Journal of Social Media Research
2024, 1(1): 47-59
https://jsomer.org

Pathways to social media addiction: Examining its prevalence and predictive factors among Ghanaian youths

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Article Info

Type: Research

DOI: 10.29329/jsomer.9

Article History:

Received: 15/11/2024
Revised: 21/11/2024
Accepted: 01/12/2024

Keywords

Social media addiction,
Gaming disorder,
Internet gaming disorder,
Smartphone application-based addiction,
Nomophobia.

Highlights

- Social media addiction prevalence rate is 12.3%.
- Smartphone application-based addiction, directly and indirectly, affects social media addiction.
- Gaming disorder and nomophobia mediate the effect on social media addiction.
- Predictive factors differ between genders for social media addiction.

Abstract

Social media addiction among youths is becoming a pressing public mental health issue in contemporary society due to the devastating consequences on individuals (i.e., perpetrator and victim) and society. This study, therefore, examined the prevalence, pathways to social media addiction, and predictive factors of social media addiction among Ghanaian youths. The present study used a cross-sectional survey design. A total of 488 participants were conveniently selected to respond to measures on social media addiction, gaming disorder, internet gaming disorder, smartphone application-based addiction, nomophobia, stress, anxiety, and depression. Linear regression and Hayes' PROCESS macro were used to analyze the data. The findings revealed the prevalence rates of social media addiction (12.3%), gaming disorder (3.7%), internet gaming disorder (3.1%), smartphone application-based addiction (29.1%), nomophobia (49.6%), stress (26%), anxiety (62.1%), and depression (49%). There was a direct effect of smartphone application-based addiction on social media addiction and indirect effects through gaming disorder and nomophobia. Also, smartphone application-based addiction had direct effects on gaming disorder, internet gaming disorder, nomophobia, stress, anxiety, and depression. However, there was no direct effect of internet gaming disorder, stress, anxiety, and depression on social media addiction. Furthermore, smartphone application-based addiction and nomophobia (specifically, "losing connectedness" and "giving up convenience") significantly predicted social media addiction among the youths in general. Among females, the predictive factors were smartphone application-based addiction, and nomophobia, specifically "losing connectedness" and "not being able to access information," while smartphone application-based addiction, anxiety, and nomophobia, specifically "giving up convenience," were the predictive factors for males. Smartphone application-based addiction and nomophobia play significant roles in social media addiction, and there are at least three pathways to social media addiction among youths. Therefore, counselors and health professionals need to develop educational and preventive programs that focus on digital literacy and healthy technology use among youths.

Citation: Ahorsu, D. K. (2024). Pathways to social media addiction: Examining its prevalence and predictive factors among Ghanaian youths. *Journal of Social Media Research, 1*(1), 47-59. https://doi.org/10.29329/jsomer.9

1. Introduction

Social media addiction among youths is becoming a pressing public mental health issue in contemporary society due to the devastating consequences on individuals (i.e., perpetrator and victim) and society. It is characterized by excessive engagement with social media platforms, significantly disrupting daily functioning and well-being (Andreassen, 2015). Social media addiction is particularly common due to the advancement in technology and media platforms (Cheng et al., 2021). Epidemiological studies indicate that this phenomenon is widespread (across age, sex, and countries—developing and developed—, and cultures—collectivistic and individualist), with an overall pooled prevalence estimate of 24%. However, this can vary based on culture (e.g., 14% and 31% for individualist and collectivistic countries, respectively) or population (e.g., 18.4% for university students) (Casale et al., 2023; Cheng et al., 2021; Salari et al., 2023). Adolescents are one of the most vulnerable groups of people who frequently use and are affected by social media addiction due to their exploratory nature, although they are inexperience in managing stressful situations, including the use of maladaptive coping strategies (Giordano et al., 2023; Khodarahmi et al., 2023; Villanti et al., 2017; Xu et al., 2023). It is reported that those who use social media for more than 3 hours per day may likely develop mental health problems (Riehm et al., 2019). It is, therefore, not surprising that there have been reported associations between social media addiction and mental health conditions among adolescents.

Knowing more about the factors associated with social media addiction and the role it plays in mental health is important to understand and help deal with this addiction fully. There are several predictive factors of social media addiction. These factors include sex, depression, anxiety, stress, self-esteem, smartphone addiction, and fear of missing out (Alfaya et al., 2023; Piko et al., 2024; Shannon et al., 2022; Tunc-Aksan & Akbay, 2019; Zhao et al., 2022) although it may vary from country to country, culture to culture, and developing countries to developed countries (Cheng et al., 2021; Salari et al., 2023). Furthermore, there were significant associations between social media addiction, nomophobia, smartphone application-based addiction, internet gaming disorder, stress, anxiety, and depression (Al-Mamun et al., 2023; Buctot et al., 2020; Chen et al., 2020; Chen et al., 2023; Lin et al., 2019; Shannon et al., 2022; Victor et al., 2024; Zhao et al., 2022). There were other reported relationships between social media addiction, gaming disorder, stress, anxiety, depression, and nomophobia (Awofala & Esealuka, 2021; Aydin & Kuş, 2023; Giordano et al., 2023; Imani et al., 2022; Krishnan & Chew, 2024; Oppong et al., 2022; Yildiz Durak, 2019). However, there are inconsistent results in all these predictors and associations (Idris et al., 2023; Vagka et al., 2024; Zhao et al., 2022). One of the notable inconsistencies is among the sexes. That is, some studies have reported males (Alnjadat et al., 2019; Xuan & Amat, 2021) while others reported females (Ciacchini et al., 2023; Su et al., 2020; Zhao et al., 2022) as a factor predicting social media addiction, yet still, some found sex as not a significant predictor of social media addiction (Kırık et al., 2015; Mahmood et al., 2022; Piko et al., 2024). These inconsistencies suggest a need for country-specific research to examine the factors that predict social media addiction and the influence of social media addiction on mental health.

The above-reviewed literature revealed significant interrelationships between the studied variables, suggesting that there may be several potential pathways (i.e., direct and indirect pathways) to which an individual may develop social media addiction. Also, previous studies have revealed several pathways to social media addiction (Iwatani & Watamura, 2024; Topino et al., 2023), but there is no known study that has reported the pathway to social media addiction from smartphone application-based addiction via gaming disorder, internet gaming disorder, stress, anxiety, depression, and nomophobia. Therefore, this study may reveal additional pathways to social media addiction.

These global findings may not be significantly different from those of the youths in Ghana. Ghanaian youths have been known to use social media on a massive scale with mixed effects (Abdul-Latif et al., 2024; Ocansey et al., 2016). The positive effects of social media include communication, entertainment, creative works, research, self-promotion, impression management, and academic work (Odoom et al., 2024; Kyei-Gyamfi, 2024) while the negative effects included isolation, social anxiety, distraction, poor academic performance, and addiction, (Abdul-Latif et al., 2024; Odoom et al., 2024; Kyei-Gyamfi, 2024; Tetteh & Kankam, 2024). The main issue among Ghanaian youths is the overuse and/or overdependence on social media for entertainment, self-promotion, and impression management facilitated by cheap smartphones and affordable internet, which may lead to addiction. The effects of social media on youths are known, but the predictive factors of social media addiction are not certain, as well as the possible pathways to social media addiction. Therefore, this study intends to examine i) the prevalence of the studied variables, ii) the pathways to social media addiction, and iii) the predictive factors of social media addiction among Ghanaian youths.

