The Journal of Education, 2(2), 1~15
December 2019
http://dx.doi.org/10.25020/JoE.2019.2.2.1

Prevention and Intervention of Adolescents' Maladaptive Internet use

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ABSTRACT

This article presents the characteristics of addiction, cognitive behavior, and social cognitive perspectives, which are the mainstream views of maladaptive Internet use. As the academic branch dealing with mental health, such as psychology and psychiatry, first raised the issue of maladaptive Internet use and continued research, views in the context of mental health, such as addiction and cognitive behavior perspectives, have become mainstream. The mental health perspective, however, shows considerable limitations in that maladaptive Internet use has extensive and multifaceted attributes with the changes in the ecosystem surrounding digital technology and the industry. As an alternative to the mainstream views, this article presents a digital economy perspective and suggests that mental health and digital economy perspectives can be complementary for the future research.

Keywords: maladaptive Internet use, addiction, cognitive behavior, social cognition, digital economy

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Ⅰ. Initiation of Research on Maladaptive Internet Use

Twenty-three years have passed since 1996 when American psychologist Kimberly Young first raised academic questions about addictive Internet use (Young, 1996). In her initial study, Young used the criteria for measuring drug dependence to conduct a case study of "addictive Internet users," but in a new study published two years later, she defined and diagnosed "Internet addiction" using the pathological gambling presented in DSM-IV as a model (Young, 1998). As the addictive use of the Internet was a new phenomenon, Young's initial research was nothing more than an exploratory study, not a confirmed study. And 23 years later, Internet addiction remains an academically unsolved phenomenon in its cause, justice, results, prevalence and recovery rates.

The long absence of academic consensus on Internet addiction is due to the complexity the Internet has. The original meaning of the Internet refers to a system of interconnected computer networks, but in studies involving Internet addiction, it sometimes refers to online content, sometimes online interaction, and sometimes a device for accessing the Internet. These content, interactions, and devices are changing every minute. Therefore, when scholars study Internet addiction, the phenomenon of each person's research depends on the individual's perspective and context.

This paper will address Internet addiction as an open concept that requires continued exploration, not a stable and agreed phenomenon, and will give something to think about how it can be understood from the current perspective. In this context, the term used in this paper is relatively flexible one, maladaptive Internet use (MIU), rather than closed terms such as "addiction" and "overdependence". This approach is expected to contribute to more critical and exploratory ways of intervening, not in ways that strengthen existing thoughts, in preventing and addressing problems seen in adolescents' Internet use.

Ⅱ. Three Perspectives on MIU

Tokunaga (Tokunaga, 2015) analyzed the results of theoretical and empirical research of MIU in the field of communication studies and classified them into three perspectives: addiction, cognitive behavior, and social cognition/habit. A detailed description of each view is given below.

1. Addiction perspective

The addiction perspective is the earliest view of MIU and identifies MIU as a disease or pathological phenomenon. Scholars who view MIU from an addiction point of view stress that drug addicts and other behavioral addicts appear to have common symptoms with individuals diagnosed with Internet addiction such as tolerance, withdrawal and serious functional disabilities. Recent studies from the addiction perspective have revealed using fMRI (functional magnetic resonance imaging) that there is a difference between those who are addicted to the Internet and those who are not in the change in dopamine secretion and resulting stimulation of the pleasure center.

There have been four major points of contention concerning the addiction perspective. First, the term addiction results in reducing the serious problem of a medically recognized addiction, such as substance addiction. Second, most studies from an addiction point of view use unverified self-scale. Third, there is a lack of conclusive evidence to consider MIU as a solitary condition that separates it from other mental disorders. Fourth, there are many cases of self-recovery without therapeutic intervention. In the review for DSM-5 preparation, the lack of standardized diagnostic tools, conceptual inconsistencies, uncertain etiology, and underlying theories were also identified, which excluded Internet addiction, although gaming disorders were cited as areas requiring further research.

