Internet Addiction among College Students from 20 Countries: Scoping Review of Risk Factors and Impact on Academic Procrastination and Sleep Quality

Jacob Owusu Sarfo [a, *], Mustapha Amoadu [a], Edward Wilson Ansah [a]

[a] University of Cape Coast, Cape Coast, Ghana

Abstract

The internet is integral in the life of a college student. Notwithstanding the growing number of studies on students' vulnerability to the misuse of the internet, few reviews have been done so far to synthesise the risks of internet addiction and its relationship with academic procrastination and sleep quality. This review aimed at synthesising studies to understand the internet addiction risks among college students and its association with academic procrastination and sleep quality. We conducted our main search using PubMed, PubMed Central, JSTOR and Dimensions. Our search yielded 4,365 records, with an additional 13 from Google Scholar and Google searches. Following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses, 50 eligible records were included in the final review. The risk of internet addiction among college students was high among males, those under 20 years old, and those with regular social media use. Additionally, college students with academic challenges and those living with mental health conditions like depressive episodes, anxiety, stress, low self-esteem and impulsivity were more prone to developing internet addiction. Furthermore, internet addiction influences college students' academic procrastination and sleep issues such as insomnia, poor sleep quality, daytime drowsiness, usage of sleep aids, restless nights, sleep latency and sleep deprivation. Internet addiction affects college students' academic procrastination and sleep quality. Re-orienting existing mental health services rendered by colleges may help address internet addiction by establishing special deaddiction clinics to support addicted students.

Keywords: Internet addiction, college students, academic procrastination, sleep quality, scoping review.

1. Introduction

Over three billion people use the internet daily, with young people being the most frequent users (Zenebe et al., 2021). The world has changed due to internet use in terms of information exchange, business opportunities, communication, learning, relationships, socialisation, commerce, and entertainment, all of which are now easy to access with just a click (Joseph et al., 2021). Thus, the internet has become an integral and essential part of life. Internet usage is incredibly individualised. The swift completion of tasks, devoid of user experiences of mental or behavioural pain, characterises healthy internet usage. Several people cannot control how much time they spend online, effectively indulging in unhealthy internet use (Diomidous et al., 2016).

Internet addiction (IA) is excessive internet technology use that interferes with daily living. With the accessibility and portability of new media, it has become a potential issue among young people, especially college students. College students use the internet to facilitate research, information seeking, and interpersonal communication. On the other hand, some college students

use it to engage in deviant behaviours, including pornography, binge gaming, all-night chit-chat, and even gambling. Concerns about the nature of IA, which Goldberg first described as a disorder, have been spreading across the globe (Goldberg, 1996; Kumar, Mondal, 2018). In fact, IA also causes the same challenges with health, relationships, finances, education, and employment as other addictions. Overusing or problematic internet use causes several physical, psychological, and social issues. Anxiety, stress, and depression are the most detrimental impacts of IA (Karakose, 2022).

The best way for people to relax is to sleep. After a restful night's sleep, people feel energised and prepared for a new day. However, sleep can be impaired, especially among people with IA. Poor sleep quality is a condition that can cause a variety of problems and disturb daily life. Lack of sleep can lead to dangerous consequences like unsatisfactory academic performance and weaker coping strategies (Mahmoud et al., 2022). Also, the association between IA and poor sleep quality has been linked with students' procrastination behaviours at bedtime (Cui et al., 2021; You et al., 2021) and academic activities (Magalhães et al., 2021).

Procrastination is a common issue that hinders daily and academic duties. Although bedtime procrastination (Cui et al., 2021; You et al., 2021) exists among the general population, academic procrastination (AP) is specific to only students (Magalhães et al., 2021). As a prevalent type of procrastination among students, AP is an irrational pattern in which the person puts off beginning or completing educational projects or other obligations, particularly those with deadlines (Hayat et al., 2020). Evidence shows that AP is highly prevalent among college students, ranging from 28 to 90 % (Hayat et al., 2020). Moreover, evidence indicates that AP behaviours are related to poor grades (Özer et al., 2009), withdrawal from a course and school (Solomon, Rothblum, 1984), anxiety and low self-confidence (Steel, 2007). Furthermore, recent evidence shows that students with high levels of AP are more unlikely to achieve their academic goals (Gustavson, Miyake, 2017). Hence, giving AP the necessary research attention is relevant, especially in modern days, where IA is highly prevalent among young people.

After decades of research on IA, there is a need to map evidence on the risks and consequences of IA on AP and sleep quality among college students. For instance, a meta-analysis on IA conducted in 2018 only focused on medical students (Zhang et al., 2018), while a similar synthesis was done in Indian settings (Joseph et al., 2021). Notwithstanding the narrow population of these studies, IA was significantly higher among college students than among the general population (Zhang et al., 2018). Thus, this scoping review provides a broader synthesis of the literature on IA. Additionally, a cursory search of available databases in English shows no recent review on the linkages between IA, AP, and sleep quality among college students. Mapping this evidence will help raise efforts to increase awareness and prevent the consequences of IA among college students. Hence, this scoping review maps research evidence on IA among college students, its associated risk factors, and its impact on students' sleep quality and AP. The research questions for this scoping review included: (1) what are the risk factors for IA among college students? (2) What are the consequences of IA on AP and sleep quality among college students?

2. Materials and methods

This scoping review was conducted following the guidelines outlined by Arksey and O'Malley (Arksey, O'Malley, 2005). The steps include identifying and stating the research questions, identifying relevant studies, selecting studies, collecting data, summarising and synthesising results, and consultation. For the literature exploration, we searched four main databases (PubMed, PubMed Central, JSTOR, and Dimensions). Medical Subject Headings (MeSH) terms were utilised for the search in PubMed. The MeSH terms were then used for search in the other three databases (PubMed PubMed Central, JSTOR, and Dimensions). The eligibility criteria and the search strategy are presented in Table 1.

Table 1. Search strategy for articles on IA and its impact on AP and sleep quality

Search strategy item	Search strategy
Databases	PubMed, PubMed Central, JSTOR and Dimensions,
Language filter	English Language

Time filter	2010-2022
Spatial filter	Global
Keywords	1. "Internet addiction" OR "Problematic internet use" OR "Compulsive internet use" OR "Computer addict" OR "Cyber addict" OR Excessive internet use" OR "Internet addict" OR "Internet-dependent" OR "Internet disorder" OR "Online addict" OR "Social media addict" OR "Problematic smartphone use" OR "Online gaming addiction" 2. "Academic Procrastination" OR "Procrastination" OR "Slowness in completing assignments" OR "Delays in completing assignments" 3. "Quality sleep" OR "Poor sleep quality" OR "Sleep latency" OR "Sleep disturbances" 4. "College students" OR "University students" OR "Undergraduate students"
Inclusion criteria	The paper should be: 1. peer-reviewed or grey literature; 2. published in 2010 and later; 3. published in the English language; 4. conducted using college students; and 5. on the effect of internet addiction on academic procrastination and sleep quality.
Exclusion criteria	The paper should be: 1. conducted on the general population aside from students; 2. a study published online before the year 2010; 3. a report, review, abstract, minute, commentary, letter to editors, preprint, literature review; 4. published in a language other than English; 5. outside the variables of interest.

