AMENDED Exhibit 359

PLAINTIFFS' OMNIBUS OPPOSITION TO DEFENDANTS' MOTIONS FOR SUMMARY JUDGMENT

Facebook "Addiction"

- What the media says
- What the research says
- Where we go from here

What is the issue?

There is growing concern in the public that technology companies are deliberately manipulating users by designing addictive products that can harm our well-being and subvert our efforts at self-control.

Technology

Addicted to posting on Facebook? Blame your brain

FACEBOOK, TWITTER, COCAINE: DOES SOCIAL MEDIA REALLY HAVE SIMILAR EFFECT ON US AS ADDICTIVE DRUGS?

Facebook Addiction' Activates Same Brain Areas As Drugs; How Social Media Sites Hook You In

Live Science › Culture

What Facebook Addiction Looks Like in the Brain

Headlines frequently reference the concept of addiction with respect to Facebook and social media

The media narrative likens Facebook to a drug of abuse, implying that it is similarly addictive.

"Social media triggers a dopamine high"

There are also claims that Facebook is like a drug dealer, where the goal is to get people "hooked."

"Facebook is a drug dealer... the drug in question is dopamine"

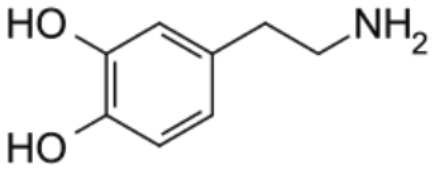
Let's cut through some of the noise

1. Obviously Facebook isn't a drug.
2. There is no medically established diagnosis of Facebook addiction.
3. But – is there some truth here?

To understand and respond to these claims, we first need to understand:

WHAT IS ADDICTION?

WHAT IS DOPAMINE?

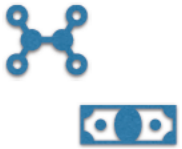


WHAT IS OUR ROLE?

How can we understand clinical addiction in the context of Facebook use?

Clinical addiction defined

- **Addiction is a primary, chronic disease where a substance or behavior is pursued pathologically.**
  It is life-impairing and causes significant psychological distress.



- **Current medical diagnoses apply only to substances or gambling.**
  There are 9 defined categories of abusable substances (e.g., stimulants).
  Gambling is a recently defined behavioral addiction, as of 2013.

- **Addiction involves a broad set of changes to brain circuitry underlying reward, stress, and self-control.**
  The major brain change is that the dopamine system becomes less sensitive.

What might a "Facebook addiction" look like?

Note there is NO approved clinical definition

PREOCCUPYING THOUGHTS	OVERWHELMING BEHAVIOR	LIFE IMPAIRMENT *as a direct result
Thoughts about FB use are excessive, absorbing, and irresistible.	Drive to use FB is extremely strong, despite desire and/ or attempts to stop. Other interests are neglected in favor of FB use. Use continues despite these problems.	FB use has caused significant negative impacts on important areas of life functioning, e.g., loss of job or relationships.

"Facebook addiction" related concepts

Note there is NO approved clinical definition

"TOLERANCE"	"WITHDRAWAL"	MOOD ESCAPE
Need to use FB for longer (higher "dose") to get same feelings of excitement	Negative feelings like irritability, anxiety, sadness, or anger result from not using FB.	FB is used to relieve certain moods, like depression or anxiety (that are unrelated to withdrawal feelings)

What would NOT constitute "Facebook addiction"

Based on proposed clinical criteria for Internet Gaming Disorder

Excessive use	Using more that you like/ feeling guilty about use	Feeling "out of control"
Excessive use may be a necessary, *but not sufficient*, criterion A proposed threshold of >3 months of >6 hours per day of non work-related internet use would still not be diagnostic on its own	This is a personal judgment call and not a sign of a disorder, unless the negative feelings are causing significant distress	Unless these are persistent feelings *plus* having failed attempts to stop

Since Facebook addiction isn't a medical diagnosis (yet), does this mean there isn't a problem?

Within certain populations (e.g., U.S. college students), **up to 30% of people report "problematic" FB use behaviors**. International prevalence estimates of internet addiction range from 0.3-25%.

