Alan Hu Foundation Mental Health Lecture Series

Dopamine Fasting: A Neuroscience Informed Approach to Compulsive Overconsumption in a Digital Age
Webinar with Anna Lembke, MD

Professor of Psychiatry at Stanford University School of Medicine and
Chief of the Stanford Addiction Medicine Dual Diagnosis Clinic
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[00:00:00]
CHIH-CHING HU: Hello everyone. Welcome to Alan Hu Foundation Mental Health Lecture Series. I'm Chih-Ching Hu, cofounder of Alan Hu Foundation and host for your webinar. Today, Dr. Anna Lembke will present "Dopamine Fasting: A Neuroscience-Informed Approach to Compulsive Overconsumption in a Digital Age".

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We'd like to thank Three Valleys Community Foundation for their generous grant to fund this webinar. We'd also like to thank the Mental Health Association for Chinese Communities for providing simultaneous Chinese interpretation. And thank you to Ida Shaw for Chinese interpretation.

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Alan Hu Foundation's mission is to promote mental health, raise awareness and remove stigma surrounding psychiatric disorders, and support fundamental research for cures. Please consider making a gift to Alan Hu Foundation by using the donation link in the chat box. Thank you for supporting our programs.

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Today it is our great honor and privilege to introduce Dr. Anna Lembke.

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Dr. Lembke is Professor of Psychiatry, Stanford University School of Medicine, and Chief of the Stanford Addiction Medicine Dual Diagnosis Clinic.

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Dr. Lembke's latest book, "Dopamine Nation: Finding Balance in the Age of Indulgence" was an instant New York Times and Los Angeles Times bestseller, and has been translated into 30 languages. It combines the neuroscience of addiction with the wisdom of recovery to explore the problem of overconsumption in a dopamine-overloaded world.

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In this talk, Dr. Lembke provides a practical, science-informed approach to addressing compulsive overconsumption of everything from food to sex, to video games.

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Following the presentation there will be a Q&A session. Please use the Zoom Q&A function to submit your questions. The presentation is for educational purposes only and is not intended for medical diagnoses. If you have any persistent symptoms please seek professional help.

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With that, I'm turning to Dr. Lembke. Welcome, Dr. Lembke.

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DR. ANNA LEMBKE: Thank you so much for having me. I am delighted to be here, and very, very honored. I know that you all have a lot of questions, so I am going to try to cover a lot of material in a short amount of time, and I hope that we'll have time for interactive questions at the end.

[00:02:58]
Can you all see my screen? I just want to make sure.

[00:03:01]
CHIH-CHING HU: I can see your screen now. Now it's in presentation mode.

[00:03:06]
DR. ANNA LEMBKE: Yes, perfect. All right, so these are my disclosures. I do not receive any funding fees, stock options, etc., from medical companies, but I have been retained as a medical expert witness in federal state and county opioid litigation against Purdue Pharma and others.

[00:03:23]
Here's what I want to cover in about the next 30 to 40 minutes. I want to talk about the Neuroscience of Pleasure and Pain, and what happens in our brains as we become addicted. Then I want to widen the lens and talk about what I think are some broader societal implications of what's happening in our brains with the compulsive over consumption of all of the rewarding substances and behaviors available to us now. And then finally, I want to talk about what we can do about it. I'm going to focus on what we as individuals and individual families can do about this problem, but that doesn't mean that it's just an individual problem. This is really very much a societal problem. I do think that addiction is the "modern plague", and one of the main problems that we'll be dealing with for the foreseeable future when it comes to mental health.

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Okay first of all, just to kind of lay out terms, what is addiction? Addiction is the continued compulsive use of a substance or behavior despite harm to self and/or others. There is no brain scan or blood test to diagnose addiction. It's based on phenomenology or observable patterns of behavior that repeat themselves across individuals from different demographic groups, different cultures, different temperaments, that are very indicative of a similar kind of phenomenon. It is a complex biopsychosocial disease, so that means there are biological risk factors, psychological risk factors, and environmental or social risk factors, and that when we intervene for addiction, we really need to intervene at all three of those touch points: biologically, psychologically, and socially or contextually. The good news is that it is a treatable disorder, and patients who actively engage in addiction treatment have the same kinds of response rates as people who have other chronic illnesses with the behavioral component, like type 2 diabetes, and major depressive disorder.

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So what I want to do now is reduce the Neuroscience of addiction into about the next 15 minutes, and I'm going to use an extended metaphor. But before I get to that, I want to talk about the brain's reward circuitry. So the identification of a dedicated reward circuitry in the human brain is one of the advances in Neuroscience in the past 50 to 75 years. Our brain reward circuit consists of the prefrontal cortex–that's the large gray matter area right behind our foreheads. That's so important for delayed gratification and appreciating future consequences. And this area kind of acts like the brakes on a car. Then we've got the nucleus accumbens and ventral tegmental areas. These are deep within the brain, they're rich in dopamine releasing neurons–I'll talk about dopamine in a second–and they act like the accelerator on the car. Addiction, or compulsive over consumption, is a problem of either too much of the accelerator, or too little of the brakes.

[00:06:31]
Dopamine is a human brain neurotransmitter. It was discovered in the 1950s. Neurotransmitters are chemicals

that we make in our brain that help us fine-tune the electrical circuits that make us who we are. So our brain is composed of different types of cells, but one of the main cells is the long, spindly, neuron. These are kind of like wires because they conduct an electrical circuit. And those wires don't actually touch end to end, there's a little space between them. That space is called the synapse, and that is where the neurotransmitters go back and forth to allow for fine-tuning of the electrical circuit. You might think of the pre synaptic neuron as the pitcher in a baseball game, the postsynaptic neuron is the catcher, the ball is dopamine or another neurotransmitter, and that catcher mitt is the postsynaptic receptor. That's important because what happens when we stimulate the brain with too much dopamine, the postsynaptic receptor involutes or that catcher takes his mitt and goes home. Dopamine has been identified as essential for the experience of pleasure, reward, and motivation. It's not the only neurotransmitter involved in that process, but it is the final common pathway for all reinforcing substances and behaviors.