2. Method

2.1 Research Design, Participants, Procedure, and Ethical Considerations

The present study used a cross-sectional survey design. The ethics committee of Kwame Nkrumah University of Science and Technology approved this research (approval number CHRPE/AP/612/23). Following this, the research team secured permission from lecturers to recruit students from various departments and schools in the university. The participants were selected from undergraduate and postgraduate programs. They were informed about the study's purpose and procedures. Those interested were provided with a paper-and-pencil survey. Before participating, individuals signed a consent form, ensuring they understood their rights, including confidentiality, anonymity, and the ability to withdraw from the study without repercussions. Surveys, written in English, included questions on demographic characteristics (age and sex) and measures on social media addiction, gaming disorder, internet gaming disorder, smartphone application-based addiction, nomophobia, stress, anxiety, and depression. The measures were selected for their cultural relevance and psychometric reliability within the Ghanaian context. Participants were given adequate time and privacy to complete the survey, with research assistants available to clarify any uncertainties. Surveys were collected on the same day by the research team. Upon completion, participants were thanked for their contribution and allowed to ask questions regarding the study. Data was collected between 19 July and 04 August 2023.

2.2 Measures

2.2.1 Bergen Social Media Addiction Scale (BSMAS)

The BSMAS is a self-administered tool consisting of six items to evaluate the potential for social media addiction, reflecting social media usage over the past 12-month period (Andreassen et al., 2016). Each item is rated on a five-point Likert scale ranging from 1 (very rarely) to 5 (very often). The total score is achieved by summing each item's ratings, with higher scores signifying a higher likelihood of social media addiction. A score of 24 is considered an optimal cut-off point for clinical diagnosis of social media addiction (Luo et al., 2021; Zhao et al., 2022). This cut-off score was, therefore, used to indicate those who can be considered as having social media addiction. Previous studies among Ghanaians have demonstrated that BSMAS has strong psychometric properties (Huang et al., 2024; Oppong et al., 2022).

2.2.2 The Gaming Disorder Test (GDT)

The GDT is a self-assessment tool created to evaluate gaming disorder symptoms over a one-year period, in line with the diagnostic criteria outlined in the eleventh revision of the International Classification of Diseases (ICD-11) (Pontes et al., 2021). It comprises four items that cover aspects such as the ability to control gaming behavior, the priority given to gaming, the persistence of gaming activities, and the experience of significant problems. Each item is rated on a five-point Likert scale, where 1 represents "never" and 5 represents "very often". The total score is achieved by summing each item's ratings, with higher scores reflecting more severe symptoms. A score of 15 is considered an optimal cut-off point for gaming disorder (Islam et al., 2022; Wu et al., 2023). This cut-off score was, therefore, used to indicate those who can be considered as having gaming disorder. A previous study among Ghanaians has demonstrated that GDT has strong psychometric properties (Huang et al., 2024).

2.2.3 Internet Gaming Disorder Scale-Short Form (IGDS9-SF)

The IGDS9-SF is a self-assessment tool intended to evaluate internet gaming disorder over a one-year period, according to the diagnostic criteria outlined in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) (Pontes & Griffiths, 2015). It consists of nine items, each rated on a five-point Likert scale where 1 means "never" and 5 means "very often". The total score is achieved by summing each item's ratings, with higher scores indicating greater severity of internet gaming disorder. A score of 32 is considered an optimal cut-off point for internet gaming disorder (Qin et al., 2020). This cut-off score was, therefore, used to indicate those who can be considered as having internet gaming disorder. A previous study among Ghanaians has demonstrated that the IGDS9-SF has strong psychometric properties (Huang et al., 2024).

2.2.4 Smartphone Application Based Addiction Scale (SABAS)

The SABAS is a self-report tool consisting of six items aimed at evaluating the risk of developing addictions to smartphone applications (Csibi et al., 2016). Each item is rated on a six-point Likert scale, ranging from 1 (strongly disagree) to 6 (strongly agree). The total score is achieved by summing each item's ratings with higher scores suggesting a higher risk of smartphone application-based addiction. A score of 23 is considered an optimal cut-off point for smartphone application-based addiction (Peng et al., 2023). This cut-off score was, therefore, used to indicate those who can be considered as having smartphone application-based addiction. Previous studies among Ghanaians have demonstrated the SABAS to have strong psychometric properties (Huang et al., 2024; Oppong et al., 2022).

2.2.5 Depression Anxiety Stress Scale-21 (DASS-21)

The DASS-21 is a self-administered questionnaire aimed at evaluating psychological distress (and/or depression, anxiety, and stress) experienced over the past week (Lovibond & Lovibond, 1995). The 21 items are rated on a four-point Likert scale, ranging from 0 (did not apply to me at all) to 3 (applied to me very much or most of the time). The total score is achieved by summing each item's ratings and multiplying by two, with higher scores reflecting more significant depression, anxiety, and stress. A score of 10-13, 14-20, 21-27, and 28 and above for mild, moderate, severe, and extremely severe depression, respectively. For anxiety, a score of 8-9, 10-14, 15-19, and 20 and above for mild, moderate, severe, and extremely severe anxiety, respectively. For stress, a score of 15-18, 19-25, 26-33, and 34 and above for mild, moderate, severe, and extremely severe stress respectively (Lovibond & Lovibond, 1995). A previous study among Ghanaians has demonstrated the DASS-21 to have strong psychometric properties (Oppong et al., 2022).

2.2.6 Nomophobia Questionnaire (NMP-Q)

The NMP-Q is a self-assessment tool designed to evaluate the fear of being without a mobile phone (Yildirim & Correia, 2015). It comprises four dimensions, which include i) not being able to communicate (Items 1–4), ii) losing connectedness (Items 5–9), iii) not being able to access information (Items 10–15), and iv) giving up convenience (Items 16–20). Each of the 20 items is rated on a seven-point Likert scale, from 1 (strongly disagree) to 7 (strongly agree). The total score is achieved by summing each item's ratings, with higher scores indicating a greater degree of nomophobia. A score of 73 is considered an optimal cut-off point for nomophobia (Luo et al., 2024). This cut-off score was, therefore, used to indicate those who can be considered as having nomophobia. A previous study among Ghanaians has demonstrated that the NMP-Q has strong psychometric properties (Huang et al., 2024).

