Relationship between Problematic Internet Use and Adolescent Mental Health in Saudi Arabia

Khulood Mohammed Al Mansoor[1]

[1]Assistant Professor of Clinical Psychology, Self-Development Skills Department, King Saud University, Riyadh, Saudi Arabia.
kalmansoor@ksu.edu.sa
ORCID number 0000-0002-3635-1481

Abstract

Background: The Internet has transformed into a versatile digital platform encompassing social interactions, academic research, knowledge acquisition, and entertainment and resulting in healthcare problems among all age groups, especially adolescents. This study sought to explore the prevalence of problematic internet use (PIU) and its effects on adolescents' mental well-being in the Kingdom of Saudi Arabia. This descriptive, cross-sectional comparative study involved a convenience sample comprising 154 Saudi Arabian adolescents. Data were collected through an online survey, employing the Problematic Internet Use Questionnaire Short Form-6 (PIUQ-SF-6) and the Revised Mental Health Inventory (MHI-5). A substantial proportion of the sample exhibited problematic internet usage patterns, coupled with a moderate level of mental well-being. Except for gender (female) and academic performance ("fair" evaluation grade) in the preceding year, sociodemographic factors exhibited no significant correlation with PIU scores. Mental health scores had a significant negative correlation with PIU; the obsession, neglect, and control subscales; hours spent on the Internet daily, and daily sleeping hours. Conversely, there was a significant positive correlation between PIU and the days per week and hours per day of internet use, as well as with daily sleeping hours. Finally, daily sleeping hours and days per week of internet use significantly predicted adolescents' mental health. To foster adolescent mental well-being, it is imperative to explore this area through continued research efforts. Mitigating excessive online engagement and its associated psychological challenges requires a multilevel approach encompassing individual counseling and family-centered interventions.

Keywords: Problematic, Internet, Mental health, Adolescence, Saudi Arabia.

Introduction

Since the 1990s, the Internet has become nearly ubiquitous, rendering it a necessity, changing how individuals connect, and transforming communication **(Kaya & Bicen, 2016).** Simultaneously, it has assumed several roles, serving as a digital domain for social interaction, academic research, knowledge acquisition, entertainment, and even presenting potential health risks due to overuse of the Internet **(Musetti & Corsano, 2018).** This phenomenon is particularly conspicuous among adolescents **(Tsitsika et al., 2014),** who now enjoy unfettered internet access via diverse devices, anytime and anywhere, exhibiting extensive online engagement that significantly influences their lives **(Tzavela et al., 2015).** In response to this phenomenon, research on problematic internet usage (PIU) and internet addiction (IA) has surged **(Demetrovics et al., 2016).**

Globally, the coronavirus disease 2019 (COVID-19) pandemic has ravaged nations **(Belkin et al., 2021; Hau et al., 2020).** It has left enduring and widespread effects on both physical and mental health **(Holman et al., 2020; Tateno et al., 2019),** with students bearing a substantial brunt **(Hwang et al., 2020).** Amidst the pandemic, adolescents have consistently participated in various online activities, including remote learning, social interaction, gaming, academic tasks, and information retrieval **(Dong et al., 2020).** The increase in daily internet usage since the pandemic, compared to the pre-pandemic era, has put adolescents at a higher risk of

developing IA (**Duan et al., 2020; Faltýnková et al., 2020; Lin, 2020**). Moreover, the imposition of remote studying due to preventive measures like quarantine, isolation, lockdowns, and social distancing (**Unger & Meiran, 2020**) may contribute to a substantial surge in excessive internet usage (**Fung et al., 2021**) or even IA (**Masaeli & Farhadi, 2021; Ustun, 2021; Yu et al., 2021**). For example, extensive research confirms that the COVID-19 pandemic has markedly worsened internet-related problems among teenagers (**Dong et al., 2020**). Furthermore, this concern is heightened during pandemics. To demonstrate, IA can worsen pre-existing depression (**Steffen et al., 2020**). According to prior research, depression has become significantly more prevalent among students during this period (**Brailovskaia et al., 2021; Yang et al., 2021**). In addition, **Yang et al. (2021)** found a frequent co-occurrence of IA and depression.

PIU can be conceptualized as an inability to exert control over internet usage, despite the severe repercussions on one's daily life (**Spada, 2014; Tam & Walter, 2013**). According to **Douglas et al. (2008),** the inability to resist the allure of excessive internet use leads to feelings of distress and impairs daily functioning. An alternative perspective from **Lai and Kwan (2017)** characterizes PIU as non-clinical yet unhealthy internet use that detrimentally influences the user's everyday life. **Meanwhile, Chao et al. (2020)** define it as excessive internet use that disturbs or harms the individual.

Further, PIU encompasses behaviors that involve "(a) maladaptive concern about the internet, leading to compulsive use for longer durations than intended, (b) substantial distress arising from this behavior, and (c) the absence of another Axis I pathology that could explain the behavior, such as mania or hypomania" (**Shapira et al., 2003**). Studies have revealed that excessive internet use shares symptoms akin to those of substance addiction, including withdrawal, mood fluctuations, and tolerance (**Grant et al., 2010**), underscoring the parallels between these two detrimental behaviors (**Andreassen et al., 2013**). PIU is a multifaceted syndrome characterized by cognitive and behavioral symptoms that

negatively affect an individual's social, emotional, and physical development, as well as their professional and financial well-being (**Caplan, 2002; Liebert, 1998**).

In recent years, there has been a discernible rise in the prevalence of distinct and prominent internet-related issues, including cyber-grooming, cyber-mobbing, gaming disorder, social network disorder, excessive internet shopping, internet pornography, and online sex addiction. However, specific diagnostic criteria for these internet-related issues are not currently featured in either the Diagnostic and Statistical Manual of Mental Disorders (**DSM-5; American Psychiatric Association, 2013**) or the International Classification of Diseases and Related Health Problems (ICD-10), except for gaming disorders, which were included in the ICD-11. Nonetheless, the literature contains a range of taxonomical words to collectively address this phenomenon; these words include internet reliance, smartphone addiction, compulsive internet usage, and PIU (**Paulus et al., 2018**). The term "problematic internet use" is used in a broad sense (**Ruckwongpatr et al., 2022**) and encompasses various specific internet-related behaviors as previously mentioned. The following criteria are used to define it: (1) experiencing unpleasant emotions when unable to use the Internet; (2) persisting in internet usage despite intending or desiring to discontinue; (3) resorting to the Internet to alleviate negative emotions; (4) allowing the Internet to dominate thoughts and behaviors; and (5) the Internet becoming a cause of inter- or intra-personal conflicts (**Meerkerk et al., 2006**). Moreover, **Tokunaga and Rains (2016)** propose three primary classifications for PIU: (a) an impulse control disorder, stemming from inadequate control over impulsive thoughts or feelings; (b) akin to substance dependence, similar to chemical addiction and termed as "internet dependency"; and (c) a deficiency in relational and relationship-building resources, viewed through its adverse impact on the user's life. Although the current DSM or ICD does not comprehensively cover other manifestations of PIU, such as problematic use of social media platforms (e.g., Facebook, Instagram, Reddit, WhatsApp, YouTube, Tik Tok, Twitter), the DSM-5 criteria (**American Psychiatric**

Association, 2013) for Internet Gaming Disorder could potentially offer a useful framework for clinically evaluating other specific forms of PIU, like excessive usage of social networks, internet pornography, and online shopping **(Müller et al., 2018).**