2. Cognitive behavior perspective

The cognitive behavior perspective differs from the addiction perspective in that it identifies the cognitive aspect as the main cause of maladaptive behavior. The cognitive behavior perspective has contributed to broadening the scope of discussions on MIU phenomenon and their factors. In terms of cognitive behavior, MIU can coexist with other related mental disorders and can result from a combination of psychological and social problems and stress in life. In addition, social isolation and lack of social support are factors that make individuals vulnerable to MIU. Davis (Davis, 2001), who expanded MIU from the perspective of cognitive behavior, describes the psychological and social problems as remote factors and stress such as social isolation and lack of social support as proximal factors.

Davis (Davis, 2001), extending MIU from the cognitive behavior perspective, classifies the phenomenon into specific problem-based Internet use (SPIU below) and general problem-based Internet use (GPIU below). SPIU refers to an overconsumption of certain content, such as games, shopping and social networking services while GPIU means overuse of the Internet without a clear purpose due to the general characteristics of the Internet, such as anonymity or non-simultaneousness (하정 & 안현의, 2013).

3. Social cognition/habit perspective

Social cognitive theory has been used to explain the phenomenon of losing self-control over certain actions. Control of behavior relies on being able to accurately observe one's behavior and determine whether the action taking place is within the normative range and the following consequences are desirable (Bandura, 1999). However, people experience a loss of conscious self-control of a particular action when a situation arises, which is impeded by this observation and judgment.

The use of the Internet stems from the expectation that a person's direct experience and proxy experience will give positive incentives such as strengthening a sense of achievement, improving social relations and relieving stress. However, any vulnerability causes MIU to occur if people lose their self-controlled functions, such as appropriate observation, judgment, and self-reaction (LaRose et al., 2001, 2003). The vulnerability means psychological and social problems such as depression and anxiety, and the resulting cognitive distortion and emotional distress.

If social cognitive theory explains the failure of conscious Internet use behavior, the media usage habit perspective complements the limitation of social cognition theory by explaining the unconscious behavioral mechanism. In a stable condition where there is no vulnerability, those who take repeated compensatory actions automatically undergo cognitive restructuring to perform repeated learning and form a habit. While this habit is not necessarily negative, it can develop into problematic behaviors, such as MIU, under certain circumstances.

4. Summary

Due to the variety of causes and phenomena of MIU, it is difficult to fully explain MIU with just one of the perspectives; addiction, cognitive behavior or social cognition. In addition, there is a lack of clinical research conducted from three perspectives, and it is usually limited in that the study was conducted on general users, not on maladaptive Internet users.

Tokunaga (Tokunaga, 2015) argues that research needs to be improved in five aspects to overcome the limitations held by the three perspectives. First, it is necessary to refine whether MIU is generated by responses by specific content or within the overall context of smartphone or PC-based Internet use. Second, accuracy of the self-control processes that leads to observation, judgment, and self-reaction of the person presented from a social cognition perspective is required. Third, it is necessary to further refine and rationalize MIU measurement tools to clearly measure the factors mentioned in each view. Fourth, in order to ensure justification for the phenomena presented as problematic results from each point of view, an analysis of causality and consideration of the positive

consequences are also needed. Fifth, research on people suffering from maladaptive Internet use should ensure clinical basis for each perspective.

Ⅲ. Maladaptive Internet Use as a Social and Cultural Phenomenon

The ministry (Ministry of Science and ICT) and the agency (Korea Information Society Agency), which carry out MIU prevention and resolution policies in Korea, have regarded MIU from a socio-cultural perspective since 2016. This change is in line with the change in academia, where the theory of choice (Heyman, 2013) that sees addictive behavior as an issue of individual choice, away from the existing disease model (White, 1998), has emerged (신성만 et al.). Hayman (2013) argues that drug addicts in the U.S. stop using drugs without professional intervention for reasons such as legal concerns, economic pressure, and desire to be respected, and that these reasons are for personal choice.

