***Glow Kids: How Screen Addiction Is Hijacking Our Kids - And How To Brake The Trance***

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**Introduction**

The screen revolution-social media, video games, iPads, apps, smart phones- is more than just “the next thing” in media or technology. There is a growing and compelling mountain of clinical and neurological research showing that these devices are harming kids in ways that parents never anticipated.

What can the individual parent do? The one most important suggestion that I can give is to delay, as much as possible, your child's exposure to individual screen devices. Your children *will* be tech savvy; you needn't worry about that. But if you wait until they are at least 10 years old before you unleash the technology hounds, your little ones will be further along developmentally and better equipped to handle our amazing little screen marvels.

In the meantime, let your kids be kids-the way that nature and evolution had intended them to develop: let them play, explore, create, use their imagination, and just watch the miracles of their developing minds unfold. And very importantly: allow them the opportunity to be bored. There is no better master for and innate creativity than a child compelled to entertain themselves. If at all possible, don't fall into the trap of feeling obligated to keep your child perpetually entertained. You will do more harm than good.

There is not one credible research study that shows that a child exposed to more technology earlier in life has better educational outcomes then a tech-free kid; while there is some evidence that screen-exposed kids may have some increased pattern-recognition abilities, there just isn't any research that shows that they become better students or better learners.

Instead, what we do have is a growing mountain of evidence showing that there can be some very significant negative clinical and neurological effects on Glow Kids.

What's more, an ever-increasing amount of clinical research correlate's screen tech with psychiatric disorders like ADHD, addiction, anxiety, depression, and increased aggression. Perhaps most shocking of all, recent brain-imaging studies conclusively show that excessive screen exposure can neurologically damage a young person's developing brain in the same way that cocaine addiction can. That's right-a kids brain on tech looks like a brain on drugs.

Ironically, while we've declared a so-called War on Drugs, we've allowed this *virtual* drug- which Dr. Peter Whybrow, director of neuroscience at UCLA, calls “electronic cocaine”; which Commander Dr. Andrew Doan, who has an M.D. and Ph.D. in neuroscience and heads addiction research for the U.S. Navy, calls digital “pharmakeia” (Greek for “drug”); and which Chinese researchers call “electronic heroin”- to slip into the homes and classrooms of our youngsters and most vulnerable, seemingly oblivious to any negative effects.

We've become so dependent on the digital babysitter or the so-called virtual learning tool that we don't really want to hear that our handy-dandy smartphones and our wonderful, all-knowing iPads can actually be damaging our kids brains.

As one of the country's foremost addiction experts, I know addiction when I see it. And I'm seeing it in epidemic proportions in the obsessive video gaming, compulsive texting and hypnotized stares of the kids I treat. Indeed, in the past decade, I've done clinical work with over a thousand teenagers and have noticed the insidious and addictive effect of screens, which has led to a whole host of clinical disorders and digitally induced adolescent malaise.

I'm fully aware that I may get some pushback or even anger from tech lovers and video gamers. But neither this book nor I am anti-tech. Rather, this book is aimed at informing adults who care about the society they live in while also warning and informing parents about the clinical and neurological dangers that excessive screen exposure can have on their kids.

Whatever we may think about tech usage for adults, a person doesn't need to be an addiction expert or a neuroscientist- or a Luddite- to see the undeniably negative effects of age-inappropriate tech, both in the latest research and in the everyday reality of plugged-in and turned-out kids.

**Chapter 1: Invasion of the Glow Kids**

There are more than 125 million registered active users of *Mindcraft,* the best-selling computer game of all time. *Minecraft* proponents will use the magic buzzword “educational” to deflect any concern but fail to produce any research or evidence that actually shows that video games can lead to increased *learning*. Sure, there is some evidence that video games can increase spatial awareness and pattern recognition-but at what cost?

The ever-increasing and never-ending “limitless possibilities” of the game created very hypnotic grip on kids. That hypnotic pull along with the stimulating hyperarousing content creates a “dopaminergic” (dopamine-increasing) effect; the dopamine increase becomes the key ingredient in a primordial addiction-forming dynamic.

The most primitive part of our brains-the medulla and cerebellum- cradle our ancient dopamine-reward pathways. And when an action has a feel-good result- like finding food or discovering something new on the Internet or in a video game- dopamine is released, which feels pleasurable and creates a more we-get-more-we-want addictive cycle.

Dr. Peter Whybrow, UCLA's director of the Institute of Neuroscience and Human Behavior, has called computers and computer games “electronic cocaine” and describes this novelty-seeking addictive dynamic this way: “Our brains are wired for finding immediate reward. With technology, novelty is the reward. You essentially become addicted to novelty.”

What also makes *Minecraft* particularly addictive goes beyond compulsive novelty of Lego-like block building and the dopamine increase; combining archetypal imagery with basic principles of behavioral psychology, Mojang created a game that relies on a system of rewards to keep kids playing. Since the rewards (the ores) are distributed randomly through the “earth,” the player never knows which strike of the pickax will find that sought-after gold or diamonds. Just as in casino slot machines, this is known as a variable ratio reward schedule, the most habit-forming an addicting rewards schedule- just ask any pensioner who has compulsively gambled away an entire paycheck, one-fourth at a time, to the one-armed bandit.

According to Commander Dr. Doan of the U.S. Navy: “anytime that there’s arousal, there can be addiction because it feels so good. Research shows that when the brain is stimulated, that arousal mechanism also stimulates the pituitary gland through the hypothalamus. So the hypothalamus-pituitary-adrenal access (HPA) is also stimulated; that's the adrenaline rush that's essential with gaming. The kids’ blood pressure goes up, their palms get sweaty, their pupils constrict-they're all revved up in a state of fight or flight mode. Then there's also the dopamine response and the dopamine-reward pathway which makes the kid want to chase that adrenaline rush again.” And, as any neuroscientist can tell you, adrenaline and dopamine make for a potent and addictive combination.

According to Dr. Whybrow: “When the stress response is continuously in play, it causes us to become aggressive, hypervigilant, and overactive.” Dr. Whybrow draws parallels between symptoms of tech addiction and those of clinical mania; rapid speech and excitement over acquiring new things are followed by sleep loss, irritability and depression.

This addictive adrenaline arousal is no accident. The video game business is a sophisticated, multibillion-dollar industry devoted entirely to creating addictive products aimed at defenseless kids and young people. According to Dr. Doan, the entire focus of the research and development departments of the gaming industry is to make games as stimulating and arousing to children as possible, because that's what amplifies the addictive effect and sells the most games.

“Gaming companies will hire the best neurobiologists and neuroscientists to hook up electrodes to the test-gamer. If they don't elicit that blood pressure that they shoot for- typically 180 over 120 or 140 within a few minutes of playing, and if they don't show sweating and an increase in their galvanic skin responses, they go back and tweak the game to get the maximum addicting and arousing response that they're looking for,” Dr. Doan explains.

Can something so arousing to the brain and nervous system of a child somehow also be educational, as *Minecraft* proponents would have us believe?