Kraut et al. (1998) established that alongside reduced social engagement, prolonged internet use is typically associated with concomitant psychopathologies such as depression, anxiety, attention deficit hyperactivity disorder (ADHD), and obsessive-compulsive disorder **(Carli et al., 2013).** While researchers have strived to rigorously examine the influence of digital media on adolescents' lives, most investigations have primarily focused on physical or mental health outcomes, such as obesity or depression. The association between PIU and sleep has been the focus of other initiatives. **(Alimoradi et al., 2019; Lam, 2014).** Moreover, continuous internet use may also have undesirable physiological effects including migraines, headaches, and back pain **(Alam et al., 2014).**

The relationship between mental health and PIU has been elucidated by the self-regulation theory (e.g**., Chak & Leung, 2004; Song et al., 2004).** This model posits that individuals are driven to fulfill three core needs: relatedness (forming attachments with others), competence (achieving mastery), and autonomy (experiencing independence and contentment with decisions) **(Deci & Ryan, 2000).** The significance of these foundational needs has been extensively explored across various domains, notably in the context of internet usage **(Barnes & Pressey, 2011)** and online gaming **(Hsu et al., 2009).** With individuals exercising control over their online interactions, engagement with social media platforms can engender feelings of connectedness, autonomy, and competence **(Nadkarni & Hofmann, 2012).**

The association between PIU and the satisfaction of these needs has been demonstrated by **Wong et al. (2014),** who assert that psychological distress in young adults underpins this association, suggesting that psychological discomfort could serve as a predictor of future PIU. Beyond this, PIU's

detrimental effects on adolescents' adaptive abilities are varied and substantial. This includes difficulties with sleep **(Yang et al., 2018),** a decline in academic performance **(Zhou et al., 2020),** diminished self-efficacy **(Berte et al., 2021),** and ensuing effects on peer relationships and overall life satisfaction **(Lim, 2023).**

PIU is consistently associated with several negative mental health outcomes, including ADHD **(Wang et al., 2017),** social anxiety disorder **(Prizant-Passal et al., 2016),** and alcohol misuse **(Ho et al., 2014).** Prior research has also extensively explored the psychological ramifications of PIU. Investigations into cognitive functioning have yielded substantial evidence linking PIU to declines in multiple neuropsychological domains, including inhibitory control, decision-making, and working memory **(Ioannidis et al., 2019).** Additionally, PIU has the potential to diminish both the quality and duration of sleep, along with impairing perceptions of social support **(Lei et al., 2018). Fumero et al. (2018)** studied role-specific risk factors for PIU that are correlated with psychopathology (e.g., depression and anxiety), personality traits (e.g., aggressiveness, hostility, and sensation-seeking self-esteem), and social factors (e.g., peer issues and family difficulties). Their findings revealed that personal emotional factors, such as hostility, depression, and anxiety, exhibited stronger correlations with PIU than did social factors, with PIU being primarily associated with mood disorders. Regarding comorbidities, PIU has been linked to heightened levels of somatic symptoms, clinical depression, psychoticism, paranoid ideation, significant mental illness, and various levels of suicidality, encompassing thoughts, plans, and attempts **(Guo et al., 2020).**

Significance of the Study

Numerous studies **(e.g., Kim et al., 2006; Lin et al., 2013)** have consistently shown that unauthorized internet use negatively impacts teenagers' physical health and social interactions, along with their academic performance and mental well-being. There is also evidence of a connection between IA and other mental health problems **(Byun et al.,**

2009; Ko et al., 2008). To better grasp health and well-being in the digital age, it becomes imperative to ascertain whether internet use can indeed lead to harmful addiction. In the pursuit of addressing and preventing these challenges, a crucial step is gaining an understanding of the underlying processes that foster improper internet usage.

Aim and Research Question

This study sought to investigate the prevalence of PIU and its effects on adolescent mental health in the Kingdom of Saudi Arabia, addressing the following question: How closely is PIU related to adolescent mental health?

Methodology

Design and Setting

A descriptive, cross-sectional, comparative research study was conducted in Saudi Arabia.

Sample Size

The correlation between PIU and the average daily internet usage time was found to be 0.36 **(Demetrovics et al., 2016).** With a confidence level of 95%, a test power of 90%, and an effect size of 2, the calculated sample size required for the study was 154 adolescents.

Total sample size (n)=$[(Z\alpha+Z\beta)/C]2 + 3$

Standard normal deviation for $\alpha = Z_\alpha = 1.96$

Standard normal deviation for $\beta = Z_\beta = 0.8416$

C = 0.5 * ln[(1+r)/(1-r)] **(Hulley et al., 2013)**

Using a Google form disseminated electronically, a non-probability sampling technique was employed to achieve the required sample size.

Data Collection

The data were collected through a three-part survey. Part 1 gathered sociodemographic information including age, gender, education level (primary, preparatory, secondary), and the average academic score in the preceding year. Additionally, questions on internet usage habits were included, covering frequency of internet use per week, daytime online activity duration, reasons for internet use, and nightly sleep hours.

The subsequent sections of the questionnaire comprised two reliable standardized instruments: the Problematic Internet Use Questionnaire Short-Form (PIUQ-SF-6) and the Mental Health Inventory (MHI-5).

PIU-SF-6

The PIUQ-SF-6, developed by **Demetrovics et al. (2016),** was used to assess problematic use of the internet. The instrument comprises three subdomains: Obsession (items 2 and 6: deliberate internet-related thoughts and mental disturbance when not using the internet), Neglect (items 1 and 5: disregarding fundamental needs and everyday activities due to internet use), and Control Disorder (items 3 and 4: difficulties in controlling internet usage). Participants responded to the questionnaire items on a 5-point Likert-type scale ranging from 5 ("usually/almost always") to 1 ("never"). The total score can range from 6 to 30, with higher scores indicating more PIU. A recent study (Pontes & Macur, 2021) reported excellent internal consistency for the PIUQ-SF-6 with Cronbach's α = .84 and McDonald's ω = .90.

MHI-5

The MHI-5 **(Berwick et al., 1991)** was designed for broad public use and comprises five items assessing psychological well-being to measure the frequency of mental issues. The scale measures mood over the past month (1 item), psychological well-being (2 items), and the absence of psychological distress (2 items). Three items are reverse-scored. In this study, the response options were reduced from the original six to a four-point scale. This decision was influenced by two factors: firstly, surveys with fewer response choices alleviate the cognitive burden on participants, as indicated by **Rivera-Riquelme et al. (2019);** secondly, psychometric properties of scales are relatively consistent across four, five, or six response categories **(Lee & Paek, 2014).** Responses on this condensed four-point Likert-type scale ranged from 0 (lowest frequency) to 3 (highest

frequency). The total score, thus, ranged from 0 to 15, with the lower range (0–5), mid-range (6–10), and upper range (11–15) indicating impaired, moderate, and good mental health, respectively. A prior study (**Elovanio et al., 2020**) reported t good internal consistency for MHI-5, with Cronbach's α of 0.89.

Validity and Reliability

The face legitimacy and content of the questionnaire used in this study were evaluated by a panel of six psychology and psychiatry specialists, who found them to be acceptable. The questionnaires were translated into Arabic to ensure full accessibility for the study participants. Reliability was assessed for approximately 10% of the sample's responses, resulting in Cronbach's alpha values of .663 and 0.89 for the PIUQ-SF-6 and MHI-5, respectively.