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This slide is a summary of many different studies that have been done in rats and mice, looking at how different substances increase dopamine firing in the reward pathway. These are done by sticking a probe in a rat's brain right in the nucleus accumbens, and measuring dopamine levels. We're always releasing dopamine at a kind of baseline tonic rate, like the heartbeat of the brain, when we do something that's pleasurable or reinforcing or novel or just something that our brain says, "Hey pay attention to this. It's important for survival." Then temporarily, our dopamine firing increases above baseline. That feels good, and then that gets us to do that substance or behavior again and again. And you can see here in rats and mice, chocolate will increase dopamine firing 55% above baseline, sex 100%, nicotine 150%, cocaine 225%, and amphetamine 1000%. And indeed, if you put a rat in a cage and give that rat access to cocaine or amphetamine by pressing a lever, that rat will press that lever till exhaustion, or even death. How hard an organism is willing to work to get a particular drug is a good marker of whether or not that animal is addicted. This is somewhat artifactual because in fact cocaine and amphetamine release dopamine right into the synapse, whereas chocolate, sex, and nicotine release dopamine at the end of another complex chemical cascade. But nonetheless, you get the idea that the final common pathway of all reinforcing substances and behaviors is to release dopamine in the reward pathway. The more dopamine is released and the faster it's released, the more likely that substance is to be reinforcing or addictive.

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Now unfortunately, we don't have little rat and mouse smartphones that we can give to them to measure the addictive potential, which would be very nice. But we know that digital devices and digital media light up the same brain reward pathway as drugs and alcohol, and in fact, just recently a neuroscientist in France created this rig in order to see if rats and mice would get addicted to selfies, and it turns out that a rat will continue to press a lever to see a selfie of itself, beyond any other additional reinforcer, like a jolt of sugar. So they'll do it for the joy of seeing a selfie itself.

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Dopamine is a chemical in our brain that's also really important for movement. For example, Parkinson's disease is characterized by a decrease of dopamine in another part of the brain called the substantia nigra. Even the most primitive nematode will release dopamine in response to food in the environment, and the dopamine allows it to locomote, or move, toward the food. It's probably no coincidence that the same neurotransmitter that's essential for pleasure, reward, and motivation, is also important for movement, because for most of human history, we had to move in order to get the things we needed to survive. Today, that's no longer true. We can sit on the couch, swipe right and swipe left, and have it immediately delivered. It's also true that in the process of recovering from addiction, it's very important that we reincorporate movement and get the brain reconnected to the body, because so many of us now are living in this kind of supratentorial or disembodied state.

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Okay, so what happens in the brain as we become addicted? In order to understand that, it's essential to appreciate one of the most exciting findings in Neuroscience in the past 75 years. And that is that pleasure and pain are collocated in the brain. So the same parts of the brain that process pleasure also process pain, and they work like opposite sides of a balance. And we reflexively approach pleasure and avoid pain. We don't need to think about it. It's a very old and conserved brain mechanism. In fact, we have to think about not approaching pleasure, and we have to think about approaching pain. So, when we experience pleasure, our metaphorical balance tilts to the side of pleasure, and we release dopamine in the brain's reward pathway. But there are certain rules governing this balance, and the first and most important rule is that the balance wants to remain level. This is what neuroscientists call homeostasis. And with any deviation from that level position, either to pleasure or to pain, our brains will work very hard to restore a level balance.

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How do our brains do that? Well they do it first by tilting an equal and opposite amount to whatever the initial stimulus is. This is called neuro adaptation, and I like to think of that as these little neuro adaptation gremlins hopping on the pain side of the balance to bring it level again. But the gremlins like it on the balance, so they don't get off as soon as we're level. They stay on until we're tilted in equal and opposite amounts to the side of pain. That's the come down, the hangover, or that moment of craving; wanting to have one more piece of chocolate, watch one more YouTube video, take one more hit on a bomb. Now if we resist that urge, those gremlins get the message, hop off the pain side of the balance, and homeostasis is restored.

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But if we don't, and we continue to consume our drug of choice over days to weeks to months to years, those gremlins start to multiply. And pretty soon, they're camped out on the pain side of the balance, U-Hauls and barbecues in tow, and now we've entered into addicted brain. We've changed our hedonic or joy set point. Such that, now we need more of our drug and in more potent forms, not to get high, but just to level the balance and feel normal. And when we're not using, we're walking around with a balance tilted to the side of pain, experiencing the universal symptoms of withdrawal from any addictive substance, which are: anxiety, irritability, insomnia, depression, and craving. And this is why people with severe addiction will relapse even though they can objectively see that their lives are better. It's because they're in a state of painful craving. It also explains why people who repeatedly use highly reinforcing substances and behaviors will over time get depressed and anxious. And they will come in seeking help for depression and anxiety, they'll tell you that they can't enjoy other rewards, and the only thing that helps their depression and anxiety is their drug of choice. But what they don't realize is that although their drug of choice may temporarily return them to homeostasis and make them feel better, in fact, what they're doing by continuing to consume, is just multiplying more gremlins on the pain side of the balance, and change their capacity to experience pleasure in anything.

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To represent this graphically, if we go back to dopamine and the receptors, what happens with initial exposure to a reinforcing substance or behavior, is that dopamine levels increase above baseline followed by neuro adaptation, not just to baseline, but below baseline; a dopamine deficit state, and then go back up to our baseline level position. With repeated exposure to the same or similar reinforcer, that initial upward deflection, or pleasure, gets weaker and shorter in duration, but that after response to pain gets stronger and longer, and we can eventually end up in this chronic dopamine deficit state, which is akin to addiction, where now we're using to "self-medicate" depression and anxiety, and the more we use over time, the worse we feel, and we need more and more of our drug to have any effect at all, and we've lost the ability to take pleasure in other, more modest, rewards.