To be clear: I- and by extension, this book- are not against technology, either in everyday usage or as a learning tool. The problem is the age of exposure; hyperarousing screens can be damaging to a young child's brain, which simply is not developmentally ready to handle that level of stimulation.

People need to first develop their brains- their cognitive, attentional, linguistic, emotional, spatial and reality-testing mental faculties- before their brains can go beyond those areas and handle hyperarousing and reality-immersing screens.

Yet the false narrative fed to most parents is clear: if you want your children to keep up in the race to the best schools, early tech is good and more tech is better- despite the dearth of research to back that up and in spite of the research that does show that interactive screens are not quite as harmless as we originally thought.

Like it or not, the reality is that in our glowing screen culture, we have essentially been giving our most innocent and most vulnerable an addicting and mind-altering electronic drug.

**Chapter 2: Brave New E-World**

**Electronic Soma**

Although it may come as a shock to some- even to trained therapists- the idea that electronic screens could have an addicting drug-like effect is not a new concept.

In 1985, 25 years before Steve Jobs, in his trademark black turtleneck introduced the world to the game changing iPad, a soft-spoken, visionary intellectual NYU professor named Neil Postman wrote a prophetic little book called *Amusing Ourselves to Death*. In it he suggested that we were living in the equivalent of Aldous Huxley’s *Brave New World*, only instead of Huxley's imaginary drug, soma, our addictive elixir was the “new” electronic medium- television.

It was a provocative idea: TV as a cocaine-like drug.

Postman believed that, like soma and cocaine, this visual medium was so highly addicting that it was creating an entire society of uninformed pleasure-seekers. Keep in mind that Postman's prophetic bit of wisdom was written well before the world had ever glimpsed of Xbox, smart phone, iPad, tablet or laptop.

Postman didn't believe that electronic media was *just* an addictive drug; like philosopher and communication theorist Marshall McLuhan before him, he believed the television also marked a major shift in human development, fundamentally impacting not only the way we communicate, but also the way we think as well.

He argued that since television images had replaced the written word as the dominant communication medium, our ability to engage in in-depth rational discourse and the dialectical engagement of serious and complex issues- which had evolved over hundreds of years as a consequence of a reading culture- had now been compromised. We had effectively been dumbed down as the depth of written language was replaced by the superficial visual images of television's information-as-entertainment.

Dr Leonard Sax (author of *Why Gender Matters*) writes extensively about this adolescent malaise in *Boys Adrift*, as he, too, cites our video game culture as one of the main culprits in the “failure to launch” dynamic.

In addition to being addicting, according to Sax, video games do not engender the sense of resilience or the patience and drive that the real world requires. In real life, when people lose in sports, they have to lick their wounds and process those experiences as they learn to eventually get back on the horse to compete another day. All of that fosters resilience and emotional growth. When you lose in a video game, you hit the reset button. Game on.

Author and psychiatrist Dr. Mark Banschick adds: “From the psychiatric couch, I have come to see avoidance as being part of the generational style; at least in a sizable group. Boys in particular love their video games and have developed an expectation of instant gratification that makes schoolwork and other chores seem too much. The brain is a developing organ, and we've been feeding our boys (and to some degree girls as well) with brain junk food.”

**Chapter 3: Digital Drugs and the Brain**

Most of us understand true addiction as ingesting a substance or engaging in a behavior in a way that is pathological- that is, a person continues with the addictive behavior and a compulsive way despite adverse consequences. But adverse consequences can have a pretty wide range. Typically, in the addiction treatment field, we think of something as being an addiction if a person continues to ingest the problematic substance or engage in the problematic behavior despite consequences such as losing their jobs, jeopardizing their relationships, or negatively affecting their physical health or their schooling. But beyond symptomatic criteria that help us diagnose addiction, what is it *really*? I mean, at its *essence*,-what is it?

For many, clinicians and researchers alike, the understanding of addiction is sort of like a riddle wrapped in a mystery inside an enigma. Many have a hard time categorizing it- is it a bad habit, a lack of willpower, a disease, a mental disorder, a moral failing, a genetic condition, a psychological condition? Etiological theories abound.

For most people, clinical definitions arise, it's sort of like the old line from Supreme Court Justice Potter Stewart in 1964, when he tried to define the highly subjective notion of obscenity: “I know it when I see it.” I think that's true for addiction; most of us know it when we see it.

But perhaps even more importantly, if we are really trying to understand addiction, we should ask the further question: why and how does someone become an addict? This is an important question, because if we're to understand how an iPad can be *electronic* cocaine, we need to understand how powdered cocaine can be so compulsively addicting.

Is it our genetics? Or the results of trauma or a rough childhood? Perhaps people with addiction have a neurochemical imbalance? Or are addicts simply people with poor impulse control and minimal willpower?

People who don't understand addiction often ask: just how can a person become so compulsive about ingesting a substance- be it alcohol, cocaine, heroin or a pill- or engaging in addictive behavior like gambling or Internet use, sometimes even to the point of total self-annihilation? To the nonaddicted, it just doesn't make sense. Of course it doesn't- addiction *isn't* rational.

We know that certain people are more prone than others to addictive behavior; for arguments sake, we might say that these people are more predisposed toward having addictive personalities. Further, we know that having addiction in one's family can predispose a person toward that condition and that the children of addicts are eight times more likely to develop an addiction problem.

What is less clear is why. It's been debated whether that increased risk is a consequence of genetics, the modeling of addictive behaviors or simply dysfunctional family dynamics that can create the emotional and psychological conditions for addictive vulnerability. Or perhaps all the above.

We know, too, that trauma and abuse correlate highly with addiction, by some estimates quadrupling the odds that a person will become an addict. There is an attachment theory, according to which an addict is a person who may not have been consistently and appropriately nurtured in childhood and who then grows up prone to codependence, forming a pathological attachment to an external entity, be it a person, alcohol, cocaine or an iPad- all to help fill the void of nurturing.

For all of these reasons, it's commonly accepted in the addiction psychology field that the problem is less about the particular substance or behavior than about the underlying perfect storm of genetic, psychological, environmental and neurobiological factors that make a person ripe for addiction- any kind of addiction.

Harvard’s Dr. Howard Schaffer, one of the world's foremost addiction experts and a friend and colleague of mine, has developed a “syndrome model” of addiction. He analogizes addiction to a virus that compromises the immune system and compares the multiple expressions of addiction (i.e., alcoholism, gambling, opiate addiction, video games) too opportunistic infections that an addictively predisposed person needs to come into contact with in order to “catch.” For example, the addictively predisposed person with the weakened addiction immune system who comes into contact with alcohol is more likely to become an alcoholic; if that same addictively predisposed person, however, is exposed to pain pills, then pill addiction it is. And so on.

Having said that addiction is more about a person's vulnerability to addictive substances and/or behaviors, we do know that certain substances or behaviors have a strong magnetic pull for the vulnerable person; crystal meth tends to be more addicting than alcohol, for example.

Why is that?

As Dr. Steve Hyman, the former director of the National Institute of Mental Health, asks:

“Why does the brain prefer opium to broccoli?” Why do our brains gravitate toward certain substances- or behaviors- more than others? And how might highly stimulating technology act in the same way as a highly addicting drug?