Long-term follow-up studies of MIU have also shown that many of the maladaptive Internet users recover without therapeutic intervention. A study of teenagers in Taiwan and Hong Kong found that about 37 to 51 percent of those who were categorized as maladaptive Internet users in the first year of the survey recovered in the second year of the survey. In particular, the sense of self-efficiency that arises from the belief that interference in reducing MIU can be eliminated and problematic behavior can be improved has a positive effect on self-recovery.

Publication Year	**2007**	**2014**	**2014**	**2017**
Study Year	2003~2004	2005~2006	2010~2011	2012~2013
Participants	Taiwanese adolescents	Taiwanese adolescents	Taiwanese adolescents	Hong Kong adolescents
Self-recovery Rate	49.4%	51.4%	36.7%	45.9%
References	Ko et al., CyberPsychology & Behavior	Ko et al., Comprehensive Psychiatry	Lau et al., Addictive Behaviors	Chang et al., Addictive Behaviors

In the case of Korea, the analysis of the data on the Korean Children and Youth Panel (National Youth Policy Institute 2014; 2015; 2016) showed that about 50 percent of teenagers who were categorized as maladaptive Internet users in the baseline showed improvement within one year and 70 percent within two years.

School Year in 2014 (No.)	2014 (Baseline)	2015	2016
		(Improvement rate compared to baseline)	
5th grade in elementary school (n=1,406)	118	55 (53.4%)	26 (78.0%)
2nd grade in Middle school (n=1,592)	256	111 (56.6%)	53 (79.3%)
2nd grade in high school (n=1,540)	281	140 (50.2%)	90 (68.0%)

Ⅳ. Measurement of Maladaptive Internet Use

According to a study published in 2014(Laconi et al, 2014), there are 45 MIU measurement tools introduced in English-language journals over the past 20 years, 17 of which have been verified at least once in terms of psychometric properties. These measurement tools were developed primarily by utilizing theoretical frameworks of pathological gambling, drug dependence, and cognitive behavior. Among the 45 measuring tools, the highest number of quotes was “Internet Addiction Test (IAT),” developed by Kimberly Young, a pioneer of MIU research. The IAT is still the most frequently used measure at home and abroad, but it has limitations from the current point of view where Internet use has become common and the boundaries of online and offline have become blurred. For example, the question "Have you ever made an online friend?" and "Have you checked your e-mail before doing anything else to do?" is hardly an appropriate question in determining whether MIU is today.

In Korean academia, some use measures developed in other countries after verification of validity, and others use measure developed by themselves. Among them, the most frequently used are the ones developed by the Korea Information Society Agency. The measure is used in the national official statistics “Smartphone Overdependence Survey” (approved in 2006 by Statistics Korea), and is a basis for policy demand at the national level.

The measure went through three reformation processes, considering changes in the digital environment, academic progress on MIU and the economic feasibility of “smartphone overdependence survey” as a national official statistic. In 2002, a measure consisting of seven factors in 30 questions was developed in consideration of the PC-based Internet use environment, but the measure was reduced to 15 questions in 2009 and was reorganized by dividing it into PC-based and smartphone-based measures in 2011 as the use of smartphones spread. In 2016, it was integrated into one measure in consideration of the difficulty of distinguishing between PC-based and smartphone-based Internet use.

2002 (Internet)	2009 (Internet)	2011 (Internet·Smartphone)	2016 (Integrated)
Withdrawal	Withdrawal	Withdrawal	Salience
Tolerance	Tolerance	Tolerance	Self-control failure
Disturbance of Adaptive Functions	Disturbance of Adaptive Functions	Disturbance of Adaptive Functions	Serious consequences
Deviate Behavior	-	-	-
Virtual Interpersonal Relationship	Virtual Interpersonal Relationship	Pursuit of virtual world	
Addictive Automatic Thought	-	-	-
Reality Separation Disorder	-	-	-