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This is a very famous study where the scientists took pictures of people's brains to measure levels of dopamine transmission. Here, red represents dopamine transmission. On the left hand side, you see the brains of healthy

control subjects,–this is specifically the nucleus accumbens–and you see there's plenty of red here, so good healthy dopamine transmission. On the right hand side, you have the brains of people who have used cocaine, methamphetamine, alcohol, and heroin, for long periods of time in heavy doses, and stopped two weeks prior to taking these pictures. And what you see is that there's very little red, or very little dopamine transmission. So these folks are in a dopamine deficit state, and they have been for a very long time, and even stopping two weeks prior is not yet enough to correct that dopamine deficit state, so that's important. Once those gremlins are camped out on the pain side of balance, it can take a long time for them to get off; it doesn't happen instantly.

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Okay, another rule of this pleasure-pain balance is that those gremlins can be triggered not just by the drug itself, but by reminders of the drug; What we sometimes refer to as people, places, and things. So for example, I've got my smartphone in my pocket, I said I wasn't going to use my smartphone because I was going to do something else, but all of a sudden I get a vibration in my pocket, and then that sets me up for a lot of craving to want to check my phone. So those notifications are a way that we can be put into a state of craving that makes it difficult not to go further and look at the phone, even though I really promised myself and others I wouldn't.

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What's going on here in the brain? This is a series of studies that was done, again, in mice and rats looking at dopamine levels. And these rats were taught to know that if they saw a light go on, then they could go and press a button or press a lever and they would get an injection of cocaine. Light equals cocaine, no light equals no cocaine. And then the scientists measured dopamine levels in the nucleus accumbens through this process, and what they found, not surprisingly, is that with an injection of cocaine dopamine levels increased.

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But what I want you to focus on here, is what happens to dopamine levels when the rat sees the light. You'll see that dopamine levels go up, even just by being reminded of our drug of choice. This is really important because it tells us we get a little bit high just anticipating the reward, or just thinking about the drug, or being reminded of the drug. And importantly, right after that, dopamine levels don't go back down a baseline, but go into a little mini dopamine deficit state. That is the state of craving which then makes it very difficult for me to resist the urge. I want to do it again, which is why when we're thinking about treating addiction or compulsive overconsumption, we have to think about creating barriers, not just between ourselves and the drug, but also ourselves and reminders of the drug, right, so we're not completely getting triggered all the time, to think about wanting to use.

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Also, if we expect a certain reward and we don't get it, that is a painful experience. You'll see this rat that was taught to anticipate that when he saw the light he could get cocaine. When he didn't get cocaine in that paradigm, dopamine levels went well below baseline. And that's of course what happens with things like social media, where we post something, we get a lot of reward, we get a flooding of dopamine validation. It feels good. We post something else, and we don't get that at all. And then dopamine levels go way down, putting us in an even more intense state of craving, where we're then going to spend even more time on social media, posting in order to bring those levels back up again.

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This is just to describe the importance of protecting children and adolescents from maladaptive coping strategies and dangerous substances, because from about age five to about age twenty, the brain is essentially cutting back or pruning the neurons we're not using, and myelinating, or making more efficient, the neurons that we use most often, so that by about age twenty-five, we have the neurological scaffolding that we will rely on for most of our adult lives.

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Here, red represents the number of neuronal connections and neurons, and you can see red decreases, or we cut back on neurons through adolescence. And blue here represents myelin–that's a protective sheath that goes on the neurons that makes them faster and more efficient–so by age twenty, it's mostly myelinated circuits with fewer, about 50% fewer, neuronal synapses than we have at age five.

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Okay, I want to widen the lens here, and just talk about a hypothesis, what I call the Plenty Paradox, which essentially states that overabundance itself is a stressor, and that we are individually and collectively bombarding our reward pathways with so much dopamine in almost everything today, and that we are putting ourselves into a dopamine deficit state that is contributing to symptoms of anxiety, depression, attention deficit disorder, etc.

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What do I mean by a druggified world? I mean we've taken traditional drugs, like cannabis, marijuana, opioids, cocaine, alcohol, nicotine, and we've made them more potent than they ever were before, releasing more dopamine all at once in the reward pathway. We also have drugs that didn't exist before. Novelty, we have quantity, we have more abundance of drugs. Tik Tok, for example, never runs out. It's literally infinite. And then we have access. One of the biggest risk factors for addiction is simple access. We often think about people having an addictive personality or being vulnerable to addiction, but really in today's world, we're all vulnerable because there's so much access to these highly reinforcing substances and behaviors.

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And this universal access I believe, is contributing to our current mental health crisis. We know that starting about 20 years ago, world happiness surveys showed that people were getting less and less happy, and that was happening most in the wealthiest countries of the world. We know that all over the world rates of depression and anxiety are going up, but they're going up fastest in the richest countries in the world, in the same countries where people have the most access to mental health treatment, suggesting that we are getting something fundamentally wrong about mental health.

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It's probably no coincidence that the advent of the smartphone in 2007 and the explosion of the amount of time we're spending on the internet, which is both a powerful tool and a potent drug, is contributing to our mental health crisis.

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And then finally, sadly we're seeing that suicide rates are for the first time in human history, or at least since human recorded history, are higher in wealthy nations compared to poorer nations. Again, the problem of the Plenty Paradox, or overabundance itself, as a stressor.

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So what to do about it? Again, I'm going to focus on sort of our clinical approach, which you can do in your own lives, or as a family, or with your children. We're coming out with a workbook this year. The official Dopamine Nation Workbook is coming out in October, which also provides a guide for people to go through these steps on their own. But essentially, we use a kind of framework that can be summarized by the dopamine acronym: data, objectives, problems, abstinence and aestheticism, mindfulness, insight, next steps, and experiment.

