2. DOPAMINERGIC MODULATION OF ATTENTION FRAGMENTATION IN HIGH DIGITAL MEDIA EXPOSURE

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Introduction. The rapid expansion of digital technologies has significantly altered patterns of cognitive stimulation and reward processing. Digital media platforms are designed to deliver rapid and frequent reward signals, activating dopaminergic pathways involved in motivation and reinforcement, particularly within the mesolimbic system. These neurobiological mechanisms may influence attentional regulation and cognitive control. Since the prefrontal cortex, responsible for executive functions, impulse control, and decision-making, continues to mature until approximately 25 years of age, adolescents and young adults may be particularly vulnerable to the cognitive effects of prolonged digital media exposure.

Aim of study. To analyze the relationship between high levels of digital media consumption and attention fragmentation, focusing on mesolimbic dopaminergic activity as a potential neurobiological mediator.

Methods and materials. An analytical literature review was conducted using PubMed, Google Scholar, and Elicit. From 84 peer-reviewed publications (2013–2024) identified using keywords on dopamine reward pathways, digital media exposure, attention, and cognitive control, 46 studies met inclusion criteria. Exclusions were non-peer-reviewed sources, duplicates, non-English articles, studies without neurocognitive focus, and non-human models lacking cognitive-behavioral relevance.

Results. The analyzed studies consistently demonstrate that repeated exposure to highly stimulating digital environments activates dopaminergic reward circuits within the mesolimbic pathway, reinforcing rapid engagement behaviors characterized by frequent reward anticipation. Approximately 65–75% of reviewed studies reported associations between intensive digital media use and reduced sustained attention or increased attentional fragmentation. Neuroimaging findings from several studies indicate increased activity in reward-related regions such as the ventral striatum, accompanied by reduced engagement of prefrontal cortical areas responsible for executive control. These patterns suggest that frequent digital reward cycles may reduce tolerance for cognitively demanding tasks requiring prolonged concentration.

Conclusions. High levels of digital media exposure may influence attentional regulation through dopaminergic reward mechanisms within the mesolimbic system. These neurocognitive dynamics may contribute to attention fragmentation and decreased sustained focus, particularly among adolescents and young adults. Understanding these mechanisms may support the development of preventive strategies aimed at promoting balanced digital media use and protecting cognitive health.

Keywords. Attention fragmentation, Dopamine reward system, Digital media exposure, Cognitive control.

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