Ⅴ. New Perspectives on Maladaptive Internet Use

1. Digital economy: Rise of a new perspective

Since last year, more and more people have discussed MIU from the perspective of digital technology and the economy. At the heart of the discussion is Tristan Harris, who worked as a design ethicist for Google and now serves as executive director of the Center for Human Technology. He announced inside Google in 2013 that the company should minimize interference from digital technology and respect the rights of users to focus on and has been pushing for activities against non-humanitarian digital technologies and industries in earnest since leaving the company in 2016. Harris' activities have drawn more attention, with a series of events in January last year, including Apple shareholders calling for corporate responsibility for children's screen time and the British government holding social media companies accountable for children's mental health. The digital economy perspective provides a broader view of MIU by explaining MIU in the relationship with the maintenance and diffusion of media business ecosystems and the development and application of new technologies.

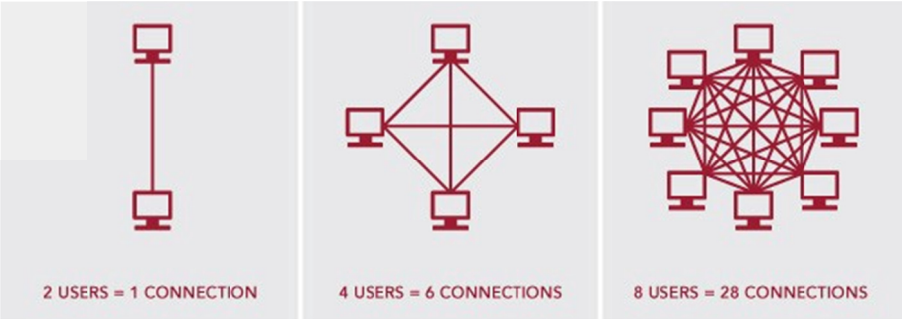
2. Platform business: The core of digital economy

Platform business is the most important model in today's digital economy and the most frequently mentioned model associated with MIU. Platform business is the business of laying the foundation for an individual or an entity to interact with each other and earning revenue as a result of an interaction. Facebook, for example, provides a communication platform for individuals to maintain and form a diverse network of relationships, including family and friends, and benefits from advertisers in return for exposing them to advertising. Airbnb takes a commission in return for providing a place for transactions so that hosts and guests can easily rent and find their homes. As such, the platform business creates value through its role as an intermediary to connect diverse groups, including users, consumers, suppliers and advertisers.

A few books dealing with platform businesses have been published in the past one to two years. The books attach words such as "imperial," "war" and "revolution" behind the platform, suggesting the position of the platform business in the digital economy. The emphasis and expectations are high in that most companies that are leading and changing the digital ecosystem today are based on platform businesses, whether wholly or partially. According to Accenture, a market outlook company, the market value of platform companies that are ranked in the top 15 in the world amounts to about 2.6 trillion U.S. dollars. This is more than 15,000 times higher than the market value of the 15 largest Internet companies in 1995.

3. Key elements of platform business success: Users and data

The movie “Social Network,” which depicts the true story of Facebook’s birth, features employees celebrating the entry of a millionth user. In a platform firm, the number of users means more than the number of purchasers of manufactured goods or services. This is because ‘network effects’ can be attributed to multiple times of user activity as users increase. In addition, more users can outpace alternative platforms with similar functions. For example, Kakao Taxi naturally increases the number of matches between the drivers and passengers as more of them use the app. In addition, if the number of drivers and passengers using Kakao Taxi far exceeds that of alternative app users such as T-map taxi and Seoul taxi apps, both drivers and passengers will be forced to choose to use Kakao Taxi in order to increase the chances of driver-passenger match.



[Figure1] Network Effect with Increasing Number of Users (Busse, 2012)

As the number of users is important, the value of the platform company increases in proportion to the size of the actual users. This is because the actual number of users means the degree of sustainability of the platform as well as the possibility of generating profits. Shares plunged 20.5 percent in the second quarter of this year after Twitter's real users dropped 1 million after deleting fake and violated accounts. The figure is 500 million dollars (Neate, 2018a). Facebook's share price also dropped 19 percent as its European subscribers withdrew following the Cambridge Analytica scandal (Neate, 2018b).

