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The Short Video Addiction among Teenagers

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Abstract. As people have more access to electronic devices, more entertainments rely on these devices. Naturally, most people are not so self-disciplined that electronic device addiction can be seen everywhere, whether among kids or older people, from cleaners in a building to professors in a university. Short videos are at the top of the entertainment list. And in terms of addicted users, teenagers also account for a significant proportion. So this article aims to analyse why teenagers are addicted to short videos, including psychological analysis, platform factors and neural mechanisms. Current research showed that the mental pain of teenagers and the balance between challenge and ability in terms of browsing short videos are the keys to addiction. At the same time, unpredictability and interaction design are relevant platform factors. Some solutions, including communication to gain confidence and specific popularization of addiction mechanisms, are also given.

Keywords: Teenagers, Short video addictions, Platform factors, Neural mechanisms

1. Introduction

Due to the development of social media, it's increasingly common to see teenagers browsing short videos anywhere and at any time. The report on Internet Use of Minors in China in 2020 showed that China's teenage Internet users have reached 183 million, the Internet penetration rate has been 94.9%, the proportion of teenagers owning mobile phones is 65.0%, and the proportion of using mobile phones to access the Internet is 92.2% [1].

However, it's extremely hard for teenagers to use their devices properly. A survey on some secondary vocational school students in Guizhou province showed that nearly 70% of students have a screen time of more than 5 hours a day, even when there's device supervision [2]. 22.27% of these students considered short video browsing as their main usage of phones, becoming the highest except for gaming.

Therefore, a study aiming to tackle the short video addiction among teenagers emerges as the times require. This literature review aims to summarize the mechanisms of short video addiction and how to deal with it.

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2. The psychological analysis of short video addiction

2.1. The source of addiction

Addiction is essentially due to mental pain. But that's not enough...there's an experience involved, and this experience is a cure to the pain [3]. For example, teenagers tend to face mental pain such as self-confusion and self-denial, or they may gain little confidence in life. In TikTok or other short video platforms, they get this sense of achievement by acquiring followers and receiving likes and comments, which is much easier than gaining confidence in real life. They must move their fingers, click buttons, post videos, and gain confidence. At the same time, they must be unwilling to face the pain; in other words, they must continue studying diligently until they receive good grades.

Incompletion is a source of addiction in this case. There's a psychological effect called the Zeigarnik Effect, which states that unfinished tasks are remembered approximately twice as well as completed ones [4]. In the case of short video browsing, a short video usually can only show the highlight of a story instead of a full one. There comes the unfinished task, which arouses the user's attention, and they tend to be more interested in and addicted to browsing short videos [5].

Unpredictability is another well-known source of short video addiction. In a famous operant conditioning experiment, Skinner's mouse pressed the lever the most frequently when the probability of receiving a food reward was completely random. That's precisely how short video apps work. The users will never know the following video, so they just helplessly keep swiping down. It's not because of the desire for an interesting video, but out of the expectation that the next unpredictable video can be satisfying [5]. The platform had already emphasised the recommendation mechanism, which will be discussed later.

2.2. The maintenance of pleasure

The maintenance of pleasure is a crucial factor of continuous addiction, which is also known as the state of flow.

The reason why short video addiction is related to this flow state is that the levels of challenge and ability are balanced. Figure 1 is the Three Channel Model [5]. It shows that the flow state can be reached only when the challenge level is approximately the same as the skill level. Too high a challenge level will lead to anxiety, and too high a skill level will cause boredom. In the case of short video apps, usually there's a function in which users can shoot and post similar videos using the same special effects as certain videos. It's common to reach flow state in this process, in which challenges and skills are approximately at the same level, as specific instructions and special effects are carefully designed by platforms. Self-approval is gained whenever users post this kind of video and receive likes and comments. So they are more driven to take on these posting similar video tasks. That's why users spend hours and hours watching and posting videos.

