

Brain Chemistry Research and Porn

Summary:

Since free porn videos became widely available at high speed, about five years ago, heavy porn users increasingly report inability to become aroused by real mates, and early onset of erectile dysfunction. The parallels between drug use and porn use, and the benefits that accrue as users avoid porn, suggest that researchers may find it fruitful to study the effects of porn in the reward circuitry of the brain. Framing the porn debate in terms of “dampening the pleasure response of the brain,” and recovery from porn addiction in terms of “returning the brain to normal sensitivity” has definite advantages.

Introduction

There are evident parallels between drug use and heavy porn use: escalation, [tolerance](#), impaired decision-making, anxiety, altered perception, and so forth. There are also strong parallels between the *withdrawal* symptoms of addicts and the [withdrawal symptoms](#) of heavy porn users who try to quit: shakes, severe insomnia, persistent headaches, irritability, extreme cravings, despair, brain fog, desire to isolate, flu-like symptoms, and so forth.

Since free porn videos and video sex chat became widely available at high speed, about five years ago, heavy porn users also increasingly report inability to become aroused by real mates, and early onset of erectile dysfunction.

Returning the brain to sensitivity

At the same time, it’s truly inspiring to see the [changes users report](#) when they have been off of porn for a few weeks to a month. Improvements continue for months.

As their brains return to normal sensitivity, erectile dysfunction fades, their taste for extreme material/acts with mates evaporates, they find normal mates attractive again, they find social interaction easier and more rewarding, they laugh more readily, they feel less depressed and more optimistic, they can focus better, they feel like they are in control of their lives, they feel more confident and more attractive. Some men even notice

their voices get deeper. One man described the change as a welcome “fire in the gonads.”

The downside of increased sensitivity is that recovery is not linear. Former users have really good days and really bad days before their brains return to equilibrium—almost like a pendulum swings before it rests. Because many have been numbing their brains with hyper-stimulating porn since puberty, they have not necessarily learned how to deal with intense emotions of anger and frustration as they come out of their fog. Group support is very helpful during this phase.

Other things that they report help regulate mood during a return to equilibrium are: vigorous exercise, time in nature, daily mindfulness meditation, friendly interaction with others (avoiding isolation), techniques for turning their attention elsewhere when urges arise, and avoiding all sexual cues for a time, even on TV. For many, “avoiding cues” means avoiding masturbation itself for a time (to the extent possible), simply because, at first, sexual arousal is so tightly wired to porn use and porn flashbacks. Masturbation without porn or flashbacks, with an emphasis on sensual, gentle touch is less problematic.

Consistently they report that they cannot return to Internet porn, even “just looking.” Those who test themselves soon report relapses, often with binging and escalation in nature of material viewed. Porn is a powerful cue for relapse.

Thoughts on research, porn and brain changes

The parallels between drug use and Internet porn use, and the benefits that accrue as users avoid porn, suggest that researchers may find it fruitful to begin studying the effects of porn in the reward circuitry of the brain. The reward circuitry governs both addictions and drives like sex. It’s where the brain wires activities perceived as valuable to neurochemical reward signals, so we repeat them.

Human brains are surprisingly plastic. Psychiatrist Normal Doidge (*The Brain That Changes Itself*) has explained that brain plasticity means porn causes physiological changes in the brain. Dr. Jeffrey Schwartz (author of *The Mind and the Brain*, and other relevant titles) has shown that even OCD patients can often rewire compulsive behavior by substituting other actions

when urges arise. This seems to be critical information for would-be, and existing, porn users. Once they understand how brain plasticity works, they can both gauge the effects of porn use, and know what's entailed in rebooting if use becomes compulsive.

It would be great if research could examine whether heavy porn use impairs brain function and decision-making by dysregulating aspects of the reward circuitry. At base, porn use may simply be supranormal stimuli overstimulating—and therefore *decreasing the sensitivity* of—the brain, driving continued dissatisfaction, which easily escalates in some users.