However, prevalence estimates of Facebook problems or addiction symptoms are hard to interpret because of the varying definitions and measurement methods used.
Clearly more consensus around the clinical definitions/ cut-offs is needed.

- Even if *most* people's behavior isn't at the level of clinical concern, many people may have subthreshold symptoms and could benefit from support to regulate their Facebook use

- There may also be some people with a real, impairing, and distressing problem with their Facebook use that could constitute a psychiatric disorder. We just haven't talked to them yet.

Doesn't Facebook activate dopamine?
That sounds like a powerful chemical, like a drug

Dopamine has been linked to technology "high," "addiction," "getting hooked," and "wanting more"

But of course it's much more complicated

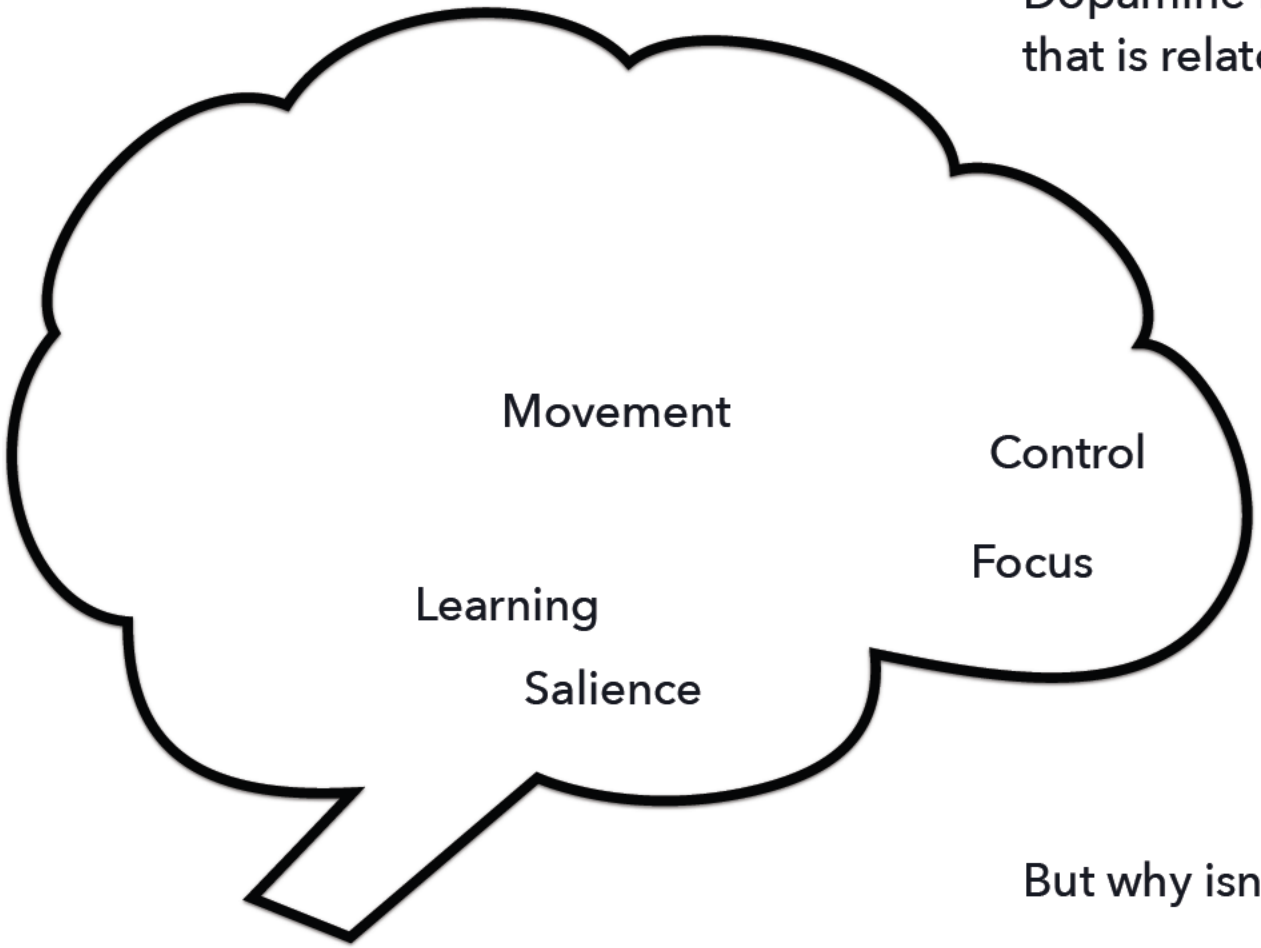
A fair headline from *The Guardian*:

> **The unsexy truth about dopamine**
>
> Dopamine might be the media's neurotransmitter of choice for scare stories about addiction, but the reality is rather more nuanced

What is dopamine? How is it related to addiction?