2.3 Data analyses

The demographic characteristics of participants were presented using means and standard deviations (M and SD) and frequencies with their percentages (%). Also, the Pearson correlation coefficient (r) was used to examine the relationships between the studied variables. After that, linear regression was used to test the predicting factors for social media addiction. The predictor variables were gaming disorder, internet gaming disorder, smartphone application-based addiction, nomophobia (i.e., not being able to communicate, losing connectedness, not being able to access information, and giving up convenience), and psychological distress (i.e., stress, anxiety, and depression). Furthermore, a mediation analysis was performed using Hayes' PROCESS macro version 4.3 for SPSS (Hayes, 2022). The mediation analysis had smartphone application-based addiction as the predicting variable, gaming disorder, internet gaming disorder, nomophobia, stress, anxiety, and depression as the mediating variables, and social media addiction as the outcome variable (Figure 1). The mediation analysis used model 4 and 5000 bootstrapping resamples. The level of significance was set at 0.05. All these statistical analyses were conducted using SPSS version 29 software (Armonk, NY, USA: IBM Corp.).

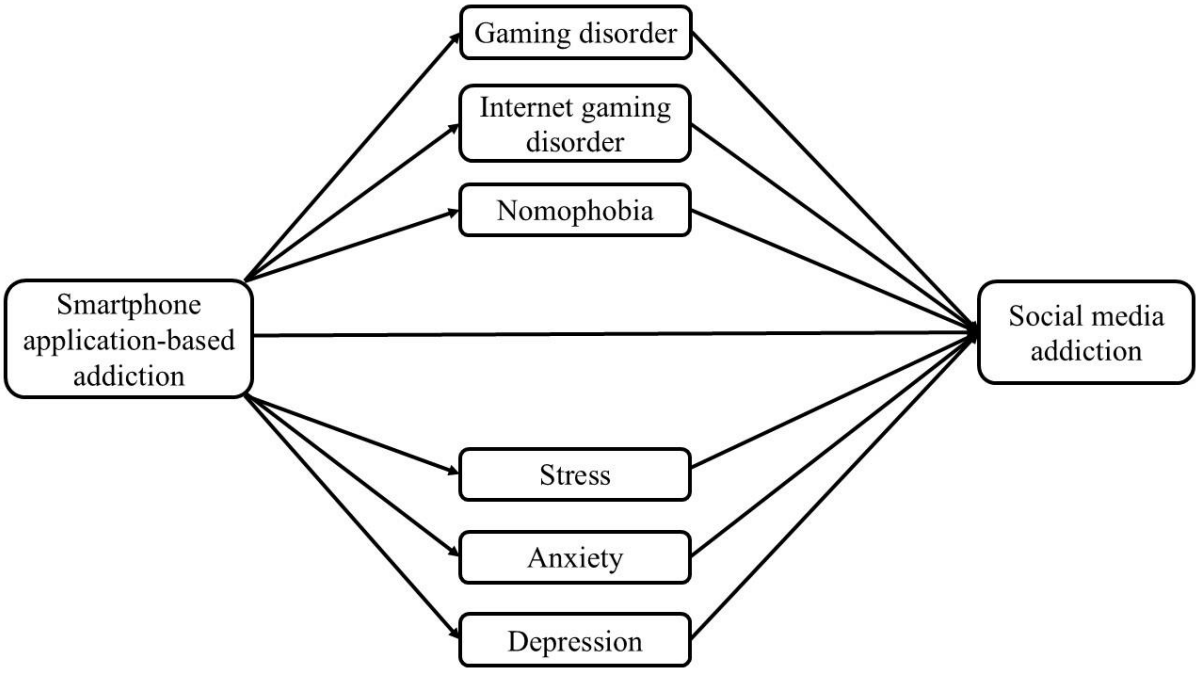

Figure 1. The mediating roles of nomophobia, gaming disorders, stress, anxiety, and depression in the association between smartphone application-based addiction and social media addiction

3. Results

Table 1 shows 488 participants, with females being the majority (n=297, 60.90%) and a mean age of 19.59 years (SD=1.92) for this study. The prevalence rates for social media addiction, gaming disorder, internet gaming disorder, and smartphone application-based addiction were 12.3%, 3.7%, 3.1%, and 29.1%, respectively. The prevalence rates for nomophobia, stress, anxiety, and depression were 49.6%, 26%, 62.1%, and 49% respectively. On average, participants spend more than 6 hours sleeping, 1.64 hours exercising, 2.39 hours gaming, 4.61 hours on social media, and 3.95 hours learning online per day.

Table 1. Characteristics of participants (N=488)

Variable	Mean (SD) or N (%)
Age	19.59 (1.92)[a]
Sex (females)	297 (60.90%)[a]
Prevalence of social media addiction	60 (12.3%)
Prevalence of gaming disorder	18 (3.7%)
Prevalence of internet gaming disorder	15 (3.1%)
Prevalence of smartphone application-based addiction	142 (29.1%)
Prevalence of stress	127 (26%)[b]
Prevalence of anxiety	303 (62.1%)[c]
Prevalence of depression	239 (49%)[d]
Prevalence of nomophobia	242 (49.6%)
Time spent (average hours per day) on the following activities	
Sleep (weekday)	6.22 (1.33)
Sleep (weekend and holiday)	7.54 (1.79)
Exercising	1.64 (1.52)
Gaming	2.39 (2.22)
Social media	4.61 (2.77)
Learning online	3.95 (2.61)

Note: [a]Five participants were missing; [b]Mild and above (and n=70, 14.3% for moderate stress, n=28, 5.7% for severe stress, and n=4, 0.8% for extremely severe stress); [c]Mild and above (and n=258, 52.9% for moderate anxiety, n=127, 26.0% for severe anxiety, and n=70, 14.3% for extremely severe anxiety); [d]Mild and above (and n=169, 34.6% for moderate depression, n=55, 11.3% for severe depression, and n=23, 4.7% for extremely severe depression).

Table 2 shows the correlations between the studied variables. There were significant positive correlations between all the studied variables (i.e., gaming disorder, internet gaming disorder, social media addiction, smartphone application-based addiction, stress, anxiety, depression, and nomophobia), with the degree of their relationships ranging from small to large (r= 0.10 – 0.84, ps< 0.05).

Table 2. The correlation matrix between the studied variables (N=488)

		M	SD	1	2	3	4	5	6	7	8
1	Gaming disorder	7.17	3.36	–	0.64***	0.21***	0.23***	0.33***	0.34***	0.33***	0.13***
2	Internet gaming disorder	16.03	6.92		–	0.12**	0.18***	0.34***	0.35***	0.34***	0.10*
3	Social Media Addiction	15.71	5.99			–	0.70***	0.23***	0.25***	0.24***	0.58***
4	Smartphone application-based addiction	18.20	7.65				–	0.25***	0.26***	0.26***	0.61***
5	Stress	10.36	8.29					–	0.84***	0.84***	0.24***
6	Anxiety	10.35	8.31						–	0.83***	0.24***
7	Depression	9.92	8.72							–	0.22***
8	Nomophobia	73.97	35.53								–

*p< 0.05, **p<0.01, ***p<0.001

Table 3. The mediating roles of nomophobia, gaming disorders, stress, anxiety, and depression in the association between smartphone application-based addiction and social media addiction