Pilot Study

Before the main study, a pilot study was conducted on 10% of the research sample. This group was then excluded from the main study. The purpose of the pilot study was to assess the clarity of the wording, the feasibility of the study, and the applicability of the data collection methods. Additionally, the pilot study aimed to evaluate the validity of the scales. The results indicated that the survey took approximately 10–15 minutes to complete, depending on each respondent's level of participation and knowledge. These findings were used to finalize the wording of the questionnaire.

Study Procedure

The researcher invited potential respondents to participate in the pilot and main investigations through social networks. Data were collected between April and June 2023 through an electronic survey that took 10–15 minutes to complete. The questionnaire was created using Google Forms, and the link was distributed to respondents via WhatsApp and email. All relevant national data protection rules were followed during the data handling procedures.

Ethical Considerations

The Ethics Committee at [blinded for peer review] Ethics Committee approved the study, reference No: [blinded]. Respondents were not given any financial incentives and voluntarily agreed to participate in the study. The survey began only after participants read a consent form and agreed to participate. They were informed about the purpose and parameters of the study, as well as the names and affiliations of the researchers. Participants were also informed of their right to decline or withdraw participation at any time. To protect privacy, survey identification numbers were used, and participants' responses remained anonymous. No identifying information, such as names, email addresses, or cellphone numbers, was collected. The only anticipated difficulty resulting from the questionnaire was inconvenience. In conducting medical research involving human subjects, we followed the ethical guiding principle outlined in the Declaration of Helsinki.

Statistical Analysis

All data were collected, tabulated, and statistically analyzed using IBM SPSS Statistics for Windows, Version 23.0 (Armonk, NY: IBM Corp). Quantitative data were expressed as mean ± SD, median, and range. Qualitative data are presented as frequency and percentage. A t-test was used to compare normally distributed variables between the two groups, while ANOVA was used to compare normally distributed variables between more than two groups. Pearson's correlation coefficient was calculated to assess the relationships among the study variables. A plus sign (+) indicates a direct positive correlation, and a minus sign (-) indicates a negative correlation. Values close to 1 indicates a strong correlation, while those closer to 0 indicates a weak correlation. Multiple linear regression was used to describe the data and explain the relationship between one dependent continuous variable and one or more independent variables. All tests were two-sided. A p-value < .05 was considered statistically significant.

Results

Table 1 shows that the participants' ages ranged from 11 to 19 years, with an average of 15.6±1.9 years. The majority of the participants (66.2%) were female. Approximately half (48.7%) achieved fair grades in the last year. Just over half (51.9%) of the participants were in secondary school. All respondents used the Internet for social purposes. On average, participants used the Internet 5.9±1.8 days per week, with a median of 7 days and a range of 1–7. The average daily internet usage was 6.3±3.5 hours, with a median of 5.5 hours and a range of 1–17 hours. Participants slept an average of 7.6±1.9 hours per day, with a median of 8 hours and a range of 3–14 hours.

Table 2 shows that more than two-thirds of the sample had PIU (70.8%) and moderate mental health (70.1%).

Table 3 shows that there is no statistically significant relationship between PIU scores and sociodemographic characteristics, except for female gender and fair grades in the last year (p < .05).

Table 4 shows significant negative correlations between mental health scores and PIU; the obsession, neglect, and control subscales; weekly and daily internet use; and hours of sleep (all p values = .0001). Additionally, there were significant positive correlations between PIU and weekly and daily internet use, as well as daily hours of sleep (p = .0001).

The results of the linear regression (Table 5) indicate that the number of hours of sleep per day and the number of days of internet use per week were both significant predictors of mental health among adolescents (p = .0001).

Table 1 Personal Characteristics of the Sample (n = 154): Frequency and Percentage

Variables		
Age (years)		
Mean ±SD	15.6±1.9	
Median (range)	15(11-19)	
	N	**%**
Sex		
Female	102	66.2
Male	52	33.8
Academic achievement (grade in the preceding year)		
Fair	75	48.7
Good	29	18.8
Very good	23	14.9
Excellent	27	17.5
Education		
Preparatory school	63	40.9
Secondary school	80	51.9
First university grade	11	7.1
Purpose of Internet use		
Socializing	154	100.0
Learning	59	38.3
Gaming	59	38.3
Weekdays used for internet use Mean ±SD		
Median (range)	5.9±1.8	
	7(1-7)	
Number of hours spent online daily		
Mean ±SD	6.3±3.5	
Median(range)	5.5(1-17)	
Sleep (hours per day)		
Mean ±SD	7.6±1.9	
Median(range)	8(3-14)	

Table 2: Distribution of Problematic Internet Use and Mental Health (n=154).

	N	%	Mean ±SD	Median (range)
Problematic internet use (30[a])				
Normal level	45	29.2	17.7±5.2	18(6-30)
Problematic level	109	70.8		
Mental health (15a)				
Good	10	6.5		
Moderate	108	70.1	6.9±2.2	7.(1-15)
Impaired	36	23.4		

[a]Maximum score

Table 3: Relationship Between Problematic Internet Use and Participants' Demographic Variables

Variables	Problematic internet use				n	χ^2	p-value
	Normal n=45		Internet use problem n=119				
Age (years); mean ±SD	15.4±1.8		15.6±2			0.54	.59
	n	%	n	%			
Sex							
Female	37	36.3	65	63.7	102	7.3	.007*
Male	8	15.4	44	84.6	52		
Age (mean ±SD)	15.4±1.8		15.6±2				
Evaluation grade							
Fair	30	40.0	45	60.0	75	10.9	.021*
Good	5	17.2	24	82.8	29		
Very good	2	8.7	21	91.3	23		
Excellent	8	29.6	19	70.4	27		
Education							
Preparatory school	20	31.7	43	68.3	63	0.85	.65
Secondary school	23	28.7	57	71.3	80		
First university grade	2	18.2	9	81.8	11		
Purpose of internet use							
Socializing	45	29.2	109	70.8	154		
Learning	17	28.8	42	71.2	59	0.008	.93
Gaming	14	23.7	45	76.3	59	1.4	.24

χ^2: chi-square test; *p<.05: significant

Table 4: Correlation Matrix of Mental Health and Problematic Internet Use with Age, Evaluation Score, Weekly Internet Use Days, Daily Internet Use Hours, Hours of Sleep, Obsession Score, Neglect Score, and Control Disorder (n=154)

Variables	Mental health		Problematic internet use	
	r	p	r	p
Mental health	1	.		
PIU	-0.415**	0.0001	1	
Age	0.049	0.547	-0.094	.247
GPA	-0.017	0.853	0.03	.711
Internet use, days per week	-0.255**	0.001	0.555**	.0001
Internet use, hours per day	-0.301**	0.0001	0.560**	.0001
Hours of sleep per day	0.448**	0.0001	-0.533**	.0001
Obsession score	-0.354**	0.0001		
Neglect score	-0.358**	0.0001		
Control Disorder score	-0.467**	0.0001		

r = correlation coefficient: ** and *: correlation significant at the .01 and .05 levels, respectively.