Furthermore, we moved the keywords in Table 1 to the MeSH. These MeSH terms were adapted to fit other databases. Additionally, we assessed the records obtained and used the Mendeley software to remove duplicates. We further searched Google Scholar and Google for additional records and checked the reference lists of eligible records for relevant articles. See Table 2 for the planned search strategy in PubMed.

Table 2. Search Strategy in PubMed

Search (#)	Search terms
1	Internet addiction*[MeSH terms] OR Problematic internet use* OR Compulsive internet use* OR Computer addict* OR Cyber addict* OR Excessive internet use* OR Internet addict* OR Internet dependent* OR Internet disorder* OR Online addict* OR Social media addict* OR Problematic smartphone use* OR Online gaming addiction*
2	College students*[MeSH terms] OR University students* OR undergraduate students*
3	#1 AND #2
4	Academic procrastination*[MeSH terms] OR procrastination* OR Slowness in completing assignments* OR Delays in completing assignments*
5	Intervention*[MeSH term] OR Poor sleep quality* OR Sleep latency* OR Sleep disturbances*
6	#4 AND #5 Limits: 01/01/2010 to 21/12/2022

Data were independently extracted by JOS and MA and were reviewed by EWA. Confusion, misunderstanding, and discrepancies during the data extraction were resolved during a weekly meeting by all the authors. Following our review, interrater reliability of 0.8 was observed between independent authors. Dr Kwame Ntim Kodua, a chartered librarian at the Sam Jonah Library of

the University of Cape Coast, was consulted to assist and guide our search and screening process. Finally, all authors reviewed and familiarised themselves with the extracted data, thematic analysis was done, and results were presented.
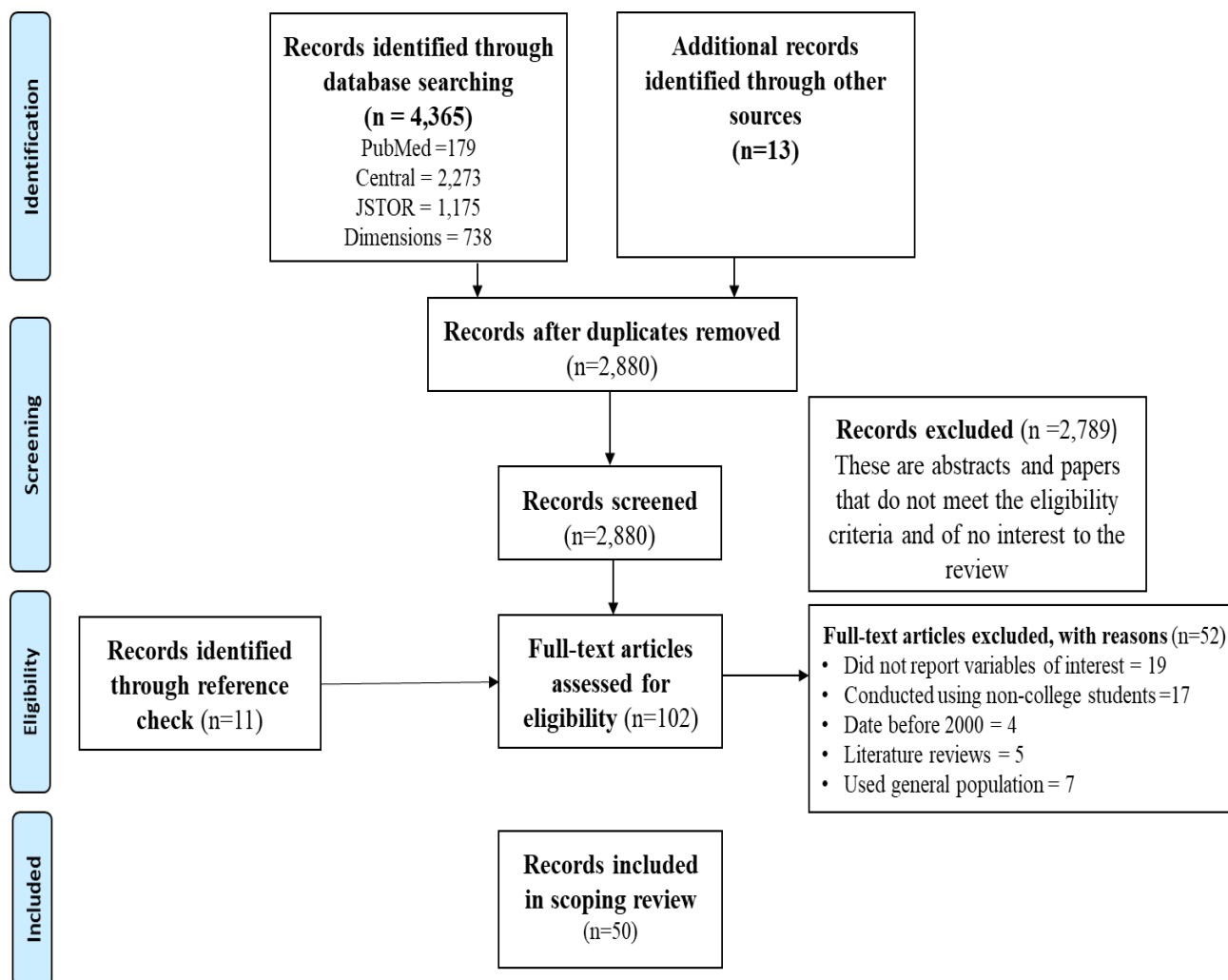

Fig. 1. PRISMA flow diagram of search results and record screening process

Details that were extracted during the data charting process included authors and year, the country where the study was conducted, the purpose of the study, study design, population, sample size, risk factors, and study outcomes. Extracted data is presented in Table 3. We saved articles that met the eligibility criteria in Mendeley software for data charting. The last search was done on December 21, 2022, and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flowchart of the search strategy is shown in Figure 1.

3. Results

The search conducted in the main four databases produced 4,365 records and 13 records through Google Scholar and Google. Through the use of the Mendeley software, 1,498 duplicates were removed. Moreover, 2,789 records were removed from further screening. The records removed could not meet the eligibility criteria or were abstracts from which full-text records could not be retrieved. One hundred and two records were assessed for eligibility. Finally, 50 records were included in this scoping review. Forty-nine of the included studies were cross-sectional surveys, while the remaining study was qualitative. The included studies were conducted in 20 countries across the globe. See Table 3 for details.