The amount of data a platform operator can obtain from personal information required for users to sign up is vast, including personal tastes, preferences, emotions and interests revealed through activities within the platform. In the case of Facebook, three categories of data are collected: demographic data (sex, age, political orientation), behavioral data (messages, photos, friends, posts, comments, logins and out), and social graph data (number of friends, demographic attributes of friends, and political orientation of friends) even before users begin active activities to post postings. Noteworthy is that drafts written before the final posting can remain as metadata and be potentially utilized (Das & Cramer, 2013). Once the final post is complete, all the emotions, interests, places, relationships, and living rhythms from the post are collected.

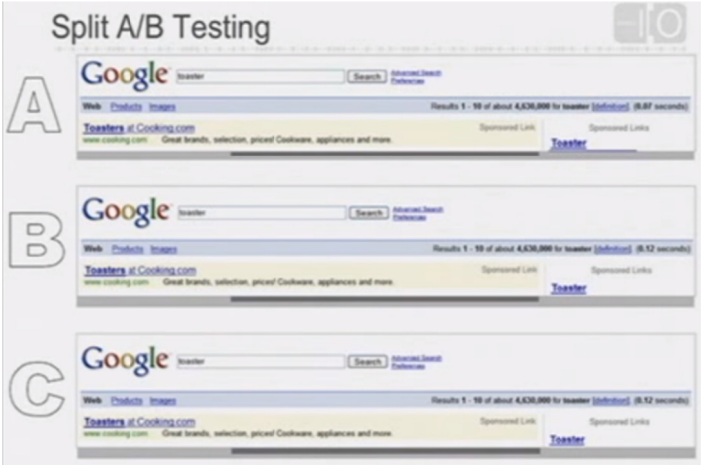
Data collected through platform business operations is used in two main ways: First, data is the basis for providing optimized services to users. As it is important to increase the number of users and maintain the amount of activity, the data is intended to provide users with a satisfactory experience. In the case of Facebook, it is well known to prioritize numerous news feeds based on more than 100,000 kinds of data, as well as user interest and emotion. Media content platforms such as Netflix and sales platforms such as Amazon utilize data to recommend content and products that users will be interested in.

Second, data plays a key role in creating advertising effects with which advertisers are satisfied. Platforms with free basic services such as Google and Facebook generate profits by mediating ads between advertisers and users. Google and Facebook are highly dependent on advertisements, which account for 61 percent of all online ads worldwide as of 2017. Facebook provides optimal advertising effects for advertisers through classification of interests, as well as gender and age categories traditionally used to set advertising targets.

4. Platform business and MIU

As mentioned earlier, the value of the platform business is based on the number of users and the extent of their activities. Thus, the platform business must come up with a variety of strategies for users to do more activity on their platforms over more time. A/B testing (also called split testing) is a method that is used by Internet companies, including platform companies, to identify users' behavior and to show users more than one version of web design, wordings, and notification functions to find most preferred versions.

The figure below is an A/B testing that was conducted by Google, which measures the relationship between the gap between the Google logo and the menu bar and the user preference of the search function. Thus, platform companies are sensitive to feedback from users' behavioral data, as decisions on such fine details are made through A/B testing.

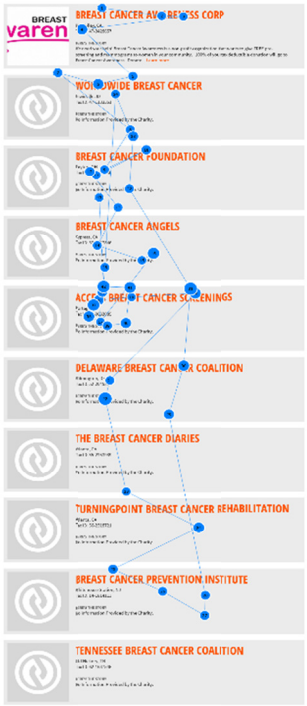


[Figure2] An example of Google's A/B testing (Google Developers, 2008)

User data on the platform is collected and evolved in an increasingly diverse way. In general, people can think of personal information entered directly at the time of joining the platform, feedback such as text, pictures, videos, clicks, and text, as well as time and location information. But this is the simplest level of information, and the latest methods of data collection and analysis are much more sophisticated.