	Unstand. Coeff.	SE or (Bootstrapping SE)	t-value or (Bootstrapping LLCI)	p-value or (Bootstrapping ULCI)
Total effect of smartphone application-based addiction on social media addiction	0.55	0.03	21.62	<0.001
Direct effect of smartphone application-based addiction on gaming disorder	0.10	0.02	5.20	<0.001
Direct effect of smartphone application-based addiction on internet gaming disorder	0.16	0.04	3.92	<0.001
Direct effect of smartphone application-based addiction on nomophobia	2.83	0.17	16.90	<0.001
Direct effect of smartphone application-based addiction on stress	0.27	0.05	5.62	<0.001
Direct effect of smartphone application-based addiction on anxiety	0.28	0.05	5.88	<0.001
Direct effect of smartphone application-based addiction on depression	0.29	0.05	5.83	<0.001
Direct effect of smartphone application-based addiction on social media addiction	0.42	0.03	13.25	<0.001
Direct effect of gaming disorder on social media addiction	0.15	0.07	1.99	0.047
Direct effect of internet gaming disorder on social media addiction	-0.06	0.04	-1.64	0.103
Direct effect of nomophobia on social media addiction	0.04	0.01	6.16	<0.001
Direct effect of stress on social media addiction	-0.02	0.05	-0.4989	0.618
Direct effect of anxiety on social media addiction	0.05	0.05	1.1228	0.262
Direct effect of depression on social media addiction	0.01	0.04	0.1705	0.865
Indirect effect of smartphone application-based addiction on social media addiction via				
Gaming disorder	0.01	0.01	0.00	0.03
Internet gaming disorder	-0.01	0.01	-0.02	0.00
Nomophobia	0.12	0.02	0.07	0.16
Stress	-0.01	0.01	-0.03	0.02
Anxiety	0.01	0.01	-0.01	0.05
Depression	0.00	0.01	-0.02	0.03
Total indirect effect	0.13	0.02	0.09	0.18

Table 3 shows the results on the mediating roles of nomophobia, gaming disorders, stress, anxiety, and depression in the association between smartphone application-based addiction and social media addiction. From the table, there were direct effects of smartphone application-based addiction on gaming disorder

(unstandardized coefficient = 0.10, p < 0.001), internet gaming disorder (unstandardized coefficient = 0.16, p < 0.001), nomophobia (unstandardized coefficient = 2.83, p < 0.001), stress (unstandardized coefficient = 0.27, p < 0.001), anxiety (unstandardized coefficient = 0.28, p < 0.001), depression (unstandardized coefficient = 0.29, p < 0.001), and social media addiction (unstandardized coefficient = 0.42, p < 0.001). There were direct effects of gaming disorder on social media addiction (unstandardized coefficient = 0.15, p = 0.047) and nomophobia on social media addiction (unstandardized coefficient = 0.04, p < 0.001). Also, only gaming disorder (unstandardized coefficient = 0.01, LLCI = 0.00, ULCI = 0.03) and nomophobia (unstandardized coefficient = 0.12, LLCI = 0.07, ULCI = 0.16) mediated the association between smartphone application-based addiction and social media addiction but not internet gaming disorder (unstandardized coefficient = -0.01, LLCI = -0.02, ULCI = 0.00), stress (unstandardized coefficient = -0.01, LLCI = -0.03, ULCI = 0.02), anxiety (unstandardized coefficient = 0.01, LLCI = -0.01, ULCI = 0.05), and depression (unstandardized coefficient = 0.00, LLCI = -0.02, ULCI = 0.03). Furthermore, there was a significant total effect of smartphone application-based addiction on social media addiction (unstandardized coefficient = 0.55, p < 0.001) and a total indirect effect of smartphone application-based addiction on social media addiction (unstandardized coefficient = 0.13, LLCI = 0.09, ULCI = 0.18).

Table 4. Predictive factors of social media addiction among youths in Ghana

Variables	Total Sample				Females				Males			
	B	SE	*B*	*p*	B	SE	*B*	*p*	B	SE	*B*	*p*
Constant	5.63	2.07		0.007	7.72	2.65		0.004	2.16	3.43		0.530
Age	-0.04	0.10	-0.01	0.693	-0.12	0.13	-0.04	0.327	0.10	0.16	0.03	0.537
Sex (male)	-0.05	0.40	-0.01	0.904	–	–	–	–	–	–	–	–
Internet Gaming Disorder	-0.06	0.04	-0.07	0.106	-0.07	0.05	-0.08	0.153	-0.04	0.06	-0.04	0.486
Gaming Disorder	0.13	0.08	0.07	0.090	0.16	0.11	0.08	0.133	0.07	0.11	0.04	0.505
Smartphone Application Based Addiction	0.41	0.03	0.52	<0.001	0.42	0.04	0.52	<0.001	0.39	0.05	0.50	<0.001
Psychological distress	(0.01)	(0.01)	(0.04)	(0.222)	(0.01)	(0.01)	(0.04)	(0.346)	(0.02)	(0.02)	(0.06)	(0.289)
Stress	-0.02	0.05	-0.03	0.646	0.02	0.06	0.03	0.771	-0.09	0.07	-0.12	0.201
Anxiety	0.06	0.05	0.08	0.211	0.01	0.06	0.02	0.813	0.14	0.07	0.18	0.049
Depression	-0.00	0.04	-0.01	0.987	0.01	0.06	0.01	0.927	0.00	0.07	0.00	0.964
Nomophobia	(0.04)	(0.01)	(0.25)	(<0.001)	(0.04)	(0.01)	(0.21)	(<0.001)	(0.06)	(0.01)	(0.33)	(<0.001)
Not able to communicate	0.07	0.04	0.09	0.132	0.09	0.06	0.11	0.153	0.04	0.07	0.05	0.567
Losing connectedness	0.09	0.04	0.15	0.027	0.12	0.05	0.19	0.031	0.03	0.07	0.04	0.718
Not being able to access information	-0.05	0.03	-0.11	0.071	-0.08	0.04	-0.17	0.033	-0.01	0.05	-0.02	0.807
Giving up convenience	0.10	0.03	0.17	0.002	0.07	0.04	0.11	0.108	0.19	0.06	0.30	0.003
R^2 (Adjusted R^2)	55.1% (54.0%)				50.2% (48.3%)				65.3% (63.0%)			
F	47.618***				26.051***				29.032***			

Table 4 shows the predictive factors of social media addiction among youths in Ghana. In general, smartphone application-based addiction (β = 0.52, p < 0.001), nomophobia (β = 0.25, p < 0.001; specifically, "losing connectedness" [β = 0.15, p = 0.027], and "giving up convenience" [β = 0.17, p = 0.002]) significantly predicted social media addiction among the youths. Taking sex differences into consideration, smartphone application-based addiction (β = 0.52, p < 0.001), and nomophobia (β = 0.21, p < 0.001; specifically, "losing connectedness" [β = 0.19, p = 0.031], and "not being able to access information" [β = -0.17, p = 0.033]) significantly predicted social media addiction among female youths while smartphone application based addiction (β = 0.50, p < 0.001), anxiety (β = 0.18, p = 0.049), and nomophobia (β = 0.33, p < 0.001; specifically,

"giving up convenience" [β = 0.30, p = 0.003]) were the factors that significantly predicted social media addiction among male youths. These predictive factors accounted for 55.1% of all possible predictive factors (F(12, 465) = 47.618, p < 0.001) for the total sample, 50.2% for females (F(11, 284) = 26.051, p < 0.001) and 65.3% for males (F(11, 170) = 29.032, p < 0.001). All the other factors were not significant.