As Jay Phelan, UCLA biology professor and co-author of *Mean Genes: From Sex to Money to Food, Taming Our Primal Instincts* observed, the real cause is changed environment:

All excessive stimulations of the reward circuitry of the brain that are not tied to the behaviors for which the circuitry originally evolved are problematic. While this has become appreciated for drug addiction such as cocaine (and for issues relating to food), it is not yet appreciated for porn.

We need to understand who we are as a species and why we have self-control problems. Like crack and Krispy Kreme donuts, Internet porn is another manifestation of "mismatch," the phenomenon of our modern world deviating from the world to which we became adapted over evolutionary time.

Most of us typically think of porn use as “just masturbation,” and therefore normal and natural, but Internet porn is like nothing our ancestors’ brains ever had to cope with, unless they owned a very kinky harem. In terms of how it lights up the brain with hit after hit of dopamine, today’s porn is more like a [drug](#) or like [gambling](#). It *hijacks* normal mating circuits without leading to satiety.

In fact, heavy users use Internet porn/chat like a drug. Even when they cannot force themselves to ejaculate again during a binge, they continue to watch, searching for that “perfect video” that will put an end to their cravings. One man describes how addictive this “edging” can become:

I find that the sexual gratification of masturbation aided by pornography far exceeds pleasures of copulation (or other practices) with a partner. I have reason to believe that this conclusion is widespread among the sub-population of self-identified chronic masturbators. I am an active participant in several masturbation-focused Internet groups (and [moderator of one](#)) ... Many go so far as to abandon partner sex even while the partner remains available and willing. Far from “rubbing off,” chronic masturbators generally engage in a practice we call “[edging](#)”: bringing ourselves to the brink of orgasm repeatedly, without ejaculation. We can sustain extremely high levels of sexual arousal literally for hours.

This practice would have been impossible to sustain without the instant novelty of today’s Internet porn. (More on why [Internet porn is different](#) from static porn of the past.)

The research situation is complicated by the fact that orgasm itself creates a drug-like high. Dutch scientist Gert Holstege observed, while viewing scans of men ejaculating, that the scans reminded him of scans of people shooting heroin. ([Brain activation during human male ejaculation](#)) Masturbation to Internet porn is a double neurochemical hit: the rush of watching extreme material *and* (eventually) the reinforcing rush of orgasm, both of which rapidly consolidate learning—i.e., wiring in the synapses.

Not surprisingly, today’s porn appears to have the power to trip humankind’s “[binge trigger](#)” in many users. Highly valued stimuli *feel* like they will satisfy more, but research reveals the opposite. Supranormal stimulation creates lingering *dissatisfaction* in order to drive mammals past their normal satiety in pursuit of activities that register as very valuable to our genes. High-calorie food and mating with novel, receptive partners are two of those highly valued activities.

This may be easiest to understand in terms of recent research on over-stimulating foods. For example, these abstracts reveal two aspects of the mammalian “binge trigger:”

1. After rats begin eating fatty foods, there is an almost immediate decline in D2 receptors in the striatum. The decline lingers *for at least two weeks*, and (after fatty foods are off the menu) the rats’ taste for normal rat chow drops off completely, and then recovers slowly during that time. ([Dopamine D2 receptors in addiction-like reward](#)

[dysfunction and compulsive eating in obese rats](#)) Also see [Weight Gain Is Associated with Reduced Striatal Response to Palatable Food](#) for related research on humans.)

This recovery timeframe is surprising because D2 recovery after cocaine use is two *days*. (Jumping ahead for a moment, most of us currently think of orgasm as a cycle that ends with the refractory period, but it's likely the true cycle is much longer in the reward circuitry of the brain. More below.)

2. The opioids released during chronic sugar consumption [depress oxytocin neuronal](#) activity in rats. Oxytocin is associated with feelings of satisfaction and termination of consumption.

From food to sex

Both of these mechanisms for pushing us mammals past our normal limits (i.e., fewer D2 receptors and decreased oxytocin neuron activity) could be at work in the case of especially potent sexual stimuli. The striatum governs both food and sex appetite. Both highly palatable food and potent sexual stimuli are natural reinforcers, which serve our genes' goals.

