The Role of Self-regulation in Internet Addiction During Adolescence

Yicheng Zhu[1,a,*]

[1]Blundell's School, Tiverton, Devon, EX16 4DN, UK
a. zhuj@blundells.org
*corresponding author

Abstract: During adolescence, individuals experience a period of significant development of emotional control, self-regulation and decision-making skills. While this is a period of opportunity for adolescents to benefit from knowledge, social life, and physical activities, it is also a time where the excessive availability of information and internet usage can potentially have detrimental effects on their mental health, academic performance, and physiology. This study aims to discuss the potential relationship between low-level self-regulation and the development of internet addiction in adolescents. With the widespread use of smartphones among young people, internet addiction has become a severe problem. Adolescents who prioritize short-term goals and focus on immediate gratification or adopt competitive gamming style may exhibit low-level self-regulation, which is a risk factor for developing internet addiction. In addition, poor family functioning, low parent education, the presence of interparental conflict, and restrictive parental mediation may also be significant factors contributing to the onset of internet addiction. Furthermore, the co-occurrence of lower self-regulation and severe internet addiction may have a substantial negative impact on academic performance and quality of life. The previous study's findings demonstrate a causal relationship between self-regulation and internet addiction. However, applying voluntary sampling methods to collect data, social desirability biases, and cultural bias are some of the limitations of most research in this area. Future research should adopt stratified sampling methods, tailor their survey and instruments to be culturally sensitive to investigate the underlying mechanisms that give rise to this association.

Keywords: adolescent, self-regulation, Internet addiction

1. Introduction

Adolescence is a pivotal developmental stage characterized by significant alterations in cognitive, emotional, and social domains. The emergence of the internet has brought a novel dimension to this developmental period, with opportunities and challenges that are unique to this era. A pertinent challenge confronting adolescents is internet addiction, which has been identified as a growing problem among this population. Despite the inclusion of internet gaming addiction as a potential disorder in the latest Diagnostic and Statistical Manual of Mental Disorders (DSM-V), the categorization of "Internet Addiction" as an established disorder remains contentious [1]. Self-regulation, an integral aspect of an individual's cognitive control, denotes the capacity to intentionally regulate one's emotions, thoughts, and actions in alignment with their desired goals and objectives.

It encompasses the conscious and deliberate management of one's internal states and responses to external stimuli to realize optimal outcomes [2]. This study endeavours to discuss the role of self-regulation in internet addiction during adolescence while discerning the factors that may modulate the association between the two.

A previous study has examined the potential risks and protective factors associated with internet addiction. It reveals that psychopathologies, such as depression and anxiety, may be risk factors that increase the likelihood of internet addiction among young people [3]. The findings also suggest that parental monitoring and authoritative parenting styles may mitigate the risk of internet addiction in adolescents. By establishing clear guidelines and expectations around internet use, parents can help their children develop healthy internet habits and prevent excessive use. Furthermore, the previous study highlights the detrimental effect of internet addiction on the mental health of young people, with depression and anxiety being identified as potential outcomes. The findings also suggest that low levels of self-regulation may contribute to both excessive internet use and the development of internet addiction. Lam's study underscores the multifaceted nature of internet addiction and emphasizes the importance of considering multiple factors in understanding and addressing the problem.

Another research regarding sensation seeking and self-regulation during adolescence showed that sensation seeking tends to be the highest during adolescence, reaching its peak at approximately 19 years, before gradually declining into adulthood. In contrast, self-regulation continues to develop gradually and linearly during this period until it plateaus in adulthood [2]. Steinberg et.al. suggested that self-regulatory capabilities may attain adult-like levels around age 15 in less arousing contexts but may not be fully developed until close to the mid-20s for more demanding or emotionally arousing tasks. Furthermore, the previous study revealed that parent education and cognitive ability were significant predictors of sensation seeking and self-regulation. Individuals with higher levels of parental education tended to exhibit lower scores on measures of sensation seeking and higher scores on measures of self-regulation. Additionally, individuals with higher cognitive ability tended to score lower on measures of sensation seeking and higher on measures of self-regulation.