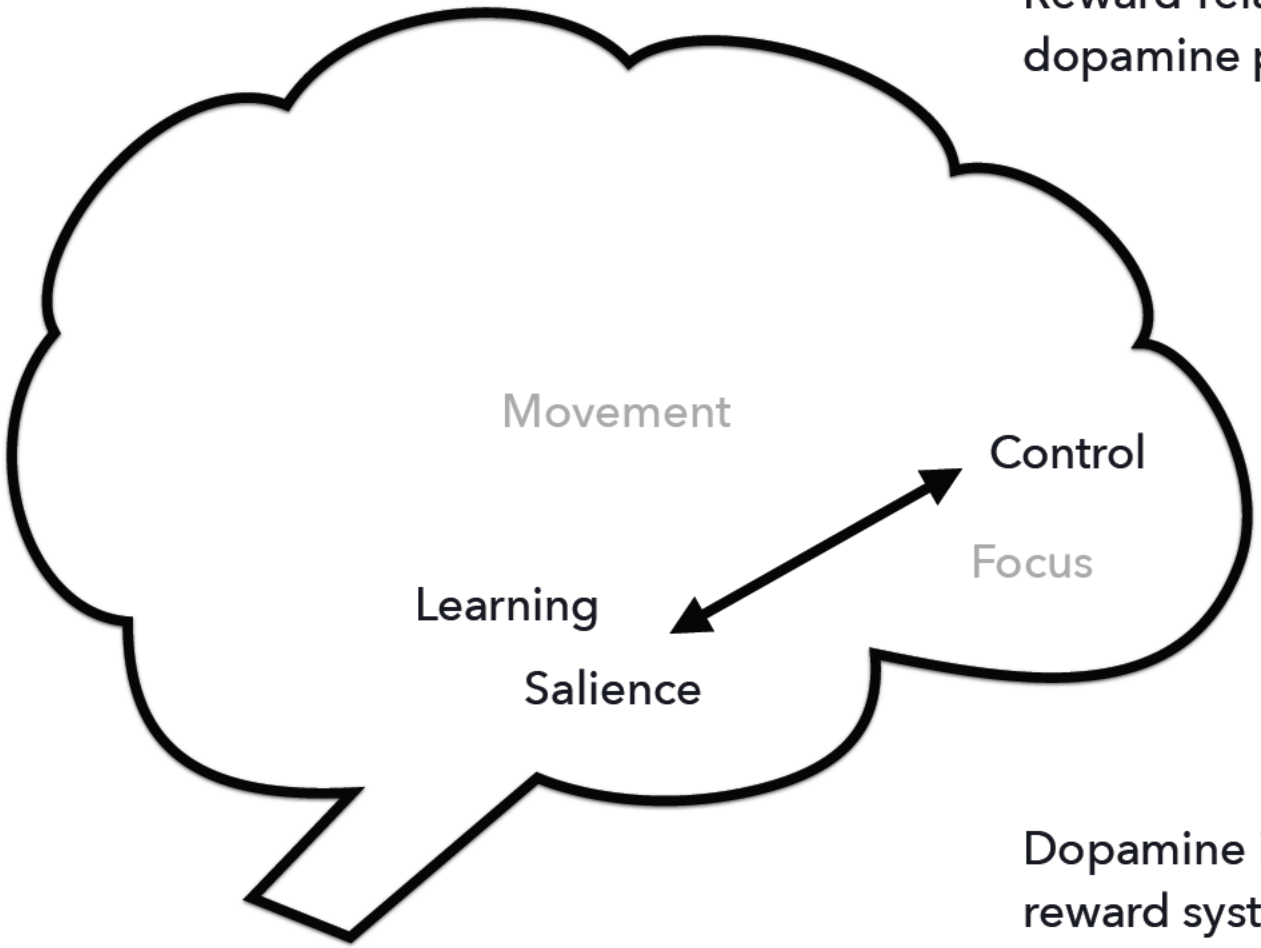
What does this mean for Facebook?