Understanding the addiction riddle- how a person can pursue something so compulsively and often self-destructively, be it crack or technology- will require an exploration of some interesting concepts along the way: the dopamine tickle. Myelin. And Rat Park.

**The Dopamine Tickle**

In order to fully understand addiction, we need to understand the brain's reward system and the impact of dopaminergic substances or behaviors on that reward pathway.

How dopaminergic (dopamine activating) a substance or behavior is correlates very highly with the addictive potential of that substance or behavior. Dopamine is the feel-good neurotransmitter that's the most critical element in the addiction process. When a person performs an action that satisfies a need or fulfills a desire, dopamine is released into the nucleus accumbens, a cluster of nerve cells beneath the cerebral hemispheres that are associated with pleasure and reward, also known as the brains pleasure center.

In simple terms, engaging in a dopaminergic behavior increases dopamine levels so that the dopamine-reward pathway is activated, thus telling the individual to repeat what he or she just did in order to get that feel-good dopamine reward (or what I like to call the dopamine tickle) again.

As an evolutionary adaptation, the dopamine tickle is a survival mechanism; it rewards and, thus, incentivizes essential biological functions such as eating and procreation. Eating food feels good because it increases dopamine; we then remember that and seek out those activities again in order to recapture the feel-good dopamine high.

Natural dopaminergic activities such as eating usually come only after effort and delay and, as mentioned, serve a survival function. But addictive drugs and addictive behaviors, like gambling and video gaming, provide a shortcut to this reward process, which floods the nucleus accumbens with dopamine without serving a biological function.

Unfortunately, evolution hasn't provided an easy way to withstand that dopamine onslaught, so that when people become addicted, they experience a dopamine reduction or short cut and ordered to give some relief to their overwhelmed receptor cells. With this reduced capacity to produce dopamine naturally, the addicted person then needs to ingest the addictive substance or engage in the addictive behavior just to maintain his or her dopamine levels.

We also know that certain substances or behaviors tickle dopamine more than others. For example, brain imaging research shows us that eating- especially eating craving foods like chocolate- can raise dopamine levels by 50 percent; snorting cocaine increases dopamine by 350 percent; and ingesting crystal meth creates a whopping 1,200 percent increase in dopamine. That's why we'd say that crystal meth has the highest dopaminergic effect- and thus the highest addictive potential- amongst the substances just mentioned.

But addiction is about more than just dopamine; we also need to understand myelination, another critically important neurological factor in the addiction process, which can, in turn, better help us understand tech addiction.

**Myelin- The Brain’s High-Speed Bandwidth**

In 2001 the pioneering UCLA neurologist Dr. George Bartzokis, in his groundbreaking “myelin model” of brain disease, was able to prove the existence of another very important brain dynamic associated with addiction: the role of myelination, otherwise also known as the brains “white matter.”

When talking about the brain, most people tend to think of “gray matter,” the network of roughly 100 billion neurons that formed the brain and give it its pinkish-Gray color. But in addition to grey matter, we also have white matter, also known as myelin, a pale lipid composed of cholesterol that, like cable insulation, envelopes the trillions of stemlike parts of neurons called axons that connect neuron-to-neuron to form a single, functioning neural network.

Without myelination, our brains would be as frustratingly slow as a dial-up connection. According to Bartzokis, “Think of the Internet. Myelination makes axons more efficient; it increases bandwidth. Axons are able to do more so that the brains are able to do more.”

The overstimulation of the glowing, flashing screens of iPads and video games can damage myelin in neuropathways as well.

That's because myelin is extremely vulnerable to disruption; oligodendrocytes, the brain cells that produce cholesterol for proper myelination, are easily damaged by things such as head trauma, environmental stressors, toxins, stress hormones, certain drugs- and over stimulation. What problems can develop as a result of this myelin-destroying overstimulation? Our ability to pay attention and focus, our ability to feel empathy, and our ability to discern reality can all be adversely affected by overstimulation during key developmental windows.

Myelination abnormalities drive various neuropsychiatric disorders across our entire life cycle- everything from ADHD and autism in infants and children to schizophrenia and drug addiction in teens and young adults to Alzheimer's in seniors.

Dr. Bartzokis’s brain research was the first of its kind that empirically showed that drug addiction can change myelin. Dr. Bartzokis stated, “You will see the average 40- or 45-year-old cocaine addict has the same amount of white matter as the average 19-year-old person.”

Healthy brains continue to grow and myelinate until we’re 50 years old; now, his addiction research clearly showed that drug use stunted myelin growth and development. These decreased-myelination results were repeated in other studies using other drugs, including alcohol, opiates and marijuana.

And now, a little over 10 years after Bartzokis’s original work, we have research from several recent brain-imaging studies that show us that tech exposure can also alter brain structure and myelination in exactly the same way that drugs can.

**Rat Park: Addiction and the Cage**

Nature vs. nurture. Most of us have heard that phrase since grade school as a framing of the two competing theories of human nature: biological determinism vs. learned behavior or behavior shaped by our environment. The consensus these days is to reject the proposition as an either/or statement in favor of the more inclusive and comprehensive “and,” as in: it's nature *and* nurture creating a perfect storm that determines who we are and how we behave.

Canadian professor Dr. Bruce Alexander has been skeptical of earlier addiction studies done on rats in the 1960s; and those earlier experiments, the poor little furry rodents were put in Skinner boxes (named after the behavior guru B.F. Skinner). These boxes were small, cramped solitary-confinement cages where often-starved rats could get tiny pellets of food, provided that they pushed a little lever on the side of the box over and over and over again.

In the addiction experiments of the 1960s, a rat would be tethered to the box’s ceiling, with tubing that included a surgically implanted needle going into its jugular vein. Yes, it was as horribly unpleasant as it sounds. When the rat pushed the lever, the sweet relief of morphine would instantly surge into its little bloodstream (in other experiments, cocaine water was used).

Not surprisingly, these poor trapped rats hit those morphine levers like a retiree at the quarter slots in Atlantic City, and the little creatures became hopelessly addicted. That drugs-lead-to-addiction research then became part of the War on Drugs media campaign, which hyped the evils of illicit drugs; for most people, the evidence was in: drugs = hopeless drug addiction.

But Dr. Alexander was troubled by these conclusions. If the power of addiction lay in the drug, why didn't all people who ingested them become addicted? He understood that rats, in their natural state, are highly social creatures not designed by nature to be isolated in Skinner boxes; was it possible that the prior experiments were merely indicating that an isolated and trapped rat might be more likely than a “free” rat to choose an anesthetic escape from an intolerable existence?

Rats share this strong social aspect with human beings, and as Dr. Alexander understood, solitary confinement often drives humans insane. It's well known that if inmates in isolation have access to mind-numbing drugs, they invariably take them. Thus, Dr. Alexander reasoned, couldn't it be the isolating Skinner box and not the morphine that was driving these similarly incarcerated rats to drug addiction?