Existing research indicates that during adolescence, sensation seeking increases while self-regulation is still in the process of developing, leaving young individuals ill-equipped to manage their heightened excitement-seeking tendencies. Depression and anxiety have been identified as potential risk factors associated with the development of internet addiction among adolescents. Moreover, parental positive monitoring has demonstrated effectiveness in preventing the onset of internet addiction in this population. However, there is still a gap in research regarding how precisely self-regulation contributes to the development of internet addiction, as well as how the risk and protective factors identified in previous studies may affect both self-regulation and internet addiction. Therefore, the current study aims to shed light on the intricate relationship between self-regulation and internet addiction by exploring the ways in which self-regulation influences the onset and maintenance of this disorder.

2.   The Effect of Relevant Factors of Self-regulation on Internet Addiction

The popularity of smartphones in modern society has made them an indispensable component of daily life. Individuals with a slow life history (LH) strategy, who prioritize long-term goals, have been shown to possess high-level self-regulation. However, those with a fast LH strategy, prioritizing short-term goals, tend to exhibit low-level self-regulation. The implications of this relationship are particularly pertinent to adolescents, who may struggle to manage their excitement-seeking tendencies and prioritize their studies or other long-term goals. In a study conducted by Zhang et al., the authors examined the relationship among LH strategy, self-regulation, smartphone addiction (SA), and internet gaming disorder (IGD) among Chinese university students [4]. It indicated that slow LH

strategy was negatively associated with both SA and IGD. Furthermore, self-regulation was also negatively correlated with both. The findings of this study suggest that while smartphones have become ubiquitous, excessive usage and addiction, it may lead to adverse physical and psychological effects, particularly for individuals who struggle with self-regulation. Consequently, individuals with broad vision and ambitious long-term goals are more likely to possess high-level self-regulation, which could help mitigate the negative effects of smartphone addiction.

Engaging in competitive game play may result in an increased risk of developing internet addiction due to weakened self-regulation. Achab et al.'s study investigated risk and protective factors for problematic engagement in gaming through self-report measures [1]. The research recruited French volunteer gamers over 18 years old between May 2009 and March 2010. The results revealed that competition and advancement motives, as well as benefits (such as reduced anxiety, solace, greater personal satisfaction, and sense of power), can be risk factors for several dysfunctional gaming items (i.e., persistent engagement despite adverse consequences, dependence-like symptoms, and elevated levels of immersion) that predict dysfunctional gaming severity. Furthermore, competition was identified as a risk factor for the development of gaming disorder (GD), particularly when combined with other factors such as impulsivity and maladaptive coping strategies. Those who utilized gaming as a maladaptive coping strategy to cope with negative feelings such as anxiety or boredom were also at an elevated risk of developing GD if they were highly competitive. Hence, competitive gaming, induced by high impulsivity levels and sensation seeking, is regarded as a significant factor in low-level self-regulation and the development of internet addiction.

3.   The Contribution of Environmental Factors

Adolescents who grow up in families with inconsistent rules and limited emotional support are at risk of developing low self-regulation, which can lead to impulsive actions and increased vulnerability to harmful habits like internet addiction. In contrast, adolescents who experience a stable and supportive family environment with consistent and positive parental involvement are more likely to develop robust self-regulation skills that protect them from developing problematic internet use habits. Marzilli et al. conducted a study to examine the association among family functioning, impulsivity, psychopathological symptoms, and internet addiction (IA) in university students [5]. The study recruited 350 participants aged 19 to 25 years, and after excluding those who did not meet the eligibility criteria, the final sample included 244 young adults. They used the Internet Addiction Test (IAT) and the Family Assessment Device (FAD) to measure IA and family functioning, respectively. The findings suggest that poor family functioning, high impulsivity, and psychopathological symptoms are positively associated with IA among young adult university students. Thus, promoting a nurturing and affirmative familial milieu that fosters robust self-regulation skills is essential to prevent the onset of internet addiction in adolescence.