Dopamine is a major chemical in the brain that is related to several important functions.



But why isn't reward depicted here?

Reward-related processes involve a specific dopamine pathway (the mesolimbic pathway)



A reward is something that results in motivated behavior to seek it out. You **learn** that it is important or **salient**, and you **control** your behavior to go get it (or not get it).

Dopamine is just one player in a complex reward system

In general, mesolimbic dopamine signaling tracks with **higher reward magnitude** and **uncertain reward probability**.

- This is results in greater motivation to pursue large rewards, and more potential for learning when rewards are unpredictable.
- Signals for natural rewards trigger the release of dopamine, including food, sex, and social approval. Humans have also learned that other things can be rewarding by association, like money.

DOPAMINE: FACT VS. FICTION

The claim	The truth
Dopamine gives you pleasure	Dopamine is not responsible for feelings of pleasure or "liking" an experience. Instead it is related to learning that an experience is desirable and "wanting" it, i.e. being motivated to seek it.
Dopamine gets you high	Excessive dopamine that is released in response to a drug that directly acts on the brain (e.g., cocaine) is associated with other brain changes that do produce a high. The amount of dopamine released by natural behaviors is not intoxicating.
Dopamine is elevated in addiction	Dopamine is blunted in addiction because the system works to get back into balance after excessive triggering by a drug.

Dopamine does play an important role in addiction

- **All drugs of abuse increase dopamine in the brain, with a specific pattern.**
  Dopamine increases are exaggerated compared to natural rewards, they are brief, and they are tightly linked in time to the action of taking the drug.

- **This produces activation in the reward system, motivating us to to pursue those drugs.**
  Because of the pattern and magnitude of the dopamine response, the brain quickly learns that the drug is important and wanted.

- **The dopamine system compensates for this excessive activation.**
  The reward system becomes blunted (so more drug is needed) and the control system gets weaker (so it is harder to inhibit drug-seeking behavior).

How is dopamine related to Facebook use?

Several aspects of Facebook are consistent with things that research has shown trigger dopamine release and reward-related brain activation (e.g., in the ventral striatum, or VS)

Social approval

Unpredictable rewards

Example neuroscience findings: Facebook and reward

1. **Instagram pictures with more vs. fewer "Likes" activate the ventral striatum (VS)**
   This means Like counts provide meaningful information for whether something is important and potentially rewarding.

2. **Facebook symbols activate the VS more if you are a frequent user**
   If you use FB often, presumably you find it rewarding, and also those images will be more familiar to you and therefore more salient.

3. **People who have stronger VS responses to reputation gains as compared to monetary gains are also more likely to use FB more**
   People who are particularly sensitive to social rewards might find FB use more rewarding and therefore use it more.

1. Sherman et al., 2016, 2017 2. Turel et al., 2014 3. Meshi et al., 2013

So, we know that **FB behaviors or cues can activate reward-related brain regions and**, most likely - though not directly proven - **trigger dopamine release**.

Importantly, **this is not tantamount to "addiction"** and instead underlies **normal learning about things that are positive, salient, and wanted.**

So if Facebook is just like any other reward that isn't a drug of abuse, what's the problem?

Potential problem #1: People keep using Facebook because design elements have made it reinforcing, but the reward value is lacking.

- e.g., notification alerts for content of little or no interest
- e.g., unexpected stories in News Feed that aren't interesting, but are unpredictable
- e.g., other use of unpredictable or variable rewards,

Potential problem #2: Facebook's rewards are easily accessible, available all the time, limitless, and hard to regulate.

