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Exploring the Effects of Internet Addiction: A multi-construct analysis using the Chen Internet Addiction Scale

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Abstract
This study examines the impact of Internet Addiction (IA) among adolescents in Malaysia using the Chen Internet Addiction Scale (CIAS). Data from 376 respondents reveal moderate impacts in Withdrawal (Mean = 2.05, SD = 0.61), Tolerance (Mean = 2.34, SD = 0.59), Compulsive Behavior (Mean = 2.14, SD = 0.61), and Health and Interpersonal Problems (Mean = 2.27, SD = 0.55). At the same time, Time Management issues revealed a low impact (Mean = 1.96, SD = 0.66). These findings highlight adolescents' increasing internet dependency and its potential behavioral and health challenges.

Keywords: Internet Addiction; IA; CIAS; Effects

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1.0 Introduction

Internet Addiction (IA) is becoming a growing concern globally, especially to adolescents and students. As the digital landscape continues to dominate various aspects of life, failure to control internet use will result in a disruption in individual life such as mental health, academic or work performance, and interpersonal relationship (Young, 2004). Meanwhile, adolescents are at risk of IA due to the nature of development, and high reliance on the Internet for education, entertainment, and socialization (Yeung et al., 2022).

Numerous studies have looked into various facets of IA, including its prevalence and risk factor (Gao et al., 2022), impact on certain aspect like academic performance (Zhang et al., 2021) and mental health (Zewude et al., 2024), and also interventions of IA (Szász-Janocha et al., 2021). However, there is little focus on analyzing complex interactions between these variables.

This study intends to bridge the gaps by using multi-constructs from the Chen Internet Addiction Scale (CIAS) to investigate the complete aspects of IA among adolescents in Malaysia, particularly in the state of Kedah. The findings of this study will be useful for education authorities, policymakers, and mental health practitioners as they confront IA and promote balance and healthier online practices.

1.1 Research Aim

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This study aims to assess the prevalence of IA among adolescents and its consequences using a multifaceted approach. Using CIAS, it aims to clarify how various components of IA affect adolescents in their everyday lives and overall well-being.

1.2 Research Objectives

i. To investigate the prevalence of internet addiction among adolescents.
ii. To assess the impacts of internet addiction from various components of CIAS.
iii. To investigate the relationship between the internet addiction constructs.
iv. To provide recommendations for managing the impacts of IA through targeted initiatives including educational institutions and policymakers.

2.0 Literature Review

2.1 Theoretical perspectives on internet addiction

Internet Addiction (IA) is a behavioral addiction with various similarities to other types of addiction such as substance abuse and gambling addiction. Griffiths (2005) has proposed a "components model" of addiction, and introduced six important components of addiction that include salience mood modifications, tolerance, withdrawal symptoms, conflict, and relapse. As for application in internet addiction (IA), this means that the internet has become the center of a person's life, is used to alter their feelings, and needs a certain amount of time to achieve satisfaction. Meanwhile, failure to access the internet may cause withdrawal and emotional distress, while relationships and certain aspects of life may be jeopardized by the excessive use of the internet. on the other aspect, any attempt to control internet consumption may lead to relapse, highlighting IA's similarities with other forms of addiction.

Before that, Davis (2001) has introduced the Cognitive-Behavioral Model of Pathological Internet Use (PIU) which explains IA as derived from cognitive distortion about the internet's importance. This aspect combined with psychological vulnerabilities like low self-esteem and poor emotional regulation will result in IA. Meanwhile, individuals with IA may have environmental triggers, such as stress, isolation, and boredom, which can aggravate this issue. This model suggests that maladaptive beliefs and emotional struggle drive IA, and proposes the need for interventions to address those underlying factors.

Moving forward, Brand et al. (2016) proposed an Interaction of Person-Affect-Cognition-Execution (I-PACE) Model that concludes IA is a result of the interaction of personal traits (like impulsivity), emotional conditions (such as stress), and cognitive processes (such as obsessive thinking). This model suggests that over a certain period, habitual internet use becomes compulsive and difficult to control. This model provides a comprehensive view by integrating behavioral, emotional, and cognitive factors, emphasizing how IA was developed through a dynamic relationship of internal and external factors.