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So data is where we try to figure out what we're using, how much and how often. This is where we're just really

trying to figure out: what are the behaviors? And the strange thing about chasing dopamine is that we can very easily lose track of time, and minimize what we're actually doing. So by writing it down or telling another human being, whether it's how much cannabis, how much alcohol, how much nicotine, how many video games, how much pornography, how much social media, all of those things, we can record in terms of quantity and frequency. And then, that makes us more aware than we were before, and also potentially more motivated.

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This is just a chart that I put together–having seen people for many decades now–of the kinds of things that people can get addicted to. And you can see that it's a very wide selection of things, speaking again to the druggification, even things like exercise and games and human relationships, which we think of as a healthy source of dopamine, have become druggified in the modern world. People can get addicted to relationships, to other people, to love, to sex, to games, to exercise, to work. So it's a really hard time, in many ways, to be alive.

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Next, we ask patients why they use, and what they get out of it. These are some common reasons that people will endorse for why they initiated a certain substance or behavior. These can broadly be categorized into two groups: to have fun or to solve a problem.

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Then we ask people to talk about what are the problems that they can identify. And often, very young people won't identify any problems, right, it's their parents who have identified a problem, bringing them in for video games or social media or cannabis or whatever it is. But if the child has a positive therapeutic alliance with their parents, then we can identify that as a problem, and their desire to have a better relationship as a reasonable goal to work for. The other really important problem that people may not realize is that, over time, our drug of choice typically stops working, and can even turn on us, and do the opposite as those gremlins accumulate on the pain side of the balance. So we will talk to folks about the pleasure-pain balance, and how on the left hand side, initially, they get a big bump in terms of dopamine, but over time, it stops working; they can end up in this dopamine deficit state. And then, they're really struggling to enjoy other things and they're experiencing, you know, a lot of withdrawal when they're not using.

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The other thing that we actually do, is we then go to recommending that they abstain from their drug of choice for 30 days. Why 30 days? Because that's about the amount of time that people can sort of realistically say, "Okay, yeah. I can do that.". If we say, "Abstain for six months." or, "Abstain for a lifetime.", people are not going to be on board with that. It's like, "Hey, could you go for four weeks without playing video games?", or, "Could you go for four weeks without looking at pornography and masturbating?", or, "Could you go for four weeks without using cannabis?" And many people will say, "Yeah, I can do that. I can give that a try."

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Now, why do we want them to do that? Because we want them to see that if they wait long enough, without using their drug of choice, those gremlins will eventually hop off the pain side of the balance and homeostasis will be restored, which allows them to then take pleasure in other more modest rewards, like watching a sunset, getting together with friends, playing a board game, things that we lose the capacity to enjoy when we're chasing highly rewarding substances and behaviors. It also really promotes insight. So folks who come in and say, "Well, I smoke marijuana because I'm depressed." After they stop for a month, they realize, "Oh, gee whiz! Like, I thought it was helping my depression, but now I can see and feel that it was actually making it worse because I feel so much better after stopping." It's really important when we invite people into this experiment that we tell them they're going to feel worse before they feel better. So if you think about that pleasure-pain balance, when we take away the reward, all those gremlins that have been accumulating on the pain side of the balance smash to the pain side, and people get withdrawal. And again, what are the universal symptoms of withdrawal? They

are anxiety, irritability, insomnia, depression, and craving. But we warn them that they'll feel worse before they feel better. It will last about ten to fourteen days, and if they can just get over the hump by weeks three and four, they will feel substantially better.

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This is just a very important study that I wanted to share with you that most people don't know about. A group of adult males who met criteria for major depression and alcohol addiction were put into a psychiatric hospital, where they could not have access to alcohol, but they also didn't get any treatment for depression. At the end of those four weeks, 80% of those individuals no longer met criteria for depression. So just by stopping drinking, 80% had complete resolution of their depressive symptoms, again indicating the ways in which addictive behaviors and intoxicants can–although they initially seem to relieve pain and elevate mood over time–actually make those symptoms worse.

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We talk about self-binding with patients. This is: ways to create barriers between ourselves and our drug of choice, and also between ourselves and reminders of our drug of choice. And there are many different ways to do it. It's important to do this because willpower is a limited resource, and if we just rely on willpower in a world that's constantly inviting us to consume, we're not going to be successful. So this is things like, getting rid of the gaming devices, right, and getting a laptop that doesn't have games on it, or deleting apps from our phone, or thinking intentionally about not using digital media for entertainment, or to change the way I feel, right, but instead using it as a tool, practicing radical honesty; that's where we actually prescribe to patients that they can't tell a single lie in the month they're doing the dopamine fast. Lying, we've learned, is part and parcel of the process of addiction, and if they have to be honest about what they're consuming, they're maybe going to think twice about whether they want to consume it. Doing this together with other people, accountability buddies, doing it as a family, or an Alcoholics Anonymous, or other 12-step groups, or faith-based organizations, can be helpful.

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And then we also have medications that can help with repetitive control in more severe cases. This is where the aestheticism comes in. So we actually prescribe aestheticism, or what we call hormesis. Hormesis is a Greek word. It means to set in motion, and it's the science of how by exposing ourselves to mild to moderate doses of toxic or noxious stimuli, we actually can get our dopamine indirectly by paying for it up front. So when we intentionally press on the pain side of the balance, those gremlins will hop over on the pleasure side and we will get our dopamine fix, or our dopamine hit, by that initial painful exposure. These are things like exercise, ice cold water immersion, intermittent fasting. Even things like meditation and prayer can serve this function.

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This is a graphic representation from some studies that have been done with exercise and ice cold water immersion, showing that once the exercise starts, there's no spike in dopamine unlike with intoxicants, but there's a gradual increase in dopamine levels over the latter half of the activity. And then dopamine levels, and serotonin, and norepinephrine, etc., stay elevated for hours afterwards, before going back down to baseline levels. Notably, there's no dopamine deficit state. So we don't get in that state of craving.