Table 5: **Multivariate Linear Regression for Mental Health among Adolescents**

Predictors	β	Std. Error	t	Sig.	R	R^2
Constant	5.279					
Hours of Sleep per day	.398	0.089	4.48	.0001	0.47	0.22
Days of Internet Use per week	-.232-	0.091	2.56	.011		

t = Student's t-statistic; β = regression coefficient, R^2 = 22% of predictors; ANOVA model = 21.6, p=.0001

Discussion

The prevalence of PIU, ranging from 7.9% to 16.0%, has garnered increasing attention, signifying its emergence as a pervasive concern among teenagers (**Mihara et al., 2016; Vigna-Taglianti et al., 2017**). Despite the recognized association of PIU with detrimental behavioral and psychological outcomes in adolescents, the Internet remains a vital avenue for learning about daily life aspects and academic subjects (**Anderson et al., 2017; Restrepo et al., 2020**). The present study aimed to assess the prevalence of PIU and its implications for adolescent mental health in Saudi Arabia. The findings revealed that 84.6% of males and 63.7% of females exhibited PIU. Notably, a significant relationship was found between PIU scores and gender, with males presenting higher mean scores. This underscores that the male gender stands as a risk factor for PIU, potentially influenced by personality differences. These results align with prior research on PIU's prevalence among adolescents, where a male-to-female ratio of 9:10 was observed (**Vigna-Taglianti et al., 2017**). Additionally, the findings suggest that gender functions as a risk factor for PIU, indicating that male students were 1.9 times more likely to engage in such behaviors compared to their female counterparts. Often, the gender disparity in PIU can be attributed to varying personality traits between boys and girls, as well as distinct motivations for internet use (**Ozturk & Ayaz-Alkaya, 2021**).

The current results reveal a significant relationship between PIU scores and "fair" academic grades in the preceding year. This indicates that students with low academic grades were more likely to have PIU. This is consistent with a study conducted in Taiwan, which found that poor academic performance could predict PIU in teenagers (**Chen et al., 2015**). Likewise, a more recent study in Nigeria (**Akanni & Adayonfo, 2020**) concluded that PIU was associated with below-average academic achievements, elevated levels of anxiety, and increased drug misuse.

Participants in the current study spent 1–17 hours on the Internet per day, with a median daily use of 5.5 hours. There was a significant positive correlation between PIU and both daily and weekly internet use, suggesting that teenagers who used the Internet improperly spent more time onscreen than teenagers who used it normally. These findings support previous research conducted in Saudi Arabia (**Taha et al., 2019**) and Egypt (**Shehata & Abdeldaim, 2021**), where a majority of participants reported frequently staying online longer than intended. According to a meta-analysis by **Chun et al. (2017)** in Korea, internet-dependent teenagers spend less time with their families than classmates who are not addicted to the internet. Additionally, a study conducted in China found that people have been spending more time online recently. The study concluded that improper regulation of internet use could have negative effects (**Jorgenson et al., 2016**).

The results of the current study indicate that all participants reported using the Internet for socializing. This may be due to its uninterrupted access to social networks and its promotion of communication. This finding aligns with a survey conducted in Egypt, which identified social media usage as one of the most prevalent internet activities among the participants (**Khalil et al., 2022**).

The current study revealed that over 70% of participants exhibited PIU, with less than a third of the sample considered as engaging in normal usage levels. Some may argue that the Internet is necessary for various daily activities such as socialization, education, and skill acquisition. Consequently, the internet's intrusion into daily life may lead to increased reliance on web-based connections. These

findings closely align with a recent study on Egyptian teenagers, where 65.6% exhibited IA, while only a third had normal internet usage **(Khalil et al., 2022).** However, they differ somewhat from the most recent study on PIU prevalence in the United States, which used the short PRIUSS-3 screening tool and reported that slightly over half of the participants had PIU **(Moreno et al., 2022).** The differences in these findings could be attributed to disparities in the study samples, as the current study focused on adolescents, who have been shown in previous research to have relatively high rates of inappropriate internet use. IA is also known to be more severe in adolescents compared to other age groups, leading to the development of many innovative IA interventions specifically tailored for this population **(Kim & Noh, 2019).**

According to the present findings, more than 70% of the sample exhibited moderate mental well-being. There was a significant negative correlation between mental health scores and PIU; the obsession, neglect, and control subscales; weekly and daily internet use, and hours of sleep. These findings suggest that PIU can have detrimental effects on mental health. These results align with a study conducted in Turkey by **Odacı and Çelik (2013),** which concluded that excessive internet use negatively impacts young people's academics, physical health, psychological well-being, family relationships, and social interactions. Furthermore, PIU has been associated with lower levels of reported well-being and life satisfaction **(Twenge, 2019).**

In the same context, there is evidence that melatonin production may be inhibited, the timing and retention of its production altered, and the circadian rhythm disrupted due to exposure to strong and blue light from internet devices' screens during the evening and at night. Prolonged texting after bedtime is also likely to disrupt the sleep cycles of high school students, leading to daytime fatigue and lower academic performance **(Lissak, 2018).** Numerous large studies have found that teenagers and young adults who use digital media often report lower psychological well-being, including higher levels of stress and mental health issues **(Rosen et al., 2014),** lower overall psychological well-being **(Shakya &**

Christakis, 2017), reduced life satisfaction **(Booker et al., 2015),** lesser happiness **(Twenge, Martin, & Campbell, 2018),** and increased feelings of loneliness and social isolation **(Primack et al., 2017; Twenge & Campbell, 2018)** compared to those who do not use them often. Additionally, a study conducted in Kuwait reported a significant correlation between IA scores and poor well-being **(Alheneidi & Smith, 2020).**

The current study found that the number of hours of sleep per day and the number of days spent online each week as important indicators of adolescents' mental health. Extended time using the Internet is associated with reduced sleep, which can negatively affect mental health. Sufficient sleep is crucial for healthy growth and development in children and adolescents. These findings are consistent with several studies that have reported the association between excessive internet use and various issues, such as psychological stress, symptoms of mental disorder **(Beranuy Fargues et al., 2009),** behavioral problems, hyperactivity, disruption of everyday activities, depression, and poor physical health **(El Asam et al., 2019).** Similarly, a longitudinal study of 1253 children and adolescents in Taiwan found a connection between internet use and sleep duration: those who exhibited addictive online behavior slept less than regular users **(Chen & Gau, 2016).**

Limitations of the Study

The limited response rate among adolescents may be attributed to the distribution of the electronic questionnaire during their school time when students may be busy with their school duties. The small sample size of the study limits the generalizability of the study findings, and additional research with a larger sample size is warranted. To gain a deeper understanding of the prevalence of PIU, conducting a more comprehensive survey of specific subdomains, such as problematic gaming or problematic social media use, may be beneficial.

Recommendations

Further research is required to promote adolescent mental health. To reduce the time spent online and mitigate the psychological issues associated with PIU in adolescents, a multilevel strategy incorporating both individual counseling and family intervention is needed. School-based prevention efforts for PIU in adolescents should include training for teachers and parents, educating students, and raising awareness. These efforts should aim to strengthen protective factors and highlight positive behaviors and aspects of the environment that reduce the likelihood of negative consequences. Psychologists can assist teenagers in identifying and avoiding risky behaviors by providing health education on PIU, similar to interventions for smoking and substance abuse.

