7. Neuroscience of Behavioral Addictions

As a reminder, behavioral addictions are marked by compulsive engagement in rewarding behaviors (e.g., gambling, gaming, pornography) in which the individual loses control over the behavior, continues to engage despite negative consequences, and experiences craving or mental preoccupation when not engaging.[1,2] Behaviors with addiction potential activate a very specific area in the brain called the *reward circuitry*, located in the midbrain, which is the same region activated by drugs of abuse.[3,4] While research is still ongoing, behavioral addictions seem to involve the same processes in the brain as chemical addictions, particularly related to the release of a neurochemical called *dopamine*.

Dopamine is a neurotransmitter, or messenger chemical in the brain, that plays a key role in the brain's reward system involving pleasure, motivation, and reward-seeking behaviors.[5,6,7] Specifically, dopamine is released when we engage in pleasurable activities as a means of reinforcing the behavior (along with other neurochemicals implicated in the experience of reward). The brain remembers what causes dopamine release and we are motivated to seek out those activities again in the future.[8,9] While many of the behaviors that activate the reward system occur naturally, some are artificial and may even be designed to exploit and amplify reward circuitry activation, thereby increasing the risk of behavioral addiction.[10]

Consider digital media use—it is highly stimulating with exciting visuals, sounds, social interaction, achievement potential, novelty, and endlessness. Digital media use triggers reward circuitry activation and dopamine release.[11,7] Therefore, when your adolescent engages with digital media (e.g., gaming, social media, scrolling), it stimulates the reward circuitry of the brain and causes the release of dopamine and other neurochemicals involved in reward. This activation of the reward system leads to pleasure and euphoria (i.e., positive reinforcement), as well as a temporary escape from negative mood states like depression, loneliness, or boredom (i.e., negative reinforcement). In this way, digital media use can become an easy, reliable, and predictable way for an individual to change their mood.[2]

The brain adapts to hyperactivation of dopamine, as caused by frequent use of digital media, with molecular changes that serve to reduce overall dopamine levels. The result is that daily life feels bland, unexciting, and unsatisfying when digital media is not being used (this state is sometimes called *anhedonia* or the inability to feel pleasure). That's why children may stop feeling pleasure and joy from real-life things like nature, books, music, or relationships.

Again, simply engaging in a behavior that activates the reward system and releases dopamine does not constitute addiction (dopamine is released in many natural processes like eating, drinking, and sexual activity).[7] However, for adolescents with risk factors for addiction (e.g., genetic predisposition, early trauma, early exposure to addictive behavior, mental health concerns), engagement in rewarding behaviors that stimulate dopamine release (like digital media use) can become compulsive and out-of-control. A subset of individuals who engage in digital media use can develop a behavioral addiction and may need professional or non-professional support to successfully change this behavior.

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