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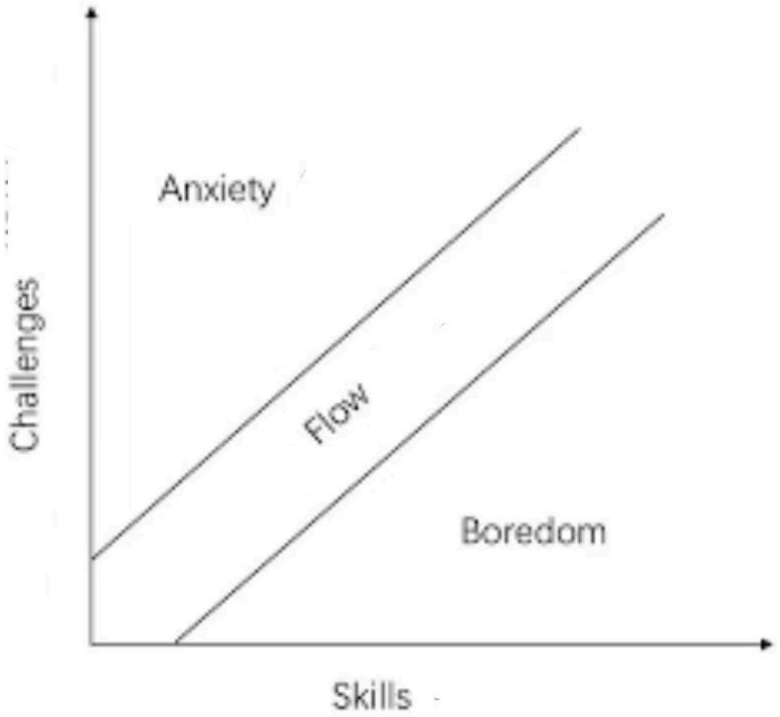

Figure 1. Three channel model

3. The platform factors of short video addiction

We have already discussed the mechanisms of addiction from an individual perspective. The following section will focus on how platforms are designed to grasp users' attention.

3.1. The recommendation system

As algorithms are gradually being applied in information dissemination, automatic algorithms have replaced traditional editing for filtering information. A specific information flow is designed for every user, based on the user's behaviour and preferences. Platforms use techniques such as collaborative filtering, decentralization, and flow pool stacking to ensure the right series of short videos is delivered to the right user [6].The videos offered are also determined by browsing, liking and commenting, a kind of bidirectional control, so the dissemination is more precise. Then, users can always easily access what they prefer to watch. That's why addiction occurs.

What's worse, in this algorithm-driven system, users can only have access to specific preferred fields, so they gradually sink into an 'information cocoon', and this phenomenon intensifies over time. Users then tend to follow and subscribe to content according to what they receive, further consolidating what platforms deliver [7]. In this case, a positive feedback state is reached, and as time passes, users are more stuck to the platform, triggered by algorithm recommendations.

3.2. Interaction design

The interaction design of short video platforms is also related to short video addiction. For example, in Rednote, users can choose to see the thumbnails of either 4 or 9 notes, making it easier to notice something appealing as soon as they open the app. Another example of interaction design is 'scrolling', which is applied in most short video platforms. The 'play' button is omitted, so another

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video is on as soon as the user swipes down. It further saves effort for the user, and the continuous scrolling makes it hard to get rid of short videos [8].

The multi-modal interaction mechanism (likes, comments, sharing) can increase social engagement and sense of belonging, especially among teenagers. Because being a teenager is a phase of self-approval establishment, and this kind of bidirectional interaction helps them gain confidence. But every coin has two sides. When there's peer pressure acting on the user [9], such as when a teenage girl sees a girl the same age as her being under the floodlights, anxiety is inevitably aroused. Anxiety further drives teenage users to watch short videos, as mentioned before, it's an easy way to tackle anxiety and gain a sense of achievement.

3.3. The nature of the content

As the name suggests, videos are usually very short on short video platforms. Long videos are generally rare on most platforms and less likely to be delivered to users, while shorter videos are more frequently offered.

Let's think of the original goal of recommendation algorithms on short video platforms. They initially aim to make as much money as possible, so they try to maximize user retention time. Short videos have natural advantages in this case. First, most people can easily finish watching a 15-second video. Suppose a large percentage of users can watch the full video. In that case, it will be considered high quality, so its informational traffic will increase, which means this video will be delivered to more people. Next, the start-up cost of watching a long 10-minute video differs from that of watching a 15-second one, as a boring 15-second video doesn't mean too much to a user. So, most people choose to watch shorter videos, as they will surely prefer to waste 15 seconds on a weird short video and swipe down with the expectation of the following video rather than waste 10 minutes on scientific research.