Parental education has been proposed as a potentially significant determinant of adolescents' self-regulatory capacity. In particular, adolescents with parents who possess higher levels of education may have access to a greater range of educational resources and more open-minded parental attitudes, which could positively influence their ability to regulate their behaviours and emotions. Debbarma and Umadevi conducted a study exploring the relationship between internet usage and self-regulation among school students in Tripura, India [6]. Utilizing a self-administered questionnaire, the researchers collected data from two schools in Tripura on problematic internet use and self-regulation levels. The study findings suggest that student self-regulatory capacity with respect to internet addiction is influenced by age, gender, place of residence, and parent education. Specifically, the results indicate that students' ability to regulate their internet usage is contingent upon their place of residence. Plus, the father's educational attainment is a significant predictor of self-regulation capacity. Conversely, maternal education was found to significantly impact students' problematic

internet usage. In sum, the findings highlight parental education as a potentially pivotal mechanism for cultivating and augmenting the self-regulatory competence of adolescents, via the provision of essential coping strategies and competencies to effectively manage their cognitive and behavioural faculties.

The impact of parental involvement on adolescent internet addiction is a significant research topic. Adolescents who receive active parental mediation, including ongoing and open communication with parents regarding online activities, guidance, support, and encouragement of responsible online behaviour, may experience a lower risk of internet addiction than their counterparts who lack parental involvement. Steinfeld's study aimed to explore the relationship between parental mediation of adolescent Internet use and adolescent concerns regarding online risks [7]. The researchers conducted a survey and interviews with adolescents to gather data on their internet use, parental mediation strategies, and concerns about online risks. The findings revealed that both restrictive is more positively associated with adolescent concerns about online risks. Additionally, active parental mediation was negatively correlated with adolescent internet activities, while restrictive parental mediation was positively correlated with adolescent internet activities. The results suggest that active mediation promotes internet use, while restrictive mediation limits internet activities as intended. However, internet risks were mainly associated with restrictive mediation, and active mediation was not associated with risks, except for cyberbullying perpetration, in which active mediation negatively predicted perpetration. In conclusion, it is recommended that parents adopt active mediation strategies to promote adolescent self-regulation while avoiding overly restrictive approaches that may impair problem-solving abilities and autonomy.

The emergence of adolescent internet addiction may be impacted by the presence of interparental conflict. Adolescents who experience frequent and intense interparental conflict may be more vulnerable to negative emotional and psychological outcomes, including a higher likelihood of developing internet addiction. Nonetheless, an adolescent's ability to regulate their emotions and behaviours may potentially mitigate the negative impact of such conflict on their susceptibility to internet addiction. An adolescent who possesses robust self-regulatory abilities may be better equipped to cope with interparental conflict, reducing their risk of developing internet addiction. Wei et al. conducted a study to examine the relationship between interparental conflict, parent-adolescent attachment, adolescent self-control, and adolescent internet addiction [8]. Through survey data obtained from 459 junior high school students. The previous study revealed that interparental conflict and insecure parent-adolescent attachment positively correlated with adolescent internet addiction, while adolescent self-control was negatively correlated with adolescent internet addiction. Additionally, adolescent self-control was found to moderate the relationship between interparental conflict, parent-adolescent attachment, and adolescent internet addiction. All in all, it is plausible to assert that interparental conflict may significantly impact the onset of internet addiction in adolescents. However, self-regulation appears to function as a critical moderator of the relationship between interparental conflict and adolescent internet addiction, potentially mitigating the negative consequences of interparental conflict.

4.   Impact of Self-regulation on Learning and Living

Given the limited nature of an individual's energy, internet addiction and a lack of self-regulation may have adverse implications for academic achievement. Ghafoor et al. conducted a study to examine the possible impact of smartphone addiction on academic performance among medical students, with self-regulation and bedtime procrastination serving as mediators [9]. The research involved the administration of an online questionnaire to measure variables related to smartphone addiction, self-regulation, bedtime procrastination, and academic performance among 260 medical students out of 300 approached, yielding an 86% response rate. The study revealed that there is no

negative relationship between smartphone addiction and self-regulation. In contrast, the study found that self-regulation had a positive association with academic performance. Nevertheless, self-regulation did not play a substantial role as a mediator between smartphone addiction and academic performance. Furthermore, the research confirmed a positive correlation between smartphone addiction and bedtime procrastination, with bedtime procrastination completely mediating the association between smartphone addiction and academic performance. These findings indicate that internet addiction can significantly impact academic performance, particularly given the correlation between low levels of self-regulation and internet addiction.

