Separating Fact from Fiction: Neuroscience and Problematic Pornography Use

MATTHEW HEDELIUS, PSY.D., LCSW, CSAT-S
PARADISE CREEK RECOVERY CENTER

True or False

- It is a well known fact that chronic PPU can alter the volume of gray matter in the human brain.
True or False

Studies show an inverse relationship between long-term PPU and IQ - the longer one experiences PPU, the lower their performance on IQ tasks.

True or False

Men who have been diagnosed with CSBD report a greater sense of sexual desire when exposed to SEM compared to controls who have not been diagnosed with CSBD.
True or False

- Patients with CSBD are more likely to have a more sensitized HPA Axis.

Multiple Choice

- Chronic consumption of SEM is associated with the following:
  - A - Decrease in IQ after 5 years.
  - B - Decrease in functional connectivity between the reward system and prefrontal cortex.
  - C - Increase in gray matter.
  - D - Decreased activity in the brain stem region.
**True or False**

- Current EEG studies reaffirm what fMRI studies are finding on problematic pornography use and the impact on brain functioning.

**Neural Correlates Study**

- Research Study: Neural correlates of sexual cue reactivity in individuals with and without compulsive sexual behaviours.
- Authors: Voon, et al. (2014).
- The Study
  - N = 19 Heterosexual men with CSBD with focus on online pornography.
  - N = 19 Heterosexual men **without** CSBD.
  - CSBD diagnosed with
  - Internet Sex Screening Test
  - Clinical interview based on Kafkas criteria
Study Continued

- Subjects viewed video clips presented from one of five conditions:
  - Explicit Sexual
  - Erotic
  - Non Sexual Exciting
  - Money
  - Neutral

- Subjects responded using a keypad with their 2nd and 3rd digit on the right hand to ensure they were paying attention.
- They were then asked two questions:
  - How much did this increase your sexual desire?
  - How much did you like the video?

Proposed Criteria for Hypersexual Disorder

A. Over a period of at least six months, recurrent and intense sexual fantasies, sexual urges, and sexual behavior in association with four or more of the following five criteria:
   1. Excessive time is consumed by sexual fantasies and urges, and by planning for and engaging in sexual behavior.
   2. Repetitively engaging in these sexual fantasies, urges, and behavior in response to dysphoric mood states (e.g., anxiety, depression, boredom, irritability).
   3. Repetitively engaging in sexual fantasies, urges, and behavior in response to stressful life events.
   4. Repetitive but unsuccessful efforts to control or significantly reduce these sexual fantasies, urges, and behavior.
   5. Repetitively engaging in sexual behavior while disregarding the risk for physical or emotional harm to self or others.

B. There is clinically significant personal distress or impairment in social, occupational or other important areas of functioning associated with the frequency and intensity of these sexual fantasies, urges, and behavior.

C. These sexual fantasies, urges, and behavior are not due to direct physiological effects of exogenous substances (e.g., drugs of abuse or medications), a co-occurring general medical condition, or to manic episodes.

D. The person is at least 18 years of age.

Specify if: Masturbation, Pornography, Sexual Behavior With Consenting Adults, Cybersex, Telephone Sex, Strip Clubs
Findings

- Men with CSBD produced greater blood oxygenation level-dependent (BOLD) responses in the reward system compared to health control men to SEM.
  - Ventral striatum, dorsal (anterior cingulate cortex) ACC and amygdala.
- Men with SEM reported higher subjective sexual desire compared to men without CSBD. More “wanting” vs. “liking”.
- Greater neural responses to SEM in men with CSBD compared to those without.