- e.g., continuous content without breaks
- e.g., expectation of quick responses and availability
- e.g., updates/counts of Likes
- e.g., lack of feedback about use

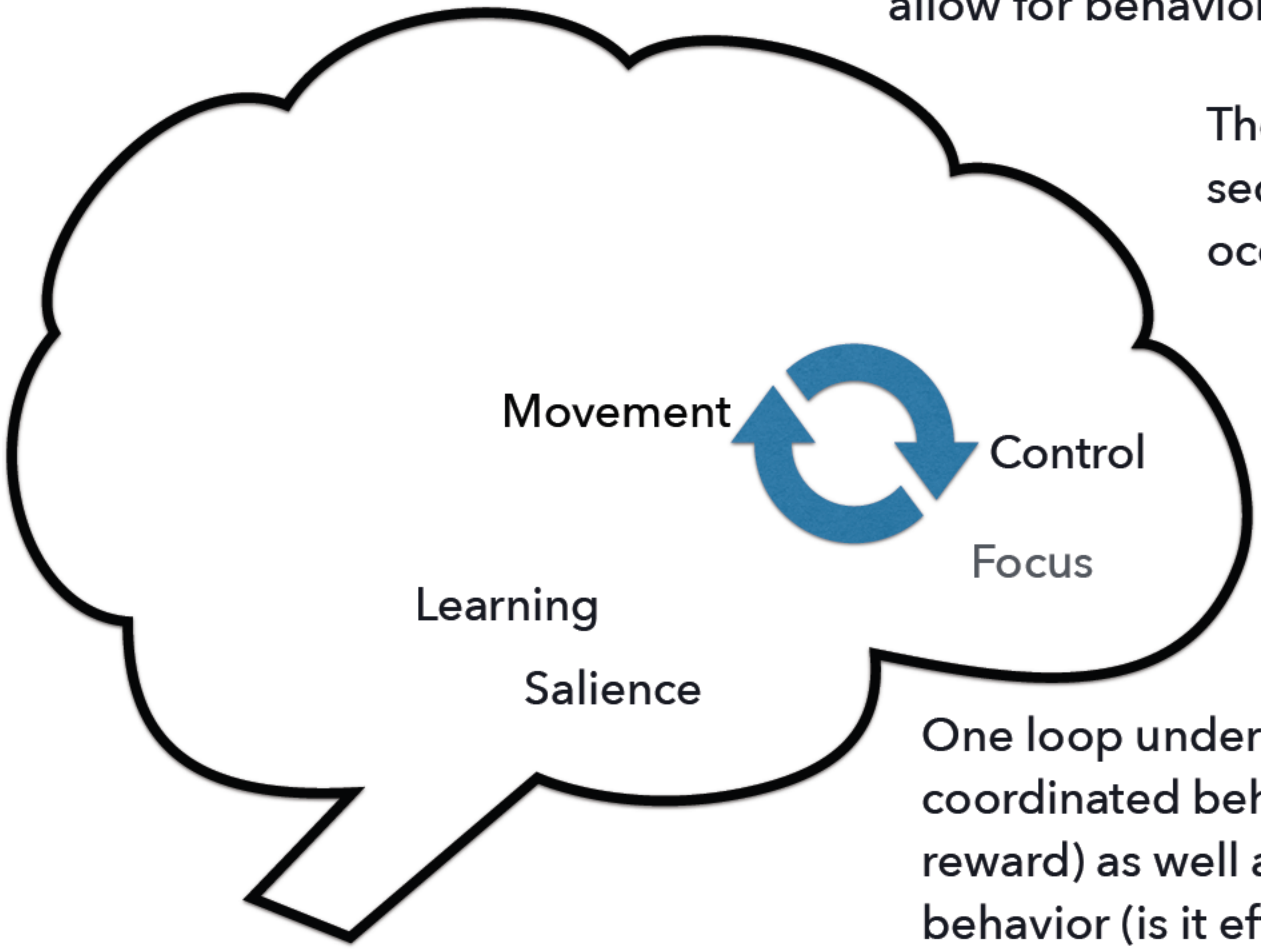
Q: Are there such things as "dopamine feedback loops" that keep people addicted?

A: Dopamine circuit "loops" do exist. They are subject to multiple inputs and therefore many sources of control.

There is no evidence that control resources are ineffective in the case of social media use.

There are several dopamine "loops" that allow for behavior to occur efficiently

These operate on the order of seconds, after dopamine signaling occurs on the order of milliseconds



One loop underlies the execution of coordinated behavior (e.g., movement to get a reward) as well as **monitoring** or control of that behavior (is it effective? is it planned? is the specific reward wanted?)