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Here are some examples that have been studied, but also, that patients have reported to me over the years, which they find difficult to do, but when they do, they find that they feel better. You'll notice that many of these activities are quite ordinary activities unplugged. So, speaking to the importance of decreasing the sensory stimulation, and giving our brains a chance to rest. Initially, because we're so over-stimulated, it can be really scary to do things in silence. But it can be very good for our brains.

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I will say that when we're talking about aestheticism or hormesis as a way to get dopamine indirectly, we're talking about the right size and the right kind of pain. We don't want people cutting on ourselves. Cutting actually works at first because the body senses injury and releases our endogenous opioids, and we get high from that. But very quickly, we build up tolerance and we deplete our neurotransmitter system, and it doesn't work. Furthermore, you know, we're actually cutting on ourselves, which is not healthy. So that's not what we're talking about here. We're talking about healthy and adaptive forms of hormesis, or exposing ourselves to difficult, challenging, experiences.

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In some rare instances, people can actually get addicted to pain. So for example, over exercising, or people who get addicted to exercise. The intervention there is to have them abstain from that type of exercise for four weeks as a way to reset reward pathways. Just anecdotally in the neuroscience literature, scientists used to think that these running wheels were just a way to measure locomotion in rats and mice. But pretty soon, they discovered there were some rats and mice who actually got addicted to running wheels, and would run on these running wheels till exhaustion or death. Just speaking to the ways in which something as seemingly simple as a running wheel, is actually kind of a way to druggify movement, right, and we have many different machines now, plus social media combined with exercise, and all of those things that can make these ventures more addictive.

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"M" is about mindfulness. Mindfulness is our ability to observe our thoughts and feelings without judgment, but also without running away from them. And when we abstain from our drug of choice, it's a great opportunity to practice mindfulness because we're not reaching for Tik Tok, you know, to change the way we feel. We're learning to just sort of rest in, and observe our emotions, allowing us to connect to our minds, connect to our bodies, get more comfortable with ourselves, and tolerate a certain amount of distress.

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Dealing with boredom and other painful emotions is a very challenging thing for modern people because we have so many ways to distract ourselves from ourselves.

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Insight is part of this experience of the dopamine fast. Again, I've had many patients over the years who come back after four weeks if they are able to abstain. They have a real "aha" moment, this kind of realization, "Oh my goodness! I thought that spending all that time on social media wasn't really affecting my mental health, but now that I stopped, I feel so much better and I wouldn't have known without stopping!" That's just one of many examples.

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Then we kind of do a pros and cons list; what was good about the dopamine fast and what was bad about the dopamine fast. People can usually generate a long list of what was good about taking a break from their drug of choice. "I had more time to be with friends and family. I was more present. I got more done. I feel physically healthier, less depressed, less anxious." On the what was bad about the dopamine fast, the top two are, "I was bored, like, I had all this time I didn't know what to do," and "I couldn't hang out with my friends because all my friends are on Discord playing video games. It's how I socialize, and I couldn't be with my friends." So we just validate that, and talk about kind of, "Yeah that's hard." You know. But on the other hand, is it worth it? It might even be worth it because you feel so much better.

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This is just noting that for a long time in the field of addiction medicine, there was this idea that abstinence was the only goal for people with addiction, but we're finding more and more that moderation is a reasonable

goal for some people, and data showing that people who for example, are addicted to alcohol after a period of absence, some are able to return to using less alcohol in moderation, and that it's healthy for them. And we're having more and more data coming out showing that people can reduce their cannabis use to five days or less per week, they will have improvements in symptoms of depression, anxiety, etc.

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So once people have done the dopamine fast, they've gathered the data, they've done their pros and cons list, then they decide: do I want to continue to abstain or do I want to go back to using? Many people will want to go back to using, but they'll want to use differently, they'll want to use less. And then here, What's very important is creating a very specific plan for what that's going to look like. So it can't be sort of vague, "Oh yeah, I'm going to go back to playing video games, but I'm going to, you know, I'm going to play less." Like no, let's come up with a plan. When are you going to play? How many hours a day? Which days of the week? What video games are you going to play? What are going to be red flags for you that you're getting back into this kind of compulsive overuse?

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I want to end by just saying, again, that this is not just a problem for individuals and individual families, although mainly families are left to deal with, especially the problems of digital media. This is something that really, we as an entire society, and frankly a world, are having to deal with. Schools and communities have to really step up. I think that schools should ban smartphones. I don't think that they allow teachers to teach, and students to learn. I think it needs to be a top-down process of not allowing smartphones during schooltime hours. If people need some kind of phone they can get a light phone or a flip phone. Corporations that make profit from digital drugs need to come to the table to help set up guard rails to protect, especially our children. And the government needs to enact laws and legislation, that again, help us create these kinds of guardrails. We have all kinds of guardrails for other drugs, right. We don't let kids go into casinos and gamble. We don't let kids buy cigarettes or buy alcohol until a certain age.

[00:38:37]
So we have to implement this for digital media as well, so limiting access. The Chinese government, for example, has limited access for kids to video games, and actually, made corporations responsible for creating the technology that will enforce that access. The state of Louisiana and others have limited access for kids to pornography. Again, this is "Low hanging fruit: No smartphones in schools". The schools that have done this talk about how their schools are noisy again because kids are actually talking to each other, as opposed to just getting lost in their devices.

[00:39:11]
And again, the corporations need to modify the most addictive design elements. Things like the treasure chests, the constant notifications, the rankings, the tracking, the pushed advertisement.

[00:39:26]
I hope that I've communicated to you these three themes: the pleasure-pain balance: what goes up must come down, the Plenty Paradox: that the pursuit of pleasure for its own sake can lead to pain and may be contributing to our mental health crisis, and that we as individuals and individual families can try to abstain, maintain, and even seek out pain as a way to reset our reward pathways.