Table 3. Data extracted from included studies

Authors, country	Gao et al., 2022 China	Karimy et al., 2020 Iran	Demir et al., 2020 Turkey	Ayran et al., 2019 Turkey	Shaibani, 2019 Saudi Arabia	You et al., 2020 China
Purpose of the study	To investigate the prevalence and risk factors among students	To examine the association between QoL, sleep quality and IA	To determine daytime sleepiness in university students and its relationship with IA as the determinant	To investigate the effect of internet addiction on sleep quality	To assess the association between AP and IA	To find the association between IA and sleep quality
Study design	Cross-sectional survey	Cross-sectional survey	Cross-sectional survey	Cross-sectional survey	Cross-sectional survey	Cross-sectional survey
Population	College students	College students	College students	College students	College students	College students
Sample size	7,990	279	1,150	419	697	1,104
Risk factors (RF)	Severe depression, stress and anxiety	Single and staying in the dormitory				
Academic procrastination					A significant association between IA and AP	
Sleep quality	Insomnia	Poor quality of sleep	Day time sleeping	Daytime dysfunction, use of medication, disturbances,		There is no direct association between IA and poor quality of sleep

	O'Sullivan, 2020 Ireland	Obiagaeri, Chidozie, 2020 Nigeria	Bodhi, Kaur, 2017 India	Nnaemeka et al., 2020 Nigeria	Akinci, 2021 Turkey	Al Gammal et al., 2019 Egypt	Shen et al., 2020 China
Objective	To examine the roles self-regulation, anxiety, IA and gender play in AP	To investigate IA and mental health comorbidities	To determine the psychological correlates of IA	To ascertain if IA and AP are predictors of academic stress	To examine the association between smartphone addiction and AP	To examine and compare the prevalence of internet addiction and internet gaming disorder with the examination of related sleep problems	To investigate the prevalence of insomnia and its related risk factors
Design	Cross-sectional survey	Cross-sectional survey	Cross-sectional survey	Cross-sectional survey	Cross-sectional survey	Cross-sectional survey	Cross-sectional survey
Population	College students	College students	College students	College students	College students	College students	College students
Sample	97	286	200	720	632	60	627
Risk factors		Anxiety and depression are not RFs	Stress, anxiety and depression are RFs		Academic self-regulation, Academic stress		Young, smoking, drinking alcohol, anxiety, depression, suicidal ideas, suicidal plans and
Association	A significant association between IA and AP			Insignificant negative association between IA and AP	A significant positive association between smartphone addiction and AP		
Outcome		No significant association between IA and insomnia				Poor sleep quality	Insomnia

Study	Country	Objective	Study design	Population	Sample size	Risk factors	Association	Sleep outcome
Bhatt, Gaur, 2019	India	To find out the effects of IA on psychological outcomes	Cross-sectional survey	College students	320	Depression, anxiety, stress and low self-esteem		Insomnia
Kumar et al., 2017	India	To know the magnitude of IA among medical students and to determine the factors associated with it	Cross-sectional survey	College students	138	Males, spending more than 5 hours on a smartphone		
Jahan et al., 2019	Bangladesh	To find the association between IA and sleep quality	Cross-sectional survey	College students	390			Poor quality sleep
Sharma et al., 2014	India	To determine the level of IA and Sleep problems	Cross-sectional survey	College students	391	Depression, spending leisure time on the phone instead with friends, males, smartphone		Sleepless night
Salehi et al., 2014	Iran	To explore the prevalence of IA and its related factors	Cross-sectional survey	College students	383	Male, 4 hours, frequent and night use of internet, and drinking more tea are RFs		
He, 2017	UK	To explore AP and its correlates	Cross-sectional survey	College students	201		Significant association between IA and AP	
Mohammed, Abdulwasiu, 2017	Nigeria	To examine the influence of IA on AP	Cross-sectional survey	College students	380	Being a male	Significant association between IA and AP.	

	Liu et al., 2022 China	Cui et al., 2021 China	Yang et al., 2018 China	Zhang et al., 2022 China	Hammoudi et al., 2021 Lebanon	Aznar-Díaz et al., 2020 Spain and Mexico	O'Brien, et al., 2015 USA
Objective	To assess Chinese medical students' smartphone addiction and its effects on sub-health and insomnia	To explore the longitudinal relationship among problematic mobile phone use, bedtime procrastination, sleep quality, and depressive symptoms	To explore the prevalence and correlates of problematic smartphone use	To investigate the effect of IA on AP	To investigate the association of increased smartphone screen time with insomnia, bedtime procrastination, depression, anxiety, body mass index and physical activity	To examine the relationship between IA and AP	To explore and understand IA and its consequence
Design	Cross-sectional survey	Cross-sectional survey	Cross-sectional survey	Cross-sectional survey	Cross-sectional survey	Cross-sectional survey	Qualitative
Population	College students	College students	College students	College students	College students	College students	College students
Sample size	2,741	1,181	475	306	591	758	27
Risk factors	Do not like speciality, drink alcohol, use a smartphone in bed, depression, and	Depression			6 hours or more daily phone use, females, unhealthy food consumption, anxiety, and depression are RFs	Homosexuals, social networks, daily internet use of leisure, male, less than 20 years. Arts	Depression, stress, and frequent social media use are RF
Association			A significant association between Problematic smartphone use and AP	A significant association between IA and AP		A significant association between IA and AP	
Outcome	Insomnia	Poor sleep quality			Insomnia		Sleep deprivation.

Study	Purpose	Design	Population	Sample size	Factor	Association	Outcome
Cerniglia, 2019 Italy	To explore the association between problematic internet use and AP	Cross-sectional survey	College students	382	Impulsiveness	A significant association between problematic internet use and AP	
Gupta et al., 2020 India	To examine the association between IA and poor-quality sleep	Cross-sectional survey	College students	222	Depression		Poor sleep quality.
Rangel et al., 2021 Brazil	To assess whether there is an association between the headache, insomnia, and internet addiction	Cross-sectional survey	College students	420	Anxiety		Insomnia
Suarez-Perdomo et al., 2022 Spain	To identify the difference in academic procrastination among profiles of social network addiction	Cross-sectional survey	College students	1,784		A higher level of social network addiction is related to AP	
Zhang, Wu, 2020 China	Tested the effect of smartphone addiction and sleep quality	Cross-sectional survey	College students	427			No direct significant effect between smartphone addiction and sleep
Ucer, 2022 USA	To examine the relationship between problematic internet use, AP, and life satisfaction	Cross-sectional survey	College students	243		A significant association between Problematic phone use and AP	
Mahmoud et al., 2022 Egypt	To explore the association between IA and sleep quality	Cross-sectional survey	College students	525	Young age, male, low academic performance, computer presence at home, and		Poor quality sleep

Study / Country	Objective	Design	Participants	Sample	Factors	Findings	Sleep outcome
Chong et al., 2022 Malaysia	To investigate the relationship between IA and AP	Cross-sectional survey	College students	370		A significant association between IA and AP	
Xian, Ying, 2022 China	To explore the relationship between social media addiction and AP	Cross-sectional survey	College students	88		A significant association between Social media addiction and AP	
Citil et al., 2022 Turkey	To investigate the relationship between smartphone addiction and sleep problems	Cross-sectional survey	College students	640	High BMI, availability of Wi-Fi, living alone, Low academic performance and		Daytime sleepiness
Stanković et al., 2021 Serbia	To examine the psychological mechanisms underlying extensive smartphone use and depression	Cross-sectional survey	College students	92	Anxiety and stress		Poor sleep quality
Anierobi et al., 2021 Nigeria	To explore compulsive social media addiction as an encouraging factor in AP	Cross-sectional survey	College students	193		A significant association between social media addiction and AP	
Serrano et al., 2022 USA	To explore the effects of social media use on students' AP	Cross-sectional survey	College students	233		A significant association between social media addiction and AP	
Nwoso et al., 2020 Nigeria	To ascertain the pathways through which IA predict AP	Cross-sectional survey	College students	500		A significant association between IA and AP	