2.2 Regional trends and impacts

Southeast Asia has become an important region for studies involving internet addiction (IA), thanks to the widespread internet use and active online participation. In Malaysia, adolescents tend to spend a considerable amount of their time online, mainly on social media (Sara Shafiqah et al., 2021), and internet gaming (Ismail et al., 2021); contributing to IA. Various research on Malaysia's adolescents and students conclude that those struggling with IA experience difficulties in time management (Kutty et al., 2022), experience relationship and family issues (Hamizah Ab Razak et al., 2023), and having lower academic grades (Aina Masturina et al., 2021).

Meanwhile, a similar trend can be observed all around the globe, and the extent of IA varies depending on certain demographic factors. For instance, Su et al. (2020) has concluded that gender provides useful insight on IA, indicating that males and females may become addicted to the internet through different pathways, where males are more prone to internet gaming addiction and females are likely to have a social media addiction. A study in China by Zhang et al. (2022) found that demographic characteristics, family environment, and psychosocial factors were associated with internet gaming addiction, social media addiction, and smartphone addiction. Negative psychological factors (such as anxiety and depression) play an important role in different behavioral addictions.

2.2 Construct of Chen Internet Addiction Scale (CIAS)

The Chen Internet Addiction Scale (CIAS) is a measure for assessing Internet Addiction (IA) that examines five major characteristics based on behavioral addiction theory. These characteristics include compulsive use, withdrawal symptoms, tolerance, interpersonal and health issues, and time management problems. The CIAS includes 26 items scored on a 4-point Likert scale (1 = never, 4 = always), with higher scores indicating more severe IA.

Compulsive Use refers to the difficulty in controlling internet usage, especially when the negative implications are obvious. Withdrawal symptoms are the emotional distress experienced when internet connection is reduced. Tolerance assesses the growing demand for prolonged online interaction to achieve the same degree of happiness. Interpersonal and Health Issues investigate the effects of excessive internet usage on relationships and physical well-being, whereas Time Management Challenges examine how internet use can lead to the abandonment of personal obligations. The score system classifies people into three categories: normal (26-57), at-risk (58-63), and addicted (64-104) (Ko et al., 2005; Mak et al., 2014).

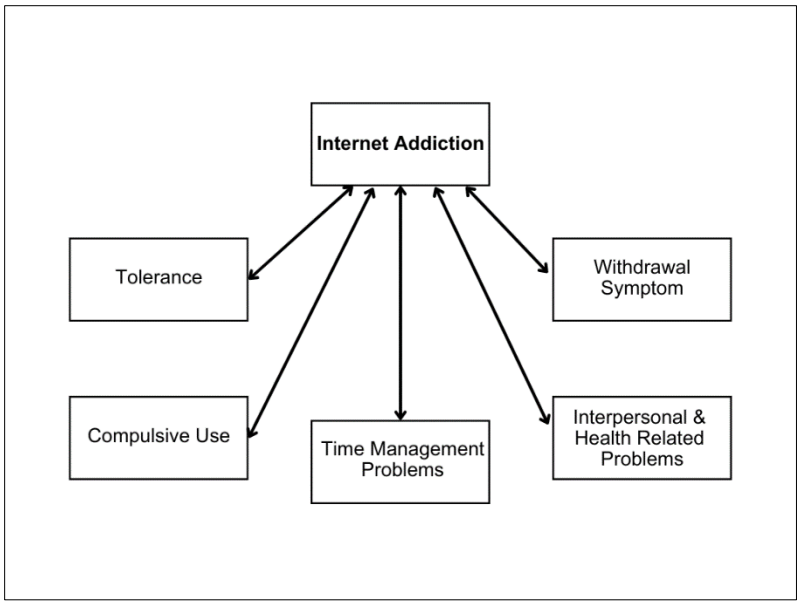

Fig. 1: Constructs of Internet Addiction

3.0 Methodology

3.1 Study design

This study utilized a cross-sectional design to assess Internet Addiction (IA) among secondary school students in Kedah. A mixed location background which is an urban and rural area was chosen to ensure a diverse variety of demographic factors. Participants were chosen using stratified random sampling, to gain sample representativeness. Initially, schools in Kedah were categorized into urban and rural clusters to address potential socio-economic and environmental disparities affecting IA. Four schools were randomly picked from each cluster using basic random sampling, guaranteeing that each school had an equal probability of selection. Participants in Form 4 (16-year-old) students were chosen based on two factors; their higher levels of internet usage during this developmental time, and upper-level students tend to have more academic-related tasks using the internet.