[00:39:50]
I invite you to try a 24-hour phone free challenge, either on your own, with a friend, or as a whole family, where you would go on a digital fast. That is, don't touch your phone or any other device for 24 hours. Prepare for it in advance by setting a time and going cold turkey and anticipating that it will be hard, that you will experience those universal symptoms of withdrawal. When you get cravings to use, try hormesis, take a cold bath, do 20 sit-

ups, organize your closet, something more painful than the pain of withdrawal as a way to alleviate the craving. And then when the fast is over, be really thoughtful of how you want to reintegrate it back into your life.

[00:40:29]
I'm really excited to take your questions. Thank you so much.

[00:40:34]
CHIH-CHING HU: Thank you so much Dr. Lembke for the wonderful presentation. Now we will open up to the Q&A. First question: can we talk about your experience with the Purdue case?

[00:40:52]
DR. ANNA LEMBKE: Sure. I mean, that's a long, probably outside the scope of this webinar, but, I have been retained as a medical expert witness in litigation against Purdue Pharma, the makers of oxycontin, as well as others in the opioid pharmaceutical industry, as a way to write the wrongs of the oversupply of opioids that led to the North American opioid epidemic.

[00:41:23]
CHIH-CHING HU: Okay. Next question. What about chronicle listening to music of teens? Does that do anything in regard to this psycho or is it unrelated?

[00:41:35]
DR. ANNA LEMBKE: Yeah. So you know, music is a powerful, potent stimulus that releases dopamine and the reward pathway and in general, you know, making music and listening to music is a positive thing, but, I think there is some danger of the constant listening, and constant music, and the way that might actually be over stimulating our brains. For example, I had a young Stanford undergraduate who was my patient who came in for anxiety and depression who described, and I talk about her in my book, how she was constantly listening to something every waking hour, whatever she was doing, walking to class, coming back from class, brushing her teeth, getting ready for bed, she was always listening. And I suggested to her that she might try to cut that out for a period of time, and she was horrified. She was like, "But why would I want to do that?" And I said, "Well, I just think that if you can spend some time not constantly processing these external stimuli, you might, you know, get in more touch with yourself." And so she gave it a try, to her credit, and she came back and said, "Oh, Dr. Lembke, while I was walking to class, for the first time I just started to notice the trees." So again, this wanting to really promote a feeling of connectedness with ourselves, other people, the environment, which a lot of us don't have now because we're constantly in this place of extreme stimulation.

[00:43:05]
CHIH-CHING HU: You said like one month is a good amount of fasting to help you get regulated. What if we fast like one time per week, like a no phone kind of thing. Would that do anything, or not really give the physiology?

[00:43:22]
DR. ANNA LEMBKE: Yeah, so I think that's a great thing to try. You know, as you saw at the end, I actually recommend less than a week. Just go for 24 hours. Go for 24 hours and don't touch or look at a single digital device. One of the things that we can learn from that is how hard it actually is, and how much we have intrusive thoughts that rationalize why: "I really need to get on my device right now, I really do. I can't wait 24 hours." I mean, that's what people with addiction to heroin experience right, like, "I really need to get some heroin. I can't wait another day." And I think, you know, it can give us a lot of empathy for just the whole phenomenology of addiction. It's probably not enough time to reset reward pathways, but it's enough of a window to realize how mentally we are preoccupied we actually are with our devices.

[00:44:10]

CHIH-CHING HU: How do you help a kid who has autism or ADHD who tends to get obsessed with playing video games or watching sports?

[00:44:22]
DR. ANNA LEMBKE: Yeah, so, you know, I've had a lot of queries over the years about how kids with autism might be different, and how they may need more digital connection because of their autism. I would just emphasize, again, when we're using these devices as tools, that's great. When we're using them as drugs, it's not so good. So the intervention with a kid with autism or ADHD is really the same as the intervention for a kid without autism, or a kid without ADHD. And, you know, this brain mechanism and the kind of dopamine overload happens for everybody. And, when we take these devices away, or limit them from kids, they will get dysregulated, right, and that's part of the withdrawal phenomenon. And a kid with autism, especially a kid who doesn't have speech, might even get more dysregulated, but I still think it's worthwhile doing, holding them in a safe container, and watching over time how as they go through the withdrawal they come out the other side, and are feeling a lot better.

[00:45:29]
CHIH-CHING HU: Is there such a thing as an addictive personality? How can one stop getting addicted to another substance?

[00:45:40]
DR. ANNA LEMBKE: Yeah. So addictive personality is a term that we don't really use anymore, but refers to this idea of some people who are just really vulnerable to addiction. And it is true that we come into the world with different degrees of vulnerability to addiction. About 50 to 60% of the risk of getting a severe addictive disorder is genetic, or inborn, and may have something to do with how we respond to rewards, may have something to do with baseline dopamine levels being lower, may may have something to do with trait impulsivity, or inability to press the pause button between desire and and acting on that thought or feeling. So that is true.There are people who come in who are more vulnerable.

[00:46:32]
CHIH-CHING HU: Is there any research on the amount of screen time that children can experience without increasing symptoms of addiction and/or anxiety?