With that in mind, Dr. Alexander and his colleagues set about designing a study with two separate groups of rats: one group was kept in the isolation of Skinner boxes while the other got to frolic in what came to be known as “Rat Park,” a large open area filled with things that rats love: platforms for climbing, tin cans to hide in and running wheels for exercise. Oh, and it was co-ed.

The results were shocking: the rats in cages became addicts. But the rats in the freedom of Rat Park, not so much; in fact, they barely touched the drug water that was made available to them. Alexander concluded that addiction was less about the magnetic, addictive pull of the drug and more about the condition of a rat’s life; without healthy socialization and connection, and rat seemed to be much more vulnerable to addiction.

But what about people?

As. Dr. Alexander speculated, “People do not have to be put into cages to become addicted- but is there a sense in which people become addicted actually feel ‘caged?’”

Years later, he wanted to see if he could test these findings on humans. Ethical considerations precluded him from caging people and offering them drugs; most universities tend to frown on such practices. But he was able to study the historical records that have just such a “natural” experiment: the colonization of Native people and their subjugation on reservations.

Alexander realized that the Native people of Canada and the United States had been effectively put in their own Skinner boxes, which robbed them of their traditional cultural ties and normal socialization. He also discovered that before this colonization, there were scant records of addiction: “There was so little addiction that it is very difficult to prove from written and oral histories that it exists at all. But once the [N]ative people were colonized, alcoholism became close to universal; there were entire reserves where virtually every teenager and adult was either an alcohol or drug addict or ‘on the wagon.’”

Today, most addiction experts have rejected the genetic-vulnerability explanation. Indeed, Rat Park- and the colonization of Native peoples- has shown us that social beings put in physical, mental or cultural isolation- “cages,” if you will-are more susceptible to addiction, including behavioral addictions like excessive Internet use.

According to Alexander: “The view of addiction from Rat Park is that today's flood of addiction is occurring because of hyper-individualistic, hyper-competitive, frantic, crisis-ridden society makes most people feel socially and culturally isolated… They find temporary relief in addiction to drugs or any have a thousand other habits and pursuits because addiction allows them to escape from their feelings, to deaden their senses, and to experience an addictive lifestyle as a substitute for a full life.”

According to this perspective, today's epidemic of glowing screens it's less about the screens and more about the isolating “hyper-individualistic, hyper-competitive, frantic, crisis-ridden society” that our kids inhabit.

When I interviewed Lt. Sam Brown about his experience using virtual reality therapy, he made an insightful observation about another important addiction dynamic when he described how many of his soldier friends were getting addicted to video games: “Look, people are looking for purpose in their lives. Some of these games give you that. Whether you're on a shared mission in *Halo* or whatever, if you don't have a sense of purpose, these games can fill that void.” He added: “Probably the only reason that I didn't get hooked those first couple of years is because I couldn't use my hands well enough to handle the control board.”

How many kids today feel adrift and purposeless? And to that the “hyper-competitive” and “hyper-individualistic” dynamic that Dr. Alexander mentioned, mixed in a little stress, social disconnect and this seductively addicting escapism of glowing screens, and voila!

Tech addiction.

Sure enough, according to the latest research, tech addiction is affecting young people more than adults: *The American Journal of Drug and Alcohol Abuse* found that 8.2 percent of Americans suffer from Internet addiction, but according to *Internet Addiction:* *A Handbook and Guide to Evaluation and Treatment*, the disorder effects more than 18 percent of college-age Internet users.

I think it's fair to say that if a person is using a substance or engaging in a behavior in such a compulsive way that it negatively affects- or even destroys- his or her life, then we can say that addiction is at hand.

In the next chapter, in order to get firsthand insight into the addictive and hypnotic power of hyperarousing screens, we will meet an amazing addiction researcher, neuroscientist-and recovering video game addict.

**Chapter 4: Interview With Dr. Doan**

**Neuroscientist and Recovering Video Gamer**

I was first introduced to Dr. Andrew Doan while writing this book and became quite fascinated by him, as I believe that he has a unique perspective to add to our understanding of tech addiction. That's because Dr. Doan is not just a Johns Hopkins- educated M.D. who also happens to have a Ph.D. in neuroscience and has extensively researched and studied tech addiction; he's also a recovering video game addict. To the best of my knowledge, he's the *only* neuroscientist/recovering video game addict.

But his bona fides are even more impressive: as previously mentioned, he's a commander in the U.S. Navy and the head of addiction research for the Navy and the Department of Defense.

I was amazed that this kind, compassionate, physically fit and respected physician had once been a very unhealthy, overweight and rage-filled video game addict. Increasingly, beyond coming to understand that his video game addiction was ruining his own life he became aware of some of the darker aspects of tech addiction when he started realizing that many military vets who were involved in violent episodes- homicides and suicides-we're also violent video gamers, and that more often than not, they were *sleep deprived* gamers.

I think his story of video game addiction can help us better understand how an intelligent medical student can get seduced by screen addiction.

**Tell me a little about your video game addiction. And what eventually was your bottom?**

*When I was in medical school, about 16 years ago, I was really heavily addicted to video games. For over 10 years and all through medical school, I played 50 to 100 hours a week… I was utilizing the games as a form of digital drug to reduce anxiety, to deal with stress, and to allow me to feel the adrenaline rush of online head-to-head competition.*

*I had played all the time and I had just assumed it was a hobby. But the first time I thought that there was a problem… I wouldn't sleep very much. So my schedule would be, I go to school- I had a full-ride scholarship at Hopkins.*

*So I'd go to school, come home around 5, get dinner ready for the kids (we had two young children) and then maybe attend to my wife for a little bit; spend some time with her. She was a nurse at the time working a hard schedule. She did go to bed early, like 8:30. And I was like “sweet!” I’d sneak out of bed- I'd already played a couple of hours before dinner, then I'd play from 8:30 till 4:30 in the morning. It was customary for me to hear the birds sing in the morning… sleep a couple of hours and repeat the cycle again. So I'd be gaming 8 hours a day at home and 8 hours a day at school. I had two full-time jobs, basically.*

*So I was a functional addict, but the problem was that I was always sleep-deprived, so I was raging. I became real rageful and abusive to my wife. And so she left. She left with the kids and filed the restraining order. So I thought that the problem was just my rage, that it was my temper. So I promised her I'd work on it- you know, come back and let's go to church together, I promised to change, get marriage counseling- all of that stuff.*

*But of course, I’m in denial of video game addiction because there’s no diagnosis, right? I'm a medical student at the time and I never heard of this addiction. So it's not an addiction- it's a hobby. I tried to moderate, but then the addiction starts building up again. I would only play for hours a day, but then four became six then eight then ten then twelve. And before you know it, I was a full-blown playing all the time like I used to.*

*Finally what kicked in, it was 2003 and I had been playing addictively for almost 11 years, when I finally developed carpal tunnel from clicking the mouse and the real-time strategy games. Because I played Starcraft- real-time strategy was my drug of choice.*

*So I had this triad- you know, I had carpal tunnel, the armpit infection and these hemorrhoids. I was in surgery at the VA and I go, man, I'm killing my career; I can barely operate or work as a physician without taking these maximum painkillers.*