Conclusion

The current study suggests that most participants exhibited PIU and had a moderate level of mental health. No significant relationship was found between PIU scores and sociodemographic characteristics, except for female gender and fair academic grades in the preceding year. Additionally, a significant negative correlation was observed between mental health scores and PIU; the obsession, neglect, and control subscales; days per week and hours per day of internet use; and hours of sleep per day. Conversely, there was a significant positive association between PIU and the number of days online per week, the number of hours online per day, and the number of daily sleeping hours. Based on these findings, it can be deduced that hours of sleep per day and days of internet use per week are significant predictors of poor mental health among adolescents.

Abbreviations

DSM-5 = Diagnostic and Statistical Manual of Mental Disorders, 5th edition; IA = internet addiction; MHI = Mental Health Inventory; PIU = problematic internet use; PIUQ-SF-6 = Problematic Internet Use Questionnaire Short-Form.

References

Akanni, O. O., & Adayonfo, E. O. (2020). Problematic internet use and its association with anxiety, substance use, and academic performance among secondary school students in Nigeria. International Journal of School Health, 7(3), 15–22. https://doi.org/10.30476/intjsh.2020.86216.1076

Alam, S. S., Hashim, N. M. H. N., Ahmad, M., Wel, C. A. C., Nor, S. M., & Omar, N. A. (2014). Negative and positive impact of internet addiction on young adults: Empirical study in Malaysia. Intangible Capital, 10(3), 619–638. https://doi.org/10.3926/ic.452

Alheneidi, H., & Smith, A. (2020). Problematic internet use and wellbeing: A study of Kuwait and UK students. International Journal of Education Humanities and Social Science, 3(4), 1–14.

Alimoradi, Z., Lin, C. Y., Broström, A., Bülow, P. H., Bajalan, Z., Griffiths, M. D., Ohayon, M. M., & Pakpour, A. H. (2019). Internet addiction and sleep problems: A systematic review and meta-analysis. Sleep Medicine Reviews, 47, 51–61. https://doi.org/10.1016/j.smrv.2019.06.004

American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders (DSM-5.). American Psychiatric Association.

Anderson, E. L., Steen, E., & Stavropoulos, V. (2017). Internet use and problematic internet use: A systematic review of longitudinal research trends in adolescence and emergent adulthood. International Journal of Adolescence and Youth, 22(4), 430–454. https://doi.org/10.1080/02673843.2016.1227716

Andreassen, C. S., Griffiths, M. D., Gjertsen, S. R., Krossbakken, E., Kvam, S., & Pallesen, S. (2013). The relationships between behavioral addictions and the five-factor model of personality. Journal of

Behavioral Addictions, 2(2), 90–99. https://doi.org/10.1556/JBA.2.2013.003

Belkin, G., Appleton, S., & Langlois, K. (2021). Reimagining mental health systems post COVID-19. Lancet. Planetary Health, 5(4), e181–e182. https://doi.org/10.1016/S2542-5196(21)00037-1

Barnes, S. J., & Pressey, A. D. (2011). Who needs cyberspace? Examining drivers of needs in second life. Internet Research, 21(3), 236–254. https://doi.org/10.1108/10662241111139291

Beranuy Fargues, M., Chamarro Lusar, A., Graner Jordania, C., & Carbonell Sánchez, X. (2009). Validación de dos escalas breves para evaluar la adicción a Internet y el abuso de móvil [Validation of two brief scales for Internet addiction and mobile phone problem use]. Psicothema, 21(3), 480–485.

Brailovskaia, J., Teismann, T., Friedrich, S., Schneider, S., & Margraf, J. (2021). Suicide ideation during the COVID-19 outbreak in German university students: Comparison with pre-COVID 19 rates. Journal of Affective Disorders Reports, 6, 100228. https://doi.org/10.1016/j.jadr.2021.100228

Berte, D. Z., Mahamid, F. A., & Affouneh, S. (2021). Internet addiction and perceived self-efficacy among university students. International Journal of Mental Health and Addiction, 19(1), 162–176. https://doi.org/10.1007/s11469-019-00160-8

Berwick, D. M., Murphy, J. M., Goldman, P. A., Ware, J. E., Jr., Barsky, A. J., & Weinstein, M. C. (1991). Performance of a five-item mental health screening test. Medical Care, 29(2), 169–176. https://doi.org/10.1097/00005650-199102000-00008

Błachnio, A., & Przepiorka, A. (2016). Personality and positive orientation in Internet and Facebook addiction: An empirical report from Poland. Computers in Human Behavior, 59, 230–236. https://doi.org/10.1016/j.chb.2016.02.018

Booker, C. L., Skew, A. J., Kelly, Y. J., & Sacker, A. (2015). Media use, sports participation, and well-being in adolescence: Cross-sectional findings from the UK Household Longitudinal Study. American Journal of Public Health, 105(1), 173–179. https://doi.org/10.2105/AJPH.2013.301783

Byun, S., Ruffini, C., Mills, J. E., Douglas, A. C., Niang, M., Stepchenkova, S., Lee, S. K., Loutfi, J., Lee, J. K., Atallah, M., & Blanton, M. (2009). Internet addiction: Metasynthesis of 1996–2006 quantitative research. Cyberpsychology & Behavior, 12(2), 203–207. https://doi.org/10.1089/cpb.2008.0102

Caplan, S. E. (2002). Problematic internet use and psychosocial well-being: Development of a theory-based cognitive–behavioral measurement instrument. Computers in Human Behavior, 18(5), 553–575. https://doi.org/10.1016/S0747-5632(02)00004-3

Carli, V., Durkee, T., Wasserman, D., Hadlaczky, G., Despalins, R., Kramarz, E., Wasserman, C., Sarchiapone, M., Hoven, C. W., Brunner, R., & Kaess, M. (2013). The association between pathological internet use and comorbid psychopathology: A systematic review. Psychopathology, 46(1), 1–13. https://doi.org/10.1159/000337971

Chak, K., & Leung, L. (2004). Shyness and locus of control as predictors of internet addiction and internet use. Cyberpsychology & Behavior, 7(5), 559–570. https://doi.org/10.1089/cpb.2004.7.559

Chao, C. M., Kao, K. Y., & Yu, T. K. (2020). Reactions to problematic internet use among adolescents: Inappropriate physical and mental health perspectives. Frontiers in Psychology, 11, 1782. https://doi.org/10.3389/fpsyg.2020.01782

Chen, Y. L., & Gau, S. S. (2016). Sleep problems and internet addiction among children and adolescents: A longitudinal study. Journal of Sleep Research, 25(4), 458–465. https://doi.org/10.1111/jsr.12388

Chen, Y. L., Chen, S. H., & Gau, S. S. (2015). ADHD and autistic traits, family function, parenting style, and social adjustment for internet addiction among children and adolescents in Taiwan: A longitudinal study. Research in Developmental Disabilities, 39, 20–31. https://doi.org/10.1016/j.ridd.2014.12.025

Chun, J., Shim, H., & Kim, S. (2017). A meta-analysis of treatment interventions for internet addiction among Korean adolescents. Cyberpsychology, Behavior and Social Networking, 20(4), 225–231. https://doi.org/10.1089/cyber.2016.0188

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. Psychological Inquiry, 11(4), 227–268. https://doi.org/10.1207/S15327965PLI1104_01

Demetrovics, Z., Király, O., Koronczai, B., Griffiths, M. D., Nagygyörgy, K., Elekes, Z., Tamás, D., Kun, B., Kökönyei, G., & Urbán, R. (2016). Psychometric properties of the Problematic Internet Use Questionnaire Short-Form (PIUQ-SF-6) in a nationally representative sample of adolescents. PLOS ONE, 11(8), e0159409. https://doi.org/10.1371/journal.pone.0159409