Neural Substrates of Sexual Desire in Individuals with Problematic Hypersexual Behavior

- Authors: Seok, J.W & Sohn, J.H. (2015)
- Study
  - N = 23 individuals with Problematic Hypersexual Behavior
  - N = 22 individuals without Problematic Hypersexual Behavior
  - Diagnostic Measures: SAST-R; HBI; Clinical Interview.
  - Using fMRI technology, their brains were scanned while they passively watched sexual and nonsexual stimuli.
  - Levels of sexual desire were assessed.
Findings

- Participants with CSBD experienced more frequent and enhanced sexual desire during exposure to sexual stimuli comparative to control group.
- Increased activation in caudate nucleus, inferior parietal lobe, dorsal anterior cingulate gyrus, thalamus, and dorsolateral prefrontal cortex compared to control group.
- CSBD groups exhibited altered activation in the prefrontal cortex and subcortical regions.

Problematic Pornography Use

- Authors: Gola et al. (2017)
- Study
  - N = 28 heterosexual men with CSBD
  - N = 24 heterosexual men without CSBD
  - Researchers used fMRI technology to examine the ventral striatal response to erotic and monetary stimuli – differentiating between cue-related “liking” from reward related “wanting”.
- Diagnostic Measures
  - Kafka’s criteria of hyper-sexuality
  - Clinical Interview
  - Treatment seeking of all men with CSBD
Problematic Pornography Use

- Study Continued
  - Incentive Delay Task
  - Participants were shown a cue for either a monetary reward or an erotic picture.
  - They were then given a task to complete in order to receive the reward indicated by the cue.
  - Task consisted of pressing a button with either a square or triangle.

Results

- Men seeking treatment for PPU showed increased right and left ventral striatal reactivity to cues predicting erotic material compared to control group but not for cues predicting monetary rewards.
- Shorter reaction times in men with CSBD than in men without CSBD in erotic trials – not in monetary trials however.
- Increased “wanting” vs. “liking” following predictive neutral cues for erotic rewards.
- Higher motivational behaviors for erotic stimuli compared to controls.
- Men with PPU are overall more sensitive to cues signaling erotic rewards and the magnitude of the expected erotic reward modulates the ventral striatal reactivity. This did not happen in control group.
Functional Connectivity and Brain Structures and Pornography Consumption

Authors: Kuhn & Gallinat, (2014)

The Study:
- N = 64 heterosexual men with a wide range of pornography consumption
- Gray matter volume measured by voxel-based morphometry and resting state functional connectivity was measured on 3-T magnetic resonance imaging scans.

Results
- Decreased gray matter in right caudate associated with increase in pornography consumption hours per week.
- Decreased functional activity during a sexual cue-reactivity paradigm in the left putamen.
- Connectivity between right caudate to the left dorsolateral prefrontal cortex decreased as reported consumption hours increased.
- Ultimately cognitive processing impaired in decision making – specifically when faced with a sexual trigger. Less connectivity between PFC and reward system of the brain – Hence, PFC less able to control and govern reward center.
Men with CSBD and Impulsivity

- Authors: Miner et al. (2009).
- Study
  - N = 8 Men with CSBD
  - N = 8 Men without CSBD
- Diagnostic Criteria
  - Presence of recurrent and intense sexually arousing fantasies, sexual urges, or behaviors over period of at least six months that causes distress or impairment.
  - Treatment seeking.

Results

- Men with CSBD were more impulsive than men without CSBD as measured by questionnaire and Go/No-Go paradigm.
- Mean diffusivity was lower in men with CSBD than in men without CSBD in superior frontal regions.
- Prefrontal regulatory influences on emotional and motivational circuits may be diminished in men with CSBD.
Gray Matter volume: Resting State Functional Connectivity

- Authors: Seok & Sohn, (2018).
- Study:
  - N = 17 with CSBD
  - N = 17 without CSBD
  - Diagnosed with Kafka criteria of Hypersexual Disorder and HBI.

Results

- Significantly lower gray matter volume in men with CSBD compared to men without.
- Significantly lower resting state functional connectivity in men with CSBD than in men without CSBD between the superior temporal gyrus (STG) and the left precuneus and right caudate.