The relationship between self-regulation and internet addiction is believed to be causal, as the ability to regulate one's own behaviour and emotions can affect an adolescent's propensity to develop an addiction to the internet. Individuals who lack self-regulatory skills may struggle to control the extent of their internet use and the nature of content they consume, thereby increasing their risk of addiction. Conversely, those with stronger self-regulatory abilities are better able to monitor and restrict their internet use, thereby reducing the likelihood of addiction. Thomas and Bance examined the efficacy of the "Self-regulation and Quality of Life Intervention Program" (SQOLIP) in controlling/reducing pathological internet use (PIU) and enhancing the quality of life of selected Indian adolescents [10]. Data was collected from 323 adolescents from four senior secondary schools in Kerala, South India, using online surveys measuring basic information, life quality, and internet addiction level. A purposive sampling technique was used to select 223 respondents who met the inclusion criteria. Participants in the experimental group completed a five-week program consisting of seven modules including awareness of thoughts, regulation of emotions, wise decision making, planning skills, time-management, and changing lifestyle. The study found that the SQOLIP program was highly effective in reducing PIU and enhancing the life quality of the selected Indian adolescents. The post-test scores of participants in the experimental group showed significant changes in terms of pathological internet use and quality of life as compared to their pre-test scores. The program's efficacy was evaluated using Cohen's d test, which indicated a large effect size and profound changes in the behaviour of participants. These findings provide robust evidence for the causal relationship between self-regulation and internet addiction and support the claim that enhancing self-regulatory skills can have a significant impact on reducing internet addiction and enhancing overall quality of life.

5. Conclusions

The ubiquitous nature of internet in contemporary society renders it an indispensable component of people's daily lives. Its transformative influence on the way people communicate, access information, and conduct business is widely recognized. While the internet undoubtedly plays a crucial role in people's daily lives, it is not without its potential drawbacks. Internet addiction has become an increasingly pressing issue which led to social isolation and decreased physical activity. Previous studies suggest that adolescents who employ fast life strategies and competitive with gaming tend to have weaker self-regulation and leading to the development of internet addiction. Poor family functioning, lower parent education, and interparental conflict can be significant environmental factors that induce low-level self-regulation and the onset of the internet addiction. Moreover, internet addiction can contribute to impaired academic performance and poor life quality.

Previous studies in this domain have encountered various limitations. Primarily, the utilization of non-random, self-reported sampling methods may have introduced selection bias, compromising the generalizability of the findings. It is possible that individuals who chose to participate had different characteristics or motivations for gaming than those who did not participate. A relatively low sample size may not be representative of the entire population of students in various regions. The findings of one study may not be generalizable to other populations with different demographic characteristics,

cultural backgrounds, or educational systems. A larger and more diverse sample size would increase the external validity of the study and provide more robust evidence for the relationship between internet usage and self-regulation among school students. In some of the previous studies, the use of questionnaires for measuring variables may limit the accuracy and reliability of data collected due to social desirability bias or response bias. Social desirability bias occurs when participants respond in a way that they believe is socially acceptable or desirable, rather than providing honest answers. Response bias occurs when participants consistently respond in a certain way (e.g., always choosing the middle option on a Likert scale) regardless of the question being asked. These biases can lead to inaccurate or unreliable data, which may affect the validity of the study's findings.

For future research, given the limitations of previous studies, it is necessary to use more rigorous research designs, such as longitudinal studies or stratified sampling method, to establish a more definitive causal relationship between self-regulation and internet addiction. The stratified sampling methods would further enhance the inclusivity of research and mitigate potential gender biases. Additionally, it would be beneficial to investigate the potential effectiveness of intervention programs that aim to enhance self-regulation in order to reduce internet addiction in adolescents. Further, it is recommended to examine the potential mechanisms underlying the observed relationship between self-regulation and internet addiction, as well as to explore whether there are individual or cultural factors that may moderate this relationship. Finally, it would be valuable to examine the potential long-term effects of internet addiction on various domains of adolescent development, such as academic performance, social functioning, and mental health, in order to fully understand the consequences of this phenomenon and inform intervention efforts. This review can provide some suggestions to the development of prevention programs for adolescents at high risk.

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