*So finally, I was like, man, maybe I can't play video games. But still calling it a “hobby”- that's causing me hemorrhoids, carpal tunnel and armpit infection! So finally in 2004 I stopped playing completely. But I did have a relapse in 2007.*

*I played a year after that… and all of my old habits came back. My son, who was in his early teenage years- and I looked over at him one day and he was bawling his head off because I was yelling at him for not being able to keep up with me. Yelling at him! Here's my son who all he wants to do is spend time with me, but because of my rageful, addict nature when I was playing these games, that bad side came back again.*

*So when I started noticing my marriage started going back to the way it was before; my relationship with my kids was hurting; I was being rageful, I kicked the dog… I was sleeping a lot so I'm more grouchy because with this kind of addiction you have to trade something, and most gamers who are addicted trade sleep. That's the number-one thing they trade. So they stay up until two or three in the morning. I did too.*

*So I started falling asleep at the wheel. There are days when I drove- I had like a 60 minute commute one way- there were days when I dozed off in the car and woke up five minutes later, not knowing where I am. I should be dead, you know?*

*That's when I finally saw that I had this addiction and I started using the word addiction. And then you know what it was? I saw my son- I saw my son getting addicted at around 12 or 13 when he was sneaking out in the middle of the night playing Call of Duty. And then you know when you see a quality of someone else that you know it's quality that you have? It really irritates you, right? I saw that and it really irritated me. And I'm like, I'm really getting irritated at my own son for doing the same thing I do!*

*So we finally took him away from gaming and he just blossomed! I saw how gaming damaged him as well.*

Dr. Doan Has come up with the term “digital pharmakeia” to describe digital screen drugs and their effects on the brain. He believes that such screen drugs are dopamine-elevating stimulants that hyperarouse our HPA axis. He also believes that some are more potent than others. TV can be considered the mildest of the stimulation continuum, then perhaps a game like *Tetris*, culminating with high-arousal games like *Call of Duty* or *World of Warcraft*.

From both his own experience and his work in the military, he also came to understand the important role that sleep deprivation plays in gaming addiction. “With alcohol, people usually pass out and sleep with severe intoxication. In contrast, video games require being awake in order for the addict to engage in the behavior. As a result of sleep deprivation, there will be HPA dysregulation.”

HPA dysregulation is associated with depression, anxiety, psychotic breakdowns and mental disorders.

But Doan believes that many of the suicides and homicides committed by PTSD (post-traumatic stress disorder, a mental disorder that used to be commonly referred to as “shellshock”) vets are also influenced by violent video games and sleep deprivation. “Many of these soldiers- they're young kids who are already gamers when they come into the military. Then when they're on base, they can't drink or do drugs because they get tested for that, so they play video games for hours on end as an escape. Add in some combat trauma and sleep deprivation and you have a recipe for disaster.”

The attack by the infamous Washington Navy Yard shooter Aaron Alexis, who shot and killed 12 people in 2013, was the incident that first got Dr. Doan to look more closely at veteran violence and video games. Alexis seemed to have some psychotic symptoms (hearing voices, he believed he was being influenced by electromagnetic waves)-but he was also a sleep deprived gamer. He would play the ultraviolent *Call of Duty* for up to 16 hours a day, and in the weeks before the shooting, he went to the VA emergency room seeking medication for his insomnia. Did the sleep deprivation and gaming cause the psychotic symptoms that pushed him over the edge? We will never know.

**Chapter 5: The Big Disconnect- Texting and Social Media**

Best-selling author Johann Hari is presenting his powerful and well-received Ted talk on addiction (four million views) where he discusses a new addiction paradigm that stresses the importance of human connection and heavily references the work of Professor Bruce Alexander and his Rat Park research. He concludes his talk by saying that he's come to understand that “the opposite of addiction isn't sobriety- the opposite of addiction is *connection*.” The crowd then breaks into thunderous applause as he gets a standing ovation.

Social connection. It's not only the most essential part of being human but also a key ingredient in our happiness and health as well. Yet a few minutes earlier in his talk, Hari had looked out into the crowd and said: “It might sound weird to say… I've been talking about how disconnection is the major driver of addiction, and it's weird to say [addiction has] grown, because we’re the most connected society that's ever been, surely.”

More than two billion people have active social media accounts- who knew the young and awkward Mark Zuckerberg would change the world in 2004 from his Harvard dorm room? Beyond social media, a little over 3 billion people on the planet are active Internet users.

That's a lot of connecting. For a species that's hardwired for social connection, that should be a wonderful thing; we should be walking around with smiles on our faces.

Then why the hell are we so depressed and lonely? That shouldn't be the case- the more connected that we are, the happier and more fulfilled we should be. Yet we're not. As Hari Points out during his Ted Talk, “We're one of the loneliest societies that has ever been.”

Recent studies back up the theory that as social media and technology had made us more connected, we've become increasingly depressed.

Being alone doesn't agree with us. Biologists believe that human beings evolved as social animals because being with others had an evolutionary benefit: a group had a better shot at survival than a nomadic loner. This led to a hardwiring of social/tribal connection that, in turn, also helped to define the social and emotional life of the group member.

Being social creatures, we find purpose and meaning and bolster our emotional states largely through the social and cultural context created by contact with others. Without the group to act as a sort of mirror to help us contextualize our feelings and our self-concept, before very long we were gazing, as it were, into our fun-house mirror- and the distorted perceptions and irrational thinking that occur can look very much like psychosis.

This insanity-creating effect of isolation was also confirmed in several human experiments. The most notorious of these involves not only isolation but sensory deprivation as well, took place at McGill University Medical Center in Montreal in the 1950s. Initially motivated by a desire to better understand alleged “brainwashing” by the Russian and Korean military, psychologist Dr. Donald Hebb and his researchers enlisted mostly college students as paid volunteers- $20 per day- to spend several weeks by themselves in soundproofed cubicles, deprived of human contact.

The researchers’ aim was to eliminate social contact and perceptual stimulation to see how their subjects would behave when left totally alone. In order to also minimize what the volunteers could feel, see, hear and touch, the researchers fitted them with translucent visors, cotton gloves and cardboard cuffs extending beyond the fingertips. The volunteers also had to lie on U-shaped foam pillows to restrict noise, and air conditioners were set up to a create continuous hum to mask any additional noise.

After only a few hours, Dr. Hebb’s volunteers started to crave stimulation; many began talking, singing or reciting poetry to themselves to break the monotony. Later, many of them became highly emotional and anxious and were unable to perform simple math and word-association tests.

But anxiety, restlessness and adverse cognitive effects weren't the worst of it. The most shocking thing that happened to human beings in isolation with minimal stimulation, the researchers discovered, was psychosis. Test subjects started hallucinating, seeing points of light, lines or shapes. Eventually the hallucinations became more bizarre, as subjects reported seeing squirrels marching with sacks over their shoulders or processions of eyeglasses filing down a street. The test subjects seemed to have no control over what they saw: one man saw only dogs; another, babies.