4. Discussion

The present study examined the prevalence, pathways to social media addiction, mediating role of social media addiction, and predictive factors of social media addiction among Ghanaian youths. The findings revealed the prevalence rates of social media addiction (12.3%), gaming disorder (3.7%), internet gaming disorder (3.1%), smartphone application-based addiction (29.1%), nomophobia (49.6%), stress (26%), anxiety (62.1%), and depression (49%). These prevalence rates are worth mentioning, especially post-coronavirus disease 2019. These indicate that school counselors need to introduce educative programs that may help to educate and train youths on how to appropriately deal with mental health issues and, more especially, social media and smartphone usage. Furthermore, there were significant relationships between gaming disorder, internet gaming disorder, social media addiction, smartphone application-based addiction, stress, anxiety, depression, and nomophobia, which indicates that as one of these variables increases, the other also increases and vice versa. This affirms the point emphasized earlier that counselors and health experts need to introduce educative programs that may help to educate and train youths on how to deal with mental health issues as they are interrelated appropriately. Previous studies have supported these relationships (Awofala & Esealuka, 2021; Buctot et al., 2020; Chen et al., 2020; Giordano et al., 2023; Imani et al., 2022; Krishnan & Chew, 2024; Oppong et al., 2022; Yildiz Durak, 2019).

The results on pathways to social media addiction revealed that there were three pathways through which an individual with smartphone application-based addiction may influence social media addiction among youths in Ghana. Specifically, smartphone application-based addiction may, directly and indirectly, influence social media addiction through gaming disorder and nomophobia. Thus, there are three possible pathways in this study through which smartphone application-based addiction may influence social media addiction, which further suggests that there are several ways through which an individual may develop social media addiction if that individual has smartphone application-based addiction. These are novel findings. Also, the results revealed that smartphone application-based addiction had a direct influence on gaming disorder, internet gaming disorder, stress, anxiety, depression, and nomophobia, which indicates that there is an urgent need for youths to be educated on the mental health implications of getting addicted to using smartphones. The other variables (i.e., internet gaming disorder, stress, anxiety, and depression) did not directly influence social media addiction. Although some of these findings are consistent with the findings of previous studies (Al-Mamun et al., 2023; Awofala & Esealuka, 2021; Chen et al., 2020; Fazeli et al., 2020; Huang et al., 2024), some also contradict previous studies (Vagka et al., 2024; Zhang et al., 2022), which again calls for country-specific studies to be conducted. These findings, in general, are important and novel in revealing how youths may develop social media addiction.

The predictive factors of social media addiction among youths in Ghana were smartphone application-based addiction and nomophobia ("losing connectedness" and "giving up convenience"). The connection between smartphone application-based addiction and social media addiction is understandable, as the majority of the youths use smartphones with seamless access to a myriad of applications, including social media platforms. As smartphones become an integral part of daily life, habitual use can escalate into addiction. Therefore, interventions promoting healthy smartphone application usage habits and digital literacy could effectively mitigate the risk of addiction. Furthermore, the concept of nomophobia, particularly the fear of "losing connectedness" and "giving up convenience," further elucidates the psychological underpinnings of social media addiction. The fear of being disconnected from one's social network or missing out on important information reinforces compulsive social media use. This finding aligns with the broader understanding of social media as a tool for maintaining social ties and accessing real-time information, crucial aspects of modern social interaction (Garibaldi et al., 2023; Wandi & Andriana, 2021; Wang, 2022). Addressing these fears through cognitive-behavioral approaches could help youths develop healthier relationships with technology. Interventions could focus on enhancing offline social interactions and promoting a balanced lifestyle that values digital and real-world connections. These novel findings are important to youths, counselors, other health experts, and relevant policymakers in mitigating mental health conditions. Some of the results, such as sex, depression, anxiety, and stress, are inconsistent with the findings of previous studies (Alfaya et al., 2023;

Alnjadat et al., 2019; Piko et al., 2024; Shannon et al., 2022; Su et al., 2020; Tunc-Aksan & Akbay, 2019; Zhao et al., 2022).

Additionally, among females, the predictive factors were smartphone application-based addiction, and nomophobia, specifically "losing connectedness" and "not being able to access information," while smartphone application-based addiction, anxiety, and nomophobia, specifically "giving up convenience," were the predictive factors for males. Smartphone application-based addiction and nomophobia are common to both male and female youths. However, females have an extra nomophobia subscale (i.e., "not being able to access information"), while males have a different nomophobia subscale ("giving up convenience"). That is, apart from "losing connectedness", female youths experience discomfort when they are "unable to access information" on their smartphones. In contrast, the only nomophobia distress male youths have is the feeling of giving up the convenience smartphones provide. In addition, increased anxiety levels in males predict their social media addiction. This calls for the need for males to monitor and better manage their anxiety levels so as not to trigger social media addiction. also, the need for counselors and health professionals to appreciate the sex differences on the predictors of social media addiction.

4.1 Implications for Theory and Practice

There are several practical implications to the present study's results. Firstly, there will be a need for school counselors and mental health professionals to develop educational and preventive programs that focus on digital literacy and healthy technology use. These programs should aim to increase awareness about the risks of digital addiction and provide strategies for managing screen time and technology-related stress. Secondly, targeted interventions can focus on specific factors such as nomophobia and smartphone application-based addictions and promoting balanced lifestyles. Cognitive-behavioral approaches could help youths manage their fears of disconnection and develop healthier relationships with technology. Thirdly, the findings provide evidence for policymakers to develop regulations and guidelines that address the mental health implications of digital technology use among youths. These policies could promote responsible smartphone usage and encourage the development of resources and support systems for those struggling with addiction. Fourthly, given the prevalence of anxiety, depression, and stress among youths, mental health services should incorporate assessments of digital addiction as part of routine evaluations. This could facilitate early detection and intervention, reducing the long-term impact of these conditions.

4.2 Limitations and directions for future research

The present study has some limitations. Firstly, using a cross-sectional design limits the ability to infer causality between the variables studied. Therefore, it is recommended that future longitudinal research should be conducted to help establish causal relationships and examine how social media addiction and its predictors evolve. This approach could provide insights into the long-term effects of digital addiction on mental health. Secondly, the reliance on self-report instruments may introduce bias, such as social desirability bias. Participants might underreport or overreport their addiction levels or psychological distress, affecting the accuracy of the findings. To help limit this effect, participants were assured of their rights, including anonymity and confidentiality of the data, and enough space was provided for the participants to complete their survey alone (i.e., privately). Thirdly, the study focused on university students, which may limit the representativeness of all Ghanaian youths. Therefore, researchers should exercise caution in extending the results, especially to non-student populations or youths in different regions or socioeconomic contexts. Also, future studies should include a more diverse sample of Ghanaian youths, incorporating different age groups, educational backgrounds, and geographic locations to enhance the generalizability of the results.