Classroom-based randomization was utilized to select participants for each school. To execute this, the total classes in Form 4 were determined, and a certain number of students were chosen from each class to ensure equitable distribution of participants. For example, if a school has 5 classes, 10 students are randomly selected from each class to reach the intended 50 participants for every school. To select participants from each class, students were assigned a random number and then picked by a random number generator. This approach was logistically effective and guaranteed equity in the selection process. Within the eight schools, the intended sample size was 400 students. However, the final analyzed questionnaire was 376 participants due to incomplete responses from 24 participants.

3.2 Data collection

The research encompassed adolescents who were proficient in Malay and had access to digital devices and the internet. Demographic information, including gender and internet usage frequency, was gathered to examine its correlation with IA. The Chen Internet Addiction Scale (CIAS) was employed to assess IA. The CIAS has been extensively validated in Southeast Asian contexts, with its Malay translation and adaptation by Ali Sabri Radeef et al. (2018) ensuring cultural relevance and application for Malaysian adolescents. Data collection was performed manually by self-reported responses to the CIAS questionnaire, assisted by school counselors. The replies were subsequently examined utilizing the Statistical Package for the Social Sciences (SPSS) software. Descriptive statistics summarized IA levels and demographic characteristics, while inferential methods, using regression approaches, investigated correlations between IA constructs. This research methodology assures reliable and significant data, offering valuable insights into IA patterns among Malaysian adolescents.

3.2 Data collection

The study targeted adolescents aged 16 to 17 who were fluent in Malay and had access to digital gadgets and the Internet. Demographic information, such as gender and frequency of internet use, was collected to investigate the relationship with Internet Addiction (IA). To evaluate IA, the Chen Internet Addiction Scale (CIAS) was employed. The scale has been well-validated in Southeast Asia, and(Ali Sabri Radeef et al., 2018) updated the Malay version to make it appropriate for Malaysian teenagers.

Data were gathered by manually entering self-reported replies to the CIAS questionnaire, with the support of school counselors. The acquired data was then analyzed with the Statistical Package for the Social Sciences (SPSS). Descriptive statistics were employed to

summarize IA levels and demographic information, and inferential analysis, using regression techniques, was utilized to investigate the correlations between the various IA constructs.

4.0 Findings

4.1 Prevalence of Internet Addiction

The examination of internet addiction (IA) reveals notable trends among the respondents. The majority exhibit regular internet usage, while a smaller percentage is categorized as at-risk or addicted. Gender research indicates that females are more prone to internet addiction than guys, however both genders predominantly fall within the usual consumption group.

Patterns of internet usage are significantly associated with levels of addiction. Individuals with elevated weekly internet usage, especially those over 40 hours, exhibit a significant rise in addiction rates, highlighting the effects of excessive screen time. Regarding location, both urban and rural subjects display comparable distributions across IA categories, with minor differences in addiction levels. The findings underscore the impact of gender, consumption intensity, and living environment on internet addiction, providing essential insights for tailored treatments.

Table 1: Prevalence of internet addiction

Variables	Frequency (n)	Internet Addiction		
		Normal Usage N (%)	At-Risk Usage n (%)	Addicted n (%)
Overall IA	376	222 (59)	53 (14.1)	101 (26.9)
Gender				
Male	133 (35.37)	74 (55.64)	28 (21.05)	31 (23.31)
Female	243 (64.63)	148 (60.91)	25 (10.29)	70 (28.80)
Internet Usage (hours per week)				
<20 hours	82 (21.81)	52 (63.41)	12 (14.63)	18 (21.96)
20 – 40 hour	177 (47.07)	119 (67.23)	24 (13.56)	34 (19.21)
>40 hour	117 (31.12)	51 43.59)	17 (14.53)	49 (41.88)
Location				
Urban	209 (55.59)	124 (59.33)	30 (14.35)	55 (26.32)
Rural	167 (44.41)	98 (58.68)	23 (13.78)	46 (27.54)

4.2 Analysis specific to the domain

The table shows average scores and standard deviations for five primary IA categories from 376 participants. Each aspect examines how the Internet affects behavior, well-being, and daily life. The statistics show that IA has a minor impact on these areas, varying per domain.

The Withdrawal domain had a moderate influence on responders, with a mean score of 2.05 and a standard deviation of 0.61. The severity of withdrawal symptoms is moderate, yet students suffer significant emotional or psychological harm when lacking internet access. The little standard deviation shows individual response uniformity.