In rat sex lives, declines in dopamine are behind the [Coolidge Effect](#). Drops lead to satiety (loss of interest in an existing mate). When a novel mate appears, however, spurts of dopamine lead to pursuit (desire), regardless of whether a rat has just mated to satiety. (It may be that a decline in D2 receptors also helps drive him toward the novel mate because a dopamine rush feels like “medicine” to his depleted receptors.)

Today's inexhaustible porn video availability seems to play into this old mammalian program that lights up for novel mates. For a porn user, each mouse click leads to an exciting new mate begging to be fertilized, apparently over-riding his natural limits, and making him believe he has a superhuman libido—when, in fact, he may actually be trying to self-medicate from the uncomfortable feelings of depleted D2 receptors.

Returning to number 2 above, in which opioids decreased oxytocin neuron activity, it's worth noting that opioids are also released with ejaculation. In rats, they remain high for more than 24 hours, and longer in the hypothalamus. ([Evidence for changes in brain enkephalin contents](#))

[associated to male rat sexual activity](#)) In rats, sexual impotence is associated with a reduced production of oxytocin and with an [increased production of opioids](#). Could they be depressing oxytocin in porn users, too, thereby increasing dissatisfaction and restlessness—and susceptibility to seeking novel, more extreme images?

The androgen receptor density in brain areas closely related to the expression of masculine sexual behavior declines in rats for up to seven days after mating. Density was drastically reduced in sexually exhausted animals. Such reduction was specific to certain brain areas and was not related to changes in the levels of androgens. ([Pharmacological and physiological aspects of sexual exhaustion in male rats](#)) Again, porn users may be experiencing similar changes.

Scientists have also noted that, after mating to satiety, a male rat doesn't return to full vigor for *fifteen days*, although he can mate with less enthusiasm before then. ([The endocrinology of sexual arousal](#)) In human males, there is a post-orgasmic cycle of *at least* seven days. ([A Research on the Relationship Between Ejaculation and Serum Testosterone Level in Men](#)) There is also anecdotal evidence of subtle effects (increased dissatisfaction, anxiety or irritability) for two weeks in both sexes. Is some mechanism like lingering D2-receptor decline at work, as with food (above)?

Perhaps evolution has somehow conserved this longer cycle after orgasm in some of us because it subtly promotes habituation between partners and urges us on to additional partners—despite the many rewards of pair bonding. In other words, maybe our genes benefit from this tension. And perhaps extreme sexual stimulation tips the balance in favor of pursuit of novel partners, whether two-dimensional or three-dimensional, by activating our “binge trigger.”

As porn users go through withdrawal, they report that the first two weeks are the toughest, and that relapse is especially likely for about six weeks. Delta-FosB is a protein that has been linked to addiction relapse. ([Beyond the Pleasure Principle](#)) It appears to clear out of the reward circuitry of addicted mice (also those addicted to exercise) in one to two months. This may help to explain why porn users find considerable relief after a month or two of abstinence.

Challenges in designing research

Non-invasive fMRIs are available to measure receptor decline and neuronal activity in humans. They have been used to measure the brains of gamblers, overeaters and drug users. [One researcher](#) looked at declines in sensitivity of the brain's reward circuitry (i.e., a decline in response to pleasure) over a six-month period:

We tested whether overeating leads to reduced striatal responsivity to palatable food intake in humans using repeated-measures functional magnetic resonance imaging. Results indicated that women who gained weight over a 6 month period showed a reduction in striatal response to palatable food consumption relative to weight-stable women. Collectively, results suggest that low sensitivity of reward circuitry increases risk for overeating and that this overeating may further attenuate responsivity of reward circuitry in a feedforward process.

Perhaps a similar technique could be used to look for declines in sensitivity over time in the brains of heavy porn users.

It will be a challenge to find men who aren't using porn. A Canadian researcher, for example, couldn't find any male college students on his campus who [weren't using porn](#). Perhaps a study could be done comparing recovered users' brains with current users of varying degrees of use. It would also be helpful to track receptor changes during the course of recovery.