5. Conclusion

The present cross-sectional study examined the prevalence, pathways to social media addiction, and predictive factors of social media addiction among Ghanaian youths. The findings revealed the prevalence rates of social media addiction (12.3%), gaming disorder (3.7%), internet gaming disorder (3.1%), smartphone application-based addiction (29.1%), nomophobia (49.6%), stress (26%), anxiety (62.1%), and depression (49%). Also, there was a direct effect of smartphone application-based addiction on social media addiction and indirect effects through gaming disorder and nomophobia. In addition, smartphone application-based addiction and nomophobia significantly predicted social media addiction among Ghanaian youths. The results have several

important implications for both theory (e.g., integration of digital addiction models and the role of nomophobia in addiction) and practice (e.g., educational and preventive programs, targeted interventions, and policy development). Future studies may focus on longitudinal studies to strengthen the findings on the pathways to social media addiction. Furthermore, a mixed-methods approach, intervention studies, and cross-cultural comparisons may be used in future studies to enhance the understanding of social media addiction, effective treatment, and cultural differences, respectively.

Statement of Researchers

Researcher's contribution rate statement:
D. K. Ahorsu: Conceptualization, methodology, software, investigation, validation, writing- original draft preparation, writing - review & editing, data curation

Conflict statement:
The author declares that they have no conflict of interest.

Data Availability Statement: The data supporting this study's findings are available from the corresponding author upon reasonable request.

Acknowledgements: None.

Funding:
This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Ethical Considerations:
All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all participants for inclusion in the study. This research was approved by the ethics committee of Kwame Nkrumah University of Science and Technology (approval number CHRPE/AP/612/23).

Author Biography

Daniel Kwasi Ahorsu is a result-oriented clinical psychologist with over 10 years of experience conducting research. He has worked as a Clinical Psychologist at Upper East Regional Hospital, Ghana Health Service (2013-2015) and Progressive Life Centre (2009-2015). During these periods, he worked as a trainee and then later as a Clinical Psychologist, with the main duties including clinical work, teaching, and researching. He is a Research Assistant Professor at The Education University of Hong Kong. He had his BA degree in Psychology with Geography and Resource Development (2009), MPhil degree in Clinical Psychology (2012), both at the University of Ghana, and PhD degree in Mental Health and Neuroscience at The Hong Kong Polytechnic University, Hong Kong (2021). My research mainly focuses on translating knowledge in psychology and cognitive and affective neuroscience into understanding the behaviors of people with different health conditions to proffer appropriate treatment. Stanford University has named him one of the World's Top 2% Scientists (Single-year Ranking 2023, 2024).

6. References

Abdul-Latif, C. A., Kor, J. A. M., & Stephen, N. (2024). Social media addiction and its impact on University of Cape Coast distance education students' academic achievement. Journal of Education, Society and Behavioural Science, 37(6). https://doi.org/10.9734/jesbs/2024/v37i61332

Alfaya, M. A., Abdullah, N. S., Alshahrani, N. Z., Alqahtani, A. A. A., Algethami, M. R., Al Qahtani, A. S. Y., Aljunaid, M. A., & Alharbi, F. T. G. (2023). Prevalence and determinants of social media addiction among medical students in a selected university in Saudi Arabia: A cross-sectional study. *Healthcare, 11*(10). https://doi.org/10.3390/healthcare11101370

Al-Mamun, F., Mamun, M. A., Prodhan, M. S., Muktarul, M., Griffiths, M. D., Muhit, M., & Sikder, M. T. (2023). Nomophobia among university students: Prevalence, correlates, and the mediating role of smartphone use between facebook addiction and nomophobia. *Heliyon, 9*(3), e14284. https://doi.org/10.1016/j.heliyon.2023.e14284

Alnjadat, R., Hmaidi, M. M., Samha, T. E., Kilani, M. M., & Hasswan, A. M. (2019). Gender variations in social media usage and academic performance among the students of University of Sharjah. *Journal of Taibah University Medical Sciences, 14*(4), 390–394. https://doi.org/10.1016/j.jtumed.2019.05.002

Andreassen, C. S. (2015). Online social network site addiction: A comprehensive review. *Current Addiction Reports, 2*(2), 175–184. https://doi.org/10.1007/s40429-015-0056-9

Andreassen, C. S., Billieux, J., Griffiths, M. D., Kuss, D. J., Demetrovics, Z., Mazzoni, E., & Pallesen, S. (2016). The relationship between addictive use of social media and video games and symptoms of psychiatric disorders: A large-scale cross-sectional study. *Psychology of Addictive Behaviors, 30*(2), 252–262. https://doi.org/10.1037/adb0000160

Awofala, A. O. A., & Esealuka, A. R. (2021). Nomophobia, smartphone addiction, depression, and anxiety as predictors of internet addiction among Nigerian preservice mathematics teachers. *Journal of Informatics and Vocational Education, 4*(3), 107-117. https://doi.org/10.20961/joive.v4i3.54910

Aydin, M. K., & Kuş, M. (2023). Nomophobia and smartphone addiction amidst COVID-19 home confinement: The parallel mediating role of digital gaming and social media tools usage across secondary school students. Frontiers in Psychology, 14, 1175555. https://doi.org/10.3389/fpsyg.2023.1175555

Buctot, D. B., Kim, N., & Kim, S. H. (2020). The role of nomophobia and smartphone addiction in the lifestyle profiles of junior and senior high school students in the Philippines. *Social Sciences & Humanities Open, 2*(1), 100035. https://doi.org/10.1016/j.ssaho.2020.100035

Casale, S., Akbari, M., Seydavi, M., Bocci Benucci, S., & Fioravanti, G. (2023). Has the prevalence of problematic social media use increased over the past seven years and since the start of the COVID-19 pandemic? A meta-analysis of the studies published since the development of the Bergen social media addiction scale. Addictive Behaviors, 147, 107838. https://doi.org/10.1016/j.addbeh.2023.107838

Chen, I.-H., Ahorsu, D. K., Pakpour, A. H., Griffiths, M. D., Lin, C., & Chen, C. (2020). Psychometric properties of three simplified Chinese online-related addictive behavior instruments among mainland Chinese primary school students. Frontiers in Psychiatry, 11, 875. https://doi.org/10.3389/fpsyt.2020.00875

Chen, I., Chang, Y., Yang, Y., Yeh, Y., Ahorsu, D. K., Adjorlolo, S., Strong, C., Hsieh, Y., Huang, P., Pontes, H. M., Griffiths, M. D., & Lin, C. (2023). Psychometric properties and development of the Chinese versions of gaming disorder test (GDT) and gaming disorder scale for adolescents (GADIS-A). Asian Journal of Psychiatry, 86, 103638. https://doi.org/10.1016/j.ajp.2023.103638

Cheng, C., Lau, Y., Chan, L., & Luk, J. W. (2021). Prevalence of social media addiction across 32 nations: Meta-analysis with subgroup analysis of classification schemes and cultural values. Addictive Behaviors, 117, 106845. https://doi.org/10.1016/j.addbeh.2021.106845