[00:46:43]
DR. ANNA LEMBKE: So there's a lot of correlative research showing that the more time kids spend online and on screens, the more likely they are to suffer mental health consequences, like ADHD, depression, and anxiety. But unfortunately, we don't yet have a specific amount where we can say, "Okay, it's X number of hours per day, or per week, and beyond that, you know, you're fine." So we don't. We just don't have that data. I would just say in the clinic, we see the most severe cases. We see the kids who really get totally caught up, in this can't get off, are depressed or anxious. A lot of times, you know, the question is kind of a chicken and an egg question. Well, did they get depressed and anxious because they were spending all this time online, or were they depressed and anxious, which then made them want to spend more time online? I think both things are true, but I can tell you that clinically, I do strongly believe that the causality is that the online screen time can cause the depression, anxiety, or at least exacerbate it. Because when we do the dopamine fast, and kids stop for long enough, they almost universally feel better, which tells me that it is this consumption of digital media that is usurping their reward pathway, and leading to this dopamine deficit state. I wish I could tell you a specific amount. I personally recommend that for kids under the age of 12, that they not use more than about, you know, two to four hours a week, and that it be carefully supervised, and that kids not have their own devices, and if they are going to have devices, that those devices don't have unlimited access to the internet. Now I know a lot of parents out there are probably going, "Oh my gosh, my kids already doing a lot more than that!" Don't freak out. But, you might sit down as a family and talk about how much time your child, and you, are spending on your device,

and whether or not you as a family want to try changing that. When kids get to be teenagers, they're going to do what they're going to do, and even if you put in limits, they can find workarounds. So that's when I really recommend very open discussions about how we're using our devices, the pros and cons, what we as parents observe in our kids when they spend a lot of time on their screens, how they're sort of more irritable, less helpful around the house, how their social skills become sort of antisocial when they're on their devices a lot, and really just acknowledging, you know, that it's a challenge for all of us, and that we have to help each other.

[00:49:19]
CHIH-CHING HU: Next question. How can we integrate this in therapy sessions with clients?

[00:49:25]
DR. ANNA LEMBKE: Yeah, so thanks for that. I think this is, you know, dopamine fasting is something that's really integratable with clients. And you don't need a lot of overhead to do it. I think when we're thinking about compulsive overconsumption or addiction, we're thinking, "Oh, they need to go to the Betty Ford Clinic." But really, there are a lot of people struggling with this, who could really benefit from an intervention. And I would go through that DOPAMINE acronym–again, we're coming out with a workbook. That workbook is designed for therapists and clients to work through together–going right through the DOPAMINE acronym, and then trying the dopamine fast, preparing for it, trying for it, doing that pros and cons list, and then making a specific plan for how to re-enter into using, or continue to abstain, whatever that person decides to do.

[00:50:15]
CHIH-CHING HU: Okay. Can dopamine help with eating disorders, such as binge eating?

[00:50:22]
DR. ANNA LEMBKE: Yeah. So we use the addiction lens now, for quite a few eating disorders very successfully. So binge eating disorder, food addiction, more broadly, and also bulimia: binging and purging. We find that the addiction framework lends itself really well to working with these specific problems, noting that our food supply has become druggified with the addition of fat, sugar, salts, and flavorants. Once we start eating certain foods it's very hard to stop. So when we think about the dopamine fast with a food addiction, what we talk about is, obviously that we're not going to, it's not that we're going to stop eating for a month. That would not be good. But, we create a bullseye or a target where our addictive foods would be right in the middle. That's things like sugar processed foods, or whatever that person identifies as their compulsive foods. And those things would be the things that we would then fast from for 30 days. The middle circle sort of triggers for that food. Maybe watching food network shows, or cooking shows, which can trigger the appetite. So maybe we would also abstain from watching food shows for 30 days. And then that outer circle of the bullseye is the healthy kinds of foods that we want to eat. So, fruits, vegetables, non processed foods, and how we can be more likely to make that happen. So that's how we intervene with foods. It's very similar with digital media, again, identifying what are the digital products that are addictive, what are the triggers that make us more likely to engage with that, and then, what are the healthy uses of digital media. When it comes to bulimia nervosa, what we're basically talking about is the binge purge. So, it relates to avoiding sugar and processed foods, because that's what causes the binge, but also it specifically relates to 30 days of not making ourselves vomit. And just acknowledging how there's a lot of craving to do that, people get real anxious, and, you know, are in withdrawal and want to purge, but again, if they can get through the first 10 to 14 days it all gets easier.

[00:52:30]
CHIH-CHING HU: How does this therapy compare for efficacy to psychotropic medications?

[00:00:00]
DR. ANNA LEMBKE: Yeah. So there are many paths to the top of this mountain. The mountain of, you know, getting well and leading a flourishing life. And, medications can be a very important tool, you know, in healing.

So it's not one or the other. But, I do think that psychotropics are often overprescribed. Especially, I worry about addictive psychotropics like benzodiazepines, like Xanax, opioids, addictive stimulants. So I always like to intervene first behaviorally, or with psychotherapy, and only then turn to medications as an adjunct.

[00:53:19]
CHIH-CHING HU: Would stalking celebrities be under the heading of a dopamine addiction?

[00:53:28]
DR. ANNA LEMBKE: I'm sorry. Can you say that again?

[00:53:31]
CHIH-CHING HU: Would stalking celebrities be under the heading of a dopamine addiction?

[00:53:36]
DR. ANNA LEMBKE: Yeah. I think this kind of obsessive, what they almost call parasocial relationships, or, you know, obsessive time thinking about, like BTS, you know, Korean boy band, or any of those celebrities where people spend enormous amounts of time following them, watching their videos, watching interviews. That can definitely be very addictive, and so, that would fit into that category.

[00:54:08]
CHIH-CHING HU: Okay. How much does social media contribute to the general increase in mental health problems in society?

[00:54:16]
DR. ANNA LEMBKE: I think that social media has been a major contributor to the growing mental health crisis on many levels. First again, continued consumption of social media, I think physiologically, makes us depressed and anxious by contributing to this dopamine deficit state. You also have the problem of these invidious comparisons. We're now comparing ourselves not just to our siblings, or our neighbors, or our classmates. We're comparing ourselves to the whole world. And so being on social media can invariably make people feel that they're just not measuring up, that they're less than, that everybody else is so much cooler and smarter and more beautiful than they are. So, that contributes to anxiety and depression. Plus, you have the kind of evil bullying that can happen online, that can contribute to anxiety and depression, so I think it's really pernicious and dangerous. It doesn't mean that it has no social value. I mean, it's wonderful; the way that people can make positive connections across great distances, you know, like the meeting that we're having now. So there's a lot of good utility, but there's definitely this dark side. It's not a matter of getting rid of all of social media. It's how we can create guardrails for our children and have a healthier relationship with technology.

