindulging can result in "dopamine blowout." Indulging too much in naughty activities (somehow, it's always naughty activities) may create a "dopamine deficit."

To cite a few of many examples: A Washington Post podcast declared that "dopamine surges" explain why "you can't stop scrolling, even though you know you should." The Guardian reported that Silicon Valley is "keen to exploit the brain chemical" to keep us hooked on tech. Earlier this month, CNN told readers, "an addiction expert says it might be time for a 'dopamine fast.'"

There's a problem with this scientific-sounding explanation for an alleged explosion in addictive behaviors: It is not supported by science. Solid research connecting dopamine spikes to drugs and alcohol – that is, the capacity of one chemical to ignite another – has not been shown to occur in similar ways with other behaviors. Drug use is fundamentally and physiologically different from behaviors that do not rely on pharmaceutical effects. This has been confirmed in humans: Technology, such as video games or social media, simply doesn't influence dopamine receptors the way illicit substances do.

Experts say what we are seeing instead is pseudoscience that appears to legitimize a moral panic about behaviors that trouble certain segments of society. By falling for this pseudoscience, parents and others are at risk of missing more fundamental mental health issues that could be at the root of the obsessive behavior, potentially harming the very children they seek to help.

"Addiction is an important clinical term with a troubled and weighty history," said Dean Burnett, a neuroscientist and coauthor of a brief explainer of what dopamine does and doesn't do. "People enduring genuine addiction struggle to be taken seriously or viewed sympathetically at the best of times, so to apply their very serious condition to much more benign actions like scrolling TikTok makes this worse."

Burnett likens current narratives about dopamine and technology to "science garnish," effectively adding a dash of scientific language to nonsense beliefs. "It's the informational equivalent of sprinkling parsley on a lasagna that's 90 percent horse offal," he said. "It may *look* nicer, but it isn't."

The pseudoscience, however, does play a useful role for parents and others who seek to restrict the behaviors they find disturbing. After all, "Don't do X because it will dangerously rewire the reward circuits of your brain and cause addiction" is more compelling than "Don't do X because I don't like it and think you are wasting your time."

Growing Mistrust of Experts

At a time when science has been riven by a series of scandals involving unreliable and falsified research at universities, including Stanford and Harvard, the public is having a harder time distinguishing scientific truth from pseudoscience. As growing numbers of Americans question the veracity of many well-established findings, such as the safety of vaccines, the popularity of the dopamine myth amounts to another misreading of science to serve other purposes in a culture desperate for simplistic moral answers.

Such answers can be found in bookshelves full of titles like “Dopamine Detox” and “Dopamine Reset.” These experts warn us that activities we think make us happy are actually making us unhappy in the long term because we’re doing dopamine wrong. Advice sites are quite explicit about this: “You can get dopamine either from rich sources like meditating, exercising, or doing something that is meaningful to you and that serves you in the long run. Or you can get dopamine from self-sabotaging activities like eating junk food, scrolling social media mindlessly, or anything that provides pleasure instantly or in the short term. The choice is yours.” At the extreme, people may go on “dopamine detoxes,” avoiding fun activities for some length of time in hopes of resetting their dopamine.

It is not surprising that dopamine has been seized on as a ready explanation for human behavior. Dopamine is a naturally occurring neurotransmitter in the brain. It is involved in a number of behaviors and functions, ranging from movement to memory to executive functioning. It’s also involved in pleasure centers of the brain, particularly anticipatory pleasure. Think of it like the feeling of a child awaiting Christmas, the giddy excitement. That’s often different from Christmas Day itself, which feels less exciting, even if it’s pleasant.

The role played by dopamine in the brain, however, is complicated. Brain functions rarely work out to one-to-one relationships between a single chemical and some horrible outcome. And certainly not in ways that happen to coincidentally flatter people’s preexisting moral conceits.

Much of what we know about dopamine comes not from humans, but from experiments on rats – which cannot, of course, peruse the Internet or use smartphones. In a series of graphs produced by the National Institute on Drug Addiction back in the early 2000s, the difference in activation of dopamine for addictive drugs versus pleasant and normal activities is well documented.

They show that administering stimulant drugs such as cocaine and amphetamine causes massive elevations in dopamine *after* the drug is introduced. These levels spike to over 300% of baseline for cocaine and a whopping 1,000% for amphetamine.

By contrast, the increase in dopamine levels from routine activities such as food or sex is much lower, with 150% of baseline for food and 200% for sex. And this increase occurs in anticipation of the activity, not afterwards.