Study, Country	Objective	Study design	Population	Sample	Notes	Findings	Outcome measures
Khayat et al., 2018 Saudi Arabia	To evaluate the relationship between sleep quality and the level of IA	Cross-sectional survey	College students	511			Poor quality sleep
Lin et al., 2019 China	To evaluate the association between IA and sleep quality	Cross-sectional survey	Female college students.	503			Sleep quality, sleep latency, sleep duration, sleep disturbance, use of
Chen et al., 2021 China	To investigate the relationship among mobile phone dependence, self-efficacy for self-regulated learning, time management disposition, and AP	Cross-sectional survey	College students	324		A significant association between smartphone dependency and AP	
Hayat et al., 2020 Iran	To examine the effect of IA on AP	Cross-sectional survey	College students	233	Male college students living in a dormitory.	A significant association between IA and AP	
Li et al., 2020 China	To explore the smartphone addiction and AP	Cross-sectional survey	College students	483		A significant association between smartphone addiction and AP	
Ihekaike et al., 2022 Nigeria	To determine the prevalence and associated factors of IA	Cross-sectional survey	College students	383			Problem sleeping
Muslikah et al., 2018 Indonesia	To explore the relationship between social media use intensity and AP	Cross-sectional survey	College students	419		A significant association between social media addiction and AP	

Kitazawa et al., 2018 Japan	To examine the relationship between IA and Psychiatric symptoms	Cross-sectional survey	College students	1,336	ADHD, depression, and anxiety are RFs		Poor sleep quality
Parmaksiz, 2022 Turkey	To explore the relationship between phubbing frequency and AP	Cross-sectional survey	College students	518		A significant association between phubbing and AP	

3.1. Risk factors associated with IA among college students

Our synthesis yielded five major themes as risks related to IA among college students. These themes included socio-demographics, personal characteristics, academic challenges, and mental health issues.

Socio-demographic factors

Studies identified predominantly observed male college students (Aznar-Díaz et al., 2020; Hayat et al., 2020; Kumar et al., 2017; Mohammed, Abdulwasiu, 2017; Salehi et al., 2014; Sharma et al., 2014) as vulnerable to IA compared to the females (Hammoudi et al., 2021). Also, age as a risk factor revealed that college students who were adolescents (Aznar-Díaz et al., 2020; Shen et al., 2020) or below the age of 20 years (Mahmoud et al., 2022) were at risk of IA. In addition, college students identified as single (Aznar-Díaz et al., 2020; Karimy et al., 2020), living alone (Citil et al., 2022) and residing in a dormitory (Hayat et al., 2020; Karimy et al., 2020) were more likely to be addicted to the internet. Our synthesis reported college students whose parents have high income and educational status (Citil et al., 2022) were at higher risk of IA. Furthermore, access to Wi-Fi or internet connection at home (Citil et al., 2022; Mahmoud et al., 2022) and in the dormitory or campus (Citil et al., 2022) posed a higher risk of IA.

Personal factors

Among the personal factors, most studies observed frequent use of social media among college students as a major risk factor for IA (Citil et al., 2022; Mohammed, Abdulwasiu, 2017; Sharma et al., 2014). Consequently, students who spend 2-3 hours (Sharma et al., 2014), 4 hours or more (Salehi et al., 2014) and 5 hours or more (Hammoudi et al., 2021; Kumar et al., 2017) on a smartphone are at higher risk of IA. Moreover, frequent use of social media among college students is a risk factor for IA (Aznar-Díaz et al., 2020; Li et al., 2015; Salehi et al., 2014). Besides, substance use behaviours like smoking tobacco and cigarettes (Shen et al., 2020) and alcohol abuse (Liu et al., 2022; Shen et al., 2020) were more likely to be addicted to the internet. Few studies reported factors like sexual orientation, such as homosexuals in Mexico and Spain (Aznar-Díaz et al., 2020) and Turkish college students with a body mass index (BMI) of 25 or more, as risks of IA (Citil et al., 2022).

Academic challenges

Academic challenges among students were identified as risk factors of IA. College students in Egypt (Mahmoud et al., 2022) and Turkey (Citil et al., 2022) who had poor academic performance also exhibited high IA. Besides, students experiencing academic stress were more likely to be exposed to IA. Moreover, college students with impaired academic self-regulation were likely to have symptoms of IA (Akıncı, 2021).

Mental health issues

A major risk factor observed across most studies was mental health challenges among college students. Vulnerability to IA was seen among college students experiencing depression (Bhatt, Gaur, 2019; Bodhi, Kaur, 2017; Cui et al., 2021; Gao et al., 2022; Gupta et al., 2021; Hammoudi et al., 2021; Kitazawa et al., 2018; Li et al., 2015; Liu et al., 2022; Obiagaeri, Chidozie, 2020; Sharma et al., 2014), stress (Akıncı, 2021; Bhatt, Gaur, 2019; Bodhi, Kaur, 2017; Gao et al., 2022; Li et al., 2015; Stanković et al., 2021) and anxiety (Bodhi, Kaur, 2017; Corrêa-Rangel et al., 2022; Gao et al., 2022; Hammoudi et al., 2021; Liu et al., 2022; Obiagaeri, Chidozie, 2020; Stanković et al., 2021). Also, a study conducted in China revealed that college students with a history of suicidal ideation,

plans and attempts are more likely to experience IA (Shen et al., 2020). Furthermore, impulsive college students (Cerniglia, 2019), attention deficit hyperactivity disorder (Kitazawa et al., 2018), and low self-esteem (Bhatt, Gaur, 2019) were likely to be internet addicts.

3.2. Effect of IA on AP and sleep problems among college students

Our synthesis yielded two major themes: (i) IA and AP and (ii) IA and sleep problems.

Internet addiction and AP

Most studies that reported on the influence of IA on AP showed that IA has a significant positive effect on AP (Al-Shaibani et al., 2020; Aznar-Díaz et al., 2020; Chen et al., 2021; Hayat et al., 2020; He, 2017; Mohammed, Abdulwasiu, 2017; Nwosu et al., 2020; Sullivan, 2020; Zhang et al., 2022). Also, smartphone addiction [(Akıncı, 2021; Chen et al., 2021; Li et al., 2020; Parmaksız, 2022), problematic smartphone use (Cerniglia, 2019; Yang et al., 2019) and social media addiction (Anierobi et al., 2021; Muliskah et al., 2018; Serrano et al., 2022; Suárez-Perdomo et al., 2022; Xian, Ying, 2022) were reported to have a significant positive effect on AP. However, a study conducted among college students in Nigeria found no significant effect of IA on AP (Nnaemeka et al., 2022).

Internet addiction and sleep problems

Studies that explored the effect of IA on sleep problems reported that IA has a significant positive effect on insomnia (Bhatt, Gaur, 2019; Corrêa-Rangel et al., 2022; Gao et al., 2022; Hammoudi et al., 2021; Lin et al., 2019; Liu et al., 2022) and poor sleep quality (Al Gammal et al., 2019; Ayran et al., 2019; Cui et al., 2021; Gupta et al., 2021; Karimy et al., 2020; Khayat et al., 2018; Kitazawa et al., 2018; Lin et al., 2019; Mahmoud et al., 2022; Stanković et al., 2021). Additional sleep quality dysfunctions affected positively by IA included daytime sleeping (Citil et al., 2022; Demir et al., 2020), daytime dysfunction (Ayran et al., 2019; Lin et al., 2019), use of sleep medication (Ayran et al., 2019; Lin et al., 2019), sleep latency (Ayran et al., 2019; Lin et al., 2019). Also, IA was similarly affected by sleepless nights or problems sleeping (Ihekaike et al., 2021; Lin et al., 2019; Sharma et al., 2014) and sleep deprivation (Li et al., 2015). However, few studies reported no significant direct effect of IA on poor sleep quality (You et al., 2021; Zhang, Wu, 2020) and insomnia (Obiagaeri, Chidozie, 2020).