A mean score of 2.34 and a standard deviation of 0.59 indicated a minor influence for the Tolerance domain. This shows how IA is evolving as students spend more time online for pleasure. The standard deviation shows that tolerance is constant among respondents given the narrow response range.

The Compulsive Behavior domain had a moderate influence with a mean score of 2.14 and a standard deviation of 0.61. This shows adolescents have irrepressible urges to use the internet, even when it interferes with their life. The sample's uniform responses and low standard deviation indicate a shared domain experience.

The Time Management domain had the lowest mean score of 1.96 and standard deviation of 0.66, indicating limited influence. Despite internet use, students can usually manage their time. The slightly higher standard deviation suggests that some students may have more time management challenges than others.

Health and Interpersonal had a mean score of 2.27 and a standard deviation of 0.55, indicating modest influence. This statistic shows how much IA affects students' physical, emotional, and social health. The low standard deviation indicates that most people were influenced similarly.

These statistics imply that IA influences adolescents slightly but not enough to affect their time management skills. Standard deviations are similar across all sections, indicating a consistent IA experience among respondents. This research illuminates the specific aspects of IA that require intervention, namely tolerance and its potential to lead to more severe IA behaviors.

Table 2: Analysis of internet addiction domains

Domain	Mean Score	Standard Deviation	Interpretation
Withdrawal	2.05	0.61	Moderate impact
Tolerance	2.34	0.59	Moderate impact
Compulsive Behavior	2.14	0.61	Moderate impact
Time Management	1.96	0.66	Low impact
Health and Interpersonal	2.27	0.55	Moderate impact

4.3 Regression analysis for health and interpersonal relationship

Tolerance was identified as the primary predictor of health and interpersonal problems (β=0.309, p<0.001). Adolescents demonstrating elevated tolerance, indicated by the necessity to engage online for extended durations to attain equivalent enjoyment, were more prone to encounter negative health consequences and disrupted interpersonal connections. This corresponds with the cognitive-behavioral model of addiction, which recognizes tolerance as an escalating symptom that promotes dependent and maladaptive behaviors. This study empirically supports previous research indicating that excessive online participation reduces time for physical activities, social connections, and mental rest, consequently worsening physical health problems and interpersonal disputes.

Compulsive behavior (β=0.279, p<0.001) was the second most significant predictor. Adolescents with compulsive internet usage are at significant risk of encountering health and relational difficulties. Compulsive internet usage interferes with everyday obligations, resulting in physical ailments such as weariness or back pain, and damaged social relationships, including diminished interactions with family members. This highlights the essential requirement for interventions designed to improve self-regulation in order to reduce obsessive behaviors.

Withdrawal (β=0.104, p=0.062) had a weaker and slightly non-significant association with health and interpersonal problems. Withdrawal symptoms, including restlessness and irritability when disconnected, are probable early signs of internet addiction; nevertheless, they exert a lesser direct influence on health and social consequences relative to tolerance and compulsion. This indicates that withdrawal may represent an early indication of reliance, which, if neglected, could result in more pronounced behavioral issues.

Table 3: Analysis of predictor-outcome relationship for health and interpersonal problems

Construct	Relationship with Health and Interpersonal Problems	Beta (β)	p-value	Interpretation
Withdrawal	Weak positive relationship	0.104	0.062	Marginally non-significant, weaker effect.
Tolerance	Strong positive relationship	0.309	<0.001	Most impactful predictor in the model.
Compulsive Behavior	Moderate positive relationship	0.279	<0.001	Significant predictor of health/interpersonal issues.

4.3 Regression analysis for time management

The regression analysis investigated the correlations between components of internet addiction—Withdrawal, Tolerance, and Compulsive Behavior—and time management problems. The findings offer substantial insights into how these constructs affect adolescents' capacity to manage their time efficiently. The model exhibited a robust overall fit, with a R = 0.696 and R^2 = 0.485, signifying that 48.5% of the variance in time management concerns can be elucidated by the three predictors. The modified R^2 = 0.480 substantiates the model's robustness, even after considering the quantity of predictors. The ANOVA results confirmed the model's overall significance (F = 116.548, p < 0.001), indicating that the interplay of Withdrawal, Tolerance, and Compulsive Behavior strongly forecasts time management issues in adolescents.