Dong, H., Yang, F., Lu, X., & Hao, W. (2020). Internet addiction and related psychological factors among children and adolescents in China During the coronavirus disease 2019 (COVID-19) epidemic. Frontiers in Psychiatry, 11(00751), 00751. https://doi.org/10.3389/fpsyt.2020.00751

Douglas, A. C., Mills, J. E., Niang, M., Stepchenkova, S., Byun, S., Ruffini, C., Lee, S. K., Loutfi, J., Lee, J., Atallah, M., & Blanton, M. (2008). Internet addiction: Meta-synthesis of qualitative research for the decade 1996–2006. Computers in Human Behavior, 24(6), 3027–3044. https://doi.org/10.1016/j.chb.2008.05.009

Duan, L., Shao, X., Wang, Y., Huang, Y., Miao, J., Yang, X., & Zhu, G. (2020). An investigation of mental health status of children and adolescents in china during the outbreak of COVID-19. Journal of Affective Disorders, 275, 112–118. https://doi.org/10.1016/j.jad.2020.06.029

El Asam, A., Samara, M., & Terry, P. (2019). Problematic internet use and mental health among British children and adolescents. Addictive Behaviors, 90, 428–436. https://doi.org/10.1016/j.addbeh.2018.09.007

Elovanio, M., Hakulinen, C., Pulkki-Råback, L., Aalto, A. M., Virtanen, M., Partonen, T., & Suvisaari, J. (2020). General Health Questionnaire (GHQ-12), Beck Depression Inventory (BDI-6), and Mental Health Index (MHI-5): Psychometric and predictive properties in a Finnish population-based sample. Psychiatry Research, 289, 112973. https://doi.org/10.1016/j.psychres.2020.112973

Faltýnková, A., Blinka, L., Ševčíková, A., & Husarova, D. (2020). The associations between family-related factors and excessive Internet use in adolescents. International Journal of Environmental Research and Public Health, 17(5), 1754. https://doi.org/10.3390/ijerph17051754

Fumero, A., Marrero, R. J., Voltes, D., & Peñate, W. (2018). Personal and social factors involved in internet addiction among adolescents: A meta-analysis. Computers in Human Behavior, 86, 387–400. https://doi.org/10.1016/j.chb.2018.05.005

Fung, X. C. C., Siu, A. M. H., Potenza, M. N., O'Brien, K. S., Latner, J. D., Chen, C. Y., Chen, I. H., & Lin, C. Y. (2021). Problematic use of Internet-related activities and perceived weight stigma in schoolchildren: A longitudinal study across different epidemic periods of COVID-19 in China. Frontiers in Psychiatry, 12, 675839. https://doi.org/10.3389/fpsyt.2021.675839

Grant, J. E., Potenza, M. N., Weinstein, A., & Gorelick, D. A. (2010). Introduction to

behavioral addictions. American Journal of Drug and Alcohol Abuse, 36(5), 233–241. https://doi.org/10.3109/00952990.2010.491884

Guo, W., Tao, Y., Li, X., Lin, X., Meng, Y., Yang, X., Wang, H., Zhang, Y., Tang, W., Wang, Q., Deng, W., Zhao, L., Ma, X., Li, M., Chen, T., Xu, J., Li, J., Hao, W., Lee, S., . Li, T. (2020). Associations of internet addiction severity with psychopathology, serious mental illness, and suicidality: Large-sample cross-sectional study. Journal of Medical Internet Research, 22(8), e17560. https://doi.org/10.2196/17560

Hau, H. M., Weitz, J., & Bork, U. (2020). Impact of the COVID-19 pandemic on student and resident teaching and training in surgical oncology. Journal of Clinical Medicine, 9(11), 3431. https://doi.org/10.3390/jcm9113431

Ho, R. C., Zhang, M. W., Tsang, T. Y., Toh, A. H., Pan, F., Lu, Y., Cheng, C., Yip, P. S., Lam, L. T., Lai, C. M., Watanabe, H., & Mak, K. K. (2014). The association between internet addiction and psychiatric co-morbidity: A meta-analysis. BMC Psychiatry, 14, 183. https://doi.org/10.1186/1471-244X-14-183

Holman, E. A., Thompson, R. R., Garfin, D. R., & Silver, R. C. (2020). The unfolding COVID-19 pandemic: A probability-based, nationally representative study of mental health in the United States. Science Advances, 6(42), eabd5390. https://doi.org/10.1126/sciadv.abd5390

Hsu, S. H., Wen, M. H., & Wu, M. C. (2009). Exploring user experiences as predictors of MMORPG addiction. Computers and Education, 53(3), 990–999. https://doi.org/10.1016/j.compedu.2009.05.016

Hulley, S. B., Cummings, S. R., Browner, W. S., Grady, D., & Newman, T. B. (2013). Designing clinical research: An epidemiologic approach (4th ed). Lippincott Williams & Wilkins.

Hwang, T. J., Rabheru, K., Peisah, C., Reichman, W., & Ikeda, M. (2020). Loneliness and social isolation during the COVID-19 pandemic. International Psychogeriatrics, 32(10), 1217–1220. https://doi.org/10.1017/S1041610220000988

Ioannidis, K., Hook, R., Goudriaan, A. E., Vlies, S., Fineberg, N. A., Grant, J. E., & Chamberlain, S. R. (2019). Cognitive deficits in problematic internet use: Meta-analysis of 40 studies. British Journal of Psychiatry, 215(5), 639–646. https://doi.org/10.1192/bjp.2019.3

Jorgenson, A. G., Hsiao, R. C., & Yen, C. F. (2016). Internet addiction and other behavioral addictions. Child and Adolescent Psychiatric Clinics of North America, 25(3), 509–520. https://doi.org/10.1016/j.chc.2016.03.004

Kaya, T., & Bicen, H. (2016). The effects of social media on students' behaviors: Facebook as a case study. Computers in Human Behavior, 59, 374–379. https://doi.org/10.1016/j.chb.2016.02.036

Khalil, S. A., Kamal, H., & Elkholy, H. (2022). The prevalence of problematic internet use among a sample of Egyptian adolescents and its psychiatric comorbidities. International Journal of Social Psychiatry, 68(2), 294–300. https://doi.org/10.1177/0020764020983841

Kim, K., Ryu, E., Chon, M. Y., Yeun, E. J., Choi, S. Y., Seo, J. S., & Nam, B. W. (2006). Internet addiction in Korean adolescents and its relation to depression and suicidal ideation: A questionnaire survey. International Journal of Nursing Studies, 43(2), 185–192. https://doi.org/10.1016/j.ijnurstu.2005.02.005

Kim, S., & Noh, D. (2019). The current status of psychological intervention research for internet addiction and internet gaming disorder. Issues in Mental Health Nursing, 40(4), 335–341. https://doi.org/10.1080/01612840.2018.1534910

Ko, C. H., Yen, J. Y., Chen, C. S., Chen, C. C., & Yen, C. F. (2008). Psychiatric

comorbidity of internet addiction in college students: An interview study. CNS Spectrums, 13(2), 147–153. https://doi.org/10.1017/s1092852900016308

Kraut, R., Patterson, M., Lundmark, V., Kiesler, S., Mukopadhyay, T., & Scherlis, W. (1998). Internet paradox: A social technology that reduces social involvement and psychological well-being? American Psychologist, 53(9), 1017–1031. https://doi.org/10.1037/0003-066x.53.9.1017