Ciacchini, R., Orrù, G., Cucurnia, E., Sabbatini, S., Scafuto, F., Lazzarelli, A., Miccoli, M., Gemignani, A., & Conversano, C. (2023). Social media in adolescents: A retrospective correlational study on addiction. Children (Basel, Switzerland), 10(2), 278. https://doi.org/10.3390/children10020278

Csibi, S., Demetrovics, Z., & Szabo, A. (2016). Hungarian adaptation and psychometric characteristics of brief addiction to smartphone scale (BASS) [in Hungarian]. Psychiatria Hungarica, 31(1), 71–77. https://pubmed.ncbi.nlm.nih.gov/27091924/

Fazeli, S., Mohammadi Zeidi, I., Lin, C., Namdar, P., Griffiths, M. D., Ahorsu, D. K., & Pakpour, A. H. (2020). Depression, anxiety, and stress mediate the associations between internet gaming disorder, insomnia, and quality of life during the COVID-19 outbreak. Addictive Behaviors Reports, 12, 100307. https://doi.org/10.1016/j.abrep.2020.100307

Garibaldi, A. E., Waldfogle, G. E., & Szalma, J. L. (2023). Motivational underpinnings of social media use. *Psychology of Popular Media, 12*(4), 434. https://doi.org/10.1037/ppm0000431

Giordano, A. L., Schmit, M. K., & McCall, J. (2023). Exploring adolescent social media and internet gaming addiction: The role of emotion regulation. *Journal of Addictions & Offender Counseling, 44*(1), 69–80. https://doi.org/10.1002/jaoc.12116

Hayes, A. F. (2022). Introduction to mediation, moderation, and conditional process analysis: A regression-based approach (3rd ed.). The Guilford Press.

Huang, Y., Ahorsu, D. K., Adjaottor, E. S., Addo, F., Griffiths, M. D., Pakpour, A. H., & Lin, C. (2024). Instruments assessing problematic use of the internet and their associations with psychological distress among Ghanaian university students. International Journal of Mental Health Promotion, https://doi.org/10.32604/ijmhp.2024.057049

Idris, M. F., Saini, S. M., Sharip, S., Idris, N. F., & Ab Aziz, N. F. (2023). Association between the internet gaming disorder and anxiety and depression among university students during COVID-19 pandemic. Healthcare (Basel, Switzerland), 11(8), 1103. doi: 10.3390/healthcare11081103. https://doi.org/10.3390/healthcare11081103

Imani, V., Ahorsu, D. K., Taghizadeh, N., Parsapour, Z., Nejati, B., Chen, H. P., & Pakpour, A. H. (2022). The mediating roles of anxiety, depression, sleepiness, insomnia, and sleep quality in the association between problematic social media use and quality of life among patients with cancer. *Healthcare (Basel), 10*(9), 1745. https://doi.org/10.3390/healthcare10091745

Islam, M. S., Jahan, I., Dewan, M. A. A., Pontes, H. M., Koly, K. N., Sikder, M. T., & Rahman, M. (2022). Psychometric properties of three online-related addictive behavior instruments among Bangladeshi school-going adolescents. *PloS One, 17*(12), e0279062. https://doi.org/10.1371/journal.pone.0279062

Iwatani, S., & Watamura, E. (2024). Antecedents of social media addiction in high and low relational mobility societies: Motivation to expand social network and fear of reputational damage. *PloS One, 19*(4), e0300681. https://doi.org/10.1371/journal.pone.0300681

Khodarahmi, E., Amanelahi, A., & Abaspour, Z. (2023). Prediction of social media addiction among female adolescents based on parent-adolescent conflict and parental psychological control. International Journal of High Risk Behaviors and Addiction, (In Press). https://doi.org/https://doi.org/10.5812/ijhrba-134279

Kırık, A., Arslan, A., Çetinkaya, A., Gül, M. (2015). A Quantitative Research on the Level of Social Media Addiction among Young People in Turkey. *International Journal of Sport Culture and Science, 3*(3), 108-122. https://doi.org/10.14486/IntJSCS444

Krishnan, A., & Chew, P. K. H. (2024). Impact of social media addiction and internet gaming disorder on sleep quality: Serial mediation analyses. *Psychiatric Quarterly, 95*(2), 185–202. https://doi.org/10.1007/s11126-024-10068-9

Lin, C., Imani, V., Broström, A., Nilsen, P., Fung, X. C. C., Griffiths, M. D., & Pakpour, A. H. (2019). Smartphone application-based addiction among Iranian adolescents: A psychometric study. *International Journal of Mental Health and Addiction, 17*(4), 765–780. https://doi.org/10.1007/s11469-018-0026-2

Lovibond, S. H., & Lovibond, P. F. (1995). Manual for the depression anxiety stress scales (2nd. Ed.) Sydney: Psychology Foundation.

Luo, J., Bei, D., Gong, J., & Wang, M. (2024). Classification of nomophobia among Chinese college students: Evidence from latent profile and ROC analysis. *Journal of Behavioral Addictions, 13*(2), 482–494. https://doi.org/10.1556/2006.2024.00013

Luo, T., Qin, L., Cheng, L., Wang, S., Zhu, Z., Xu, J., Chen, H., Liu, Q., Hu, M., Tong, J., Hao, W., Wei, B., & Liao, Y. (2021). Determination of the cut-off point for the Bergen social media addiction (BSMAS): Diagnostic contribution of the six criteria of the components model of addiction for social media disorder. *Journal of Behavioral Addictions, 10*(2), 281–290. https://doi.org/10.1556/2006.2021.00025

Mahmood, Q. K., Jafree, S. R., & Sohail, M. M. (2022). Pakistani youth and social media addiction: The validation of Bergen Facebook addiction scale (BFAS). *International Journal of Mental Health and Addiction, 20*(1), 581–594. https://doi.org/10.1007/s11469-020-00391-0

Ocansey, S. K., Ametepe, W., & Oduro, C. F. (2016). The impact of social media on the youth: The Ghanaian perspective. *International Journal of Engineering Technology and Sciences, 3*(2), 90–100. https://doi.org/10.15282/ijets.6.2016.1.12.1062

Odoom, D., Agyepong, L., Dick-Sagoe, C., & Mensah, E. O. (2024). Unveiling the social media landscape: Exploring factors influencing usage patterns among tertiary education students in Ghana. Education and Information Technologies, https://doi.org/10.1007/s10639-024-12944-0

Oppong, D., Adjaottor, E. S., Addo, F., Nyaledzigbor, W., Ofori-Amanfo, A. S., Chen, H., & Ahorsu, D. K. (2022). The mediating role of selfitis in the associations between self-esteem, problematic social media use, problematic smartphone use, body-self appearance, and psychological distress among young Ghanaian adults. *Healthcare (Basel, Switzerland), 10*(12), 2500. https://doi.org/10.3390/healthcare10122500

Peng, P., Chen, Z., Ren, S., Liu, Y., He, R., Liang, Y., Tan, Y., Tang, J., Chen, X., & Liao, Y. (2023). Determination of the cutoff point for smartphone application-based addiction scale for adolescents: A latent profile analysis. *BMC Psychiatry, 23*(1), 675–4. https://doi.org/10.1186/s12888-023-05170-4