So, yes, there is a kernel of truth in the dopamine/addiction story. Some drugs, as well as routine pleasurable activities, definitely involve dopamine systems. But the key difference is the timing of when and how much of the dopamine is released – before versus after the activity – and this distinction is almost always ignored in scaremongering stories about rampant addiction.

"Addictive drugs are different from natural rewards (e.g. food, water, sex) in that [dopamine] will not stop firing after repeated consumption of the drug, the drive to consume is not satiated because they continue increasing dopamine levels, resulting in likelihood of compulsive behaviors from using drugs and not as likely when using natural rewards," according to an article in the Journal of Biomedical Research.

Pete Etchells, a professor of psychology at Bath Spa University in England and author of "Unlocked: The Real Science of Screen Time," says research doesn't support the claim that dopamine drives addiction in other pleasurable behaviors that don't rely on pharmaceutical effects.

"The role that it plays is really complex, to the point that neuroscientists no longer really consider it the sole or universal factor to consider," he said. "So, when we try to say dopamine 'surge' = pleasure surge = addiction, that doesn't really hold up under scrutiny."

Is Everything Addictive?

Part of the confusion over the science comes from the widespread way the term addiction is used. There are long-standing debates about whether the criteria used to identify substance dependencies still work when applied to everyday hobbies and behaviors such as work, exercise, shopping, sex, video games, or social media.

The problem is apparent when looking at the basic criteria the Diagnostic and Statistical Manual uses for addictive disorders. A person needs to answer "yes" to five of the nine questions below to be diagnosed. In this example, X is the sport or hobby you happen to be passionate about and spend some money on:

1. Do you think about X (i.e., your passionate hobby) when not doing X?
2. Do you feel bad (sad, anxious) when unable to do X?
3. Do you find yourself spending more time/money on X?
4. Do you notice you've kept doing X even when you meant to stop or cut back?
5. Have you given up other hobbies/activities to do X?
6. Have you continued to do X despite it causing obvious problems (i.e., health, work, family commitments)?
7. Have you deceived others about the time you've spent doing X?
8. Do you find yourself doing X to relieve negative moods or stress?
9. Have you experienced the loss of a job/school/relationship because of X?

If X is heroin, a yes answer to all of these questions leads to bad results. But it's not clear that this is true for all the questions when X is eating pizza, reading a book, working out, or playing a video game. If the answer is yes to the question about reading books to relieve negative moods or stress, that's *good.* People should do *something* to relieve negative moods.

The question is whether things like video games or social media are more like heroin or more like books. At present, the best evidence suggests the latter. Older adults may not like these activities, but there's little evidence they're addictive in any analogy to substance abuse. There's no tolerance and withdrawal from technology. They don't interact with dopamine systems the same way.

Making matters more complicated is the psychology of why some people overdo some pleasant behaviors. It's widely believed that behavioral addictions are a feature of the thing that users are using. To be sure, smartphones, for example, are designed with elements like push notifications to hold the attention of users. However, users can easily adjust these settings, and they are hardly an innovation of modern technology (books often end chapters mid-scene for the same reason).

But such addiction mainly appears to be a feature of the person exhibiting the problems, research shows. Cases of technology overuse can be a *symptom* of other underlying mental health problems like anxiety and depression, which tend to predate the technology addiction. Constant texting is not something done to teenagers by machines via dopamine. By contrast, time spent on technology is a poor predictor of mental health issues.

History of Moral Panics

As it purports to provide a simple explanation for complex issues, dopamine pseudoscience can be linked to previous moral panics, particularly regarding the new habits of youth. Fear sells, as Frederic Wertham showed in the 1950s when his book "Seduction of the Innocent" gained wide traction for its spurious claim that connected comic books to delinquency and homosexuality.

Today, many schools are enthusiastically attempting to shift blame for their own failures onto technology. At present, evidence suggests that cellphone bans in schools don't work as well as expected, for instance. Public records requests have revealed that, even as some teachers and administrators promote these policies, data *from their own schools* indicate that some student outcomes worsen after cellphone bans, rather than improve.

The false narratives on addiction may end up hurting children in more profound ways, too. They can distract families from the real psychological issues youth face. Parents may believe that taking a smartphone or game console away will "fix" their kids' problems, leaving the real underlying issues unaddressed. These efforts may even backfire, removing stress reduction and socialization outlets that youth rely on.

It’s time to put the pseudoscience on dopamine in the dumpster and let kids be kids. Some may have mental health issues that need to be addressed, and others, well, mostly need some freedom to explore the world on their own terms.

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