Beyond visual hallucinations, some subjects had auditory hallucinations as well, hearing a music box or a choir, for instance. Still others had tactile hallucinations: one man had the sense that he had hit been hit in the arm by pellets fired from guns; another reached out to touch a doorknob and felt an electric shock instead.

The results were so disturbing that the researchers had to cut the experiment short; the subjects became too disoriented and distressed to keep going. Hebb had originally hoped to observe his subjects for six weeks, but in the end, only a few lasted beyond two days, and no one lasted for an entire week. Afterward, Hebb wrote in the *Journal of American Psychologist* that the results were “very unsettling to us… to find, in your own laboratory, that nearly taking away the usual sites, sounds, and bodily contacts from a healthy university student for a few days can shake him, right down to the base.”

We know that like human beings, our cousins the primates don't do well in isolation either. One of the most graphic examples comes from psychologist Harry Harlow's experiments on rhesus macaque monkeys at the University of Wisconsin- Madison during the 1960s, in which he deprived them of social contact after birth for months and, in some cases, even years. They became “enormously disturbed” after only 30 days. After a year of isolation, they wore “obliterated” socially, incapable of interaction of any kind.

So we've seen that being alone can drive a person-and the monkey- crazy. But it's not just being alone that's problematic. Not getting the right kind of human contact and nurturing support at key developmental periods in childhood can lead to profound emotional and psychological problems.

We know this from the seminal work of psychiatrist John Bowlby in the 1930s at the Child Guidance Clinic in London, where he treated many emotionally disturbed children. Bowlby Observed that children experienced intense distress when separated from their mothers; even being fed by other caregivers didn't diminish the children's anxiety.

From all of these studies, we clearly see that we need social connection as much as we need oxygen. But interestingly, human beings also appear to have a couple of other basic psychological needs: the need for reward and the thirst for *novelty*. Our human brains are biologically primed for novelty, which, in turn, has helped us survive cataclysmic environmental change.

So where does modern digital technology, which plays off of these intersecting human needs of connection, reward and novelty, leave us? Short answer: Addicted. Or, at the very least, vulnerable to the potential for screen addiction.

According to Dr. Whybrow, “Our brains are wired for finding immediate reward. With technology, novelty is the reward and you essentially become addicted to novelty” as those new dopamine-tickling texts and social media updates feed into our ancient pleasure pathway.

That's the problem- many adults and kids have developed compulsive and addicting texting and social media habits precisely because they quench our thirst for novelty while tickling our dopamine-reward pathways.

And, like all addicts, they can go into withdrawal without it.

**The Text Effect**

According to a more recent 2015 Pew Research Center study of millennial communication habits, published in the American Psychological Association's Journal of *Psychology of Popular Media*, text messaging has increased dramatically over the past 15 years,” and many teenage texters share addict-like symptoms and behaviors. In fact, the researchers indicated that such teens have a lot in common with compulsive gamblers, including loss of sleep because of the activity, problems cutting back on it and a tendency to lie to cover up the amount of time they are doing it.

While boys and girls text with the same frequency, the girls have more of an emotional/psychological attachment to the texting behavior and, thus, more difficulty controlling it. To put it in alcoholic terms, two people can drink the same amount of alcohol, but the one who was unable to cut back on drinking or lies about it would be considered the person who has the more serious drinking issue- just as, apparently, girls are developing a more problematic relationship with texting.

**Social Media and the Illusion of Real Connection**

But perhaps even more worrisome than the addictive nature of our digital way of connecting is the idea that electronic connection does *not* seem to satisfy our deep-seated need for true human contact. What in fact seems to have been spawned has been the *illusion* of social connection, via a medium that has our dopamine receptors on perpetual high alert as we anticipate, like Pavlovian dogs, the next “ping” that promises to offer us the novelty and pleasure of a text, IM, tweet, Facebook update or Instagram photo.

Perhaps just as Johann Hari concluded in his Ted Talk: “I've increasingly begun to think that the connection we have- the connections we think we have- I like a kind of *parody* of human connection.” He went on to explain: “If you have a crisis in your life, you'll notice something- it won't be your Twitter followers who come to sit with you. It won't be your Facebook friends who help you turn it around. It'll be your flesh and blood friends who you have deep and nuanced and textured face to face relationships with.”

Hari’s insights are backed up by Oxford anthropologist and evolutionary psychologist Dr. Robin Dunbar. Almost two decades ago, he proposed a now-famous theory that a person can maintain about 150 acquaintances but only five or so *close* relationships- our brains simply can't handle any more. The figure 150, also known as Dunbar's Number, was a measurement of the “cognitive limit to the number of individuals with whom any one person can maintain stable relationships.”

Yet the important number is that small circle of close friends with whom we keep and face-to-face to-face contact. Dunbar attributed this to the nature of what he termed the “shared experience” effect: when you laugh or cry with someone; when you go to a social event or have dinner together; when you *experience life* together, there is a deepening of the social bond that can't be replicated by social media.

In social media, you can “share” and “like” something with your Facebook friends, or you can watch the same hysterical YouTube clip of a dancing chimp, but it's not the same as if you had done something together- which is the phenomenon that Dunbar referred to as the *synchronicity* of shared experience. Let us look beyond social media: If I tell you to watch a funny movie that I saw last week, it's just not the same in terms of deepening our social bond as if we had watched it together.

There may also be a *physiological* aspect of friendship that Facebook friends can never replace. Over the past several years, Dunbar and his colleagues have been looking at the importance of physical contact: “We underestimate how important touch is and the social world,” he said.

Dunbar is also concerned about the negative developmental impact that our new digital world will have on children. From past research on social interaction, we know that early childhood experiences are crucial and developing those parts of the brain that are dedicated to social interaction, empathy and other interpersonal skills. If we deprive a child of interaction and touch early on because they mostly socially interact via screens, those areas won't fully develop.

We will be more socially stunted in the social media age. As Hari pointed out, we have created a parody of real connection; our 500 Facebook friends have given us the illusion of being socially connected, oftentimes at the expense of the real flesh-and-blood friendships.

What then happens to a person-particularly a kid-who doesn't have those real-life connections and is already feeling a bit alienated and sad? In those instances, the *illusion* of connection actually does more harm than good. The great social-media-as-genuine-and-meaningful-social-connection myth has been debunked by several studies that correlate social media with mood disorders and higher incidence of mental health problems.

Facebook, with its 1.23 billion active users has not lead to happiness; instead, it has led to a phenomenon known as “Facebook depression,” whereby the more “friends” one has on Facebook, the higher the likelihood of depression. There is also, as mentioned, the double whammy that the more time spent on social media and the more texting a person does, the higher the likelihood of not *just* depression but tech addiction as well, which only further amplifies the isolation and disconnect from healthier activities and true, meaningful face-to-face social contact.

A 2015 University of Houston study published in the *Journal of Social and Clinical Psychology* confirmed that Facebook usage can lead to depressive symptoms. The mechanism for this increase and depressed mood? A psychological phenomenon known as “social comparison.”