[00:55:34]
CHIH-CHING HU: Okay. How long before going to sleep at night should we and our kids really focus on reducing dopamine inducing activities?

[00:55:46]
DR. ANNA LEMBKE: Yeah, I think that's a really important thing, because what happens when we start chasing dopamine at night, when we're tired and our willpower is is at its lowest, is that we can then overstimulate ourselves and get ourselves out of our normal circadian rhythm, where we're no longer feeling tired, and then we end up staying up later and later. I mean, I have this with my teenage son. We have this discussion often, you know, he comes home at the end of a long day, he's tired, he wants to unwind, he gets on YouTube, you know, that's relaxing and enjoyable for him, he can escape. And then, pretty soon, you know, I'm waking up at midnight or one in the morning, and he's still on YouTube. So, lots of discussions about: how did that happen? That wasn't your intention. I know you were planning to go to bed at 10 p.m. to do your work. How is it that you were still up

at midnight? You know, on YouTube. What do you think's going on in your brain? How did you feel the next day? What kind of guard rails can we put in place to help you not do that again? How can I be helpful? So again, just a kind of an empathic acknowledgement of the difficulty of this situation, and how we can collectively help each other. In our house, what I will often do is, I will say, "I'm going to go to bed now. Do you want me to wait until you're ready to go to bed? And so, we can kind of turn off the devices and go to bed at the same time. Will that help you get into bed?" Again, just as like an open acknowledgement. Like, this is hard. This is really, really hard. And we're all struggling.

[00:57:15]
CHIH-CHING HU: What is the best way to bring up dopamine addiction to teens, and to make dopamine fasting desirable to them?

[00:57:25]
DR. ANNA LEMBKE: Yeah, so I think my book, "Dopamine Nation: Finding Balance in the Age of Indulgence", although it does have material in it that is quite adult, teenagers now are exposed to so much stuff that we can't even imagine from when we were kids. They've got more information trying to figure out how to process. So I do think "Dopamine Nation", the book, which is available in many high school libraries, is appropriate. We're coming out with this workbook which is much more appropriate for younger kids. So I think that is helpful. There are some online videos that fans of my book, "Dopamine Nation", have made, that are super appropriate for kids, that kind of show graphically what happens with dopamine. And so, you might look at those, just like "Dopamine Nation". If you YouTube "Dopamine Nation" videos, you can probably find those, and even just yourself, educating yourself, like you've done coming to the seminar, and then just having a family discussion, having an open discussion acknowledging your own difficulty with digital media, reflecting back to your child; what you observe about their consumption of digital media, what you're concerned about, what you might do as a parent and as a family to get a healthier relationship with the technology.

[00:58:38]
CHIH-CHING HU: Okay, Dr. Lembke, we have one more minute. Maybe we have two to three questions more. Can something as a positive as reading also lead to dopamine overflow?

[00:58:53]
DR. ANNA LEMBKE: Yeah. So, I mean, in my book, "Dopamine Nation", I actually talked about how I got addicted to romance novels. Even the novel has become druggified. You know that people know exactly how to write them so that they're page turners, But in general, I would say if you've got a child who is a, you know, a reader, that's primarily good as long as it's not cutting into their sleep and cutting into their exercise. I still think that reading, which is a dying art by the way, you know, if they're reading the right kinds of things, and again it's not cutting into sleep and self-care, is still generally healthy. My own reading addiction notwithstanding.

[00:59:35]
CHIH-CHING HU: Okay. Are there support groups for families that are going to try dopamine fasting?

[00:59:42]
DR. ANNA LEMBKE: Yeah. So there are more and more support groups that are emerging for this, modeled on the 12 steps of Alcoholics Anonymous. I will refer you to a support group called "Internet and Technology Addicts Anonymous (ITAA)". So if you Google "Internet and Technology Addicts Anonymous", they have a whole website. They have meetings. They're a really awesome organization, and they directly address this kind of, you know, sort of digital overload, and what to do about it.

[01:00:16]
CHIH-CHING HU: Okay. Last question. In the sense of dopamine as a currency, what would be an AI boyfriend

and an AI girlfriend's percentage? Is there any research about that?

[01:00:30]
DR. ANNA LEMBKE: You mean how much an AI girlfriend might be triggering the dopamine reward pathways?

[01:00:35]
CHIH-CHING HU: Yes.

[01:00:37]
DR. ANNA LEMBKE: Yeah. So I think AI girlfriends and boyfriends or social media in general is a really potent example of how we've druggified human connection. So, when we make a deep and meaningful and positive human connection that releases oxytocin, our love hormone, and oxytocin binds to dopamine, releasing hormones in the reward pathway. We get dopamine, it feels good. Falling in love feels good. And that's why we want to do it, right? That's how we evolve to make us, you know, mate, so that we would propagate the species. But what AI girlfriends and boyfriends and social media have done, is essentially, crystallized human connection down into their most addictive forms. With very little upfront work, right, and very little need to negotiate other people's needs. We can now control and manipulate this highly reinforcing love relationship, and that is really not healthy.

[01:01:38]
CHIH-CHING HU: Okay. Thank you so much, Dr. Lembke, for sharing your knowledge. It's a great concept with us today, and thank you to everyone for joining our webinar, and we hope to see you again in the next webinar. Please help take a moment to fill out a short survey. Your input is critical for us to write a grand report, and I will leave the donation QR code for a few more minutes. And thank you for donating to support our programs. And with that, I'm closing the webinar. Thank you Dr. Lembke.

[01:02:13]
DR. ANNA LEMBKE: You're very welcome. It was my pleasure. Take good care everybody.

[01:02:17]
CHIH-CHING HU: Take care. Thanks everyone, and take care, and stay well. Thank you. Goodbye.