4. Discussion

The study found that males and young college students, the presence of Wi-Fi, high parental education and income status, college students with high BMI, frequent use of social media and homosexuals are likely to be addicted to the internet. Also, college students with poor academic performance and mental health issues such as depression, anxiety, stress, low self-esteem, impulsiveness and attention deficit hyperactivity disorder (ADHD) are more likely to experience IA. Internet addiction significantly affects AP and sleep problems such as insomnia, poor sleep quality, daytime sleepiness, use of sleep medication, sleepless nights, sleep latency and sleep deprivation among college students.

Risk factors associated with IA among college students

Male gender was the commonly reported socio-demographic variable associated with IA among college students. Perhaps, male preference for online activities such as online games, sports betting and online sex that are more commonly dysfunctional may explain why the male gender is at higher risk of IA (Chou et al., 2005). Furthermore, differences in personality traits such as sensation seeking, self-control and impulsivity were highly associated with the male gender and may expose male college students to IA (Billieux et al., 2012).

Most studies reported that young college students, especially adolescents, were at increased risk of IA. Young people, especially adolescents, usually attempt to combat emotional crises by withdrawing, avoiding prolonged social contact, acting aggressively, and engaging in addictive behaviour (Karacic, Oreskovic, 2017). In addition, emotional crises were more likely to occur during adolescence. Such situations are usually accompanied by mood swings, episodes of anxiety, depressive symptoms and periods of isolation, which may expose them to internet usage and lead to addiction over time (Karacic, Oreskovic, 2017). Moreover, adolescents are particularly drawn to new technological forms of communication that allow for social engagement while promoting anonymity, a sense of community, and social acceptance.

The link between IA and time spent online and the use of specific online social media and gaming applications was established among most studies. The time college students spend online

may indicate increasing tolerance to using the internet, which is a primary criterion for substance dependence. However, the studies that reported the link between time spent online and IA were all cross-sectional surveys, which do not estimate or assess the progression of time spent online (Hammoudi et al., 2021; Kumar et al., 2017; Salehi et al., 2014; Sharma et al., 2014). This positive correlation between online activity and the symptoms of IA appears to be a quick way to assess the presence of tolerance. Moreover, specific behaviours such as frequency and usage of social media applications on the internet are more likely to lead to addiction among college students. This suggests that certain online behaviours might be more problematic than others. The social interactions, motivations and structural features of social media usage may increase the risk of IA.

Various comorbid symptoms and psychosocial problems indicated that IA does not occur in isolation. The internet may be used to cope with problems such as depression, anxiety, stress, academic challenges and loneliness (Citil et al., 2022; Mahmoud et al., 2022). Similar correlations between alcohol abuse and coping behaviours have been found, indicating that there may be a connection between common problems and internet use as a coping strategy. The coexistence of IA and substance use may suggest the likelihood that neurobiological and psychosocial factors may be common etiological processes for both addictions (Kuss, Griffiths, 2012). Also, excessive internet use in certain circumstances may serve as a dysfunctional coping mechanism for mental health issues such as depression and stress rather than being a psychopathology per se.

The effect of IA on AP and sleep quality

College students who reported symptoms of IA were more liable to AP. The idea of obsession can be used to explain situations when the internet dominates people's lives. Because of this obsession, individuals' obligations to care for their homes, family, work, and other commitments were given second priority. The internet takes over a person's life, which results in college students delaying their academic work (Hayat et al., 2020). Procrastination is more prevalent when an assignment is perceived as innately unpleasant or less enjoyable (Blunt, Pychyl, 2005). For instance, a work viewed as tedious, challenging, or unpleasant puts a person off. In contrast, the internet may be regarded as a tool by which a person could acquire an exciting, pleasurable, and enjoyable experience conducive to perceived stress release despite offering many entertaining interferences. The internet is inherently seen as a procrastination-inducing distraction (Hayat et al., 2020). This is the case, particularly for those who cannot resist the allures of online entertainment and spend more time engaging in them, which leads to more procrastination (Geng et al., 2018).

Furthermore, IA can develop before or as a result of sleep disorders, psychological issues, depression, and anxiety-phobic disorders (You et al., 2021). Evidence showed that IA contributed to a disrupted circadian rhythm (Chen et al., 2021), which may negatively impact college students when they go to bed and how long they stay asleep. Another possibility is that screens emit blue light, which is known to block the pineal gland's production of melatonin and lengthen the latency to falling asleep (Moderie et al., 2017).

5. Conclusion

This review found that internet addiction is more likely to occur in males, younger college students below age 20, Wi-Fi availability, and those with parents with higher education and income levels. Additionally, college students who regularly use social media struggle academically and suffer from mental health conditions, including depressive episodes, anxiety, stress, low self-esteem, impulsivity, and ADHD, and are more prone to develop an addiction to the internet. College students' AP and sleep issues such as insomnia, poor sleep quality, daytime drowsiness, usage of sleep aids, restless nights, sleep latency, and sleep deprivation are significantly impacted by IA. Re-orienting existing mental health services rendered by colleges may help address IA by establishing deaddiction clinics to support addicted students.

6. Recommendations for policy and future research

Creating awareness about decreased sleep quality caused by increasing screen time and internet use is important. Interventions seeking to improve sleep quality and lessen internet addiction may be the central focus of parents and school administrators. By limiting the content to academic-related resources, using the internet through college facilities may provide some protection against excessive use. To promote learning and improve academic achievement, particularly on campus, the college should make concerted measures to ensure the accessibility,

dependability, and regulation of college internet services. Psychological support for college students needs to be intensified to help make mental health services readily available for college students. Thus, the current mental health services rendered by colleges need to be re-oriented to provide services that may help address IA using deaddiction centres. However, more quality research, such as randomised controlled trials and longitudinal studies, may be useful in understanding college student progression on online usage and its effects on AP and sleep quality, especially among individual reports on homosexuals and those with high BMI. In addition, the link between IA and homosexuals may need more research attention.

7. Limitation of the review

This review focused mainly on studies that were published in the English language. This limitation might affect the coverage and depth of included studies. Included studies were cross-sectional surveys that rely on self-reported behaviour. Thus, participants' self-reported behaviour and conduct may differ. Hence, college students may underreport their negligence and underestimate their addictive habits. However, the authors pulled papers from two countries across the globe and helped map evidence necessary for protecting college students going through IA.

8. Acknowledgements

9. Authors' contributions

JOS and MA conceptualised and designed the study, collected and conducted the synthesis, and wrote the initial draft. EWA is the independent expert who led and guided the team throughout the review process. All authors read and approved the final version of the manuscript for publication.

10. Ethics approval and consent to participate

We adhered to all ethical and approved reporting standards for scoping reviews.

11. Availability of data and material

All data generated or analysed during this study are included in this published article.

12. Competing interests

The authors declare that they have no competing interests.