I call it the “class reunion effect”: It's a natural tendency that we all have to compare ourselves with our peers or former classmates; and if they seem to be living wonderful, fulfilling lives and we happen to be in a bit of a rut, it makes us feel worse. On Facebook, it's the constant stream of “look-at-me!” vacation highlight reels and cute baby pics that can make a person already feeling down feel even more envious and blue.

According to the study's author, Mai-Ly Steers: “It doesn't mean Facebook causes depression, but the depressed feelings and lots of time on Facebook and comparing oneself to others tend to go hand in hand.”

For a 2014 study called “Facebook's Emotional Consequences: Why Facebook Causes a Decrease in Mood and Why People Still Use It,” published in 2014 in the journal Computers in Human Behavior, the researchers Tobias Greitmeyer and Christina Sagioglou, from the University of Innsbruck, in Austria, conducted three different studies with three different sets of participants.

Their first study showed that the longer people are actually on Facebook, the more negative their mood is afterward. The second study provided “casual evidence for this effect by showing that Facebook activity leads to a deterioration of mood compared to two different control groups.” As the experimental groups was instructed to spend time on Facebook, the control group was instructed to browse the Internet without going to any social media site.

Why do the researchers think that Facebook made people feel worse? They pointed to a reason other than just the previously mentioned “social comparison” affect: “It appears that, compared to browsing the Internet, Facebook is judged as less meaningful, less useful, and more of a waste of time, which then leads to a decrease in mood.” When the participants were asked afterward how they felt and how “meaningful” they felt their time spent online had been, the researchers found that “meaningfulness” directly correlated to mood.

According to Sagioglou: “The meaningfulness actually accounts for the mood effects. It's not surprising that if you do something you don't consider very meaningful, you're not in a good mood afterward.”

But if Facebook makes people feel like crap then why do they keep using it?

That was the $64,000 question that the third study attempted to answer. Contrary to their prior experiences, participants still indicated that they had the *expectation* that they would feel better after getting on Facebook- even though the opposite was true. The researchers called that “affective forecasting error.” It's similar to thinking, “Eating that chocolate cake is going to make me feel *great*!”- and then having the depressing post-cake reality hit.

In the addiction field, we know this phenomenon quite well. I would explain it this way: things that initially and *briefly* make us feel good- chocolate cake, Facebook, heroin- can tempt us because they are all dopaminergic and may have, once upon a time, felt good. So we focus more on that remembered short-term field-good dopamine surge that we may have experienced in the past. This is known as “euphoric recall”- and we tend not to consciously remember the less pleasant and more recent realities of our engagement with the formerly feel-good activity. From a neurological standpoint, we know that dopaminergic temptations can sometimes override the you-should-know-better rationality of our frontal cortex.

Indeed, recent research shows that Facebook can lead to social networking addiction; one recent study had participants who met all diagnostic criteria for substance addiction. In the 2014 study, conducted by the State University of New York at Albany, out of 253 undergraduate participants who completed a modified version of an assessment that measures for problem drinking, almost ten percent were found to have “disordered online social networking use”- a fancy way of saying that they had an addiction-like problem related to using Facebook. This included showing signs of withdrawal, craving and increased tolerance- all benchmarks of substance addiction.

I think that most reasonable people can understand the texting as a way to communicate and social media as a way to stay connected both have a place in our society. But if you want healthy and happy kids, it's vitally important that they have supportive, caring relationships with flesh-and-blood people in their lives.

If they absolutely must have Facebook accounts or phones with texting capability- although some parents now opt for non-texting “dumb” phones- at least wait until the children are further along developmentally and less likely to fall victim to tech addiction, Facebook depression or hyper texting. And even then, the research shows that closely monitoring your child's digital habits and virtual friends is critical in the new social media and texting landscape.

**Chapter 6: Clinical Disorder and the Glow Kids Effect**

**Electronic Screen Syndrome**

Dr. Victoria Dunkley has gone boldly where no child psychiatrist has gone before. Having worked with hundreds of kids with a variety of psychiatric, developmental and behavioral disorders, she realized something very profound: perhaps these disparate disorders had the same underlying cause. Maybe kids with ADHD, oppositional defiant disorder, sleep disorders, mood disorders like depression and bipolar disorder, or behavioral issues like aggression- even kids with autism- maybe they were all part of an underlying syndrome that presented itself in a variety of different clinical expressions.

As she looked at the data, she saw that visits for kids diagnosed with pediatric bipolar disorder had increased 40-fold from 1994 to 2003; that between 1980 and 2007 the diagnosis of ADHD had increased by nearly 800 percent, while prescriptions for psychotropic medications given to kids had sharply increased over the past two decades.

What was happening? Was this just a case of more awareness and, thus, more diagnosis, or are there really more psychiatrically distressed kids? And, if so, what might be causing these spikes in clinical cases? Dr. Dunckley wondered if there could be some common environmental stressor causing these epidemic increases. Perhaps, she reasoned, even if all of these disorders weren't being entirely *caused* by the environmental stressor, could they be getting amplified by a mitigating environmental factor?

As she looked over the child landscape trying to figure out what could have been the common denominator that kids had been getting exposed to, one thing glowingly stood out: screens.

The more that she looked at the problem, the more that she began to understand what she began to call electronic screen syndrome (ESS). Dr. Dunckley Came to believe that the unnaturally stimulating nature of an electronic screen, regardless of its content, wreaks havoc on the still- developing nervous system and mental health of a child on a variety of levels- cognitive, behavioral and emotional.

Many of the children I see suffer from sensory overload, lack of restorative sleep, and a hyperaroused nervous system, regardless of diagnosis… these children are impulsive, moody, and can't pay attention.”

In the past 14 years Dr. Doan has worked with teenagers with emotional, cognitive, behavioral or developmental issues. She had the opportunity to participate as the committee member in over one thousand Committee on Special Education (CSE) meetings for these various teenagers. And, like Dr. Dunchley, over the past seven or eight years, I also began to see a pattern- a connection- between many of those teens that had been classified with a disability and their addiction to screens- either video games, phones or social media.

**Screens and the ADHD Effect**

Six million kids have been diagnosed with ADHD. That's one in ten kids. What is going on? Some have attempted to explain away what has been called the ADHD epidemic by saying that the higher rates of diagnosis are just a function of more screening and more awareness about the disorder. Others disagree.

As Dr. Susan Linn, author of *Consuming Kids* and a lecturer in psychiatry at Harvard Medical School, puts it: “It's true that if you provide children with a screened device when you go on car trips, take public transportation, or go for their annual physical, the periods you spend waiting may be more restful or easier to manage. But such convenience comes at a cost. It fosters dependence on screens to get through a day, and prevents children from getting in the habit of noticing, and engaging with, the world around them.” Said another way, once kids have developed a taste for *Grand Theft Auto*, sitting down to do their algebra homework just doesn't cut it anymore.

“The reality is that we're seeing ten times more ADHD than we were seeing twenty years ago,” says Dr. Dimitri Christakis. “I think that the concern is that the pacing of the program, whether it's video games or TV, is overstimulating and contributes to attention problems.”

**Chapter 14: The Solution (Escaping Plato’s Cave)**

**Plato’s Cave**

Let's talk about the so-called real world.