If and when control is ineffective, behavior to get a reward may go unchecked.

These loops are difficult to regulate in certain circumstances

ADDICTION

Deficient dopamine systems due to brain changes associated with **clinical addiction**

HABITS

Strong links between a cue and an automatic behavior, **when awareness is low**

Let's talk about habits

Related to the addiction narrative are accusations that Facebook is deliberately habit-forming, reducing people's agency in controlling their behavior

Habits are automatic behavioral tendencies

Situation -> behavior
Situation -> behavior
Situation -> behavior
Situation -> behavior
Situation -> behavior
Situation -> behavior

Repeated behaviors in the same situation can lead to habit formation *especially if rewarded*

The situation serves as a cue for an **automatic** behavioral response

Exerting control over automaticity is effortful; habits are hard to break

There are many Facebook cues that signal particular behaviors

Facebook Cue	→	Response
Notification pops up	→	Read it
See News Feed tab	→	Click on it
App icon with a red badge	→	Open it

People engage in these behaviors repeatedly, sometimes without thinking

There are also cues in life outside of Facebook that can signal Facebook-related behaviors

Non-Facebook Cue	→	Response
Wake up in morning	→	Reach for phone
Finish checking email	→	Open FB
Feel bored	→	Check for any notifications

People engage in these behaviors repeatedly, sometimes without thinking

So people use Facebook a lot, and it becomes a habit. There must be enough reward, at least initially, for people to use it often.
What is the problem here?

Potential problem: Facebook provides cues for use that may draw people in when they don't want to

- e.g., unwanted push notifications and badges, especially ones that are on by default
- e.g., pressure of social reciprocity when receiving tags or comments
- e.g., stories or videos that autoplay

Habits can be changed by behavior regulation, but several aspects of Facebook can make regulation difficult

From Vishwanath, 2015

Low awareness

★ Increase awareness by getting feedback on behavior, receiving alerts, and tracking behavior over time

Low attentiveness

★ Increase attentiveness by adding new salient stimuli or "speed bumps" to add friction to automatic behaviors

Low intentionality

★ Increase intentionality by prompting more choices, reconsidering defaults, and providing support for setting and pursuing goals

Low control

★ Increase control over behavior with tools to set limits, prompts for alternative behaviors, and reduced barriers for exercising control (e.g., make it easy to flexibly change settings)

Is the "addiction" narrative really about people having a habit of using Facebook?

If people find Facebook somewhat rewarding and indulgent, they may feel guilty.
If their motivation to change their habit is low, they probably will be unsuccessful.

We need to find out if "real" Facebook addiction exists.

*Is there such thing as **compulsive** Facebook use that persists even when it is causing harm and distress?*

VERY HARD TO RESIST

Even when exercising efforts at self-control

STRONGER THAN OPPOSING FORCES

Behavior persists even when it causes harm and distress

Who is vulnerable?

- People with deficient self-regulation more generally (e.g., people with bipolar mania, ADHD, depression, anxiety, other addictions...)
- People whose primary way of coping with difficult emotional experiences is to go on Facebook, so they may become dependent on Facebook
- People with broader dependence on the internet or phone, especially those who are driven to "escape" their real life
- Adolescents, whose self-regulation abilities are still developing

Facebook "addiction" may be a symptom of other problems, instead of the primary problem itself. However, Facebook can still be part of the solution.

Topics for Future Research I

Can we identify behavioral patterns that are consistent with addiction?

Tolerance concept:

- Do people progressively increase length of time spent per session (with or without changing # of sessions), similar to needing an increased "dose" of a drug? Do they do this prior to a deactivation?

New user behaviors:

- Classic addictive substances have a relatively short time frame from first use to addiction. What is the length of time or "ramp up" pattern from first use to some definition of problematic use?

Topics for Future Research II

How can we understand problematic use (a symptom) as well as pathological use (a disorder resembling addiction)?

- What are examples of negative impacts from using Facebook? (interviews; survey)
- Prevalence of self-reported addiction symptoms (survey). Important to distinguish Facebook vs. phone/internet broadly
- In-person assessment with people reporting problems to understand Facebook contributing factors (interviews)