

Neurotransmitter Dopamine (DA) and its Role in the Development of Social Media Addiction

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Abstract

Social media today has become an integral part of people's lives worldwide. It can cause addiction with dopamine implicated. This is perpetuated through feedback loop mechanisms acting through dopamine reward system; keeping the users in the loop. Social media has helped many people around the world in different ways - connecting people globally and providing easy access to different types of information. However, overuse of the platforms and the application algorithm by individuals may be detrimental to their physical and mental well-being. There should therefore be increased awareness campaigns to address this contemporary issue and help to balance its impact on society; maximising its positive utility and minimising its potential adverse impacts.

Keywords: Social media•Feedback loop•Addiction•Cognition

Introduction to C₈H₁₁NO₂

Dopamine is a naturally occurring type of neurotransmitter. It is known to have numerous important roles in the body and specifically the brain. Biochemically it belongs to the catecholamine and phenethylamine category of organic chemicals. It has many functions in the brain including memory, reward pathways and motor co-ordination (relation to Parkinsonism) [1]. It is released by the neurones and sends signals to other nerves cells within the Central Nervous System. There are several distinct dopamine pathways in the brain – and includes integration with reward motivated behaviour. Generally, it is seen to be the 'pleasure chemical' when there is talk of the underlying mechanism behind why humans feel pleasure and there is a myriad of things which can bring this about [2].

More research into dopamine has revealed a tangential idea that it is involved with motivational salience. This is related to the aversiveness or desirability of an organism's behaviour towards or away from reaching an outcome [3]. It is understood that there are several important diseases affecting the nervous system where dopamine plays a substantial role in the pathogenesis. This includes Parkinson's Disease which is a neurodegenerative condition which is known to be caused by a loss of dopamine-secreting neurones in substantia nigra para compacta. It has a metabolic precursor which is known as L-Dopa otherwise commonly referred to as Levodopa. Another condition where dopamine plays an integral role is schizophrenia – it is interesting to note that most antipsychotic drugs used to treat this are dopamine antagonists – which tautologically reduce the activity of dopamine [4]. Other conditions where dopamine is believed to be implicated include ADHD (Attention Deficit Hyperactivity Disorder) [5].

Contemporary Social Media Platforms

There are more than a billion accounts from people from every part of the world on the major social media platforms with Facebook, Instagram and Twitter amongst the 3 most popular and widely-used of these. It has become a great avenue for connection for people everywhere, opening up avenues

for opportunity, development and connection. It has undoubtedly become a pervasive part of the lives of today's modern generation.

The Feedback Loop Mechanism

Nowadays, many people spend hours on end using an array of social media platforms. There have been studies into Reward Prediction Error (RPE) encoding. Essentially, this pertains to a feedback loop related to dopamine feedback signals. This can be likened to other forms of addictive behaviour such as gambling [6]. For example, playing on a machine in a casino there is noted to be an intense anticipatory period. It is at this stage that the dopamine neurones are very active and firing away. However, this is not infinite. Gradually there is tiring and when the cumulative negative outcomes build up, the individual can become disheartened and disengaged.

The disengagement is caused by the loss of dopamine activity. Therefore, it is integral that there is a more delicate balance between the outcomes experienced. That way, the user can be kept in a loop. Essentially, that's how the social media apps exploit these innate systems. The way this comes about is through a term referred to as Variable Reward Schedules. This works by positive stimuli being provided at random intervals. By users checking their phones for notifications and updates at periodic intervals for something that could be intrinsically rewarding. Most of the time it's a neutral stimuli, but on occasion there may be a positive stimuli leading to the rewarding dopamine release hence keeping the user in the feedback loop [7].

Addiction and Social Media - Dopamine Implication

Getting texts, likes or messages are intrinsically rewarding – they evoke feelings of happiness and satisfaction due to the 'virtual' social life that social media platforms mimic. However, these feelings are only temporary and once they initial short-lived moment wears off, individuals look for more. It has also been shown to have had an association with the many social problems that have grown in society over the past decade. It has also been linked with anxiety, depression and sleep disturbances [8]. Self-harm and body image issues are two such contemporary difficulties facing the younger generation thought to be largely influenced by these platforms [9-12].

Parallels with other addictions

Studies have looked into various factors around this phenomenon. There are several elements which are indicative of social media addiction. It has been documented that the most important of these is salience – the idea that the users elevate the use of these social media platforms to becoming one of the most important and integral aspects of their daily life. The modification of mood is also implicated, with individuals using these avenues as a method to alter their feelings and mood states. Expanding from this, it has also been stated that akin to other addictions of a more physical nature, tolerance may develop; where the users need to spend more time on the platforms to obtain the same changes in moods coveted. Concerningly, symptoms correlating with withdrawal have also been noted to affect some individuals in a similar way to physical addictions such as alcohol [13].

Interlink with Attachment Theory

There have been postulations that such addictions are closely interlinked with attachment disorders – caused from difficulties in early childhood interactions with caregivers. The use of Facebook, for example, has been correlated with increased levels of attachment anxiety in the literature. Individuals with such anxiety attachment were considerably more likely to turn to the platform to help alleviate negative feelings when encountered. Additionally, they were also noted to be more likely to pay increased attention to others perceptions of them on the platform [14]. These can hinder healthier forms of coping with life's difficulties from being fostered in such individuals; such as exercise, developing new hobbies and other creative outlets. These alternative dopamine releasing activities may also enable more stable and longer lasting inner contentedness to develop within individuals.

Conclusion

Social media today has become an integral part of people's lives worldwide.

It can cause addiction with dopamine implicated. This is perpetuated through feedback loop mechanisms acting through dopamine reward system; keeping the users in the loop. Social media has helped many people around the world in different ways - connecting people globally and providing easy access to different types of information. However, overuse of the platforms and the application algorithm by individuals may be detrimental to their physical and mental well-being. There should therefore be increased awareness campaigns to address this contemporary issue and help to balance its impact on society; maximising its positive utility and minimising its potential adverse impacts.

Conflict of interest

The authors declare no conflict of interest.

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