Each prediction uniquely contributed to time management challenges. Tolerance (β=0.451, p<0.001) emerged as the most significant predictor, indicating that teenagers with elevated tolerance levels—who necessitate extended online durations for gratification—are more prone to difficulties in time management. This indicates that heightened tolerance reduces the time allocated for vital activities, including sleep, food, and daily routines. Compulsive behavior (β = 0.206, p < 0.001) was the second most significant predictor, highlighting that uncontrollable internet usage interferes with scheduled tasks such as studying, eating, or sleeping. This indicates the preference for internet usage over organized timetables. Withdrawal symptoms (β = 0.117, p = 0.022) exhibited a diminished yet still significant correlation with time management difficulties. Adolescents exhibiting restlessness or irritation when offline may prioritize reestablishing internet access over adhering to daily schedules, indicating that withdrawal symptoms reflect early-stage dependency that could exacerbate time management difficulties over time.

Table 4: Analysis of predictor-outcome relationship for time management

Construct	Relationship with Time Management	Beta (β)	p-value	Interpretation
Withdrawal	Weak positive relationship	0.117	0.022	Early-stage dependency affects adherence to schedules.
Tolerance	Strong positive relationship	0.451	<0.001	Most significant contributor to time management issues.
Compulsive Behavior	Moderate positive relationship	0.206	<0.001	Impulsive online behaviors disrupt planned activities.

5.0 Discussion

This study supports Griffiths' (2005) “components” model of addiction, notably with salience, withdrawal, and tolerance in Internet Addiction. The modest impact of withdrawal symptoms shows adolescents psychological dependency on internet use, reflecting other behavioral addictions and underlining the necessity for emotional regulation therapies. Tolerance was found to affect health, interpersonal relationships, and time management, showing how prolonged online engagement disrupts social connections, physical health, and the ability to allocate time for sleep, meals, and daily routines (Zhou et al., 2022). The cognitive-behavioral model of addiction treats tolerance as a precursor to dependent and dysfunctional behavior. These findings support previous research showing excessive online activity diminishes physical activity (Xu & Tang, 2024), social connections (Wang et al., 2021), and rest, worsening relational disputes, health issues, and time management issues.

Compulsive behavior also contributed to these issues. Compulsive internet users often put their online time before their daily tasks, causing weariness, discomfort, and family strife and interfering with planned activities like studying and resting. To regulate compulsive tendencies and reduce their negative implications on health, relationships, and time management, self-regulation techniques are crucial

(Nur Raihan Muhd Fauzi & Nor Diana Mohd Mahudin, 2020). Withdrawal symptoms had a smaller impact but are still early evidence of internet dependency. Although less directly influential, unconnected restlessness or irritability can worsen adolescents' health, relationships, and daily routines if left unchecked.

Kedah's socio-demographic characteristics as a predominantly rural state may explain its moderate-to-low IA scores, as adolescents may have fewer opportunities for prolonged internet use than their urban counterparts. Since respondents may not experience as much academic competition as urban adolescents, time management concerns may not be as prevalent. The study's findings are limited to eight Kedah schools and may not fully represent Malaysian adolescents. Future research should involve a more diversified sample from different states to better generalizability and explore regional IA tendencies.

These findings can help stakeholders design targeted interventions for tolerance, obsessive behavior, and withdrawal symptoms. Schools might establish digital literacy programs that emphasize emotional regulation and self-control, while policymakers could raise awareness of IA in rural communities and customize interventions to their requirements.

6.0 Conclusion and Recommendations

This study is limited to eight schools in Kedah, a primarily rural state in Malaysia, and may not fully represent the experiences of adolescents in urban or other rural areas. Additionally, its cross-sectional design makes causal links between internet addiction (IA) components and consequences difficult to draw. Future research should sample varied geographic and socioeconomic contexts across Malaysia and use longitudinal methods to study IA pattern changes and their long-term repercussions.

Policymakers might fund IA research in underrepresented locations like Kedah and launch national efforts to promote awareness of IA and its consequences on adolescents' mental health and academic performance. This study sheds light on IA in rural Malaysian adolescents and offers advice for educators, families, and policymakers. These findings can help stakeholders create targeted interventions and national initiatives to minimize IA and improve adolescent well-being.

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Paper Contribution to Related Field of Study

Research on IA is gradually developing, and this study adds useful insights, particularly in the Malaysian setting. Thus, employing the CIAS offers insight into how frequent IA is among adolescents and the extent of its influence on their lives. The findings offer practical suggestions for educators, legislators, and mental health specialists to manage IA in young people even more efficiently.

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