The figure below shows the results of analyzing reading patterns through eye tracking on mobile devices such as smartphones and smart pads. The small dots in blue show where the user's gaze lingered and indicate more focus on the information at the top than on the bottom of the page. In addition to these spatial patterns, user interest patterns are collected and analyzed, such as how long they stayed in each content and how much they spent by clicking on the title (Fessenden, 2017).

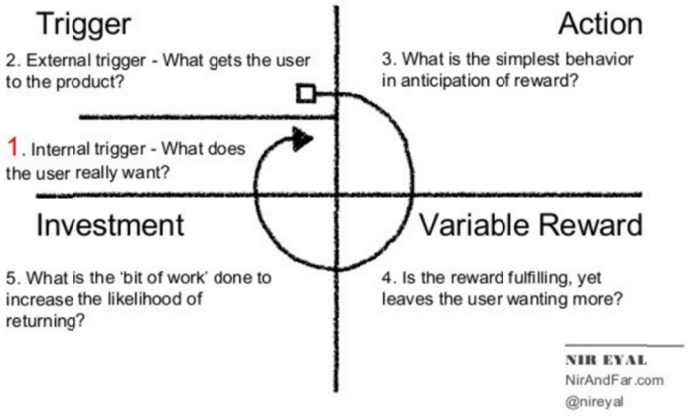
Along with the development of language and image analysis processing technology, it is also possible to identify user emotions. It is also possible to predict the possibility of depression by analyzing postings on social media (Brook, 2018), and Facebook has been patented for its technology to analyze facial attributes and convert emotional states into emoticons. The amount and type of data collected through the platform company is so vast that it is called the user's DNA or genome (Silver, 2017).



[Figure3] An example of eye tracking (Fessenden, 2017)

The insights gained from A/B testing, user data collection and analysis are used to design strategies to help more people spend more time on their platforms. Because one user has a limited amount of time to use the media per day, it is an important task to devise strategies to maintain and change user behavior. Nir Eyal and Ryan Hoover (2014), authors of "Hook," analyze strategies commonly used by successful digital media companies and present a so-called habit-forming model consisting of four elements of trigger-action-variable reward-investment.

According to the authors, the proper combination of users' psychological motivations and skills can create strong habits. These habits may be positive for expressing positive human motivations, or, when combined with aggressive commercial motivations, such as platform companies, could lead to negative consequences, such as MIU.



[Figure4] Nir Eyal's habit-forming technology model

Ⅵ. Conclusion

Most discussions on maladaptive Internet use, such as addiction and cognitive behavior perspectives, regard the phenomenon as an issue of mental health. This is because the branch of academia, which deals with mental health such as psychology and psychiatry, first raised the issue of Internet addiction and conducted continuous research, thereby establishing itself as the mainstream perspective. Some of the discussions in the mental health perspective focus on personal psychological and relational issues that

contribute to maladaptive Internet use, while others assume that the Internet is a direct cause of maladaptive Internet use and criticize its harmfulness. Discussions from the mental health perspective have largely contributed to spreading social awareness of the problem of maladaptive Internet use over the past two decades. The mental health perspective, however, shows significant limitations in that the maladaptive Internet use has broader and multifaceted attributes, with the changes in the ecosystem surrounding digital technology and the industry. The emerging digital economy perspective is suited to uncover the mechanism of habit-forming digital technology but lacks the explanatory power of maladaptive Internet use caused by personal psychology and the social environment. As various aspects of maladaptive Internet use are observed, analysis and resolution from various perspectives are necessary.

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