13. Funding

References

Akıncı, 2021 – *Akıncı, T.* (2021). Determination of predictive relationships between problematic smartphone use, self-regulation, academic procrastination and academic stress through modelling. *International Journal of Progressive Education*. 17(1): 35-53. DOI: https://doi.org/10.29329/ ijpe.2021.329.3

Al Gammal et al., 2019– *Al Gammal, MAFS, Elsheikh, M.M.A., Abozahra, A. AE* (2019). Internet addiction and internet gaming disorder and associated insomnia among a sample of Al-Azhar University Students, clinical study. *The Egyptian Journal of Hospital Medicine.* 77(5): 5718-5726. DOI: https://doi.org/10.21608/ejhm.2019.63227

Al-Shaibani et al., 2020 – *Al-Shaibani, M.H., Hejab, M., Shaibani, A.* (2020). Academic procrastination among university students in Saudi Arabia and its association with social media addiction. *Psychology and Education.* 57(8): 1118-1124.

Anierobi et al., 2021 – *Anierobi, E.I., Etodike, C.E., Okeke, N.U., Ezennaka, A.O.* (2021). Social media addiction as correlates of academic procrastination and achievement among

undergraduates of Nnamdi Azikiwe University Awka, Nigeria. *International Journal of Academic Research in Progressive Education and Development*. 10(3). DOI: https://doi.org/10.6007/ijarped/v10-i3/10709

Arksey, O'Malley, 2005 – *Arksey, H., O'Malley, L.* (2005). Scoping studies: Towards a methodological framework. *International Journal of Social Research Methodology: Theory and Practice*. 8(1): 19-32. DOI: https://doi.org/10.1080/1364557032000119616

Ayran et al., 2019 – *Ayran, G., Gundogdu, G., Arslan Işık, N.* (2019). Effect of internet addiction on sleep quality in university students. *Galician Medical Journal*. 26(4). DOI: https://doi.org/10.21802/gmj.2019.4.8

Aznar-Díaz et al., 2020– *Aznar-Díaz, I., Romero-Rodríguez, J.M., García-González, A., Ramírez-Montoya, M.S.* (2020). Mexican and Spanish university students' internet addiction and academic procrastination: Correlation and potential factors. *PLoS ONE*. 15(5): 1-18. DOI: https://doi.org/10.1371/journal.pone.0233655

Bhatt, Gaur, 2019 – *Bhatt, S., Gaur, A.* (2019). Psychological risk factors associated with internet and smartphone addiction among students of an Indian dental institute. *Indian Journal of Public Health*. 63(4): 313-317. DOI: https://doi.org/10.4103/ijph.IJPH_330_18

Billieux et al., 2012 – *Billieux, J., Rochat, L., Ceschi, G., Carré, A., Offerlin-Meyer, I., Defeldre, A.C., Khazaal, Y., Besche-Richard, C., van der Linden, M.* (2012). Validation of a short French version of the UPPS-P Impulsive Behavior Scale. *Comprehensive Psychiatry*. 53(5): 609-615. DOI: https://doi.org/10.1016/J.COMPPSYCH.2011.09.001

Blunt, Pychyl, 2005 – *Blunt, A., Pychyl, T.A.* (2005). Project systems of procrastinators: A personal project-analytic and action control perspective. *Personality and Individual Differences*. 38(8): 1771-1780. DOI: https://doi.org/10.1016/J.PAID.2004.11.019

Bodhi, Kaur, 2017 – *Bodhi, V., Kaur, J.* (2017). Psychological correlates of internet addiction among college students. *Indian Journal of Health & Wellbeing*. 8(11): 1404-1408.

Cerniglia, 2019 – *Cerniglia, L.* (2019). An exploratory study on adaptive psychopathological risk and problematic use of the web associated with procrastination in university students. *International Journal of Developmental and Educational Psychology. Revista INFAD de Psicología*. 1(1): 41. DOI: https://doi.org/10.17060/ijodaep.2019.n1.v1.1382

Chen et al., 2021 – *Chen, P.S., Li, J., Kim, S.Y.* (2021). Structural relationship among mobile phone dependence, self-efficacy, time management disposition, and academic procrastination in college students. *Iranian Journal of Public Health*. 50(11): 2263-2273. DOI: https://doi.org/10.18502/ijph.v50i11.7582

Chou et al., 2005 – *Chou, C., Condron, L., Belland, J.C.* (2005). A review of the research on Internet addiction. *Educational Psychology Review*. *17*(4): 3630388. DOI: https://doi.org/10.1007/ S10648-005-8138-1/METRICS

Citil et al., 2022 – *Citil, R., Unlu, U., Onder, Y.* (2022). Investigation of the relationship between technology addiction and sleepiness among university students in health-related departments in Turkey. *Journal of the Pakistan Medical Association*. *72*(3): 497-503. DOI: https://doi.org/10.47391/ JPMA.3188

Corrêa-Rangel et al., 2022 – *Corrêa-Rangel, T., Falcão Raposo, M.C., Sampaio Rocha-Filho, P.A.* (2022). Internet addiction, headache, and insomnia in university students: a cross-sectional study. *Neurological Sciences*. 43(2): 1035-1041. DOI: https://doi.org/10.1007/s10072-021-05377-x

Cui et al., 2021 – *Cui, G., Yin, Y., Li, S., Chen, L., Liu, X., Tang, K., Li, Y.* (2021). Longitudinal relationships among problematic mobile phone use, bedtime procrastination, sleep quality and depressive symptoms in Chinese college students: A cross-lagged panel analysis. *BMC Psychiatry*. 21: 449. DOI: https://doi.org/10.1186/s12888-021-03451-4

Demir et al., 2020 – *Demir, G., Arslan, S., Kocoglu-Tanyer, D.* (2020). Daytime Sleepiness in University Students and Internet Addiction as the Determinant. *Journal of Addictions Nursing*. 31(3): 153-160. DOI: https://doi.org/10.1097/JAN.0000000000000346

Diomidous et al., 2016 – *Diomidous, M., Chardalias, K., Magita, A., Koutonias, P., Panagiotopoulou, P., Mantas, J.* (2016). Social and psychological effects of the internet use. *Acta Informatica Medica*. 24(1): 66-69. DOI: https://doi.org/10.5455/AIM.2016.24.66-69

Gao et a., 2022 – *Gao, M., Teng, Z., Wei, Z., Jin, K., Xiao, J., Tang, H., ... Huang, J.* (2022). (2022). Internet addiction among teenagers in a Chinese population: Prevalence, risk factors, and its relationship with obsessive-compulsive symptoms. *Journal of Psychiatric Research*. *153*(June): 134-140. DOI: https://doi.org/10.1016/j.jpsychires.2022.07.003

Geng et al., 2018 – *Geng, J., Han, L., Gao, F., Jou, M., Huang, C.C.* (2018). Internet addiction and procrastination among Chinese young adults: A moderated mediation model. *Computers in Human Behavior*. 84: 320-333. DOI: https://doi.org/10.1016/J.CHB.2018.03.013

Goldberg, 1996 – *Goldberg, I.* (1996). Internet addiction disorder. *Internet addiction disorder. Cyberpsychology and Behavior*. 3(4): 403-412.