Plato's most famous allegory, known as “the Myth of the Cave,” helps to give us a perspective about living in an illusion or living in reality. Plato asks (via) Socrates to imagine a cave, in which prisoners are kept. These prisoners have been in the cave since their childhood; they are all chained so that their legs and necks are immobile, and they are forced to look at a wall in front of them. That's all that they've ever known.

Behind the prisoners is a fire, in between the fire and the prisoners is a raised walkway. The people on the walkway are carrying various objects that cast shadows on the wall in front of the prisoners. But the poor prisoners can see only the flickering images, since they can't move their heads. So they assume that the images are real, rather than just shadows of what is truly real.

Then Socrates asks: what if one of the prisoners were to break free and turned to see the fire? Sure, the bright light might hurt his eyes, since he's been used to the shadows. But then he would realize that what he thought was real wasn't real at all, but only shadows of the real items on the walkway behind him.

Then, if the prisoner were taken out of the cave and brought outside, into the sunlight, what then? The bright light would be even more blinding and disorienting than the fire. But after his eyes adjusted, he would be able to see the world as it truly is: real trees, real grass. After learning of the reality of the world, the prisoner would understand how pathetic and blind his former fellow prisoners in the cave really are. But if he returned to the cave and tried to tell them of what he had seen and discovered, they would think he was crazy; they wouldn't be able to fathom or believe that there was a reality beyond the shadows. In fact, they would probably want to stay in the illusion of the cave. But the prisoner who had escaped and seen the light- and true reality- would be free from the illusion. He would be awakened.

Put another way, the prisoner is Neo, who eats the red pill and wakes up from the illusion of the Matrix.

Whether we're talking about ancient Greek philosophy or a contemporary sci-fi film, the problem is essentially the same as the solution: the protagonist has been living in an illusion and manages to escape the dream/nightmare.

In a sense, we've all been chewing on that illusion-maintaining blue pill, blurring and confusing the digital world with a fully awakened, real existence. You might say, “Of course I know that the things on my screens aren't ‘real’”- and that may be true. But are your devices hypnotizing you to the point that your actual flesh-and-blood life is suffering? Rather than tools, have your screens become your cage?

Unfortunately, we've lost a large number of kids and teens to the digital blue pill. They prefer the illusion of an entertaining glowing screen, often times complete with archetypal myths and fantasy that let them engage in some noble quest instead of doing their math homework or chores.

**Tech Addiction Treatment**

If we look at the similarities with other addictions, we've learned some things from roughly eighty years of addiction research and treatment. As we discussed with regard to Bruce Alexander's Rat Park research, the sad irony of addiction is that a person who feels alienated, disconnected and trapped-as if in a cage-seeks an escape, but then gets trapped worse than before by the even more daunting cage of addiction.

With kids and tech addiction, we can say that a kid who may feel disconnected and trapped finds a sense of connection and escape in screen life- only to get trapped in the Matrix. We get that; we can understand escapist tendency.

So what's the solution?

Well, two things. Rat Park taught us that the happier and more fulfilled the rat's life was, the less likely it was to drink the morphine water and become addicted. So from a preventative standpoint, a kid who has healthy human connections and healthy hobbies and outlets is less likely to fall into the Matrix.

But we also know that about 10 percent of people- including kids-are predisposed toward addiction. A child among that 10 percent, even one who has the best and most loving supports, may be more vulnerable to the Matrix once they taste digital drugs like hyperarousing video games and experience their addicting dopaminergic affect.

So what to do in those instances? A kid who may not have been aware that addiction runs in the family suddenly gets hooked on a video game- or becomes an addicted texter or Facebook addict. Then what?

Breaking free of an unhealthy relationship with tech is similar to breaking free of an eating disorder; unlike drugs and alcohol, from which one can abstain, food and, it can be argued, technology are unavoidable. Except for those who have gone entirely off the grid, we all inevitably interact with tech. The key is a healthy relationship with tech through a balance with real-life experiences.

But if a person has gone too deep into the e-cave, the absolute first step is a tech fast (otherwise known as digital detox); this is necessary before person can engage in healthy, moderate usage. We know from the field of addiction treatment that an addict- drug, digital or otherwise- needs to detox before any other kind of therapy can have any chance of being effective. That means a *full* detox- no computers, no smartphones, no tablets- nothing. The extreme digital detox even eliminates television. The prescribed amount of time is four to six weeks. That's the amount of time that is usually required for a hyper aroused nervous system to reset itself.

But we need to do that gradually, so we don't trigger any of the explosive behaviors that we see when addicts are detoxed cold turkey. So, for example, a kid who is online for seven hours a day needs to cut down at a rate of one hour per day. By the end of the week, he or she has been tapered to zero- abstinence. Once abstinent, the person remains screen-free for their prescribed four to six weeks.

Just as in drug detox, there will be a withdrawal period; the digitally detoxing kid- even with a sudden gradual taper- will go through a period of increased irritability, anxiety, depression and, perhaps, even some physical symptoms like head and stomach aches. These are all natural.

In traditional drug and alcohol rehabs, like the one that I run, we also understand that it takes some time away from the triggers and the addictive behavior to learn new and healthy ways to live- new healthy habits such as going to bed and waking up at regular hours; eating healthy meals consistently; doing some chores; developing healthy outlets. All of these things help build a sense of structure and self-confidence that are often lacking.

It's also critically important that kids who are digitally detoxing not just sit around and twiddle their thumbs. They need to get busy with new, fun things to do; they absolutely have to replace the old addictive screen behavior with something new. Maybe the child reconnects with a sport he or she used to play- or a musical instrument. Maybe the child journals the entire experience or gets involved in some other creative project, like painting a mural or writing music. Perhaps the child gets involved in some volunteer work. But new hobbies must be found, or old passions need to be rekindled.

I've worked with some of the most severely addicted drug users imaginable- self-destructive crystal meth and heroin addicts who seemed beyond any sort of help. One of my more challenging clients, who was slowly killing herself with her crystal meth addiction, had the most amazing and transformative experience when she took a slow, mindful beach walk and just experienced a spectacular sunset.

That's when what I like to call “the shift” can happen- the shift from the alienated, self-destructive and compulsive addict to the person who feels a deeper sense of connection with the universe and within him/herself. From these kinds of experiences, a genuine sense of purpose can emerge. Talk therapy is great, but there is something truly magical and potentially life changing when a disconnected kid connects with the natural world.

**Raising Awareness and Creating Social Change**

At the societal level, we've been asleep at the switch. Perhaps because we, as the adults have been seduced by technology and its shiny baubles, we've been willfully blind to the serious impacts that these glowing screens have on developing little brains.

As with Plato’s cave dweller or Neo in *The Matrix*, it's not just the tech addicted kids who need to awaken. We, the sleeping adults, need to open our eyes and wake up as well. On a grass roots and mass-media level, raising awareness about the dangers of screen tech is the key. The damaging virtual epidemic is spreading due to a lack of awareness among people and the media- even among mental health professionals. As a society, we are simply unaware of the research indicating that too-early tech use and excessive screen exposure can be damaging.