Therefore, it's clear that users can easily access short videos and are more willing to watch short videos. In the next section, we will discuss how short videos are addictive in terms of neuroscience.

4. The neural mechanisms of short video addiction

The hypothetical study by Liu et al. [10] suggests that short video addiction is driven by two processes: evidence accumulation and loss aversion, which are implemented by specific neural circuits. Evidence accumulation is like a voting committee in the user's brain. The user faces two choices when watching short videos: Swipe down or keep watching. However, brains are cautious. They tend to collect evidence for both options.

Let's think of an example: Assume a person is watching a video, in the first second, he notices that the background music is brilliant, so that's one vote for 'continue watching this video'. Three seconds later, he finds out that the speaker is a bit too verbose, and that's one vote for swiping down. Another five seconds later, he encounters an unexpected laughing point, and that's three votes for continuing to watch. At this instant, the difference between evidence (votes) for keep watching and evidence for swipe down overcomes a threshold. So the video is regarded as worth watching, and the user moves away the finger about to swipe down.

Loss aversion is a cognitive bias where the pain of losing is psychologically twice as powerful as the pleasure of gaining. In this context, a potential loss of a good video (swiping away) feels more aversive than the gain of moving on. This creates a powerful urge to keep watching if the following video is rewarding, preventing the user from stopping.

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The Nucleus Accumbens is the hub of the brain's reward circuit. It releases dopamine in response to unpredictable rewards. (Potential funny videos in this case.) The Ventral Tegmental Area (VTA) is the source of dopamine neurons that project to the striatum and other regions, signalling reward prediction [11]. The Dorsolateral Prefrontal Cortex is typically critical for executive control, decision-making and the evidence accumulation process. But when addiction occurs, its top-down control is impaired, so it's harder to resist the urge to keep scrolling. At the same time, the Ventromedial Prefrontal Cortex is involved in assigning subjective value to rewards. Its function is altered in addiction, so it may lead to overvaluing the immediate rewards from 'If the next video is funny or not', over some long-term goals, such as good sleep. Moreover, the insula is involved in processing negative emotions, so it may be activated by the anticipation of missing a potentially funny video if one stops scrolling.

The interplay of these regions creates an addictive loop. First, boredom or stress triggers a behaviour of opening the app. Due to anticipation driven by the VTA and striatum, the user then watches and swipes. While swiping, dlPFC rapidly accumulates evidence. As the reward is random, a surge of dopamine in response strongly reinforces the behaviour. The insula amplifies the fear of missing out on the next potential reward, overcoming the PFC's 'stop' signals for those long-term goals. Then, a weakened dlPFC cannot decide to stop watching. So with repetition, this behaviour becomes automatic and compulsive, and finally becomes a habit, and that's why users are trapped in an endless cycle of scrolling.

5. Conclusion

In a nutshell, adolescents are easily addicted to short videos mainly due to mental pain, which is a lack of confidence and happiness in real life, when it comes to personal factors. The nature of short videos makes it easy to be addicted to, as there's incompletion and unpredictability; you will never know what the following video is about. Addiction is the maintenance of pleasure; the flow state is key to this process. Apart from psychological factors, we also focused on platform factors. Short video platforms like TikTok and Rednote have carefully designed algorithms and interaction mechanisms to capture users' attention. Finally, the neurobiological basis of short video addiction is discussed, in which different brain regions and loops are involved.

There are some possible solutions for short video addictions among adolescents. First, parents and teachers should communicate with these teenagers at intervals. Encouragements and praises are crucial without confidence in one's real life. As mentioned, a lack of sense of achievement and confidence will lead teenagers to short video addiction. So teenagers should shift that unattainable sense of accomplishment from online to real life. What's more, I suggest that teenagers should know how short video platforms work and why they are addictive, including the algorithms and the interaction mechanisms. One will never conquer their enemy if he isn't clear of how their enemy works.

In the future, platforms should be under supervision and focus on users' proper use. For example, real-name authentication can be applied, just as it is applied in video games. In terms of scientific research, the specific neurobiological basis of short video addiction should also be investigated in detail.

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