Gupta et al., 2021 – *Gupta, R., Taneja, N., Anand, T., Gupta, A., Gupta, R., Jha, D., Singh, S.* (2021). Internet Addiction, Sleep Quality and Depressive Symptoms Amongst Medical Students in Delhi, India. *Community Mental Health Journal*. 57(4): 771-776. DOI: https://doi.org/10.1007/s10597-020-00697-2

Gustavson, Miyake, 2017 – *Gustavson, D.E., Miyake, A.* (2017). Academic procrastination and goal accomplishment: A combined experimental and individual differences investigation. *Learning and Individual Differences*. 54: 160. https://doi.org/10.1016/J.LINDIF.2017.01.010

Hammoudi et al., 2021 – *Hammoudi, S.F., Mreydem, H.W., Ali, B.T.A., Saleh, N.O., Chung, S., Hallit, S., Salameh, P.* (2021). Smartphone screen time among university students in Lebanon and its association with insomnia, bedtime procrastination, and body mass index during the COVID-19 pandemic: A cross-sectional study. *Psychiatry Investigation*. 18(9): 871-878. DOI: https://doi.org/10.30773/PI.2021.0120

Hayat et al., 2020 – *Hayat, A.A., Kojuri, J., Amini, M.* (2020). Academic procrastination of medical students: The role of Internet addiction. *Journal of Advances in Medical Education & Professionalism*. 8(2): 83-89. DOI: https://doi.org/10.30476/JAMP.2020.85000.1159

He, 2017 – *He, S.* (2017). A multivariate investigation into academic procrastination of university students. *Open Journal of Social Sciences*. 5(10): 12-24. DOI: https://doi.org/10.4236/jss.2017.510002

Ihekaike et al., 2021 – *Ihekaike, M.M., Shehu, M.Y., Makama, M.* (2021). Prevalence and associated factors of internet addiction among clinical medical students of a Nigerian Private University. *International Neuropsychiatric Disease Journal*. *May*: 41-51. DOI: https://doi.org/10.9734/indj/2021/v16i330183

Joseph et al., 2021 – *Joseph, J., Varghese, A., Vr, V., Dhandapani, M., Grover, S., Sharma, S., Khakha, D., Mann, S., Varkey, B. P.* (2021). Prevalence of internet addiction among college students in the Indian setting: A systematic review and meta-analysis. *General Psychiatry*. 34(4): 1-12. DOI: https://doi.org/10.1136/gpsych-2021-100496

Karacic, Oreskovic, 2017 – *Karacic, S., Oreskovic, S.* (2017). Internet addiction through the phase of adolescence: A questionnaire study. *JMIR Mental Health*. 4(2): e5537. DOI: https://doi.org/10.2196/MENTAL.5537

Karakose, 2022 – *Karakose, T.* (2022). Assessing the relationships between internet addiction, depression, COVID-19-related fear, anxiety, and suspicion among graduate students in educational administration: A structural equation modeling analysis. *Sustainability*. 14(9): 5356. DOI: https://doi.org/10.3390/su14095356

Karimy et al., 2020 – *Karimy, M., Parvizi, F., Rouhani, M. R., Griffiths, M. D., Armoon, B., Fattah Moghaddam, L.* (2020). The association between internet addiction, sleep quality, and health-related quality of life among Iranian medical students. *Journal of Addictive Diseases*. 38(3): 317-325. DOI: https://doi.org/10.1080/10550887.2020.1762826

Khayat et al., 2018 – *Khayat, M. A., Qari, M. H., Almutairi, B. S., Shuaib, B.H., Rambo, M.Z., Alrogi, M.J., ... Alqarni, D.A.* (2018). Sleep quality and internet addiction level among university students. *The Egyptian Journal of Hospital Medicine*. 73(7): 7042-7047.

Kitazawa et al., 2018 – *Kitazawa, M., Yoshimura, M., Murata, M., Sato-Fujimoto, Y., Hitokoto, H., Mimura, M., Tsubota, K., Kishimoto, T.* (2018). Associations between problematic Internet use and psychiatric symptoms among university students in Japan. *Psychiatry and Clinical Neurosciences*. 72(7): 531-539. DOI: https://doi.org/10.1111/pcn.12662

Kumar et al., 2017 – *Kumar, A., Nawaz, A.S., Kumar, R.B.N.Y., Yamuna, B.* (2017). Internet addiction and factors associated with it: A cross sectional study among students of a medical college in Davangere, Karnataka. *International Journal of Community Medicine and Public Health*. 4(7): 2525. DOI: https://doi.org/10.18203/2394-6040.ijcmph20172853

Kumar, Mondal, 2018 – *Kumar, M., Mondal, A.* (2018). A study on internet addiction and its relation to psychopathology and self-esteem among college students. *Industrial Psychiatry Journal*. 27(1): 61. DOI: https://doi.org/10.4103/IPJ.IPJ_61_17

Kuss, Griffiths, 2012 – *Kuss, D.J., Griffiths, M.D.* (2012). Internet and gaming addiction: A systematic literature review of neuroimaging studies. *Brain Sciences.* 2(3): 347-374. DOI: https://doi.org/10.3390/BRAINSCI2030347

Li et al., 2020 – *Li, L., Gao, H., Xu, Y.* (2020). The mediating and buffering effect of academic self-efficacy on the relationship between smartphone addiction and academic procrastination. *Computers and Education.* 159(2019): 104001. DOI: https://doi.org/10.1016/j.compedu.2020.104001

Li et al., 2015 – *Li, W., O'Brien, J.E., Snyder, S.M., Howard, M.O.* (2015). Characteristics of Internet Addiction/Pathological Internet Use in US university students: A qualitative-method investigation. *PLoS ONE.* 10(2): 1-19. DOI: https://doi.org/10.1371/journal.pone.0117372

Lin et al., 2019 – *Lin, P.H., Lee, Y.C., Chen, K.L., Hsieh, P.L., Yang, S.Y., Lin, Y.L.* (2019). The relationship between sleep quality and internet addiction among female college students. *Frontiers in Neuroscience.* 13(JUN): 1-9. DOI: https://doi.org/10.3389/fnins.2019.00599

Liu et al., 2022 – *Liu, H., Zhou, Z., Huang, L., Zhu, E., Yu, L., Zhang, M.* (2022). Prevalence of smartphone addiction and its effects on subhealth and insomnia: A cross-sectional study among medical students. *BMC Psychiatry.* 22(1): 1-7. DOI: https://doi.org/10.1186/s12888-022-03956-6

Magalhães et al., 2021 – *Magalhães, P., Pereira, B., Oliveira, A., Santos, D., Núñez, J.C., Rosário, P.* (2021). The mediator role of routines on the relationship between general procrastination, academic procrastination and perceived importance of sleep and bedtime procrastination. *International Journal of Environmental Research and Public Health.* 18(15): e7796. DOI: https://doi.org/10.3390/ijerph18157796

Mahmoud et al., 2022 – *Mahmoud, O.A.A., Hadad, S., Sayed, T.A.* (2022). The association between Internet addiction and sleep quality among Sohag University medical students. *Middle East Current Psychiatry.* 29: 23. DOI: https://doi.org/10.1186/s43045-022-00191-3

Moderie et al., 2017 – *Moderie, C., van der Maren, S., Dumont, M.* (2017). Circadian phase, dynamics of subjective sleepiness and sensitivity to blue light in young adults complaining of a delayed sleep schedule. *Sleep Medicine.* 34: 148-155. DOI: https://doi.org/10.1016/J.SLEEP.2017.03.021

Mohammed, Abdulwasiu, 2017 – *Mohammed, A.I., Abdulwasiu, A.* (2017). Influence of internet-addiction on academic procrastination among students of Ahmadu Bello University Zaria, Kaduna State-Nigeria. *International Journal of Educational Research and Management Technology.* 2(3): 189-200.