Lai, F. T. T., & Kwan, J. L. Y. (2017). Socioeconomic influence on adolescent problematic internet use through school-related psychosocial factors and pattern of Internet use. Computers in Human Behavior, 68, 121–136. https://doi.org/10.1016/j.chb.2016.11.021

Lam, L. T. (2014). Internet gaming addiction, problematic use of the internet, and sleep problems: A systematic review. Current Psychiatry Reports, 16(4), 444. https://doi.org/10.1007/s11920-014-0444-1

Lee, J., & Paek, I. (2014). In search of the optimal number of response categories in a rating scale. Journal of Psychoeducational Assessment, 32(7), 663–673. https://doi.org/10.1177/0734282914522200

Lei, H., Li, S., Chiu, M. M., & Lu, M. (2018). Social support and internet addiction among mainland Chinese teenagers and young adults: A meta-analysis. Computers in Human Behavior, 85, 200–209. https://doi.org/10.1016/j.chb.2018.03.041

Liebert, M. A. (1998). Internet addiction: The emergence of a new clinical disorder. Cyber Psychology and Behavior, 1(3).

Lim, S. A. (2023). Relationship between Korean adolescents' dependence on smartphones, peer relationships, and life satisfaction. Child and Youth Care Forum, 52(3), 603–618. https://doi.org/10.1007/s10566-022-09703-y

Lin, C. H., Chen, S. K., Chang, S. M., & Lin, S. S. J. (2013). Cross-lagged relationships between problematic internet use and

lifestyle changes. Computers in Human Behavior, 29(6), 2615–2621. https://doi.org/10.1016/j.chb.2013.06.029

Lin, M. P. (2020). Prevalence of Internet addiction during the COVID-19 outbreak and its risk factors among junior high school students in Taiwan. International Journal of Environmental Research and Public Health, 17(22), 8547. https://doi.org/10.3390/ijerph17228547

Lissak, G. (2018). Adverse physiological and psychological effects of screen time on children and adolescents: Literature review and case study. Environmental Research, 164, 149–157. https://doi.org/10.1016/j.envres.2018.01.015

Masaeli, N., & Farhadi, H. (2021). Prevalence of Internet-based addictive behaviors during COVID-19 pandemic: A systematic review. Journal of Addictive Diseases, 39(4), 468–488. https://doi.org/10.1080/10550887.2021.1895962

Meerkerk, G. J., Van Den Eijnden, R. J., & Garretsen, H. F. (2006). Predicting compulsive Internet use: It's all about sex! Cyberpsychology and Behavior: The Impact of the Internet, Multimedia and Virtual Reality on Behavior and Society, 9(1), 95–103. https://doi.org/10.1089/cpb.2006.9.95

Mihara, S., Osaki, Y., Nakayama, H., Sakuma, H., Ikeda, M., Itani, O., Kaneita, Y., Kanda, H., Ohida, T., & Higuchi, S. (2016). Internet use and problematic internet use among adolescents in Japan: A nationwide representative survey. Addictive Behaviors Reports, 4, 58–64. https://doi.org/10.1016/j.abrep.2016.10.001

Moreno, M., Riddle, K., Jenkins, M. C., Singh, A. P., Zhao, Q., & Eickhoff, J. (2022). Measuring problematic internet use, internet gaming disorder, and social media addiction in young adults: Cross-sectional survey study. JMIR Public Health and Surveillance, 8(1), e27719. https://doi.org/10.2196/27719

Müller, K. W., Wölfling, K., Beutel, M. E., Stark, B., Quiring, O., Aufenanger, S., Schemer, C., Weber, M., & Reinecke, L. (2018). Insights into aspects behind Internet-related disorders in adolescents: The interplay of personality and symptoms of adjustment disorders. Journal of Adolescent Health: Official Publication of the Society for Adolescent Medicine, 62(2), 234–240. https://doi.org/10.1016/j.jadohealth.2017.09.011

Musetti, A., & Corsano, P. (2018). The internet is not a tool: Reappraising the model for internet-addiction disorder based on the constraints and opportunities of the digital environment. Frontiers in Psychology, 9, 558. https://doi.org/10.3389/fpsyg.2018.00558

Nadkarni, A., & Hofmann, S. G. (2012). Why do people use Facebook? Personality and Individual Differences, 52(3), 243–249. https://doi.org/10.1016/j.paid.2011.11.007

Odacı, H., & Çelik, Ç. B. (2013). Who are problematic internet users? An investigation of the correlations between problematic internet use and shyness, loneliness, narcissism, aggression and self-perception. Computers in Human Behavior, 29(6), 2382–2387. https://doi.org/10.1016/j.chb.2013.05.026

Ozturk, F. O., & Ayaz-Alkaya, S. (2021). Internet addiction and psychosocial problems among adolescents during the COVID-19 pandemic: A cross-sectional study. Archives of Psychiatric Nursing, 35(6), 595–601. https://doi.org/10.1016/j.apnu.2021.08.007

Paulus, F. W., Ohmann, S., von Gontard, A., & Popow, C. (2018). Internet gaming disorder in children and adolescents: A systematic review. Developmental Medicine and Child Neurology, 60(7), 645–659. https://doi.org/10.1111/dmcn.13754

Pontes, H. M., & Macur, M. (2021). Problematic internet use profiles and psychosocial risk among adolescents. PLOS ONE, 16(9), e0257329. https://doi.org/10.1371/journal.pone.0257329

Primack, B. A., Shensa, A., Sidani, J. E., Whaite, E. O., Lin, L. Y., Rosen, D., Colditz, J. B., Radovic, A., & Miller, E. (2017). Social media use and perceived social isolation among young adults in the U. S. American. American Journal of Preventive Medicine, 53(1), 1–8. https://doi.org/10.1016/j.amepre.2017.01.010

Prizant-Passal, S., Shechner, T., & Aderka, I. M. (2016). Social anxiety and internet use. A meta-analysis: What do we know? What are we missing? Computers in Human Behavior, 62, 221–229. https://doi.org/10.1016/j.chb.2016.04.003

Restrepo, A., Scheininger, T., Clucas, J., Alexander, L., Salum, G. A., Georgiades, K., Paksarian, D., Merikangas, K. R., & Milham, M. P. (2020). Problematic internet use in children and adolescents: Associations with psychiatric disorders and impairment. BMC Psychiatry, 20(1), 252. https://doi.org/10.1186/s12888-020-02640-x

Rivera-Riquelme, M., Piqueras, J. A., & Cuijpers, P. (2019). The revised Mental Health Inventory-5 (MHI-5) as an ultra-brief screening measure of bidimensional mental health in children and adolescents. Psychiatry Research, 274, 247–253. https://doi.org/10.1016/j.psychres.2019.02.045

Rosen, L. D., Lim, A. F., Felt, J., Carrier, L. M., Cheever, N. A., Lara-Ruiz, J. M., Mendoza, J. S., & Rokkum, J. (2014). Media and technology use predicts ill-being among children, preteens and teenagers independent of the negative health impacts of exercise and eating habits. Computers in Human Behavior, 35, 364–375. https://doi.org/10.1016/j.chb.2014.01.036