Piko, B. F., Krajczár, S. K., & Kiss, H. (2024). Social media addiction, personality factors and fear of negative evaluation in a sample of young adults. *Youth, 4*(1), 368. https://doi.org/10.3390/youth4010025

Pontes, H. M., & Griffiths, M. D. (2015). Measuring DSM-5 Internet gaming disorder: Development and validation of a short psychometric scale. Computers in Human Behavior, 45, 137–143. https://doi.org/10.1016/j.chb.2014.12.006

Pontes, H. M., Schivinski, B., Sindermann, C., Li, M., Becker, B., Zhou, M., & Montag, C. (2021). Measurement and conceptualization of gaming disorder according to the World Health Organization framework: The development of the gaming disorder test. *International Journal of Mental Health and Addiction, 19*(2), 508–528. https://doi.org/10.1007/s11469-019-00088-z

Qin, L., Cheng, L., Hu, M., Liu, Q., Tong, J., Hao, W., Luo, T., & Liao, Y. (2020). Clarification of the cut-off score for nine-item internet gaming disorder scale-short form (IGDS9-SF) in a Chinese context. Frontiers in Psychiatry, 11, 470. https://doi.org/10.3389/fpsyt.2020.00470

Riehm, K. E., Feder, K. A., Tormohlen, K. N., Crum, R. M., Young, A. S., Green, K. M., Pacek, L. R., La Flair, L. N., & Mojtabai, R. (2019). Associations between time spent using social media and internalizing and externalizing problems among US youth. *JAMA Psychiatry, 76*(12), 1266–1273. https://doi.org/10.1001/jamapsychiatry.2019.2325

Salari, N., Zarei, H., Hosseinian-Far, A., Rasoulpoor, S., Shohaimi, S., & Mohammadi, M. (2023). The global prevalence of social media addiction among university students: A systematic review and meta-analysis. Journal of Public Health, https://doi.org/10.1007/s10389-023-02012-1

Shannon, H., Bush, K., Villeneuve, P. J., Hellemans, K. G. C., & Guimond, S. (2022). Problematic social media use in adolescents and young adults: Systematic review and meta-analysis. *JMIR Mental Health, 9*(4), e33450. https://doi.org/10.2196/33450

Su, W., Han, X., Yu, H., Wu, Y., & Potenza, M. N. (2020). Do men become addicted to internet gaming and women to social media? A meta-analysis examining gender-related differences in specific internet addiction. Computers in Human Behavior, 113, 106480. https://doi.org/10.1016/j.chb.2020.106480

Sylvester Kyei-Gyamfi. (2024). The benefits of social media among children aged 8 to 17 in Tema metropolitan area in Ghana. *Sage Open, 14*(3), 21582440241278546. https://doi.org/10.1177/21582440241278546

Tetteh, P. K., & Kankam, P. K. (2024). The role of social media in information dissemination to improve youth interactions. *Cogent Social Sciences, 10*(1), 2334480. https://doi.org/10.1080/23311886.2024.2334480

Topino, E., Gori, A., Jimeno, M. V., Ortega, B., & Cacioppo, M. (2023). The relationship between social media addiction, fear of missing out and family functioning: A structural equation mediation model. *BMC Psychology, 11*(1), 383. https://doi.org/10.1186/s40359-023-01409-7

Tunc-Aksan, A., & Akbay, S. E. (2019). Smartphone addiction, fear of missing out, and perceived competence as predictors of social media addiction of adolescents. *European Journal of Educational Research, 8*(2), 559–566. https://doi.org/10.12973/eu-jer.8.2.559

Vagka, E., Gnardellis, C., Lagiou, A., & Notara, V. (2024). Smartphone use and social media involvement in young adults: Association with nomophobia, depression anxiety stress scales (DASS) and self-esteem. *International Journal of Environmental Research and Public Health, 21*(7), 920. https://doi.org/10.3390/ijerph21070920

Victor, S. A., Ibrahim, M. S., Yusuf, S., Mahmud, N., Bahari, K. A., Yoke Ling, L., & Abd Mubin, N. N. (2024). Social media addiction and depression among adolescents in two Malaysian states. *International Journal of Adolescence and Youth, 29*(1), 2292055. https://doi.org/10.1080/02673843.2023.2292055

Villanti, A. C., Johnson, A. L., Ilakkuvan, V., Jacobs, M. A., Graham, A. L., & Rath, J. M. (2017). Social media use and access to digital technology in US young adults in 2016. *Journal of Medical Internet Research, 19*(6), e196. https://doi.org/10.2196/jmir.7303

Wandi, W., & Andriana, N. (2021). Social media and communication. *Palakka: Media and Islamic Communication, 2*(2), 145–154. https://doi.org/10.30863/palakka.v2i2.2369

Wang, C. (2022). The function of social media and the construction of people's social relationships. *Journal of Innovation and Social Science Research, 9*(5), 56-60. https://doi.org/10.53469/jissr.2022.09(05).13

Wu, T., Huang, S., Chen, J., Kamolthip, R., Kukreti, S., Strong, C., Pontes, H. M., Lin, I., Lin, C., Potenza, M. N., & Pakpour, A. H. (2023). Translation and validation of the gaming disorder test and gaming disorder scale for adolescents into Chinese for Taiwanese young adults. Comprehensive Psychiatry, 124, 152396. https://doi.org/10.1016/j.comppsych.2023.152396

Xu, X., Han, W., & Liu, Q. (2023). Peer pressure and adolescent mobile social media addiction: Moderation analysis of self-esteem and self-concept clarity. Frontiers in Public Health, 11, 1115661. https://doi.org/10.3389/fpubh.2023.1115661

Xuan, Y. J., & Amat, M. A. C. (2021). The gender differences in the relationships between self-esteem and life satisfaction with social media addiction among university students. *Asian Social Science, 17*(11), 48. https://doi.org/10.5539/ass.v17n11p48

Yildirim, C., & Correia, A. (2015). Exploring the dimensions of nomophobia: Development and validation of a self-reported questionnaire. Computers in Human Behavior, 49, 130–137. https://doi.org/10.1016/j.chb.2015.02.059

Yildiz Durak, H. (2019). Investigation of nomophobia and smartphone addiction predictors among adolescents in Turkey: Demographic variables and academic performance. *The Social Science Journal, 56*(4), 492–517. https://doi.org/10.1016/j.soscij.2018.09.003

Zhang, W., Pu, J., He, R., Yu, M., Xu, L., He, X., Chen, Z., Gan, Z., Liu, K., Tan, Y., & Xiang, B. (2022). Demographic characteristics, family environment and psychosocial factors affecting internet addiction in Chinese adolescents. Journal of Affective Disorders, 315, 130–138. https://doi.org/10.1016/j.jad.2022.07.053

Zhao, J., Jia, T., Wang, X., Xiao, Y., & Wu, X. (2022). Risk factors associated with social media addiction: an exploratory study. Frontiers in Psychology, 13, 837766. https://doi.org/10.3389/fpsyg.2022.837766