Muslikah, Andriyani, 2018 – *Muslikah, M., Andriyani, A.* (2018). Social media user students' academic procrastination. *Psikopedagogia.* 7(2): 53-57.

Nnaemeka et al., 2022 – *Nnaemeka, G.U., Unachukwu, G.C., Nwosu, K.C.* (2022). Internet addiction and academic procrastination as predictors of academic stress in universities in the South East. *GPH-International Journal of Educational Research.* 5(05): 22-31.

Nwosu et al., 2020 – *Nwosu, K.C., Ikwuka, O.I., Onyinyechi, M.U., Unachukwu, G.C.* (2020). Does the association of social media use with problematic internet behaviours predict undergraduate students' academic procrastination? *Canadian Journal of Learning and Technology.* 46(1): 1-22. DOI: https://doi.org/10.21432/cjlt27890

Obiagaeri, Chidozie, 2020 – *Obiagaeri, E.R., Chidozie, I.G.* (2020). Internet addiction and mental health comorbidities among students of the University of Portharcout, Nigeria. *British International Journal of Education and Social Sciences.* 7(6): 4519-6511.

Özer et al., 2019 – *Özer, B.U., Demir, A., Ferrari, J.R.* (2009). Exploring academic procrastination among Turkish students: possible gender differences in prevalence and reasons. *The Journal of Social Psychology.* 149(2): 241-257. DOI: https://doi.org/10.3200/SOCP.149.2.241-257

Parmaksız, 2022 – *Parmaksız, I.* (2022). The effect of phubbing, a behavioral problem, on academic procrastination: The mediating and moderating role of academic self-efficacy. *Psychology in the Schools. March:* 105-121. DOI: https://doi.org/10.1002/pits.22765

Salehi et al., 2014 – *Salehi, M., Khalili, M.N., Hojjat, S.K., Salehi, M., Danesh, A.* (2014). Prevalence of internet addiction and associated factors among medical students from Mashhad, Iran in 2013. *Iranian Red Crescent Medical Journal.* 16(5). DOI: https://doi.org/10.5812/ircmj.17256

Serrano et al., 2022 – *Serrano, D.M., Williams, P.S., Ezzeddine, L., Sapon, B.* (2022). Association between Problematic Social Media Use and Academic Procrastination: The Mediating

Role of Mindfulness. *Learning: Research and Practice*. 8(2): 84-95. DOI: https://doi.org/10.1080/ 23735082.2022.2100920

Sharma et al., 2014 – *Sharma, A., Sahu, R., Kasar, P., Sharma, R.* (2014). Internet addiction among professional courses students: A study from central India. *International Journal of Medical Science and Public Health*. 3(9): 1069. DOI: https://doi.org/10.5455/ijmsph.2014.180620142

Shen et al., 2020 – *Shen, Y., Jin, X., Zhang, Y., Huang, C., Lu, J., Luo, X., Zhang, X.Y.* (2020). Insomnia in Chinese College Students With Internet Addiction: Prevalence and Associated Clinical Correlates. *Frontiers in Psychiatry*. 11(November): 1-7. DOI: https://doi.org/10.3389/ fpsyt.2020.596683

Solomon, Rothblum, 1984 – *Solomon, L.J., Rothblum, E.D.* (1984). Academic procrastination: Frequency and cognitive-behavioral correlates. *Journal of Counseling Psychology*. 31(4): 503-509. DOI: https://doi.org/10.1037/0022-0167.31.4.503

Stanković et al., 2021 – *Stanković, M., Nešić, M., Čičević, S., Shi, Z.* (2021). Association of smartphone use with depression, anxiety, stress, sleep quality, and internet addiction. Empirical evidence from a smartphone application. *Personality and Individual Differences*. 168(2020): 110342. DOI: https://doi.org/10.1016/j.paid.2020.110342

Steel, 2007 – *Steel, P.* (2007). The nature of procrastination: a meta-analytic and theoretical review of quintessential self-regulatory failure. *Psychological Bulletin*. 133(1): 65-94. DOI: https://doi.org/10.1037/0033-2909.133.1.65

Suárez-Perdomo et al., 2022 – *Suárez-Perdomo, A., Ruiz-Delgado, Z., Garcés-Delgado, Y.* (2022). Profiles of undergraduates' networks addiction: Difference in academic procrastination and performance. *Computers and Education*. 181 (September 2021). DOI: https://doi.org/ 10.1016/j.compedu.2022.104459

Sullivan, 2020 – *Sullivan, R.O.* (2020). Academic Procrastination: The role of self-regulation, anxiety, internet use and gender. BA Dissertation at Dublin Business School, School of Arts, Dublin.

Xian, Ying, 2022 – *Xian, L.C.T., Ying, S.H.P.* (2022). Relationship between social media addiction levels and academic procrastination among undergraduate students in Malaysia: Grit as the mediator. *Advanced Journal of Social Science*. 11(1): 13-27. [Electronic resource]. URL: https://journals.aijr.org/index.php/ajss/article/view/5604

Yang et al., 2019 – *Yang, Z., Asbury, K., Griffiths, M.D.* (2019). An exploration of problematic smartphone use among Chinese University Students: Associations with academic anxiety, academic procrastination, self-regulation and subjective wellbeing. *International Journal of Mental Health and Addiction*. 17(3): 596-614. DOI: https://doi.org/10.1007/s11469-018-9961-1

You et al., 2021 – *You, Z., Mei, W., Ye, N., Zhang, L., Andrasik, F.* (2021). Mediating effects of rumination and bedtime procrastination on the relationship between Internet addiction and poor sleep quality. *Journal of Behavioral Addictions*. 9(4): 1002-1010. DOI: https://doi.org/10.1556/2006.2020.00104

Zenebe et al., 2021 – *Zenebe, Y., Kunno, K., Mekonnen, M., Bewuket, A., Birkie, M., Necho, M., ... Akele, B.* (2021). Prevalence and associated factors of internet addiction among undergraduate university students in Ethiopia: A community university-based cross-sectional study. *BMC Psychology*. 9(1): 1-10. DOI: https://doi.org/10.1186/S40359-020-00508-Z/FIGURES/2

Zhang et al., 2018 – *Zhang, M.W.B., Lim, R.B. C., Lee, C., Ho, RCM* (2018). Prevalence of internet addiction in medical students: A meta-analysis. *Academic Psychiatry*. 42(1): 88-93. DOI: https://doi.org/10.1007/S40596-017-0794-1

Zhang, Wu, 2020 – *Zhang, M.X., Wu, A.M.S.* (2020). Effects of smartphone addiction on sleep quality among Chinese university students: The mediating role of self-regulation and bedtime procrastination. *Addictive Behaviors*. 111(February): 106552. DOI: https://doi.org/10.1016/j.addbeh. 2020.106552

Zhang et al., 2022 – *Zhang, X., Chen, K., Wang, M., Chen, C.* (2022). The Relationship between Academic Procrastination and Internet Addiction in College Students: The Multiple Mediating Effects of Intrusive Thinking and Depression-Anxiety-Stress. *Psychology*. 13(04): 591-606. DOI: https://doi.org/10.4236/psych.2022.134040