Ruckwongpatr, K., Chirawat, P., Ghavifekr, S., Gan, W. Y., Tung, S. E., Nurmala, I., Nadhiroh, S. R., Pramukti, I., & Lin, C. Y. (2022). Problematic Internet use (PIU) in youth: A brief literature review of selected

topics. Current Opinion in Behavioral Sciences, 46, 101150. https://doi.org/10.1016/j.cobeha.2022.101150

Shakya, H. B., & Christakis, N. A. (2017). Association of Facebook use with compromised well-being: A longitudinal study. American Journal of Epidemiology, 185(3), 203–211. https://doi.org/10.1093/aje/kww189

Shapira, N. A., Lessig, M. C., Goldsmith, T. D., Szabo, S. T., Lazoritz, M., Gold, M. S., & Stein, D. J. (2003). Problematic internet use: Proposed classification and diagnostic criteria. Depression and Anxiety, 17(4), 207–216. https://doi.org/10.1002/da.10094

Shehata, W. M., & Abdeldaim, D. E. (2021). Internet addiction among medical and non-medical students during COVID-19 pandemic, Tanta University, Egypt. Environmental Science and Pollution Research International, 28(42), 59945–59952. https://doi.org/10.1007/s11356-021-14961-9

Song, I., LaRose, R., Eastin, M. S., & Lin, C. A. (2004). Internet gratifications and internet addiction: On the uses and abuses of new media. Cyberpsychology & Behavior, 7(4), 384–394. https://doi.org/10.1089/cpb.2004.7.384

Spada, M. M. (2014). An overview of problematic internet use. Addictive Behaviors, 39(1), 3–6. https://doi.org/10.1016/j.addbeh.2013.09.007

Steffen, A., Nübel, J., Jacobi, F., Bätzing, J., & Holstiege, J. (2020). Mental and somatic comorbidity of depression: A comprehensive cross-sectional analysis of 202 diagnosis groups using German nationwide ambulatory claims data. BMC Psychiatry, 20(1), 142. https://doi.org/10.1186/s12888-020-02546-8

Taha, M. H., Shehzad, K., Alamro, A. S., & Wadi, M. (2019). Internet use and addiction among medical students in Qassim University, Saudi Arabia. Sultan Qaboos University Medical Journal, 19(2), e142–

e147. https://doi.org/10.18295/squmj.2019.19.02.010

Tam, P., & Walter, G. (2013). Problematic internet use in childhood and youth: Evolution of a 21st century affliction. Australasian Psychiatry, 21(6), 533–536. https://doi.org/10.1177/1039856213509911

Tateno, M., Teo, A. R., Ukai, W., Kanazawa, J., Katsuki, R., Kubo, H., & Kato, T. A. (2019). Internet addiction, smartphone addiction, and hikikomori trait in Japanese young adult: Social isolation and social network. Frontiers in Psychiatry, 10, 455. https://doi.org/10.3389/fpsyt.2019.00455

Tokunaga, R. S., & Rains, S. A. (2016). A review and meta-analysis examining conceptual and operational definitions of problematic internet use. Human Communication Research, 42(2), 165–199. https://doi.org/10.1111/hcre.12075

Tsitsika, A., Janikian, M., Schoenmakers, T. M., Tzavela, E. C., Olafsson, K., Wójcik, S., Macarie, G. F., Tzavara, C., & Richardson, C. (2014). Internet addictive behavior in adolescence: A cross-sectional study in seven European countries. Cyberpsychology, Behavior and Social Networking, 17(8), 528–535. https://doi.org/10.1089/cyber.2013.0382

Twenge, J. M. (2019). More time on technology, less happiness? Associations between digital-media use and psychological well-being. Current Directions in Psychological Science, 28(4), 372–379. https://doi.org/10.1177/0963721419838244

Twenge, J. M., & Campbell, W. K. (2018). Associations between screen time and lower psychological well-being among children and adolescents: Evidence from a population-based study. Preventive Medicine Reports, 12, 271–283. https://doi.org/10.1016/j.pmedr.2018.10.003

Twenge, J. M., Martin, G. N., & Spitzberg, B. H. (2019). Trends in U.S. adolescents' media use, 1976–2016: The rise of digital media, the decline of TV, and the (near)

demise of print. Psychology of Popular Media Culture, 8(4), 329–345. https://doi.org/10.1037/ppm0000203

Tzavela, E. C., Karakitsou, C., Dreier, M., Mavromati, F., Wölfling, K., Halapi, E., Macarie, G., Wójcik, S., Veldhuis, L., & Tsitsika, A. K. (2015). Processes discriminating adaptive and maladaptive internet use among European adolescents highly engaged online. Journal of Adolescence, 40, 34–47. https://doi.org/10.1016/j.adolescence.2014.12.003

Unger, S., & Meiran, W. R. (2020). Student attitudes towards online education during the COVID-19 viral outbreak of 2020: Distance learning in a time of social distance. International Journal of Technology in Education and Science, 4(4), 256–266. https://doi.org/10.46328/ijtes.v4i4.107

Ustun, G. (2021). Determining depression and related factors in a society affected by COVID-19 pandemic. International Journal of Social Psychiatry, 67(1), 54–63. https://doi.org/10.1177/0020764020938807

Vigna-Taglianti, F., Brambilla, R., Priotto, B., Angelino, R., Cuomo, G., & Diecidue, R. (2017). Problematic internet use among high school students: Prevalence, associated factors and gender differences. Psychiatry Research, 257, 163–171. https://doi.org/10.1016/j.psychres.2017.07.039

Wang, B. Q., Yao, N. Q., Zhou, X., Liu, J., & Lv, Z. T. (2017). The association between attention deficit/hyperactivity disorder and internet addiction: A systematic review and meta-analysis. BMC Psychiatry, 17(1), 260. https://doi.org/10.1186/s12888-017-1408-x

Wong, T. Y., Yuen, K. S., & Li, W. O. (2014). A basic need theory approach to problematic internet use and the mediating effect of psychological distress. Frontiers in Psychology, 5, 1562. https://doi.org/10.3389/fpsyg.2014.01562

Yang, J., Guo, Y., Du, X., Jiang, Y., Wang, W., Xiao, D., Wang, T., Lu, C., & Guo, L. (2018). Association between problematic Internet use and sleep disturbance among adolescents: The role of the Child's sex. International Journal of Environmental Research and Public Health, 15(12), 2682. https://doi.org/10.3390/ijerph15122682

Yang, X., Hu, H., Zhao, C., Xu, H., Tu, X., & Zhang, G. (2021). A longitudinal study of changes in smart phone addiction and depressive symptoms and potential risk factors among Chinese college students. BMC Psychiatry, 21(1), 252. https://doi.org/10.1186/s12888-021-03265-4

Yu, Y., She, R., Luo, S., Xin, M., Li, L., Wang, S., Ma, L., Tao, F., Zhang, J., Zhao, J., Li, L., Hu, D., Zhang, G., Gu, J., Lin, D., Wang, H., Cai, Y., Wang, Z., You, H., . . . Lau, J. T. (2021). Factors influencing depression and mental distress related to COVID-19 among university students in China: Online cross-sectional mediation study. JMIR Mental Health, 8(2), e22705. https://doi.org/10.2196/22705

Zhou, D., Liu, J., & Liu, J. (2020). The effect of problematic Internet use on mathematics achievement: The mediating role of self-efficacy and the moderating role of teacher–student relationships. Children and Youth Services Review, 118, 105372. https://doi.org/10.1016/j.childyouth.2020.105372