The next question is whether an ethics committee would approve an orgasm-free control group as part of any experiment. Psychologists tell me that ethics committees would not allow them to ask a control group to avoid orgasm for a few weeks, either because mental health professions have defined sex without orgasm as a "paraphilia," or because such a request might cause temporary distress (even though participants could opt out simply by climaxing). Without this control group, it would be even more difficult to reveal the precise changes in receptor activity associated with heavy porn use. After all, orgasm itself can perhaps be stimulating enough to activate the binge trigger, i.e., lower receptors for a time, possibly confounding results.

Perhaps a way around this is to simply have a large control group that orgasms at will, preferably without porn or porn fantasy to activate the porn-related neural circuitry, and keeps track of frequency. That way, researchers could compare the heavy porn users with various (orgasm-frequency) groups of non-porn users.

Another confounding factor is that orgasm without a partner appears to have a [different neurochemical profile](#) than orgasm during intercourse with a partner. Orgasm with intercourse, for example, releases four times as much prolactin after climax and is associated with lower stress markers for a week. It's likely related changes are going on in the limbic system. It may be that the results reported in connection with intercourse are linked to greater production of oxytocin (among other changes) due to affectionate touch and positive social interaction. Again, oxytocin is associated with feelings of warm satisfaction.

Orgasm often triggers a [brief rise in oxytocin](#). Curiously, however, orgasm doesn't reduce cortisol, while positive [social interaction](#) and [warm touch](#) consistently do. Attachment cues (generous touch, close companionship) appear to work by *relaxing* the amygdala, not hammering the reward circuitry directly (as porn does). In social bonds, it appears that oxytocin triggers the release of dopamine to make them rewarding via a slightly different brain pathway. So researchers may need to take into consideration whether participants have partnered sex or not.

Some assume that porn users “bond” to porn in lieu of women, perhaps due to the spurt of oxytocin often released at climax. This seems doubtful. Porn hijacks our drive to mate, which is probably the most powerful, most drug-like, neurochemical response we humans experience. Porn can certainly lead to subsequent dissatisfaction and a desire for more. But porn users don't desire *more of the same*. Instead they desire the more intense stimulation of *novelty*. So they generally aren't “bonding” to specific porn; most are simply becoming dependent on the neurochemicals of intense arousal. One of our website visitors mentioned he had seen a TV show on sex dolls. One man had already acquired *ten* life-size rubber dolls he barely had room to store, because only novelty seemed to offer satisfaction. (Obviously, it didn't, and this is a graphic example of how the binge trigger actually promotes dissatisfaction.)

Conclusion

Framing the porn debate in terms of “dampening the pleasure response of the brain,” and recovery from porn addiction in terms of “returning the brain to normal sensitivity” has definite advantages:

1. It sidesteps the moral debate and freedom-of-speech debate entirely, so it doesn't provoke resistance, or increase shame (which can strengthen compulsion due to the added neurochemical buzz of forbidden or anxiety-producing activities).
2. Educating young people about porn and the brain is challenging, but possible. In fact, learning about the reward circuitry helps kids understand all addictions, including junk food (obesity). To this end, here's a [YOUTube series](#) directed to kids and their parents to help both understand the risks of porn addiction in terms of its effects on the brain.
3. Erectile dysfunction (or lack of orgasmic responsiveness in both sexes) is powerful motivation to change one's habits. But only if one clearly understands how over-stimulation can numb the brain's pleasure response. Without this information, most users chart their course by short-term results, and conclude that the solution to erectile dysfunction is hotter and hotter porn, and then sexual enhancement drugs, or both.

One recovering user recommended this tongue-in-cheek warning for porn videos:

SURGEON GENERAL'S WARNING: Habitual use of this product may adversely affect your perceptions about the opposite sex and significantly reduce the amount of pleasure you are able to experience from normal activities and through normal social interactions.

In 2009, a highly regarded German sexologist made the same point [in an interview](#):

What is the most urgent thing to be done?

There ought be a warning notice on every porn video, and before any pornographic Internet clip there should also be a warning: "The viewing of pornography can inflict considerable harm to your sexual health!" We do have sufficient facts that would justify such a warning.

Other experts are calling for Internet addiction to be recognized as a [behavioral addiction](#) in the psychiatric diagnostic manual.